AN ABSTRACT OF THE THESIS OF

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The distribution patterns of quartz and opal contents and the distribution patterns of radiolarian assemblages, in the sediments of the southeastern Pacific, are largely controlled by both the surface winds and the mixed-layer oceanic circulation. The distribution pattern of quartz is related to eolian and ice-rafted transport, as well as to runoff. In the subtropical region, quartz distribution extends offshore of Peru as a tongue in the same direction and position as the prevailing trade winds. Along the South American and Antarctic coast, high quartz concentrations are found in patches near shore or abundances commonly decrease rapidly seaward. Opal distribution follows the mixed-layer circulation around the subtropical anticyclonic gyre and shows high values under areas of oceanic divergence, characterized by high primary productivity. Along the continental margins, opal abundances are diluted by terrigenous debris; even off the Peruvian coast, where strong upwelling occurs and consequently high primary productivity prevails. The distribution patterns of six radiolarian assemblages, defined through Q-mode factor analysis, reflect the geographical distribution of water masses

associated with both surface and subsurface circulation. These are: 1) the surface Antarctic water mass, 2) the surface Subantarctic-Temperate water mass, 3) the Chile Current, 4) the Peru Current, 5) the surface Subtropical water mass and 6) the Equatorial Undercurrent. The Equatorial Undercurrent surfaces either because of strong trade winds or because of considerable relaxed trade winds.

The above mentioned distribution patterns have shifted geographically during the Late Quaternary because of global climatic changes (glacial and interglacial stages). Fluctuations in the strength of the winds have been concurrent with fluctuations in the amount of ice stored on the continents, represented by the $\delta^{18}O$ stratigraphic record; however, the direction and position of the winds have varied in a rather complex manner. Consequently, the oceanic circulation and associated water masses have presented a different behavior within each of the last five $\delta^{18}O$ stages. Approximately 127,000 years ago, at the $\delta^{18}O$ stage 5/6 boundary, the oceanographic conditions along the Pacific coast of South America were like the ones observed presently. During $\delta^{18}O$ stage 5, weak trade winds, probably less parallel to the Peruvian coast than at the present, caused reduction in coastal upwelling and allowed advection of subantarctic-temperate waters, via the Chile Current, along the Peruvian coast. During $\delta^{18}O$ stage 4, the trade winds were strong and more parallel to the equator, even to the east of the Galapagos Islands. This gave rise to surfacing of the Equatorial Undercurrent through divergence processes. Because of weak trade winds, the Galapagos front was positioned nearer to the South American coast during the lower part of

stage 3. During the upper $\delta^{18}O$ stage 3 and stage 2, the Pacific coast of South America experienced an intensified circulation, a strong development of upwelling, and as a result "cool" surface water temperatures. Approximately 18,000 years ago, at the climax of the last glaciation ($\delta^{18}O$ stage 2), sea surface temperatures in the subtropical southeastern Pacific, were as much as 4°C cooler than present during the austral winter. It appears that the trend to the present oceanographic conditions began first in high latitudes and later in the tropical regions. Similar features in oceanographic changes were also observed during the onset of $\delta^{18}O$ stage 5.

A significant waning of the Antarctic ice occurred approximately 400,000 years ago. This was preceded by a considerable waxing of the Antarctic ice close to the Brunhes-Matuyama paleo-magnetic boundary (approximately 700,000 years ago). During the last 700,000 years the Polar front zone has shifted from its present position toward the north.

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Typed by Gail Davis for Adolfo Molina-Cruz

A mi esposa: Biachi

A mis padres: Nicolas
Trini
Ernesto
Marina

A mi pais: Mexico

To the Marine Geology Group
At O. S. U.

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LATE QUATERNARY OCEANIC CIRCULATION ALONG THE PACIFIC COAST OF SOUTH AMERICA

I. INTRODUCTION

The oceanic circulation along the Pacific coast of South America is inter-related with upwelling processes and thus some of its associated water masses are characterized by high primary productivity which in turn sustains one of the largest fisheries of the world. The wind field of this region together with the associated wind-driven oceanic circulation is seasonally modified; from time to time so dramatically that fisheries are considerably reduced (Bjerknes, 1966). Thus for both scientific and economic reasons, it is important to study the causes and consequences of climatic fluctuations in this area. An approach to this objective can be made through Paleoceanographic studies; i.e., by studying the long-term modifications of the circulation system as recorded in the sediments accumulating beneath these currents.

Previous work by this author (Molina-Cruz, 1977a, 1977b) suggests the siliceous constituents of the deep-sea sediment are among the most useful in studying the paleo-circulation along the Pacific coast of South America prevalent during Late Quaternary. Therefore micropaleontological data from radiolarian assemblages, as well as data on the opal and quartz content of sediment have been utilized in

a further study of this region.

The micropaleontological data are evaluated through the "transfer function technique" (Imbrie and Kipp, 1971). Using this technique, the composition and distribution pattern of recent radiolarian assemblages in the sediments of the southeastern Pacific were established and compared to modern oceanographic conditions. The relationship between modern assemblages and surface water masses was used to trace the shifting of surface water masses within the geological past in six cores, located along the coast of South America (Appendix 2), and the statistical relationships between these assemblages and sea surface temperature were used to estimate sea surface paleo-temperatures down these cores. Present distribution patterns as well as down-core records of opal and quartz contents were also analyzed and related both to atmospheric and oceanic circulation. Consequently, the paleoceanographic inferences produced in this study are based on two independent sets of information: the micropaleontological data and the mineralogical data.

The six cores used in the down-core study have been divided into two groups based on their means of stratigraphic correlation. The four northern cores have been stratigraphically correlated through their $\delta^{18}O$ record; they represent the bulk of the down-core study presented here (the last 127,000 years). The two southern cores,

characterized by very low sedimentation rate, have been tentatively correlated through the radiolarian biozonation proposed by Hays (1965; 1967) and provide a less detailed picture of oceanographic change over the last 700,000 years.

II. OCEANOGRAPHIC SETTING

Regional Descriptive Oceanography

Upper Layer Water Circulation and Water Masses

The Pacific coast of South America spans the tropical climate of low latitudes, the desert climate of mid to low latitudes and the peri-glacial climate of high latitudes (Paskoff, 1977). Nevertheless, because of the transport of sea water from high latitudes to low latitudes along the coast and the intense upwelling off Peru, most of the waters along the coast are characterized by relatively cool temperatures compared to open sea waters at the same latitude (Fig. 1). The upper-water transport in the S.E. Pacific is mostly east-west; south of 34°S the West Wind Drift drives currents to the east, while north of 20°S the trade winds drive currents to the west (Fig. 2). However, part of the eastward water transport is diverted to the north by the South American coast and forms a subtropical gyre.

The upper-layer water circulation as well as differences in heat and moisture exchange with the atmosphere characterize the surface water masses found in the S.E. Pacific. The very cool (-2 to 3°C) and low salinity (33.6 to 34.2‰) surface water between the coast of the Antarctica and the oceanographic "Polar front" (Gordon, 1971a,

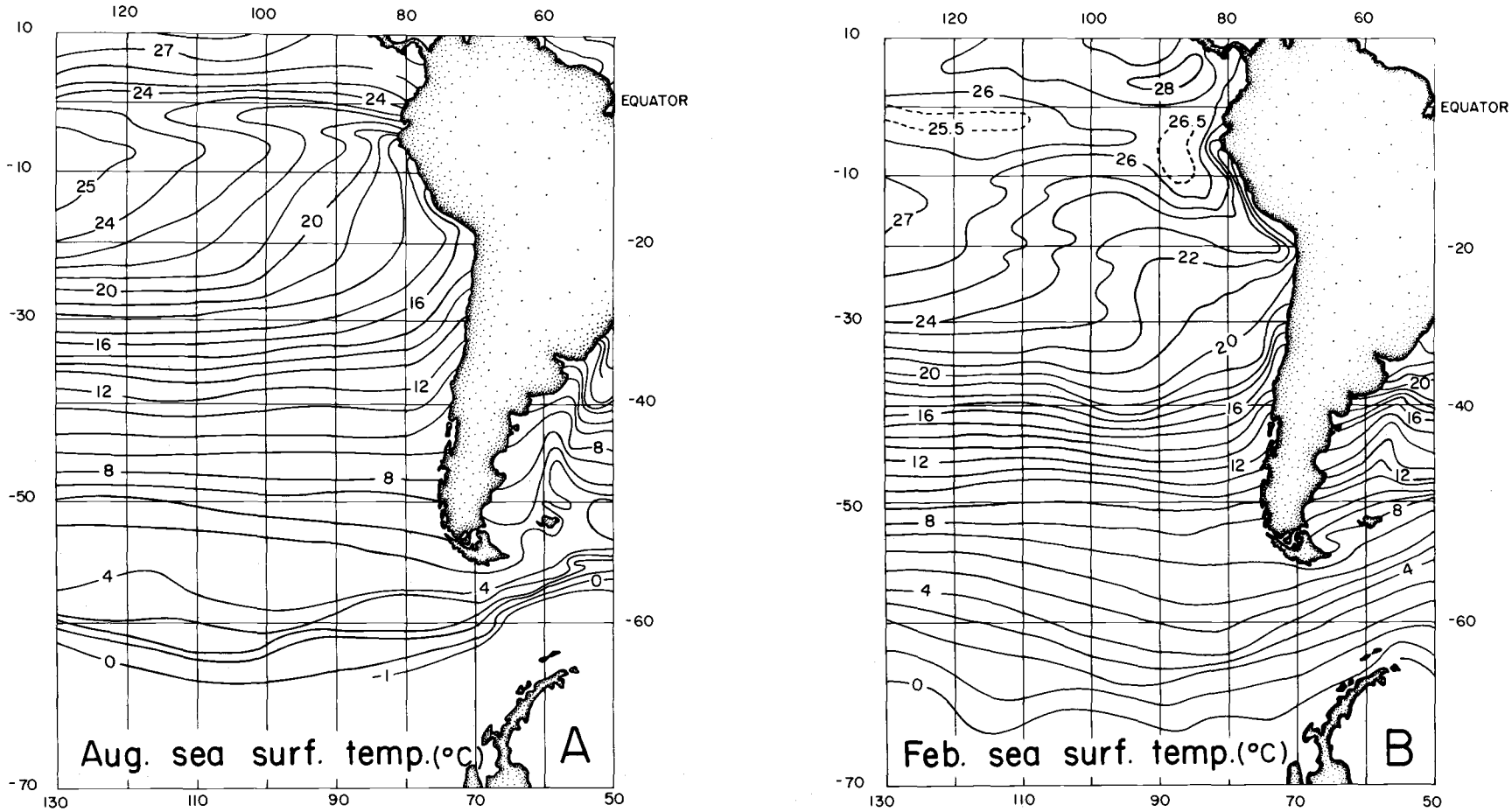

Figure 1. Average sea surface temperature (°C) for August and February (reproduced from charts prepared by Geophysical Fluids Dynamics Laboratory and the CLIMAP Project; unpublished).

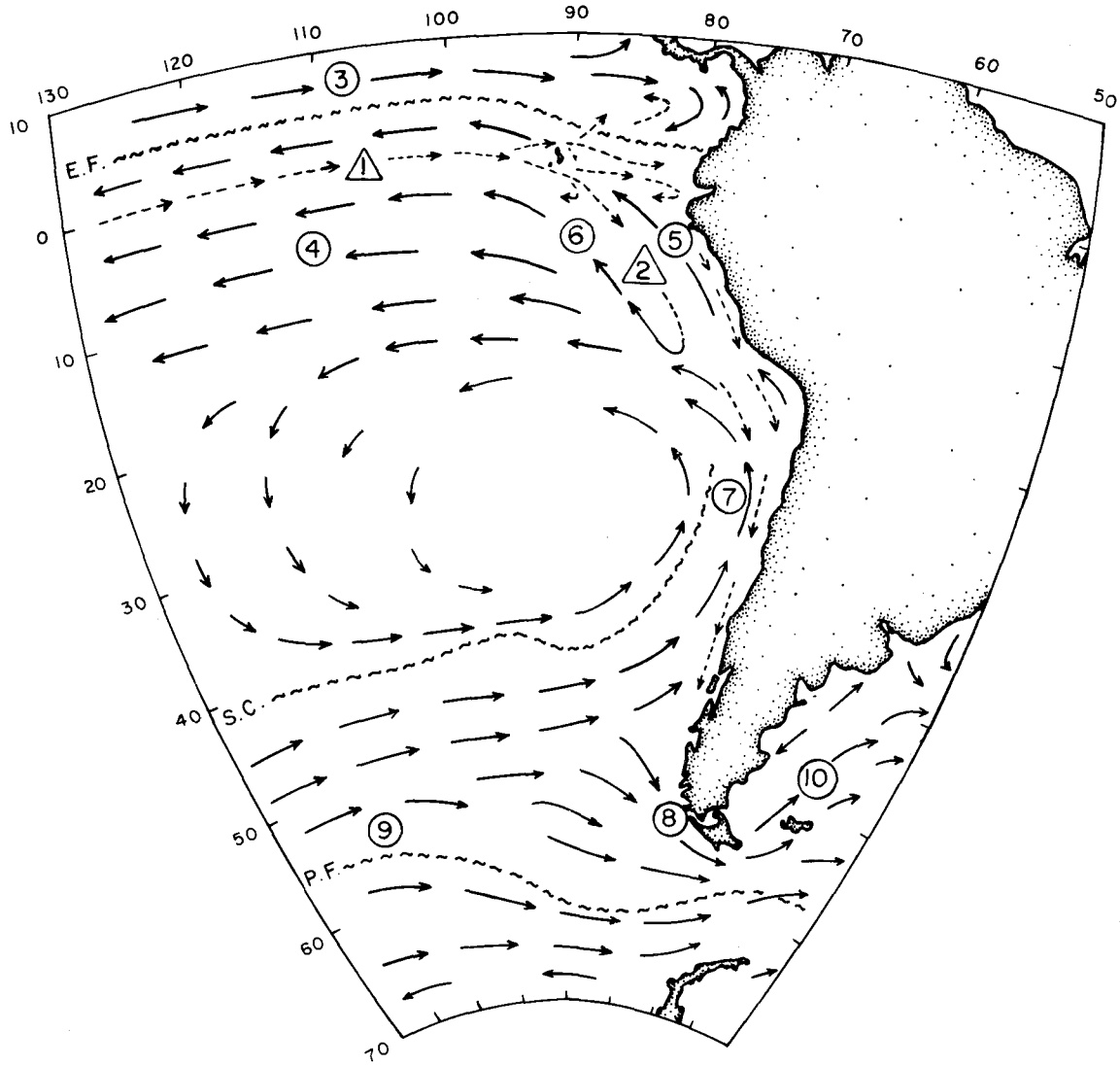

Figure 2. Generalized circulation in the southeastern Pacific: ⟶ surface currents; - - - → subsurface currents. 1 = Equatorial Undercurrent; 2 = Peru Countercurrent; 3 = North Equatorial Countercurrent; 4 = South Equatorial Current; 5 = Coastal Peru Current; 6 = Oceanic Peru Current; 7 = Chile Current; 8 = Cabo de Hornos Current; 9 = Circumpolar Current; 10 = Falkland Current. ∿∿∿∿∿ major oceanic fronts: E.F. = Equatorial front; S.C. = Subtropical Convergence; P.F. = Polar front.

1971b) is defined as the Antarctic surface water mass. This water mass is associated with the clockwise circulation of the Antarctic Circumpolar Current and with the sluggish westward circulation, driven by the "easterlies," near the coast of the Antarctic continent. The shear and Ekman transport associated with these two currents raises zones of divergence. Since the Antarctic surface water mass is largely fed by upwelling of Deep-water (Fig. 3), it is also characterized by high nutrient content and high primary productivity (Reid, 1962). However, these non-conservative water mass characteristics probably vary considerably through the year because of seasonal fluctuations in the wind, in the amount of ice around the Antarctica and in the amount of sunlight penetrating the photic zone. At the Polar front, between 50-60°S latitude, the Antarctic surface water mixes with and sinks under the Subantarctic water mass.

There is some disagreement among scientists in defining the Subantarctic surface water mass. Gordon (1967, 1971a, 1971b, 1971c) considers Subantarctic waters as those between the polar front (to the south) and the Subtropical Convergence (to the north). However, Wyrtki (1967) considers that the waters within the northern part of such a band could be considered different from those within the southern part. This is because, although sea surface temperatures and salinities decrease regularly poleward within the Subtropical Convergence and the Polar front, the northern waters have

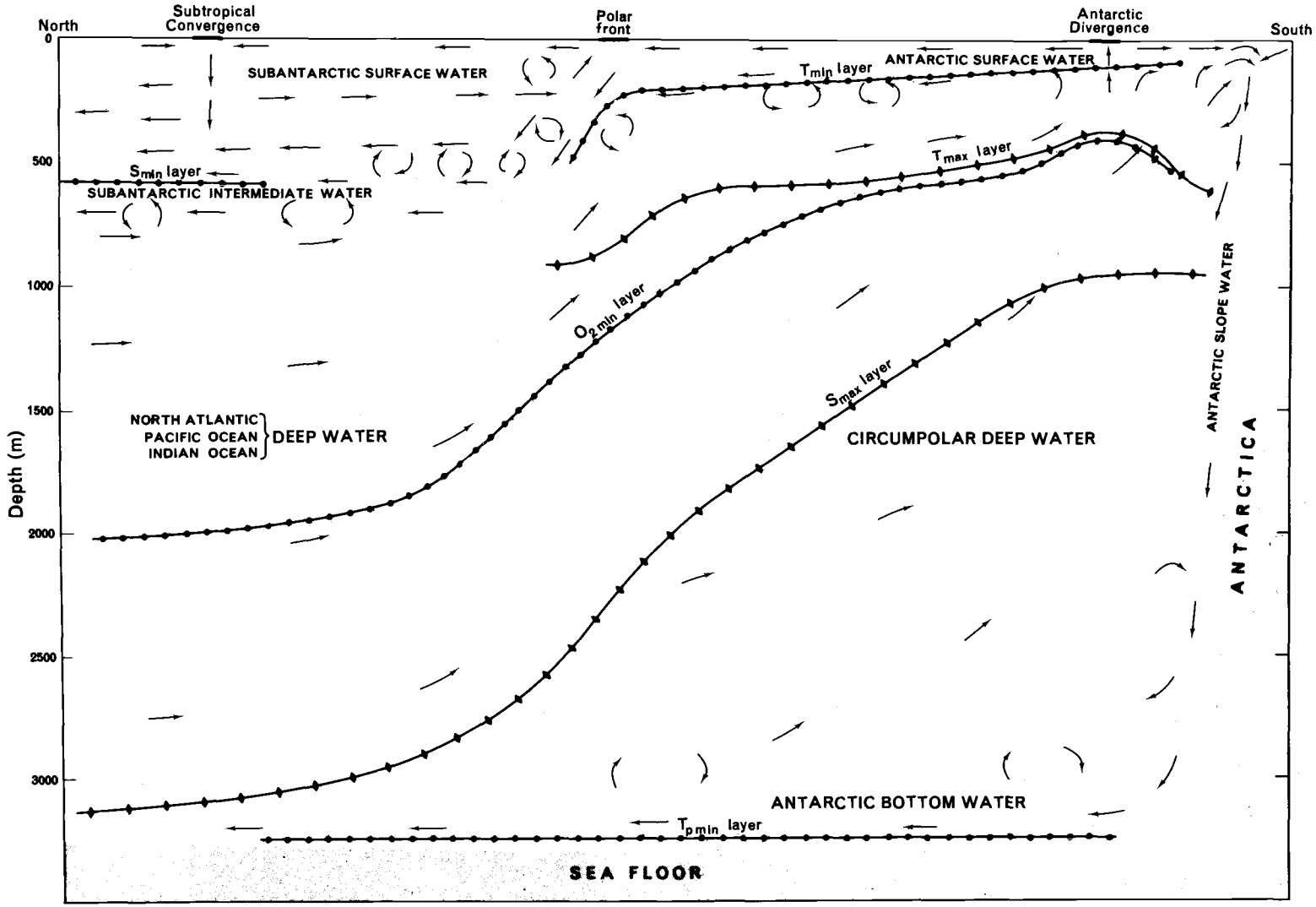

Figure 3. Schematic representation of water masses and of the meridional transport in the Antarctic Ocean (reproduced from Gordon, 1967).

much warmer temperatures (8-18°C) than the southern ones (3-8°C). Thus Wyrtki (1967) defined the northern part as the Temperate surface water mass. In any case, the surface water between the above mentioned oceanic fronts flows eastward as the West Wind Drift.

When this oceanic flow reaches the South American coast, it bifurcates near 47°S latitude (Silva-Sandoval and Neshyba, 1977; Wyrtki, 1967, 1975a). One branch turns south as the Cabo de Hornos Current, while the other turns north as part of the Peru-Chile Current system. Strong rainfall and runoff from land off Chile, between 33°S latitude and 44°S latitude (Scholl et al., 1970; Paskoff, 1977), reduce the salinity of the Subantarctic-Temperate water mass flowing in the northern branch (it reaches approximately 33‰ along the coast). As this cool, low salinity water proceeds northward, salinity increases through mixing and evaporation reaching 35‰ near 23°S latitude. With the turning to the north, the Subtropical Convergence is bent northward near 90°W longitude (Fig. 2), and finally disappears near 23°S latitude where it is disrupted by the Chile Current flowing to the north and northwest along the South American coast. Before reaching 20°S latitude, the land configuration and the wind field (Wyrtki and Meyers, 1975a; Manabe et al., 1974) turn the Chile Current to the west. Although the subsequent path of the Chile Current is not known exactly, it has been assumed that it contributes in feeding the Peru Current System (White, 1969). However, sea

surface temperature distribution (Fig. 1B; Bjerknes, 1966) and micropaleontological studies (Molina-Cruz, 1977a) suggest that the Temperate waters of the Chile Current blend principally in the Subtropical waters carried to the west with the South Equatorial Current.

North of 20°S latitude, oceanic circulation and characteristics of water masses are strongly influenced by the trade wind field. This wind field sustains strong upwelling off Peru and along the equator (Smith, 1968; Pak and Zaneveld, 1974), drives the largest westward flow of the Pacific Ocean (the South Equatorial and North Equatorial Currents; Wyrtki, 1967), and indirectly influences the subsurface circulation. Surface circulation defines the distribution of temperature in the mixed layer and thus density, which in turn defines the pressure field and from this the subsurface circulation. Therefore, in spite of the simplicity of the wind field, the equatorial upper-layer circulation is rather complex, encompassing both surface and subsurface currents.

Along the coast of northern South America, the Peru Current system, flowing northwest, is largely fed by waters coming from below, through upwelling. Therefore, this system is characterized by waters of relatively cool temperatures (16°C-20°C) and by high nutrient content which in turn sustains large fisheries. Gunter (1936) pointed out that the Peru Current system is composed of a coastal

branch and an oceanic branch; between which, the Peru Countercurrent (which appears as an undercurrent most of the time) flows southward. This southward countercurrent has been inadequately investigated; however, Silva-Sandoval and Neshyba (1977) report traces of it as far south as 40°S latitude.

The South Equatorial Current is broad and flows westward. Its latitudinal boundaries are approximately 15°S latitude and 4°N latitude (its boundary with the North Equatorial Countercurrent). The North Equatorial Countercurrent carries mostly Tropical water, while the South Equatorial Current carries mostly Subtropical water; in between, the Equatorial surface water mass is defined. The Tropical surface water mass is warm (generally > 25°C) but because of strong rainfall has a low salinity (approximately 33‰). The Subtropical surface water mass presents a wide range of temperature (17-25°C) but it is principally characterized by high salinity (> 35‰) resulting from the excess of evaporation over precipitation. The Equatorial water, between the Tropical and Subtropical water masses is intermediate in its properties and results not only from mixing of waters to the north and south but also from the advection of waters from the Peru Current and from Equatorial upwelling (Wyrtki, 1967).

The westward flowing South Equatorial Current is shallow at the Equator (20-50 m deep) and becomes considerably deeper farther

south (about 200 m deep). The supply of waters to this current coming from the Peru-Chile Current system and the North Equatorial Countercurrent is approximately 20 x 10^2 m^3/sec. This is not enough to sustain the enormous transport carried west by the South Equatorial Current (approximately 50 x 10^{12} m^3/sec) and it has been assumed that the largest contribution comes up from the eastward flowing Pacific Equatorial Undercurrent (Wyrtki, 1966; 1967).

The Equatorial Undercurrent flows eastward beneath the northern (shallowest) part of the South Equatorial Current. The core of this undercurrent is generally centered at the equator, but its width (approximately 400 km) and thickness (approximately 200 m) vary along its course (Knauss, 1960; Wyrtki, 1966, 1967). Near the Galapagos Islands the Equatorial Undercurrent is twice as wide as it is in the central Pacific (Christensen, 1971). The enormous discharge of water from the Equatorial Undercurrent (35 x 10^{12} m^3/sec; Wyrtki, 1967) in the most eastern tropical Pacific creates complex regional oceanography, which unfortunately has undergone few studies (e.g., Wyrtki, 1966, 1967; White, 1969; Stevenson and Taft, 1971; Pak and Zaneveld, 1973, 1974; Molina-Cruz, 1977b). Nevertheless, several important features of this current have been described. Although the depth of the Equatorial Undercurrent does not vary in a uniform way, it generally rises from west to east, surfacing and contributing to equatorial upwelling near the

Galapagos Islands. As it approaches these islands, the undercurrent is decelerated and is split into northern and southern branches around the islands. Most of the water discharged to the south (approximately 20×10^{12} m^3/sec; Wyrtki, 1967) feeds the South Equatorial Current. Thus, the transport of the latter current increases during its passage from the coast of Peru to about 100° W longitude. Part of the water discharged by the Equatorial Undercurrent flows southward in the Peru Countercurrent (principally as a subsurface current) and feeds the upwelling off Peru (Wyrtki, 1963; White, 1969; Barber et al., 1971). Smoothed temperature and salinity vertical gradients, resulting from intense mixing, as well as high oxygen content and light scattering are characteristics of the water associated with the Equatorial Undercurrent (Wyrtki, 1966; Christensen, 1971; Pak and Zaneveld, 1973, 1974). Although it has been assumed that the Equatorial Undercurrent undergoes low seasonal variation, there is some evidence that it may be stronger in March-May. It also appears to be in phase with intensifications of the South Equatorial Current and to slightly lag behind relaxations of this surface current (Wyrtki, 1974a).

The Sea Bottom

Physiographical Features

Figure 4 sketches the major physiographical features of the southeastern Pacific; these have been based on a bathymetric map elaborated by Chase et al. (1976). The southeastern Pacific, as it is defined here, has the East Pacific Rise and the Pacific Antarctic Ridge as its western boundary, while the South American margin together with the Drake Passage and the Antarctic peninsula lie on the eastern boundary. Along the continental margin of South America, the Peru-Chile Trench is well defined from the equator to about 34°S latitude; further south it has been filled with sediments (Hayes, 1966). The Galapagos Spreading Center lies on the northern boundary of the southeastern Pacific; this spreading center as well as the Chile Rise and the Sala y Gomez - Nazca Ridge complex join the East Pacific Rise and the South American margin and delineate the major basins. South of the Chile Rise is the Southeast Pacific Basin; between the Chile Rise and the Nazca - Sala y Gomez Ridge complex is the Chile Basin, and between the Nazca - Sala y Gomez Ridge and the Galapagos Spreading Center, with the inferred Galapagos Rise (Herron, 1972) in between, are located the Bauer Basin (west) and the Peru Basin (east). Numerous fracture zones lie more or less normal to the East Pacific Rise, the Pacific-

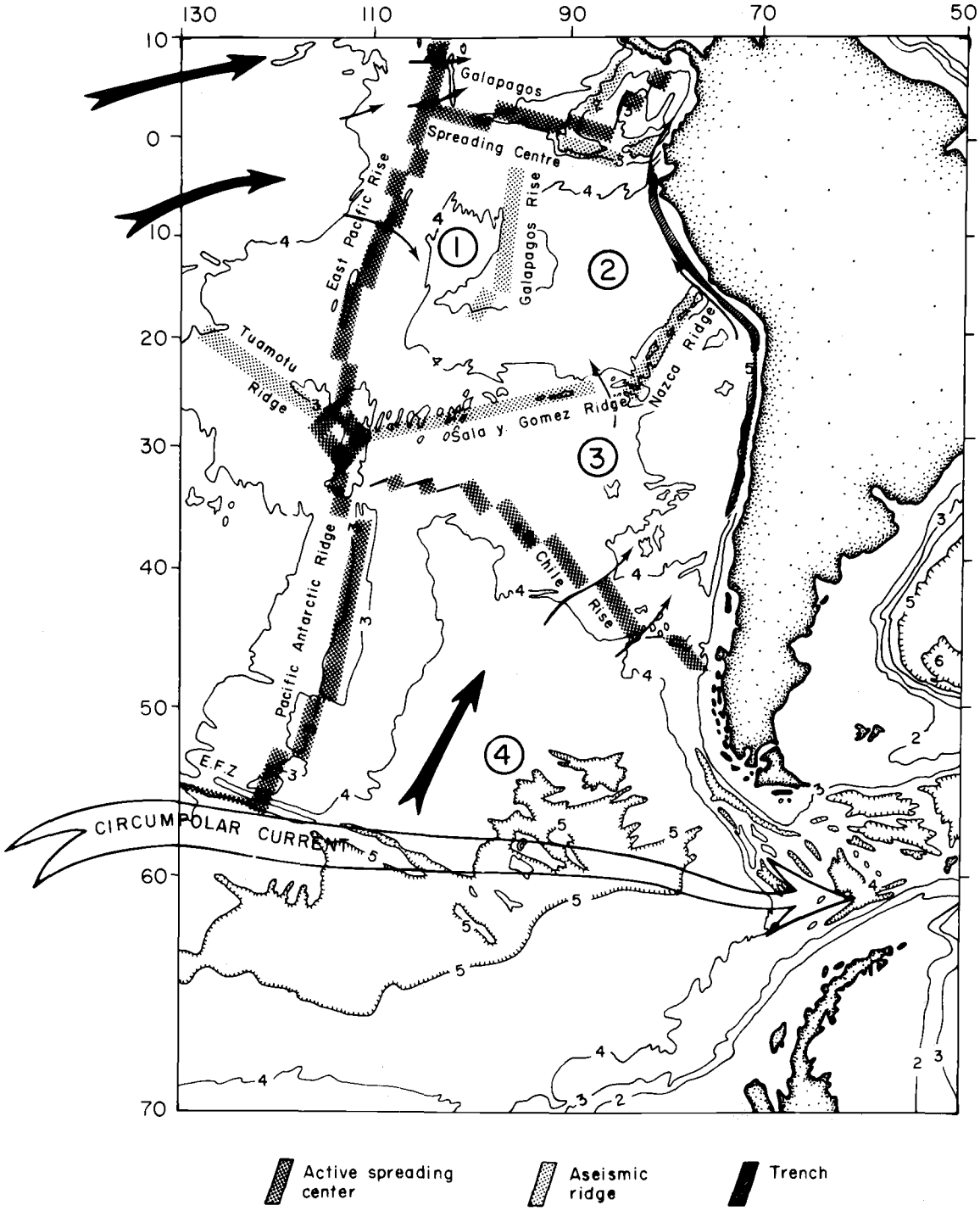

Figure 4. Bathymetry (from Chase et al., 1976), physiographic features, and bottom currents (from Lonsdale, 1976). Bathymetric contours are in meters (*1000). Encircled numbers point out: 1) the Bauer Deep; 2) the Peru Basin; 3) the Chile Basin, 4) the Southeast Basin.

Antarctic Ridge and the Chile Rise (Mammerickx et al., 1975). Some of these fractures, such as the "Glomar" and "Eltanin" fracture zones, are so huge that they noticeably offset the trending of the Pacific-Antarctic Ridge (Heezen et al., 1968).

Bottom Currents

Although bottom currents are present in the southeastern Pacific (e.g., Gordon, 1966; Heezen et al., 1968; Laird, 1971) very few studies concerning their impact on sediment distribution have been carried out (Lonsdale, 1976 and references therein).

The surface Circumpolar Current (Fig. 4) flowing clockwise around the Antarctica extends to the ocean floor probably with little attenuation (Stommel, 1958; Gordon, 1967, 1971a). Two branches off the Circumpolar Current introduces bottom water to the abyssal circulation of the Pacific Ocean: in the Southwestern Pacific as a western boundary current and in the southeastern Pacific as a northward flow in the Southeast Pacific Basin (Fig. 4; Warren, 1973). The subsequent spreading flow of the bottom water is restricted by the ridges. However, it has been shown by Lonsdale (1976) that bottom water leaks out the basins through deep transform fault-troughs and the Peru-Chile Trench.

Ocean Floor Sediments

The distribution of sediments in the deep sea is principally influenced by bathymetry, by the oceanic circulation and its associated biogenic input, and by the character of the terrigenous input (Goodell, 1973 and references therein). In the southeastern Pacific, regions shallower than approximately 4000 meters and to the north of the "Polar front" are not exposed to the "corrosive" bottom water which dissolves calcium carbonate (Berger, 1970; Lozano and Hays, 1976). Thus the sediments on the ridges are rich in calcium carbonate (reaching as high as 90-93% by weight; Rosato et al., 1975).

The basins to the north of the Chile Rise (Fig. 4) are deeper than the carbonate compensation depth (Bramlette, 1961; Parker and Berger, 1971; Luz and Shackleton, 1975) and are shielded from terrigenous input by the Peru-Chile Trench, which traps most of the land derived detritus (Rosato et al., 1975). These basins contain predominantly brown clay, which decreases in iron content from the seismically active East Pacific Rise to South America. The sediments within the Southeast Pacific Basin (sometimes referred to as the Bellingshausen Basin) are strongly influenced by terrigenous input as well as by turbidity and bottom currents (Ewing et al., 1968; Hollister and Heezen, 1967; Heezen et al., 1968; Goodell et al., 1971). The sediments and the assorted processes acting on

them present a complex distribution pattern. In the Drake Passage, as well as on the periphery of southern South America and the Antarctica, "sandy silts" and "clayed silts" (Goodell, 1973) are found. These sediments are characterized by being transitional between the coarser, easily identifiable glacial-marine deposits of the outer shelf-slope and the pelagic clays of the abyssal floor. Their distribution reflects the decrease in ice-rafted coarse-grained glacial detritus away from the continent. Along the "Polar front" (specially to the south) and far from the considerable influence of terrigenous input, siliceous ooze is common. This siliceous ooze is the product of high primary productivity in the overlying surface waters. This is caused by the recycling of nutrients to the surface through upwelling processes (Fig. 3).

The erosion caused by the Circumpolar Current (Fig. 4) is so large (Heezen et al., 1968; Hollister and Heezen, 1967) that it has caused a very low sedimentation rate throughout this area for at least the last million years (Goodell and Watkins, 1968). Furthermore, it has been proposed that this current sweeps away metal ions derived from the Pacific-Antarctic spreading center and precipitates them, within the Southeast Pacific Basin and the Drake Passage, in fields of manganese nodules (Goodell et al., 1971).

The sediments on seismically active ridges (Fig. 4) are richer in oxides and hydroxides than the sediments on the aseismic ridges

(Heath and Dymond, 1977).

III. METHODS

Sampling

One hundred sixty-four sediment samples from the S.E. Pacific (Appendix I; Fig. 7) were analyzed to establish how the Radiolaria thaphocoenoses reflects the distribution of the modern water masses. Also six piston cores, located along the Pacific coast of South America (Appendix 2), were studied to determine shifts in the water mass boundaries which have occurred during the Late Quaternary. In addition, nine down-core samples (Appendix 3) which represent the 18,000 years B.P. level have been employed to depict the geographic distribution of water masses at this particular time in the south-eastern subtropical Pacific.

The sediment samples were obtained from the trigger weight and piston core collections of Oregon State University (Yaloc cruises), of Lamont-Doherty Geological Observatory (R. Conrad and Vema cruises) and of Florida State University (Eltanin cruises). Approximately one cubic centimeter of sediment sample was taken from as close as possible to the top of each of the 164 core locations chosen for the surface study (Appendix 1). It is generally thought that such samples represent Holocene conditions; however, for samples taken in the region below the influence of the erosive Circumpolar Current (Fig. 4) this assumption may not be valid. The down-core samples

also represent approximately one cubic centimeter of sediment and they have been taken as is shown in Appendices 2 and 3.

It has been pointed out that the sediments at the center of the southern subtropical gyre are barren of Radiolaria (Lisitzin, 1971; Goll, 1976). Nevertheless, sample-locations from this region were considered for the study of the distribution of opal and quartz and because the presence (or absence) of Radiolaria in the sediments reflects important oceanographic features (Fig. 7).

Slide Preparation and Sample Counts

Fluctuations in abundance of particular species of Radiolaria in the sediments may be due not only to ecological effects but also to physical effects. Selective dissolution of some species (Berger, 1968; Moore, 1969; Johnson, 1974) or hydraulic sorting may superimpose an additional effect on the ecological fluctuations. Thus in order to yield ecological and depositional information, it is better to analyze a large number of species. This procedure will presumably buffer the phycial effects if they are minor and make them obvious if they have severely altered the assemblage. When water masses are characterized by the species makeup of Radiolaria, the cosmopolitan species tend to obscure boundary zones separating different water masses. Because the autoecology of each of the Radiolaria species found in the sediments is not yet well known, it is assumed that when

inferring distribution of water masses, analysis of a large number of species will buffer the obscuring effect caused by cosmopolitan species.

It has been estimated that over 200 species constitute the Radiolaria thanatocoenoses found in the Late Quaternary sediments. However, in the southeastern Pacific only 60 species were found in abundances greater than 2% (Molina-Cruz, 1977a). Ninety-five of the most common "categories" (see Appendix 4 for definition of "category") were selected for analysis. With this Holocene-Late Pleistocene Radiolaria taxonomic framework, it is possible to categorize 92% or more of the specimens of Radiolaria contained in the samples. For each sediment sample, the relative abundances (percentages; Appendices 5-7) of each of the 95 selected categories of Radiolaria were estimated from counts of generally more than 750 specimens.

The counts were made from slides containing (statistically) a random subsample of a Radiolaria population - sample retained in a 62 μ sieve. These slides were prepared following the settling method developed by Moore (1973a), re-explained by Sachs (1973) and refined in this study. The manufacture of a ring to hold the microscope slide within the settling container (Fig. 5) improves the method in the following ways:

(1) Assures that the slide will not move during the process; i.e., maintain the horizontal position of the slide.

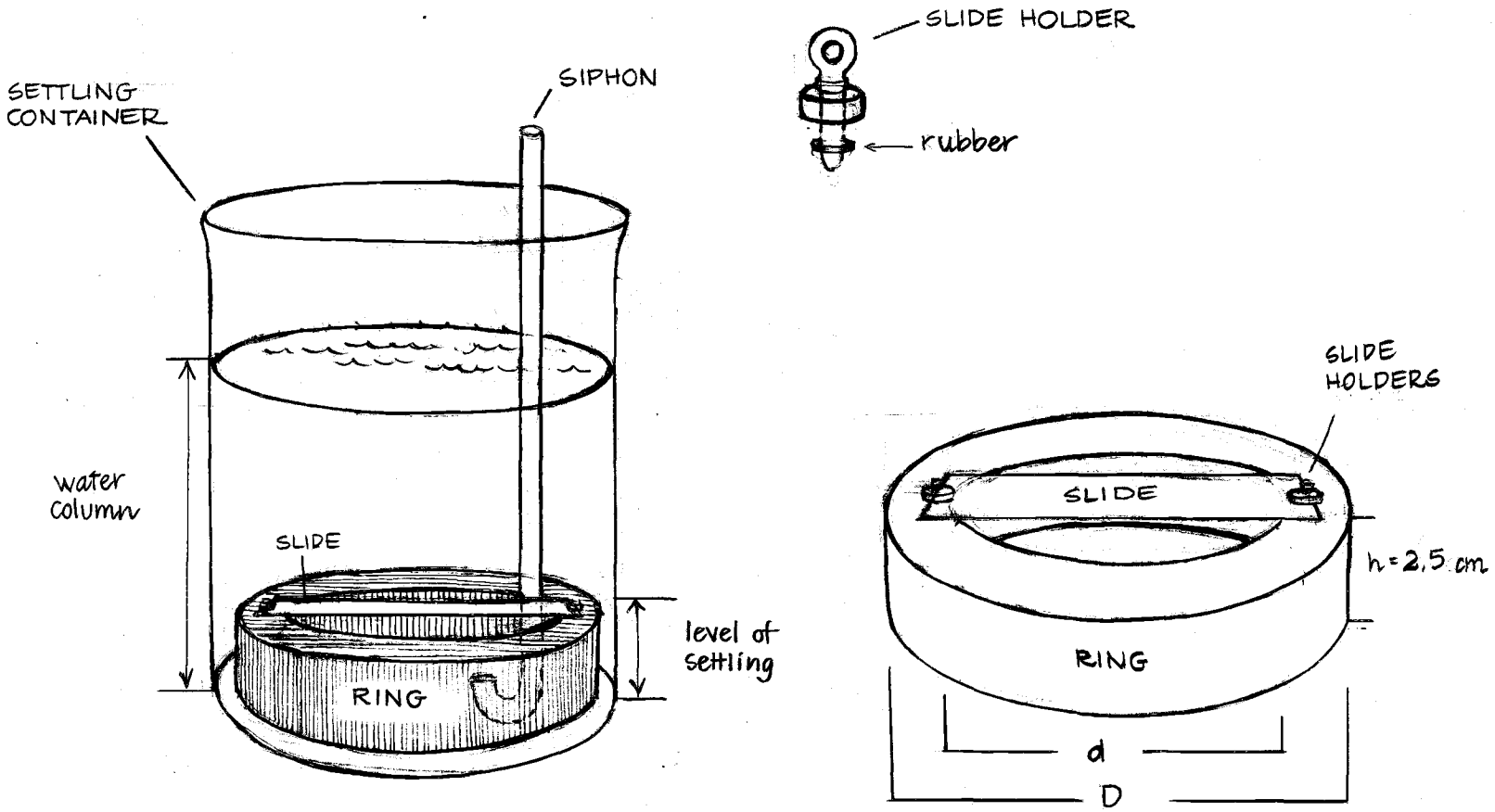

Figure 5. Settling device for grain size material. The diameters of the ring (D and d) can vary according to the size of the slide and the container. Nevertheless, to allow siphoning of the water below the level of settling, the height of the ring (h) must be at least about 2.5 cm.

(2) Avoids the use of forceps to remove the slide from within the settling container; therefore reduces the possibility of accidental falls of the slide.

(3) Allows the siphoning of water below the level of settling (Fig. 5), which eliminates the step of evaporation and removes the attendant possibility of perturbation due to heat convection. The step of evaporation and drying (Moore's step No. 8) is considerably reduced from about 2 hours to about 10 minutes.

(4) Facilitates the removal of the remaining sample. (In the unrefined method the remaining sample is dry and sticks to the walls of the settling container.)

The ring has been made of teflon, because the sediment samples do not stick so strongly to this material, thus facilitating its cleaning, which in turn reduces risk of contamination in subsequent uses. Furthermore, teflon material does not oxidize.

Step 1 of Moore's method (1973a) requires several sizes of settling containers and of slides. Therefore, it is convenient to have rings of several sizes available. When dealing with large samples, it is recommended to use micro-splitter devices.

Evaluation of Micropaleontological Data

Mathematical procedures facilitate evaluation of the large

amount of data yielded by the analysis of a large number of species. Of the several mathematical procedures most often used in geological science (see Sachs, 1973; Dinkelman, 1974), the "transfer function technique" developed by Imbrie and Kipp (1971) has been followed in this study. This method has the advantage of not only allowing one to estimate the values for oceanographic variables (sea surface temperature, salinity, etc.) which prevailed in the past, but also, through the intermediate steps of the method, allowing one to make a large number of inferences about oceanographic features. Furthermore, it is possible to interrelate data of distinctly different natures (e.g., micropaleontological with mineralogical data; Molina-Cruz, 1977b) when constructing the estimator model. The transfer function technique consists primarily of the following analysis: 1) Q-mode factor analysis, 2) regression analysis, 3) classification analysis.

Q-mode factor analysis (Imbrie and van Andel, 1964; Joreskog et al., 1976) is required in order to establish the species-makeup and distribution of radiolarian assemblages. Thus the radiolarian assemblages are usually called "factors" or "end members" because their species makeup is mathematically defined. The Q-mode factor analysis has been performed using the computer program (CABFAC) described by Klovan and Imbrie (1971). This program produces a varimax factor matrix (Appendix 16) which indicates the importance of each factor at each sample location, and a matrix of scaled factor

scores (Appendix 15) which indicates the importance of each radiolarian category in each factor (radiolarian assemblage). The values of the varimax factor matrix (Appendix 16) are contoured in a set of maps (Figs.11-16) in order to establish the geographical distribution of each of the factors in the modern sediments.

Sixty radiolarian categories (Appendix 15) out of the ninety-five radiolarian categories included in the taxonomic framework (Appendix 4) were selected to be used in the Q-mode factor analysis based on the following criteria: 1) each category accounts for abundances larger than 1.5% in at least one sample location (Appendix 5), and 2) each category can be consistently identified.

Multiple regression analysis is employed to establish the relationship between factors and (chosen) oceanographic variables, as expressed by the correlation matrix (Appendix 20). Subsequently, the regression analysis yields equations which are employed to estimate the oceanographic variables from factor loadings in samples for which these variables are unknown.

It is clear that the hydrography of the surface waters controls the distribution of radiolarian assemblages. However, for the purpose of estimating oceanographic variables through the multiple regression equations, it is assumed that the relationship is reversed, and the oceanographic variables are treated as the dependent variables while the factor loadings are used as the independent variables. Equations

to estimate February and August sea surface temperature have been produced, and their characteristics are given in Appendices 21 and 22. The data for the dependent variables were interpolated from charts (see Fig. 1) prepared by the Geophysical Fluids Dynamics Laboratory and the CLIMAP Project (unpublished). The regression analysis, within the transfer function technique was carried out using the linear, squares and cross products of the factors as independent variables.

Classification analysis (parafactor method; Imbrie and Kipp, 1971) is used to describe down-core samples in terms of the modern assemblages (factors). Classification analysis estimates factor loadings in each sample on the basis of the importance of each radiolarian category in each of the factors defined by Q-mode factor analysis. These estimated factor loadings (Appendices 17-19) are used, as independent variables, to estimate values of hydrographic variables in the equations obtained by regression analysis (Figs. 26, 27, 29, 31, 32). Furthermore, down-core plots of the estimated factor values can be used to infer shifts in water mass distributions (Figs. 19-23 and 32).

Both in the varimax factor matrix (Appendix 16) and in the matrix yielded by the classification analysis (Appendices 17-19), the degree to which the planktic radiolarian fauna in each sample is explained by the Q-mode factor model is measured and expressed

as "communality" (Sachs, 1973; Luz and Morris, 1976). Since the Q-mode factor model used only core-top (modern) samples, the communalities from down-core (historic) samples are a measure of the degree to which down-core faunas are explained by the surface assemblages.

Flow diagrams of the procedure of the transfer function technique used to estimate oceanographic variables can be found in Kipp (1976) and Molina-Cruz (1977b).

Opal and Quartz Determinations

Utilizing a portion of each of the samples employed in the radiolarian study, the determinations of opal and quartz concentration in marine sediments were carried out simultaneously, following the X-ray diffraction method first developed by Goldberg (1958) and Calvert (1966) and subsequently refined by Ellis (1972).

Prior to X-ray diffraction, the samples are treated with buffered acetic acid in order to remove the carbonate portion and heated at 1000°C for 24 hours in order to convert the opaline portion to cristobalite. On a global basis, changing compositional sediment matrix and differing proportions of diatoms and radiolarians found at high and low latitudes (Lisitzin, 1971) have raised doubts as to the reliability of this method (Heath, 1976). Nevertheless, even though the absolute values are estimated to be accurate to within $\pm$ 5% (Ellis, 1972), the

method gives reliable relative values (as pointed out by Moore et al., 1973; Ellis and Moore, 1973; Heath, 1976). The quartz content was determined from the same opal X-ray diffraction run because the heating process reduced interference from clay peaks and enhances the quartz peaks (Till and Spears, 1969).

The results of the opal and quartz determinations are first expressed as weight percentages of the carbonate-free portion (Appendices 8-12); however, weight percentages of the total sediment were calculated because this form was required at some steps of this study. Similarly, quartz content was expressed as weight percentage of the opal and carbonate-free portion in order to remove the effects of the supply and preservation of biogenic debris on the concentration of quartz in pelagic sediments (Molina-Cruz, 1976).

Stratigraphic Control and Estimation of Rates of Deposition

Measurements of $\delta^{18}O$ made on shells of microfossils yield down-core records which are relatively easy to correlate stratigraphically from one core to another core at any location. This is because $\delta^{18}O$ records represent climatic fluctuations which have been global in character and relatively concurrent in time. Variation of the amount of ice stored on the continental ice masses has largely controlled the oxygen isotopic composition of the sea water and

consequently of the shells of the organisms living in it (Shackleton and Opdyke, 1973).

Boundaries between $\delta^{18}O$ stages proposed by Emiliani (1955), and for which ages have been estimated through paleomagnetic or radiometric dating (e.g., Broecker and van Donk, 1970; Shackleton and Opdyke, 1973; Imbrie et al., 1973), are easy to recognize within the $\delta^{18}O$ records of 4 cores employed in this study (Fig. 6). It must be noticed that core V19-29 and core Y71-6-12 have oxygen isotope records that cover from the present to "Termination II" (Broecker and van Donk, 1970), while records from core V15-53 and core RC15-61 only reach to just older than the $\delta^{18}O$ maximum which represents the 18,000 years B.P. datum. The ages of the down-core samples are based on linear interpolation between ages of the closest boundaries of isotopic stages 1 to 6. Ages used for these boundaries are those proposed by Shackleton and Opdyke (1973).

Using the $\delta^{18}O$ chronology and the length of the sediment representing an $\delta^{18}O$ stage within each core, deposition rates were estimated; they are shown in Appendix 14.

Accumulation Rates

On the basis of Appendix 14, it is observed that deposition rates have varied considerably at each of the core locations during the last 127,000 years. Because this fact may mask subtle down-core

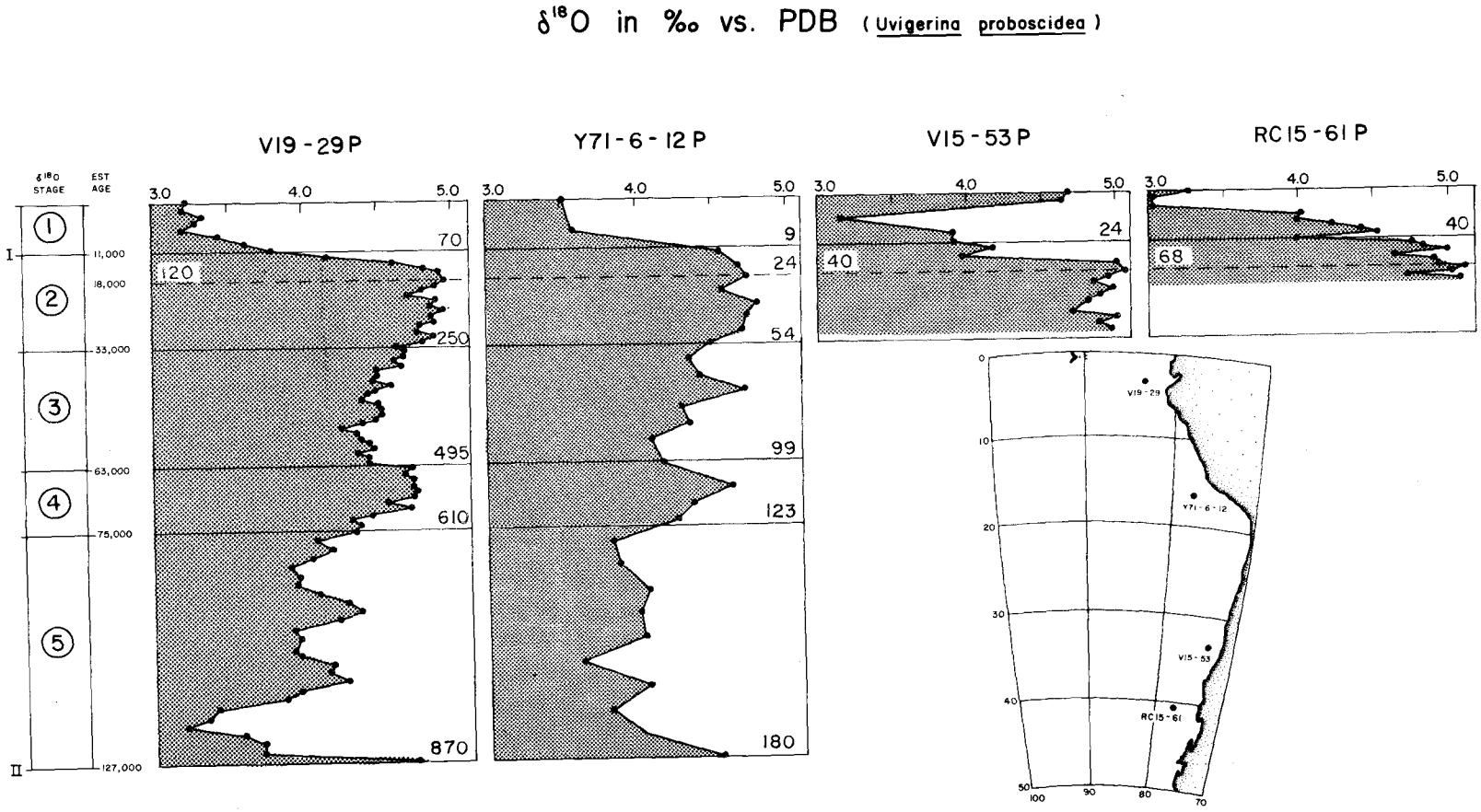

Figure 6. $\delta^{18}O$ based stratigraphic section along the Pacific coast of South America. Encircled numbers are $\delta^{18}O$ stages after Emiliani (1955). The estimated ages of the boundaries between $\delta^{18}O$ stages are from Shackleton and Opdyke (1973). The Roman numbers on the left margin of the figure represent "glacial terminations," after Broecker and van Donk (1970). The values within the boxes are depths in the core (cm).

fluctuations of some mineralogical sediment components if they are expressed as weight percentages, it was decided to compute opal and quartz accumulation rates (Lisitzin, 1971; van Andel and others, 1975).

Accumulation rates for each sample are computed by the following multiplication: the weight percentage of the variable in question * "bulk density" * sedimentation rate. Because core V19-29 has been stored dry, it was not possible to measure the "bulk density" of its samples; thus these were calculated through the regression model proposed by Luz and Shackleton (1975), since carbonate determinations for this core are available (Appendix 11). However, it was noticed that bulk densities calculated by the Luz and Shackleton (1975) approach tend to be in general lower than the measured ones: calculated bulk densities for core Y71-6-12 (as well as for core Y69-106, 2°59'N-86°33'W; Pisias, 1974) are lower than the measured bulk densities (Appendix 12). Therefore, a corrector coefficient (1.4041) has been applied to the Luz and Shackleton equation.

IV. MODERN DISTRIBUTION OF SILICEOUS DEEP SEA SEDIMENT COMPONENTS AND THEIR RELATIONSHIP TO OCEAN CIRCULATION

Distribution of Opal and Quartz

It is generally agreed that the opal and quartz found in deep-sea sediments are derived from plankton and from allochthonous terrigenous materials, respectively. Runoff from land, icebergs and winds, all carry quartz into the ocean, while primary productivity associated with oceanic circulation (Reid, 1962) controls the input of opal into the sediments (Molina-Cruz and Price, 1977). Since quartz is practically insoluble in seawater, and since opal dissolution is independent of depth (van Andel and others, 1975), together they can reflect both the influence of land and oceanic circulation more accurately than other less resistant constituents of deep-sea sediments (e.g., calcium carbonate). It is clear, however, that a perfect reflection of circulation patterns by siliceous constituents may be obscured by effects of sea bottom perturbation and by effects of dilution.

The presence of radiolarian tests, as well as the opal distribution pattern in the surface sediments (Fig. 7) reflect, in general, the mixed-layer oceanic circulation. Radiolarian tests and opal concentrations (> 5 weight percentage) occur below the margin of the anticyclonic gyre, i.e., below the areas of well defined currents

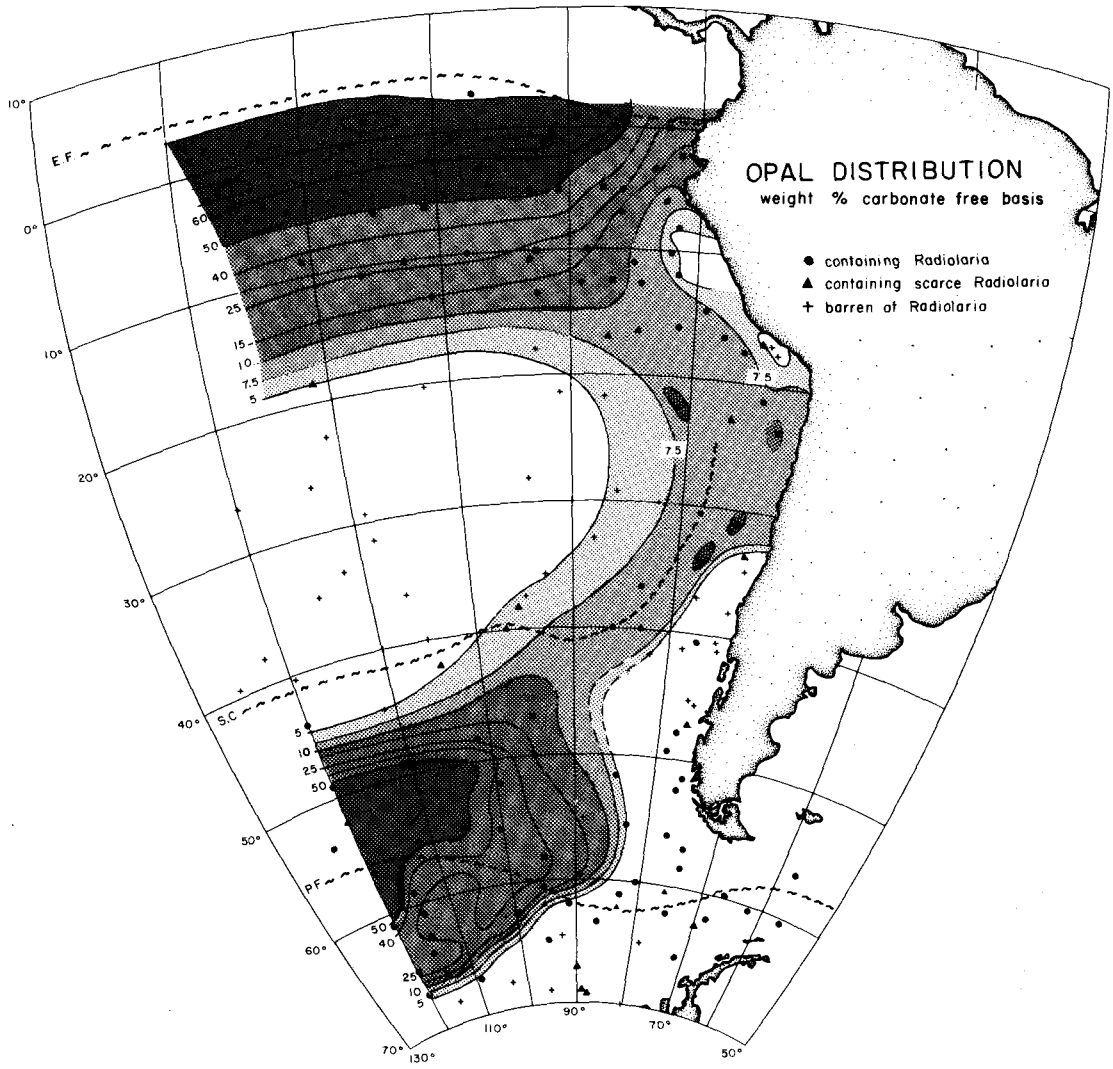

Figure 7. Opal distribution in surface sediments of the southeastern Pacific, expressed as weight percentage (carbonate-free basis). Contour intervals are irregular in order to reveal significant features.

surrounding the center of the anticyclonic gyre. Where horizontal divergence occurs, such as along the equator and in areas adjacent to the Polar front, opal concentrations are high. The center of the subtropical anticyclonic gyre is characterized by convergence; thus, due to insufficient replenishment of nutrients, primary productivity is poor. Consequently the rate of supply of opal to the sediments below the center of the gyre is exceeded by the rate of removal by solution (Lisitzin, 1971; Heath, 1976).

Along the continental margins, the effects of terrigenous dilution and vertical circulation (upwelling and downwelling) are superimposed on the opal distribution pattern related to the horizontal circulation. Strong runoff from the lake and fjord regions of Chile (Scholl et al., 1970; Paskoff, 1977) as well as icebergs from the Antarctica input a large amount of terrigenous debris which dilutes the opaline component. The amount of terrigenous debris derived from southern Chile is so large that the Peru-Chile Trench, at these latitudes, has been filled with sediments (Hayes, 1966). Downwelling reduces primary productivity; thus the downwelling associated with the southward flow of the Cabo de Hornos current also contributes to low opal concentrations along the southern coast of Chile.

We do not find high opal concentrations along the Peruvian coast even though it is an area of high primary productivity and is also apparently shielded from major terrigenous input. There are no

large rivers along the Peruvian coast and it has been assumed that the Peru-Chile Trench (Fig. 4) traps most of the debris carried from land (Rosato, 1974). Nevertheless, since the Peruvian coast is almost completely devoid of vegetation, rain and intense storms which do come after intervals of several years (Quinn, 1974) supply much debris to the ocean (Trask, 1961), thus causing dilution of the opal. Microscopic examination of samples from along the Peruvian coast shows well preserved siliceous micro-organisms diluted by terrigenous debris. Strong upwelling, recycling most of the siliceous tests before these reach the bottom (Diester-Haass, 1976), or rapid dissolution (Zhuze, 1972; Heath, 1976) may also partially account for the low opal concentrations along the Peruvian coast.

Most of the quartz content in the sediments of the ocean is a product of terrigenous input (Molina-Cruz and Price, 1977 and references therein). Therefore, the distribution pattern of quartz (Fig. 8) reflects the (character) transport potential of the "agents" which carry debris from land into the ocean, and subsequently the superimposed effect of redistribution by oceanic circulation.

The Andean cordillera extends along the western margin of South America. Here low troposphere winds (Fig. 9) have a large influence of the character of climate along the coast. South of about 40°S latitude the moist west wind impinging on the Andes causes precipitation, while north of about 25°S latitude the dry southeastern trade

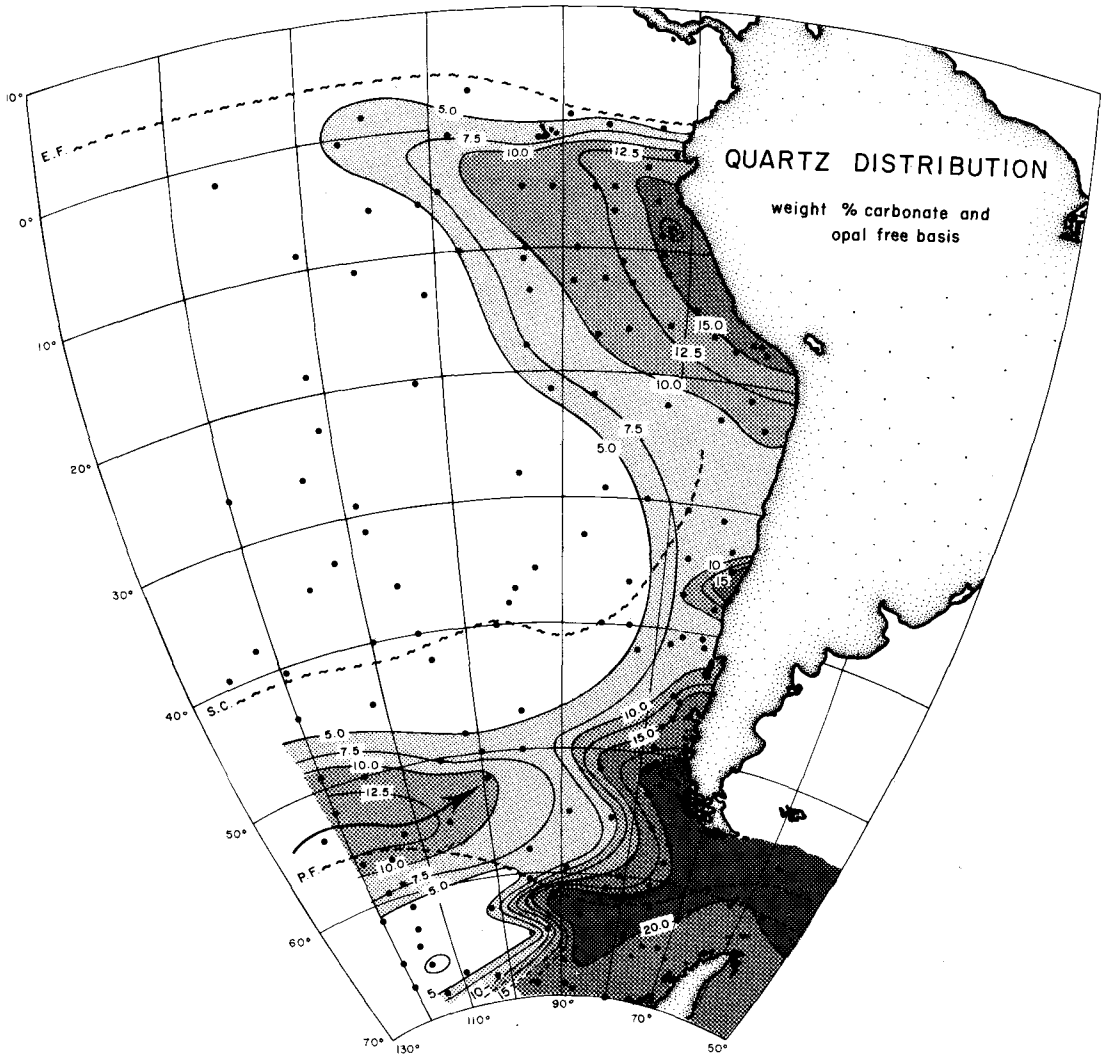

Figure 8. Quartz distribution in surface sediments of the southeastern Pacific, expressed as weight percentage (carbonate- and opal-free basis).

wind, taking off from the coast, inhibits precipitation. Rain is so common on the tip of South America that Bahia Felix, in the western Magallanes Strait, has an average of 325 days/year of rain (Riordan, 1970). Consequently, strong runoff from southern Chile as well as icebergs from the Antarctica Peninsula input abundant quartz into the Drake Passage and neighboring regions (Fig. 8).

The small area of high quartz concentrations about 37°S latitude, on the South American coast, corresponds to the mouth of the largest river in Chile: the Bio-Bio River.

North of about 25°S latitude, quartz is distributed as a tongue extending in the same manner as do the prevailing trade winds (c.f. Figs. 8 and 10); thus supporting the idea of eolian transport (Molina-Cruz and Price, 1977). The quartz concentrations close to regions of intense runoff are generally larger than 20 percent by weight (carbonate-and-opal-free basis), while in areas where quartz is considered to be a product of eolian input the quartz concentrations are around 10-15 weight percentage (Fig. 8).

It is observed in Figure 8 that quartz concentrations not only decrease seaward, but also that quartz concentrations (> 5 weight percentage values) reflect the path of the surface currents bordering the subtropical anticyclonic gyre (Fig. 2). Since the wind drives the surface currents, it is not surprising that the currents as well as the wind match the quartz distribution (c.f. Figs. 2, 8, 9). There

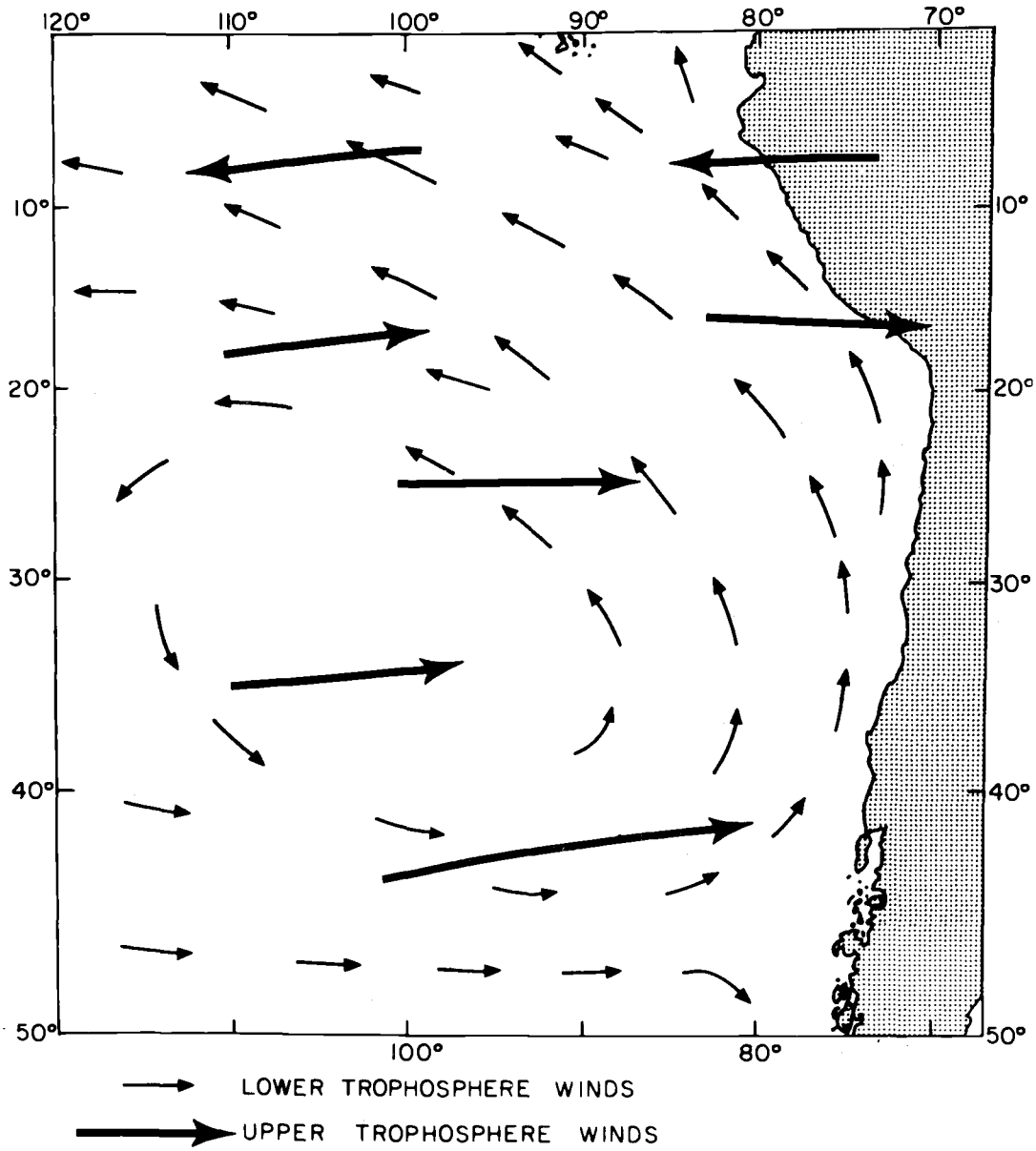

Figure 9. Generalized atmospheric circulation pattern (reproduced from Rosato et al., 1975).

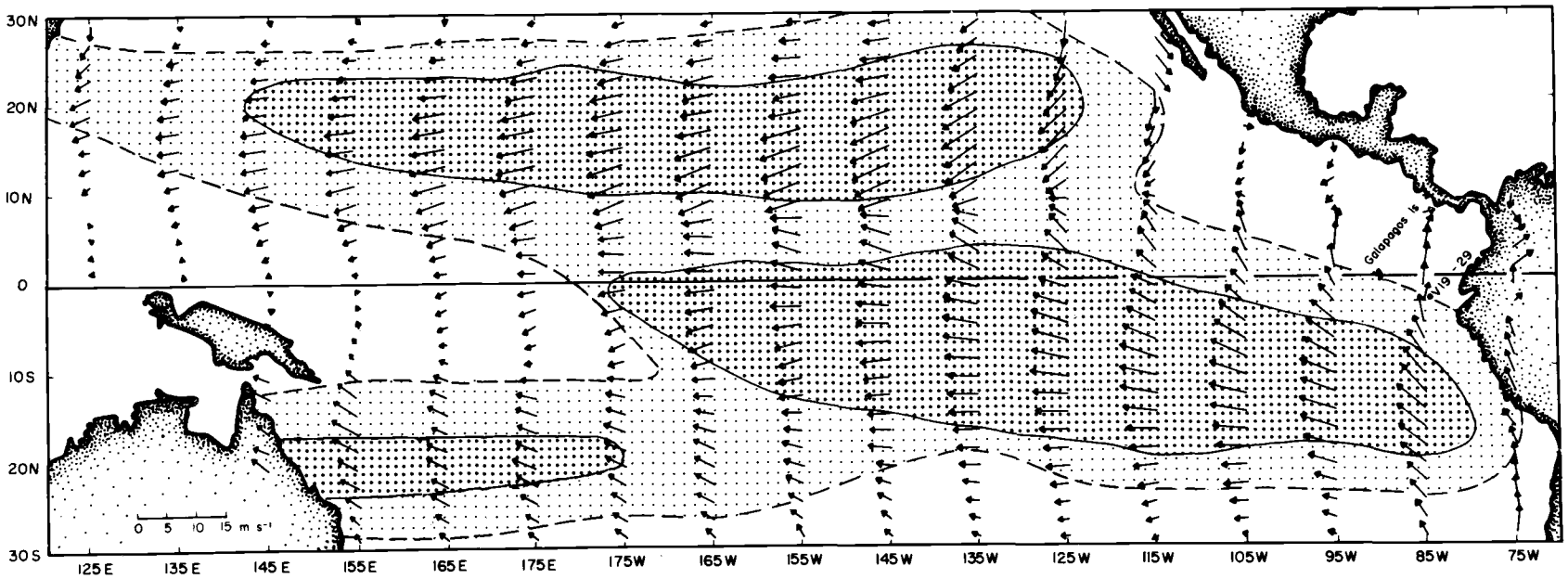

Figure 10. Annual mean surface wind velocity and trade wind field, according to Wyrtki and Meyers (1975a and b). The broken and solid contours give, respectively, the boundary of the annual trade-wind field and the areas always covered by trades. Notice the location of core V19-29 (reproduced from Molina-Cruz, 1977b).

is ample evidence that quartz is transported by wind (Molina-Cruz and Price, 1977 and references therein), while there is little or no evidence that it is transported by surface currents (Folger, 1970). Nevertheless, if detrital matter is carried in suspension by oceanic currents (Jacobs and Ewing, 1969; Chester et al., 1972; Pierce, 1976), then it is possible that the finer quartz particles delivered by the southern trade winds in the subtropical Pacific may be carried even farther away from land by the westward South Equatorial Current. Also it is possible that the subantarctic west wind drift and the southward flow of the Cabos de Hornos Current prevent high quartz concentrations far from the coast of southern Chile.

The eastward flow of the Antarctic Circumpolar Circulation, which attains its maximum velocities near the position of the Polar front, probably extends to the ocean floor with little attenuation (Stommel, 1958; Gordon, 1967, 1971a). Where this circumpolar circulation is intercepted by the Pacific-Antarctic Ridge (Fig. 4), upwelling of deep water is produced (Gordon, 1971a) inducing high primary productivity and consequently high opal concentrations within and downstream from this region (Fig. 7). The Antarctic Circumpolar Current deflects to the north where it is intercepted by the Pacific-Antarctic Ridge, and subsequently crosses the ridge at the Eltanin Fracture Zone (Gordon and Goldberg, 1970). The channeling of the Circumpolar Current through fracture troughs causes strong

erosive bottom currents within the Eltanin Fracture Zone (Gordon, 1966; Heezen et al., 1968). The winnowing produced by these bottom currents appears to influence the distribution of quartz which has been transported and released by icebergs incorporated into the Circumpolar Current, probably in the vicinity of the Ross Sea. Within the Eltanin Fracture Zone, the quartz distribution shows a tongue extending eastward in the same direction of the bottom currents (Fig. 8), which apparently are winnowing out the quartz-poor clays and leaving the quartz-rich coarser debris (Fisher, 1968).

Radiolarian Assemblage Distributions

The distribution patterns of fossil radiolarian assemblages in undisturbed ocean floor sediments reflects the geographic distribution of the different surface and subsurface water masses within the Pacific Ocean (Nigrini, 1970; Sachs, 1973; Moore, 1973b; Molina-Cruz, 1977a). In this study the distribution patterns of six major radiolarian assemblages, defined mathematically through "Q-mode factor analysis" (see Methods section), have also clearly delineated the near-surface water masses of the S.E. Pacific (Figs. 11 to 16).

The six mathematically defined assemblages (factors) account for 95.3% of the variability of the data considered in the factor analysis (Appendix 16). Maps of these factors group high values (> .5) into distinct regions. These radiolarian assemblages have been named

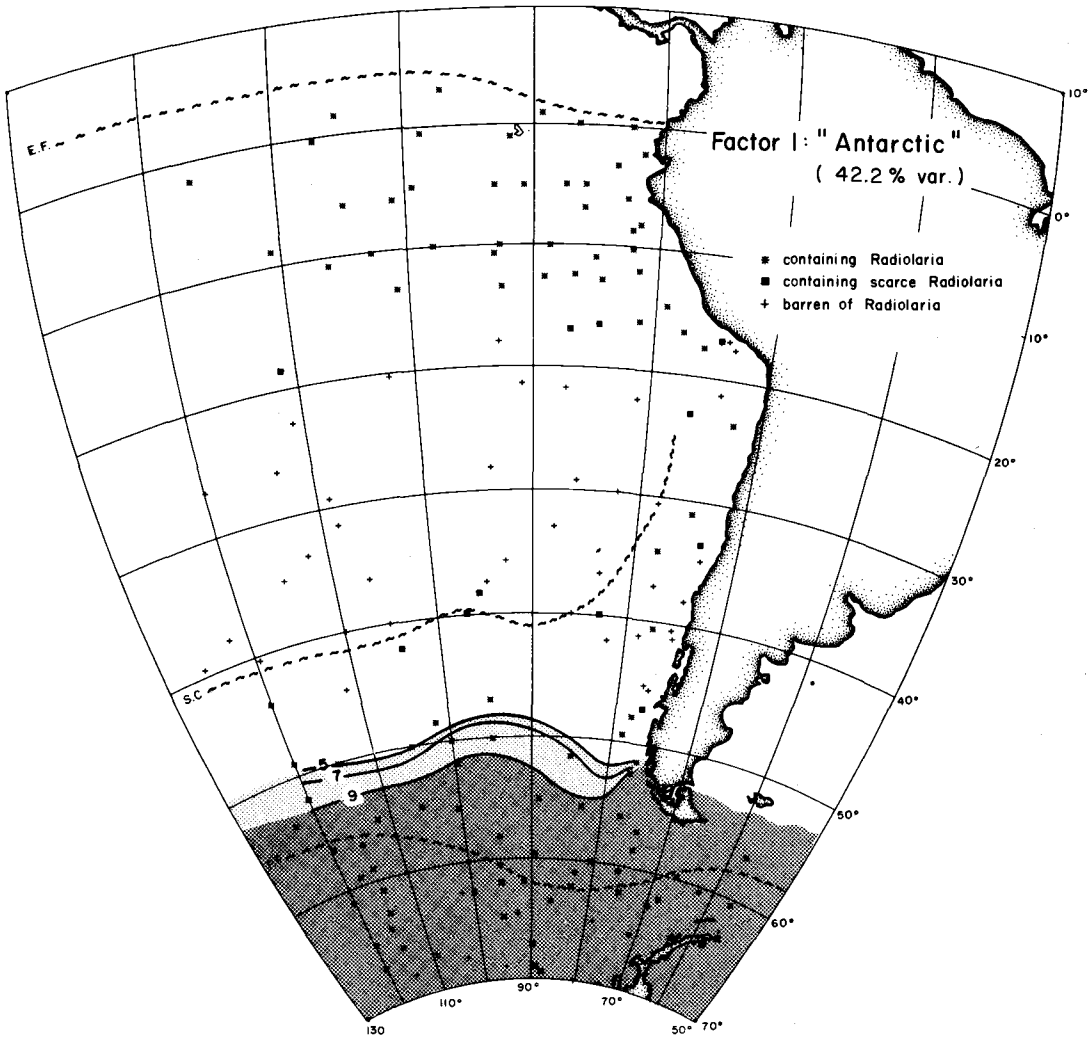

Figure 11. Distribution of the "Antarctic" factor (assemblage) in the surface sediments of the southeastern Pacific; expressed as factor loadings (*10).

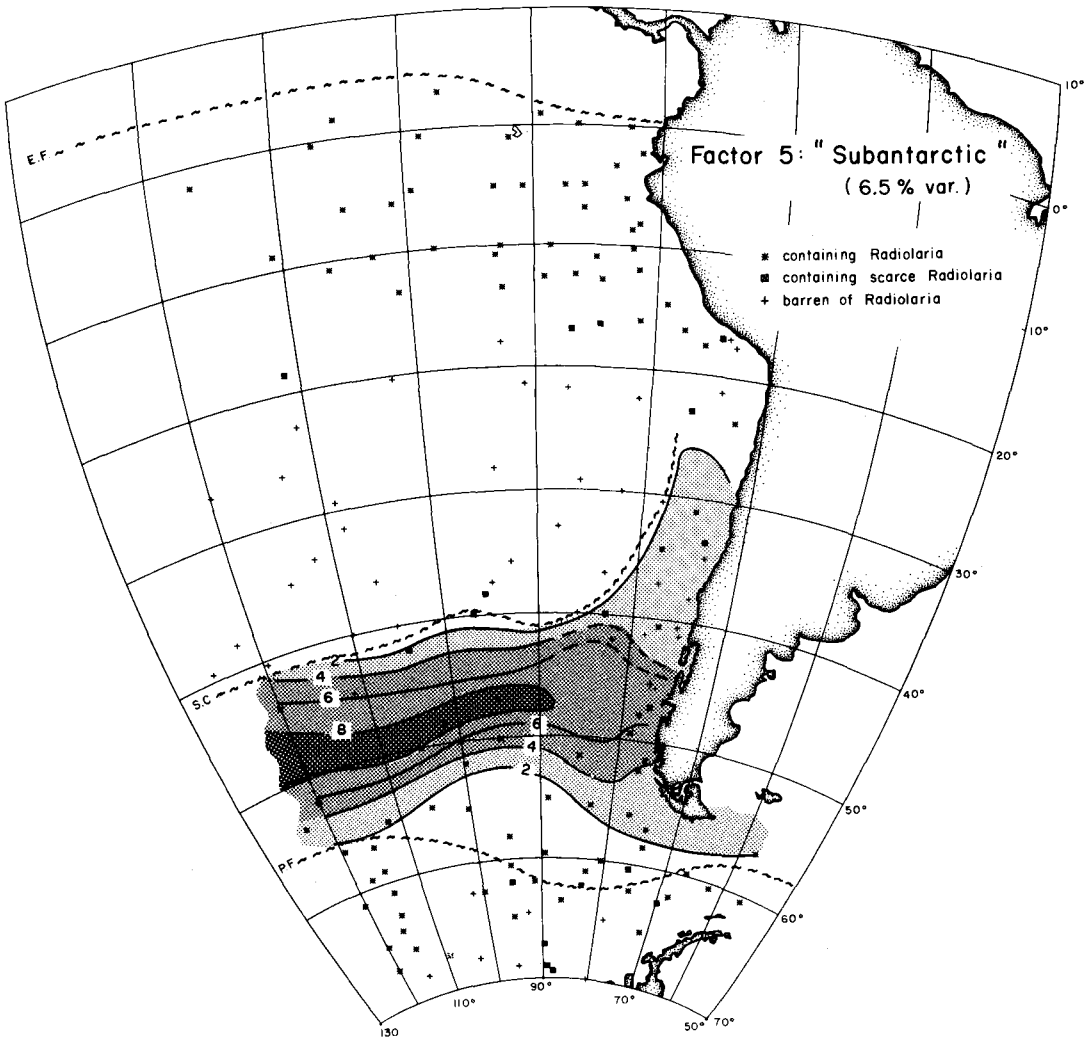

Figure 12. Distribution of the "Subantarctic" factor (assemblage) in the surface sediments of the southeastern Pacific; expressed as factor loadings (*-10).

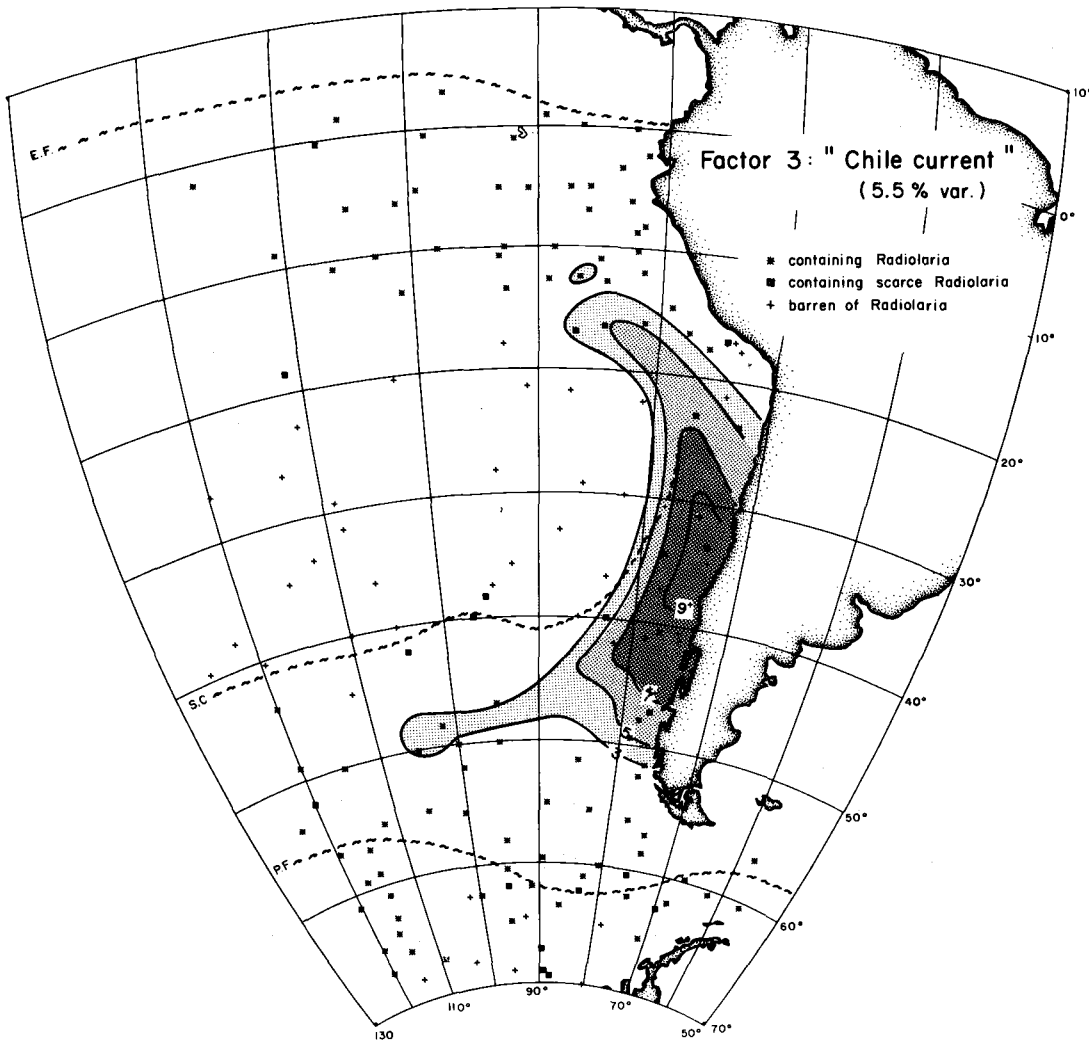

Figure 13. Distribution of the "Chile Current" factor (assemblage) in the surface sediments of the southeastern Pacific; expressed as factor loadings (*10).

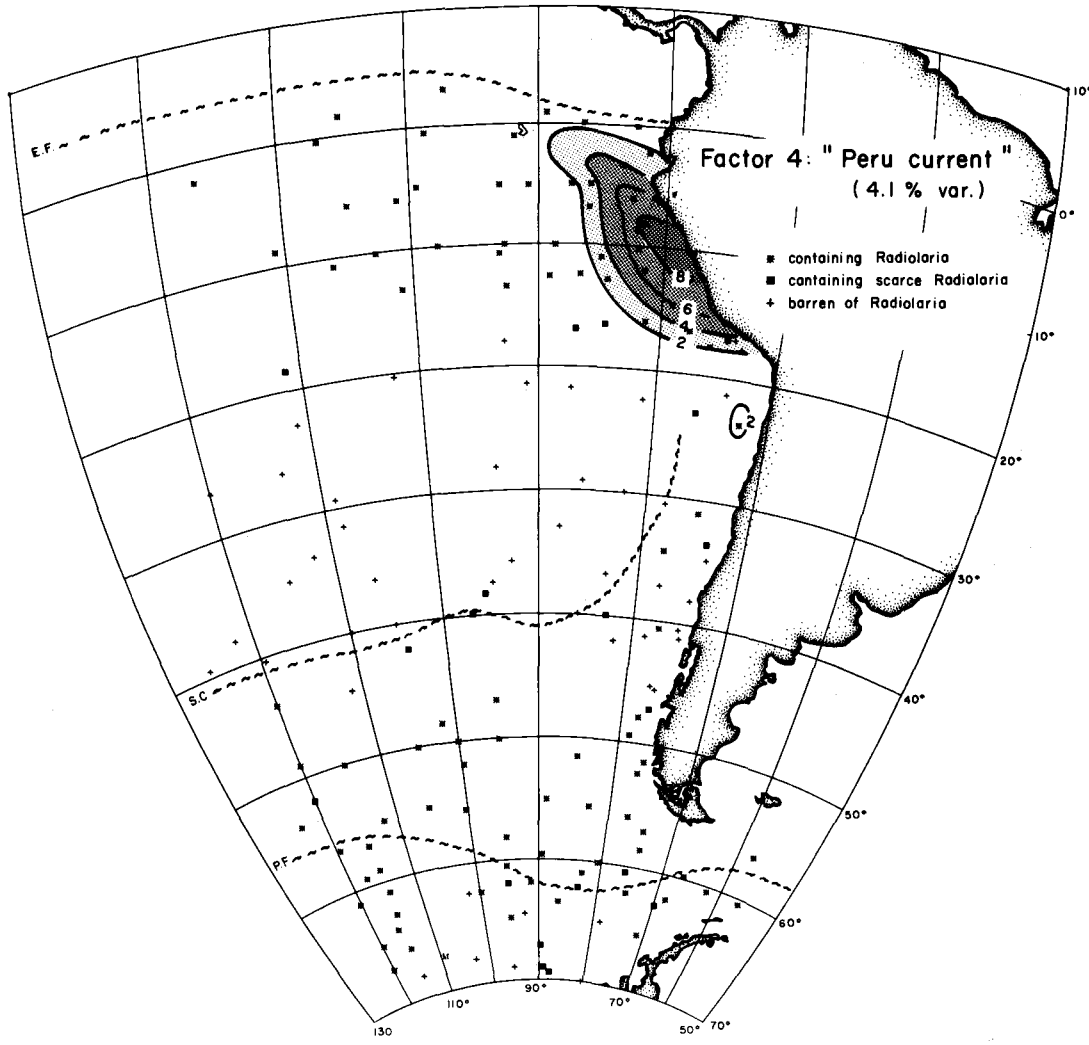

Figure 14. Distribution of the "Peru Current" factor (assemblage) in the surface sediments of the southeastern Pacific; expressed as factor loadings (*10).

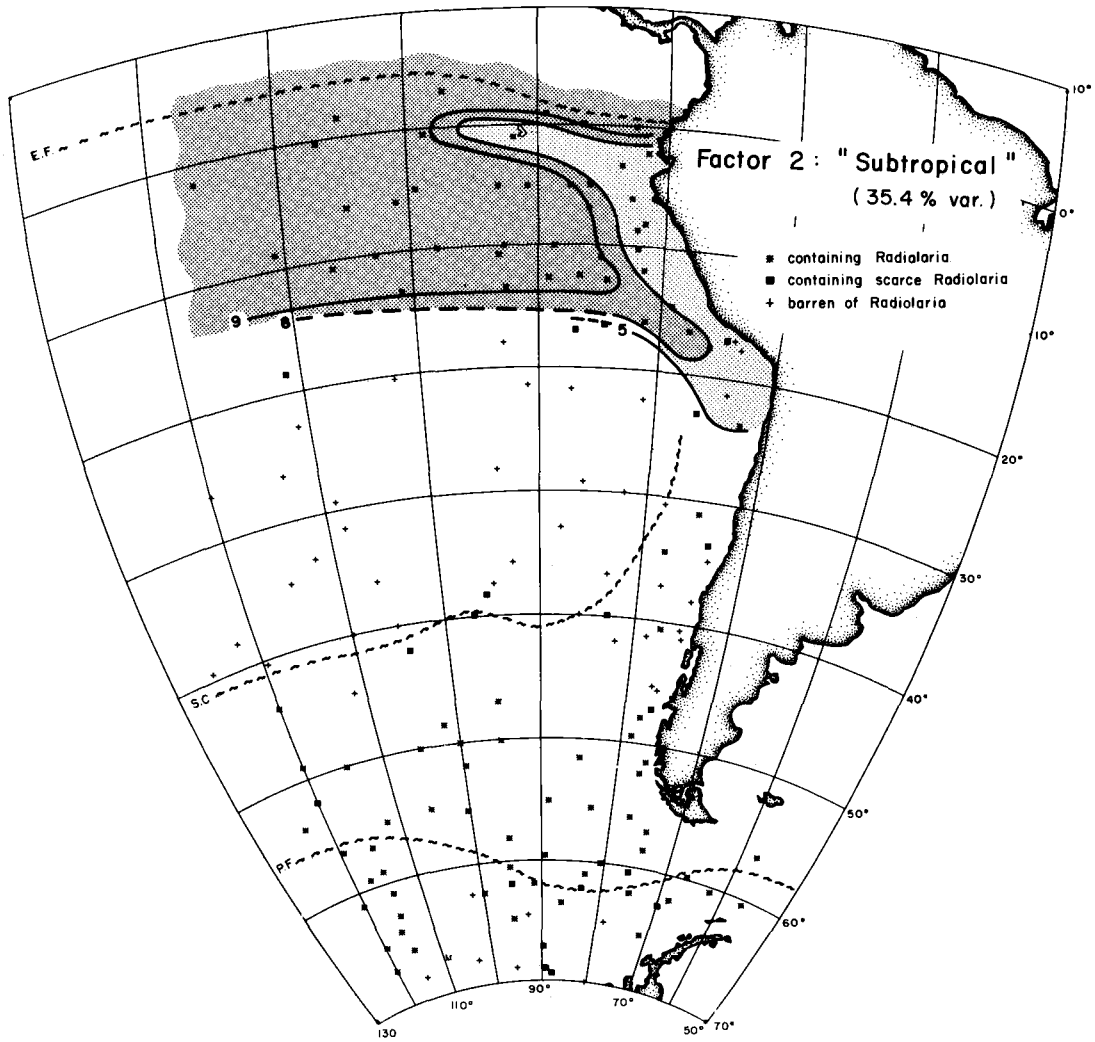

Figure 15. Distribution of the "Subtropical" factor (assemblage) in the surface sediments of the southeastern Pacific; expressed as factor loadings (*10).

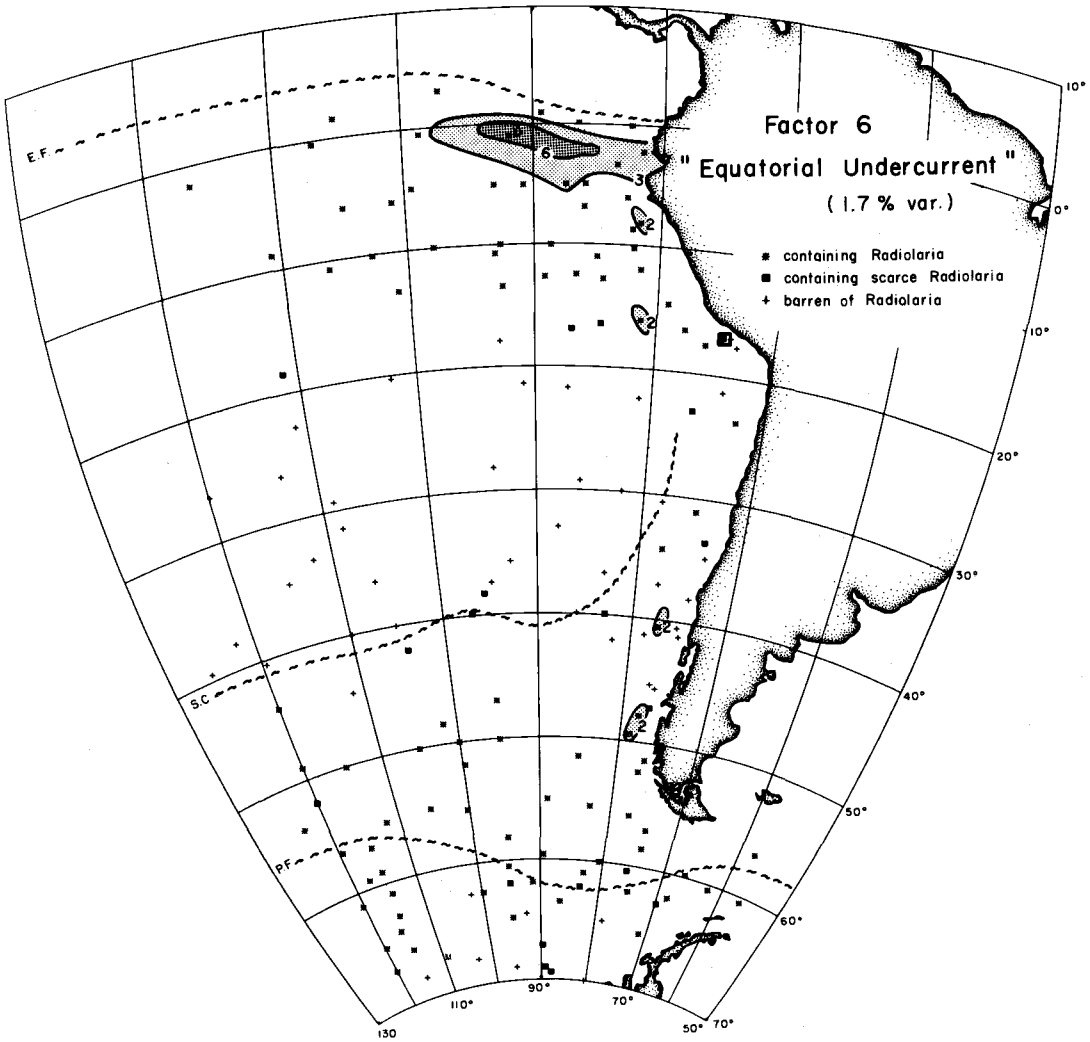

Figure 16. Distribution of the "Equatorial Undercurrent" factor (assemblage) in the surface sediments of the south-eastern Pacific; expressed as factor loadings (*10).

according to the prominent oceanographic features within the geographical area in which each factor dominates: 1) the "Antarctic" factor, 2) the "Subtropical" factor, 3) the "Chile Current" factor, 4) the "Peru Current" factor, 5) the "Subantarctic factor, and 6) the "Equatorial Undercurrent" factor.

The "Antarctic" factor accounts for most of the variance in the data (42.2%). Its distribution (Fig. 11) is dominantly to the south of 50°S latitude, where cool waters (< 8°C; see Fig. 1) associated with the circumpolar circulation prevail. The preference of this "Antarctic" assemblage for cool waters is expressed statistically in the correlation matrix (Appendix 20) which shows a strong inverse relationship between temperature and high values for this factor.

The 8°C sea surface isotherm undergoes little positional variation seasonally (Fig. 1). Consequently, it appears that this isotherm represents an ecological barrier which prevents the "Antarctic" assemblage from dwelling north of about 50°S latitude. However, it has been suggested (Hays, 1965; Lozano and Hays, 1976) that the "Polar front zone" (Gordon, 1971b) acts as an oceanographic barrier to the distribution of this radiolarian assemblage. In this study the distribution of the "Antarctic" factor extends as much as 5° latitude North of the mean position of the Polar front zone and appears to disagree with such a suggestion. However, it must be considered that the position of the Polar front zone within the geographical area studied here has not been well established (Gordon, 1971b and references therein); its proposed

boundaries varying by as much as 5°, latitude (Ostapoff, 1962a, 1962b).

The character of sedimentation and bottom circulation below the area of the Antarctic Circumpolar Current may also account for the discrepancy between the mean position of the Polar front zone and the northern edge of the geographical area dominated by the "Antarctic" factor. Because of the very low rate of deposition experienced in this area (about 3.5 mm/10^3 years, Ku et al., 1968), samples even 2 cm dowm from the top of the core locations may reflect Pleistocene environments rather than Holocene environments. In addition, bottom circulation (Figs. 3 and 4) is strong in the Southeast Pacific Basin (Heezen et al., 1968; Goodell et al., 1971). This circulation may be transporting radiolarian tests toward the north.

According to the scaled varimax factor scores (Appendix 15), the category makeup of the "Antarctic" factor is largely dominated by Antarctissa strelkovi (N50) and Antarctissa denticulata (N49); but Saccospyris antarctica (N48), Phormospyris stabilis antarctica (N14) and Lithelius (?) nautiloides (S58) also contribute significantly to the category makeup. The dominance of A. strelkovi and A. denticulata in the Antarctic environment has also been noted by Petrushevskaya (1967) and by Lozano and Hays (1976).

Although the distribution of the "Subantarctic" factor (Fig. 12) reflects the general geographical area occupied by the Subantarctic surface water mass (see the oceanographic setting), it appears that

this assemblage has preference for temperate waters; i.e., the waters in the northern portion of the Subantarctic region where temperatures range between 8 to 15°C (see Fig. 1). The distribution of the "Subantarctic" factor also follows Subantarctic waters as they split to form the equatorward Chile Current and the poleward Cabo de Hornos Current when reaching the South American coast (Fig. 2).

The "Subantarctic" factor accounts for 6.5% of the variability in the data. Its category makeup (Appendix 15) is principally characterized by the presence of Phorticium clevei (S56) and Heliodiscus asteriscus (S14). However, the occurrence of Echinomma delicatulum (S10) and Stylochlamydium asteriscus (S30) is also important.

Originating in the Subantarctic region, the Chile Current (Fig. 2) acquires its own oceanographic traits as it flows along the coast of South America, and then disappears in the subtropical region, mixing principally into the South Equatorial Current. Consequently, a distinctive radiolarian assemblage is found in the waters of the Chile Current: the "Chile Current" factor. This factor accounts for 5.5% of the variability in the data and although its distribution (Fig. 13) shows a tendency to follow the marginal circulation of the subtropical anticyclonic gyre, the distribution of its largest loadings (> 5) suggests that this radiolarian assemblage prefers the waters associated with the Chile Current. Since the Chile Current disrupts

the Subtropical Convergence, the distribution of the "Chile Current" factor is extended into the subtropical region, but does not reach the coast of Peru (Fig. 13). It leaves the coast at about 23°S latitude, thus supporting the suggestion that the Chile Current is actually distinct from the Peru Current (Wooster, 1970; Molina-Cruz, 1977a).

The category makeup of the "Chile Current" factor consists principally of Echinomma delicatulum (S10), Lithelius minor (S24), Stylatractus spp. (S51), Lamprocyclas maritalis polypora and L. maritalis ventricosa (N16), and Siphocampe aquilonaris (N33). Stylodictya validispina (S47), Axoprunum stauraxonium and Stylosphaera lithatractus (S50) are also important in the description of this factor.

The present study of the entire area occupied by the Chile Current has allowed a refinement of the species composition of the "Chile Current" factor previously defined by Molina-Cruz (1977a). Therefore, the makeup of the "Chile Current" factor shown in this study (Appendix 15) is slightly different than the one given in that reference. Furthermore, categories which are difficult to identify, such as S6 (Appendix 4) have not been employed in the factor analysis of this study.

The "Peru Current" factor accounts for 4.1% of the variance in the data. Its development is influenced by the coastal upwelling processes which feeds the Peru Current system with cool, nutrient rich waters (see the oceanographic setting). The distribution of the

"Peru Current" factor (Fig. 14) forms a narrow tongue along the Peruvian coast and shows the largest factor values in the region where the strongest coastal upwelling has been reported to occur (Wooster, 1970; Zuta and Guillen, 1970; Jordan, 1971). Seaward from this center the factor values decrease regularly.

The most important categories in the "Peru Current" factor are Polysolenia murrayana (S34) and Dictyophimus infabricatus (N24). Nevertheless, Cycladophora davisiana (N35) and Theoconus minythorax (N7) contribute significantly to this factor.

The "Subtropical" factor accounts for 35.4% of the variance in the data and dwells principally in the subtropical waters associated with the broad South Equatorial Current. The comparison of the distribution of the "Subtropical" factor (Fig. 15) with the distribution of the August sea surface temperature (Fig. 1) clearly suggests that this factor is highly correlated with sea surface temperature. This fact is supported by the correlation coefficients of the correlation matrix (R = .96 for August temperature and R = .954 for February temperature in Appenidx 20). Along the Peruvian coast and along the equatorial area to the east of the Galapagos Islands, the distribution pattern of the "Subtropical" factor shows a minimum which is the result of the warm subtropical waters being replaced by the relatively cool waters produced by upwelling processes.

The categories which dominate the makeup of the "Subtropical"

factor are: Tetrapyle octacantha and Octopyle stenozoa (S54), Ommatartus tetrathalamus (S23) and Theoconus minythorax (N7). Previously it was pointed out (Molina-Cruz, 1977a) that Liriospyris (?) toxarium A is also important in the category makeup of this factor; however, because of doubts in the identification of this category, it was not included in this study.

Accounting only for 1.7% of the variance in the data, the Equatorial "Undercurrent" factor is not as well defined as the other factors. Nevertheless, its distribution (Fig. 16) is coherent and coincident with some of the oceanographic features created by the undercurrent-countercurrent system within the S.E. Pacific. The Equatorial Undercurrent surfaces near, and to the east of the Galapagos Islands (Pak and Zaneveld, 1974; Molina-Cruz, 1977b), thus creating a particular environment in which species of the "Equatorial Undercurrent" factor prefer to dwell. The Peru Countercurrent and (or) the Peru Undercurrent flowing southward along the coast (Wyrtki, 1965, 1967; Wooster, 1970) carry (carries) equatorial waters probably as far south as 50°S latitude (Silva-Sandoval and Neshyba, 1977; Silva-Sandoval, 1978). Therefore, it is suggested that the patches of the "Equatorial Undercurrent" factor found along the Pacific coast of South America might be the product of occasional surfacing of the counter-undercurrent system. Such a surfacing has been suggested by Wyrtki (1963, 1965), Jones (1969)

and Taft et al. (1974).

There are a larger number of categories important to the description of the "Equatorial Undercurrent" factor than for the other factors (see Appendix 15): Lithostrobus (?) botrycyrtis, L. (?) lithobotrys and L. (?) seriatus (N18); Cycladophora davisiana (N35); Theoconus minythorax (N7); Stylodictya validispina (S47); Stylochlamydium asteriscus (S30); Spongurus spp. (S1); Eucyrtidium hexagonatum (N11), and Phormospyris stabilis scaphipes (N12).

The species makeup of each of the factors (Appendix 15) indicates that some individual radiolarian species may not be sensitive to special oceanographic conditions. This is the case with Echinomma delicatulum (S10); Stylodictya validispina (S47); Theoconus minythorax (N7), and Cycladophora davisiana (N35) which have appeared within more than one defined environment in this study. E. delicatulum (S10) has been found in the "Subantarctic" and "Chile Current" environments; S. validispina (S47) in the "Chile Current" and "Equatorial Undercurrent" environments; T. minythorax (N7) in the "Subtropical," "Peru Current" and "Equatorial Undercurrent" environments; and C. davisiana (N35) in the "Peru Current" and "Equatorial Undercurrent" environments.

V. DOWN-CORE STUDY

In the previous chapter it was shown that the quartz distribution pattern in the ocean-floor sediments reflects, in part, the wind circulation in the lower troposphere, while the radiolarian assemblages and the opal distribution patterns reflect the surface oceanic circulation. Thus, since the lower tropospheric wind circulation and the sea surface circulation are largely inter-related (Duxbury, 1971), it is expected that within the geological time the down-core records of quartz, opal, and radiolarian assemblages have fluctuated concurrently as a result of paleo-oceanographic events.

Six cores located along the Pacific coast of South America (Appendix 2) were available for down-core studies. However, large differences in deposition rate between the northern four cores and the southern two cores precluded the construction of a stratigraphic transect spanning the Pacific coast of South America. Based on oxygen isotope stratigraphy, the deposition rate of the northern four cores ranges between 0.84 cm/1000 yrs. and 9.6 cm/1000 yrs. (Appendix 14; Fig. 6). The deposition rate of the southern two cores is approximately 1.7 mm/1000 yrs. (Fig. 32). These rates agree with those found in neighboring cores studied by Ku et al. (1968). Consequently, the four northern cores were used in a $\delta^{18}O$-based stratigraphic transect (Fig. 6), and the two southern cores

were used to construct a biostratigraphic-based section (Fig. 32). The two southern cores will be considered separately in Chapter VII.

Down-core Quartz Records

According to the present quartz distribution pattern (Fig. 17), the locations of core V19-29 and core Y71-6-12 are under the influence of quartz input by the southern trade winds (Fig. 10), while core V15-53 and core RC15-61 are located in the vicinity of an area of strong runoff (near the mouth of the Bio-Bio River). Therefore, the down-core quartz fluctuations of cores V19-29 and Y71-6-12 are thought to record variations in the "character" of the eolian agent (the trade winds), while the down-core fluctuations of cores V15-53 and RC15-61 are thought to record variations in the amount of runoff. Furthermore, in both cases the following relationship is assumed: the stronger the intensity of the erosive agent, the larger the input of quartz.

The following inferences about paleo-circulation from the down-core quartz records of cores V19-29 and Y71-6-12 (Fig. 17) are suggested. During $\delta^{18}O$ stage 5, the trade winds were in general weak. Approximately 75,000 years ago (at the $\delta^{18}O$ 4/5 boundary), the trade winds intensified and continued to be intense during the $\delta^{18}O$ stage 4. The lower part of $\delta^{18}O$ stage 3 is a geological time of weak

QUARTZ

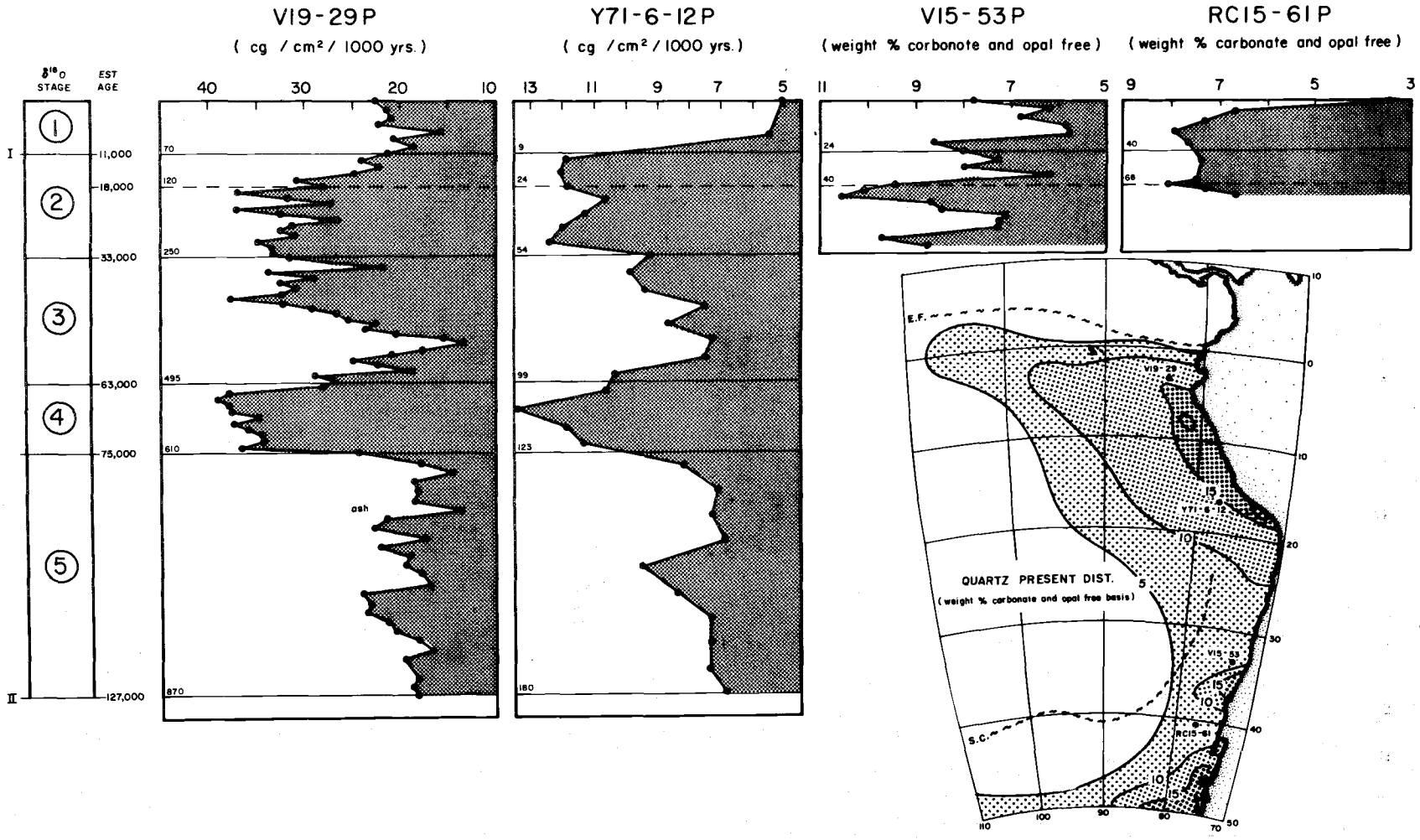

Figure 17. Down-core records of quartz content. The sample values were plotted down-core in accordance with the $\delta^{18}O$ based stratigraphic section shown in Figure 6.

trade winds, while the upper part of $\delta^{18}O$ stage 3 and $\delta^{18}O$ stage 2 experienced some of the more intense trade winds of the last 75,000 years (Molina-Cruz, 1977b). The intensification of the trade winds at this time appears to have occurred together with contraction and shifting to the north of the center of the subtropical anticyclonic gyre (Luz, 1973). The down-core quartz records of the two southern cores shown in Figure 17 (V15-53 and RC15-61) suggest that in their location, during $\delta^{18}O$ stage 2, runoff was strongly increased as a result of a shifting to the north of the region of high precipitation (Groot and Groot, 1966; Scholl et al., 1970; Paskoff, 1977). The onset of the modern conditions occurs about 11,000 years ago.

Down-core Radiolarian Assemblage Records

It is generally agreed that some water masses can be characterized by the species makeup of their planktonic assemblages (Schott, 1935). Therefore, it has been demonstrated that the remains of Radiolaria in the ocean-floor sediments of this region reflect the geographic distribution of the different surface and subsurface water masses (see previous chapter). If such a reflection has not been masked by dissolution of the micro-organisms or by disturbance of the sediments due to turbidity or bottom currents, and if the ecological response of the species has dominated any evolutionary response, it is expected that geographic shifting of the different water masses

will be recorded in the sediment column. Through classification analysis it is possible to compare the composition and distribution of the down-core radiolarian assemblages with those of the modern sediments defined by the Q-mode factor analysis (see Methods section).

The communalities (see Methods section) for core V19-29 (Fig. 18) are generally larger than .6; however, their tendency for decreasing at $\delta^{18}O$ stage 5 suggests that during this geological time the invasion or development of a radiolarian assemblage not found presently in the studied area was experienced at this location. Since core V19-29 is located in the northern extreme of the studied area, the possibility of invasions of waters of the Pacific North Equatorial Countercurrent must not be disregarded. Changes of assemblages because of winnowing which probably occurs near to core V19-29 location (Fig. 4; Lonsdale and Malfait, 1974) may also affect communalities.

Core Y71-6-12 is at the middle of the studied area and is apparently shielded from bottom disturbances; it is on the top of the Nazca Ridge and to the west of the Peru-Chile Trench which traps more of the terrigenous input. Thus, the communalities of core Y71-6-12 are generally "good" (>.8) all the way down.

The low communalities (Fig. 18) as well as the anomalous $\delta^{18}O$ values (Fig. 6) at the top of the core V15-53 indicate that the top of this core is disturbed. Microscopic analysis of samples from

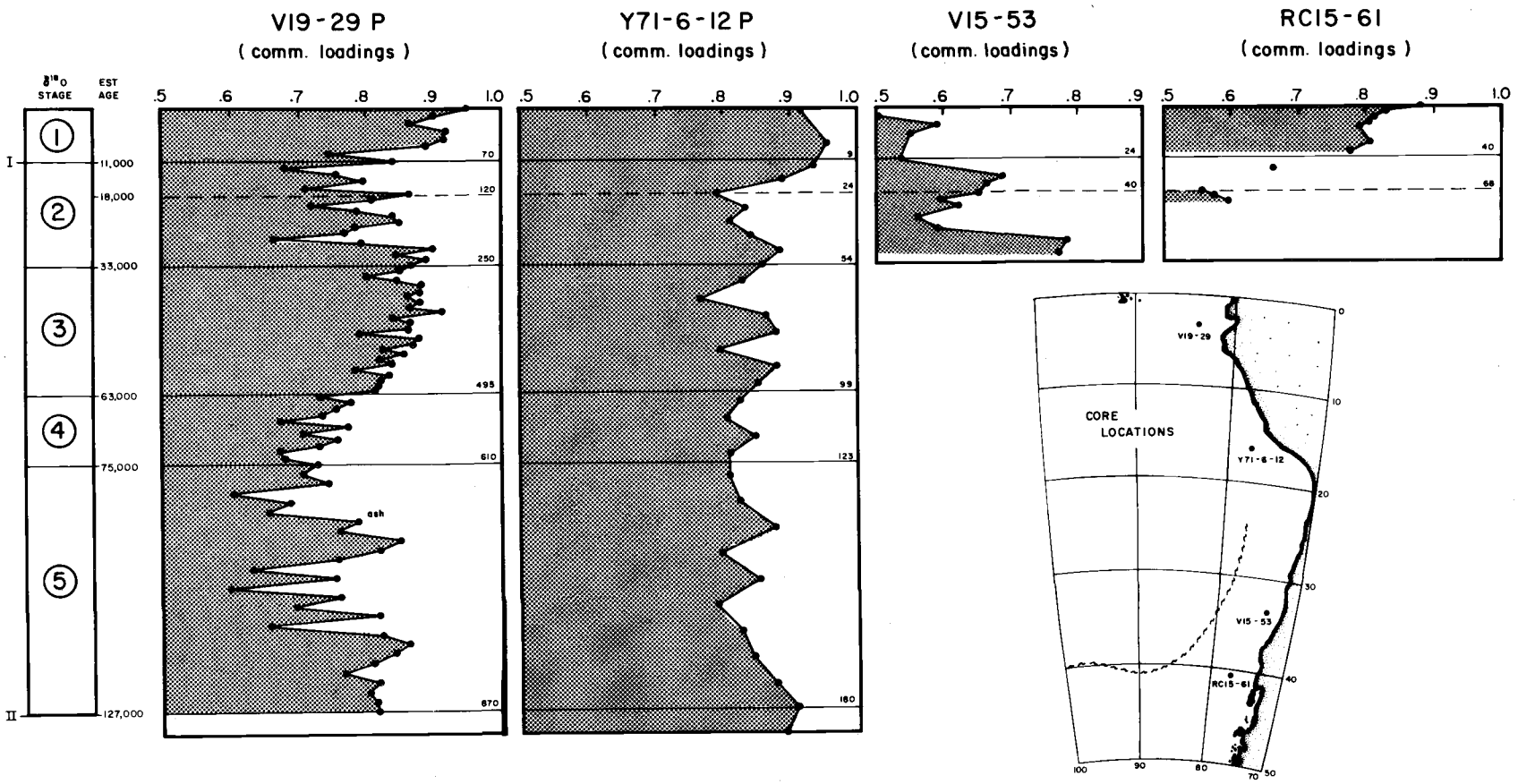

Figure 18. Down-core records of communalities. The sample values were plotted down-core in accordance with the $\delta^{18}O$ based stratigraphic section shown in Figure 6.

core RC15-61 shows that Radiolaria are strongly diluted by terrigenous material at this location. This is particularly true within $\delta^{18}O$ stage 2, where Radiolaria were not found at some levels. The low communalities and the large amount of terrigenous debris observed in core RC15-61 (Fig. 18) suggest that the increase of terrigenous supply occurring at this location during stage 2 (see down-core quartz record section) produced turbidity currents which disturbed the sediments. Therefore, the factor loadings for samples from stage 2 in this core must be considered with caution.

Figure 19 suggests that the subantarctic surface waters extended farther to the north, into the region of the Chile Current and the subtropical southeastern Pacific, during most of the last 127,000 years. At both Termination II (about 127,000 years ago) and I (about 11,000 years ago), just preceding the warm $\delta^{18}O$ stages 5 and 1, there is a marked decrease of this factor.

Major incorporation of subantarctic surface water into the Chile Current might result from the intensification of the circulation around the anticyclonic gyre; however, as was inferred from the quartz records (Fig. 17), there is evidence of stronger atmospheric circulation only for $\delta^{18}O$ stages 4, upper 3 and 2. Thus, it appears that another mechanism also causes variation in the incorporation of the subantarctic water mass into the Chile Current. The farther south the position of the core of the West Wind Drift, the larger is the

FACTOR 5: "SUBANTARCTIC"

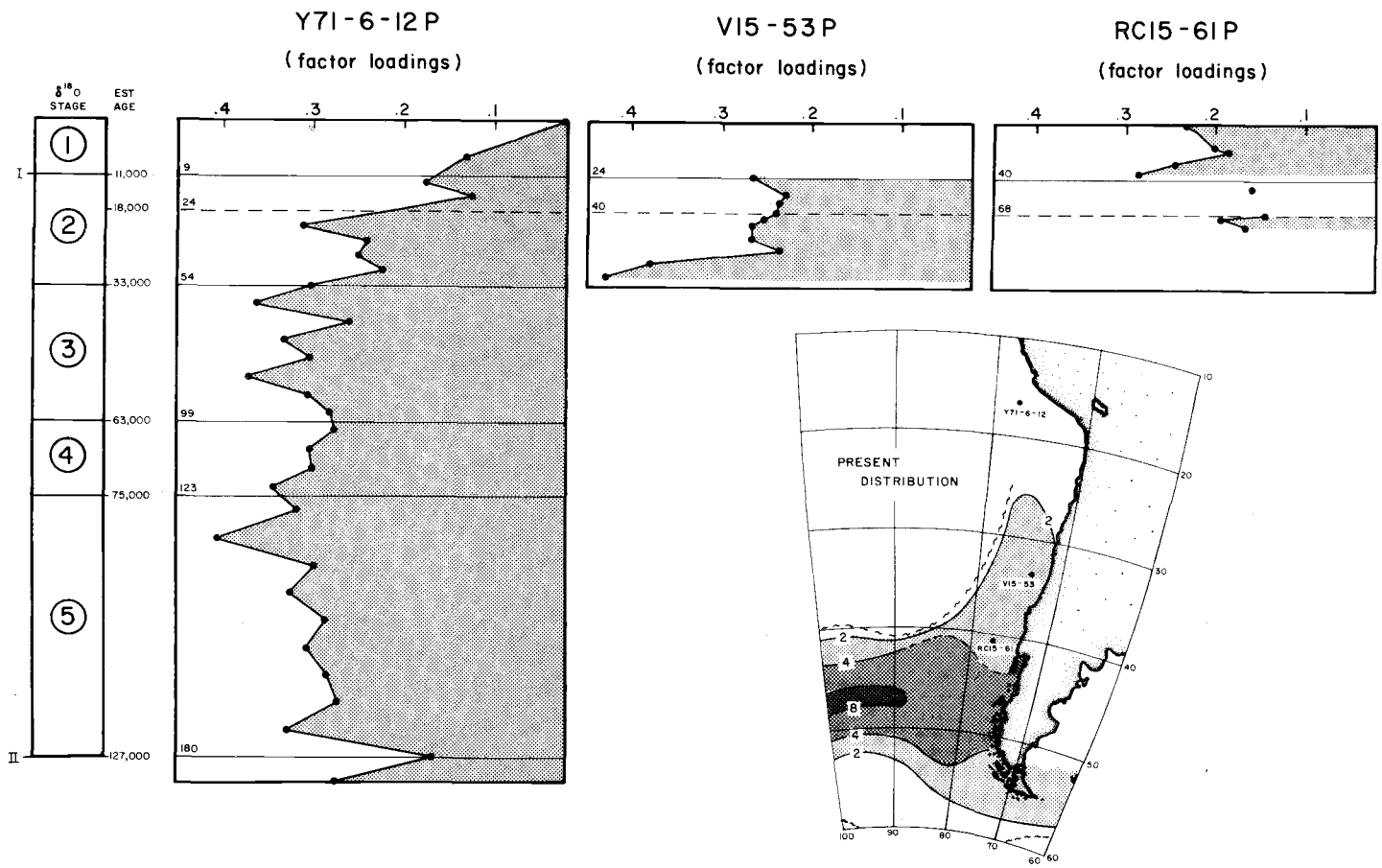

Figure 19. Down-core records of the "Subantarctic" factor. The sample values were plotted down-core in accordance with the $\delta^{18}O$ based stratigraphic section shown in Figure 6.

input of subantarctic water through the Drake Passage; and consequently the less input of subantarctic water into the Chile Current. Therefore, if the belt of the West Wind Drift is shifted north of its present position, it is possible to incorporate a larger amount of subantarctic water in the Chile Current. Such shifts in westerlies and their associated flow might be associated with high latitude changes in temperature and ice cover.

The down-core records of the "Chile Current" factor (Fig. 20) trend similarly to the down-core records of the "subantarctic" factor. For the last 127,000 years, the only time in which the Chile Current conditions appear to be similar to the conditions of stage 1 and late stage 2 was at the $\delta^{18}O$ stage boundary 5/6. Also, the down-core records of the "Chile Current" factor suggest a northward shift in the position of the anticyclonic gyre during $\delta^{18}O$ stages 2 to 5. Factor values similar to those presently found near the core of the surface water mass associated with the Chile Current were present at the location of Y71-6-12 (Fig. 20) from early $\delta^{18}O$ stage 5 to mid $\delta^{18}O$ stage 2. The center of such a water mass is presently about 12° latitude south of the location of core Y71-6-12. The "Chile Current" factor values of cores V15-53 and RC15-61 were decreased during the $\delta^{18}O$ stage 2 as the dominance of the Chile Current water mass was shifted to the north of these cores.

Along the Peruvian coast, coastal upwelling processes not only

FACTOR 3: "CHILE CURRENT"

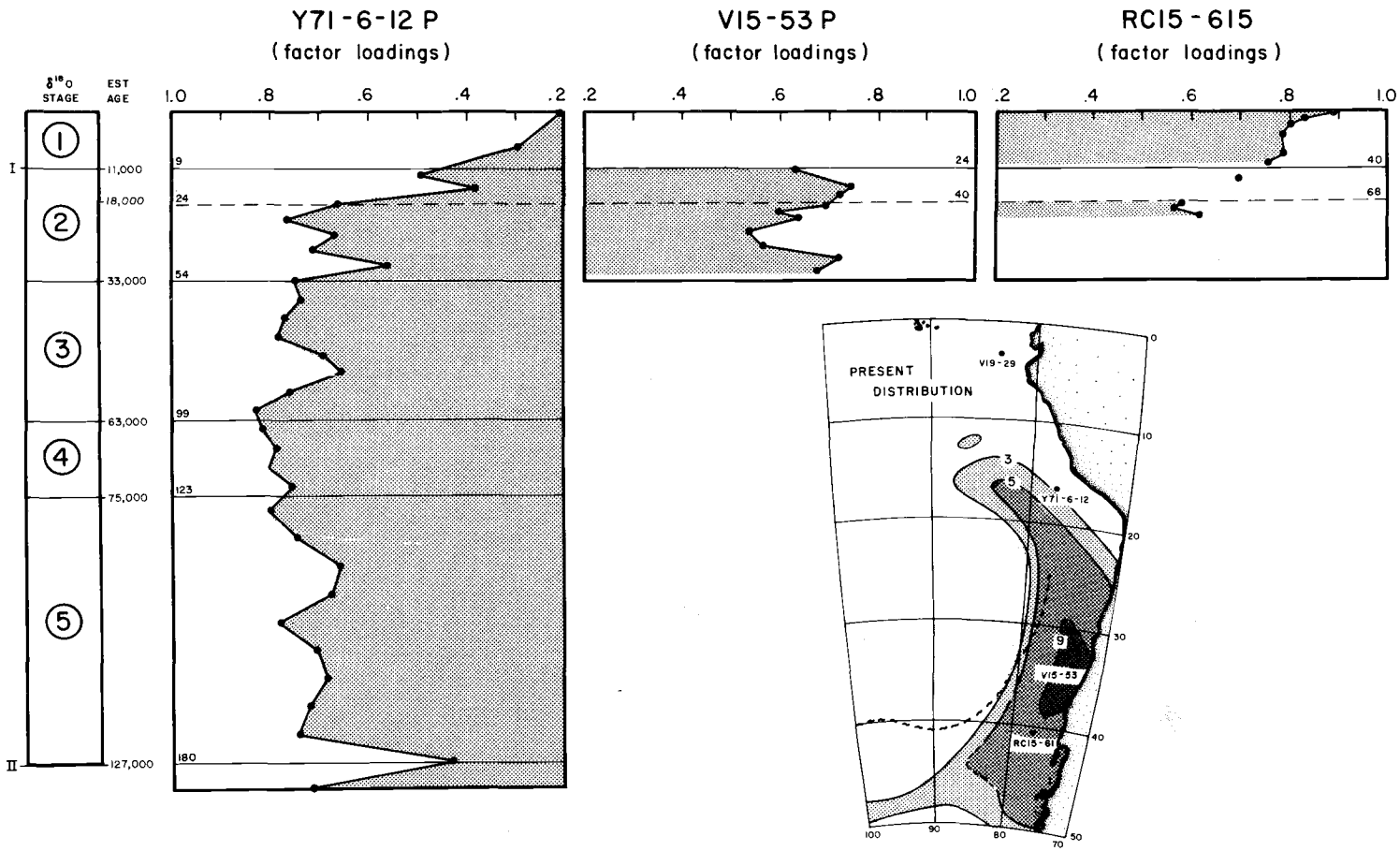

Figure 20. Down-core records of the "Chile Current" factor. The sample values were plotted down-core in accordance with the $\delta^{18}O$ based stratigraphic section shown in Figure 6.

sustain high primary productivity and influence the development of the "Peru Current" factor, but also feed the Peru Current system (see oceanographic setting). Since coastal upwelling is related to the intensity and direction of the Trade Winds, it is expected that the trend of the down-core "Peru Current" factor records (Fig. 21) would support the paleo-oceanographic inferences made on the basis of the down-core quartz records (Fig. 17). In general, $\delta^{18}O$ stages 5, 3 and 1 have been times of weak trade winds; similarly the "Peru Current" factor is poorly developed at these geological times (Fig. 21). Stages 4 and 2 are times of stronger trade winds. We have evidence of a good development of the "Peru Current" factor at $\delta^{18}O$ stage 2 but not at the $\delta^{18}O$ stage 4. In order to explain such disagreement, it is necessary to consider the position and direction of the trade wind field in addition to its strength. Wyrtki (1974b) has shown that the development of each of the currents which constitute the Equatorial circulation system is more dependent on the position of the trade wind field than on the intensity of this wind field. Thus, it is suggested that during $\delta^{18}O$ stage 4 the trade winds were more perpendicular to the coast than during $\delta^{18}O$ stage 2. This would intensify the westward deviation of the Chile Current and deliver large amounts of quartz to deep-sea sediments, but would not produce strong coastal upwelling (Molina-Cruz, 1977b).

The down-core record of the "Peru Current" factor in

FACTOR 4: "PERU CURRENT"

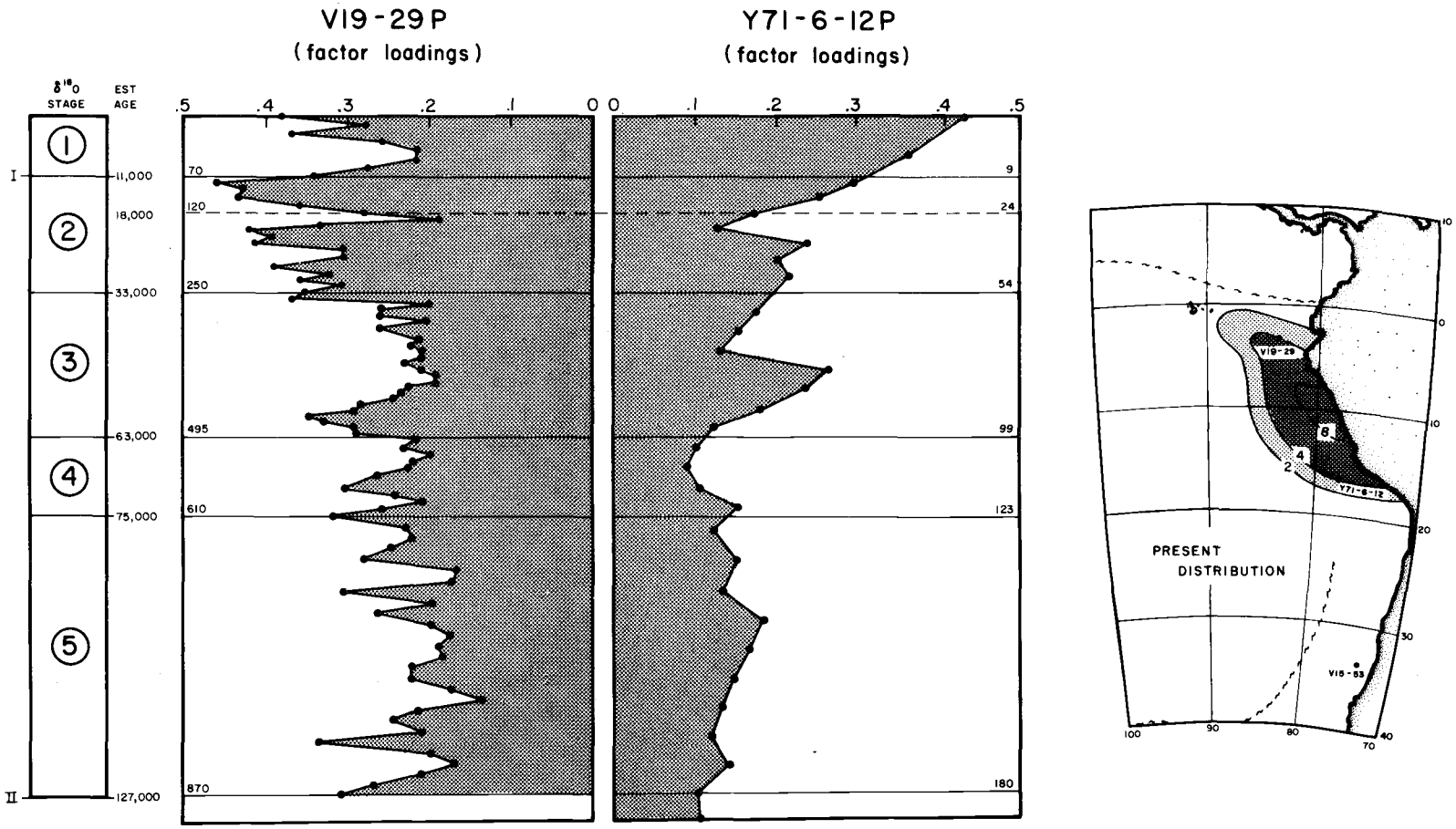

Figure 21. Down-core records of the "Peru Current" factor. The sample values were plotted down-core in accordance with the $\delta^{18}O$ based stratigraphic section shown in Figure 6.

Y71-6-12 also suggests that the region of coastal upwelling was displaced further north during $\delta^{18}O$ stages 5 to 2 than during $\delta^{18}O$ stage 1.

The coastal circulation of the Chile and Peru currents as well as surfacing of the Equatorial Undercurrent inhibit the "Subtropical" factor from reaching the Peruvian coast (see previous chapter). Therefore, the down-core records of the "Subtropical" factor (Fig. 22) depict this relationship through time. In general, when the Chile Current (Fig. 20) has intensified or shifted its geographical position to the north, invading the Y71-6-12 location, the "Subtropical" factor has retreated from the coast; i.e., during most of the last 127,000 years, but not at the $\delta^{18}O$ stage 5/6 boundary nor during late stage 2 and stage 1. The circulation at the site of core V19-29 is more complex, since this location not only "feels" the coastal circulation of the Peru Current but also the eastward flow and surfacing of the Equatorial Undercurrent. Consequently, it appears that the "Subtropical" factor has been important at the V19-29 location when neither the Peru Current (Fig. 21) nor the Equatorial Undercurrent (Fig. 23) flowed strongly; i.e., during $\delta^{18}O$ stages 5 and 1. Nevertheless, during $\delta^{18}O$ stage 2, although the "Peru" and "Equatorial" factors are important, the "Subtropical" factor is too. This fact suggests strong mixing of water masses near the V19-29 site, at this particular time.

FACTOR 2: "SUBTROPICAL"

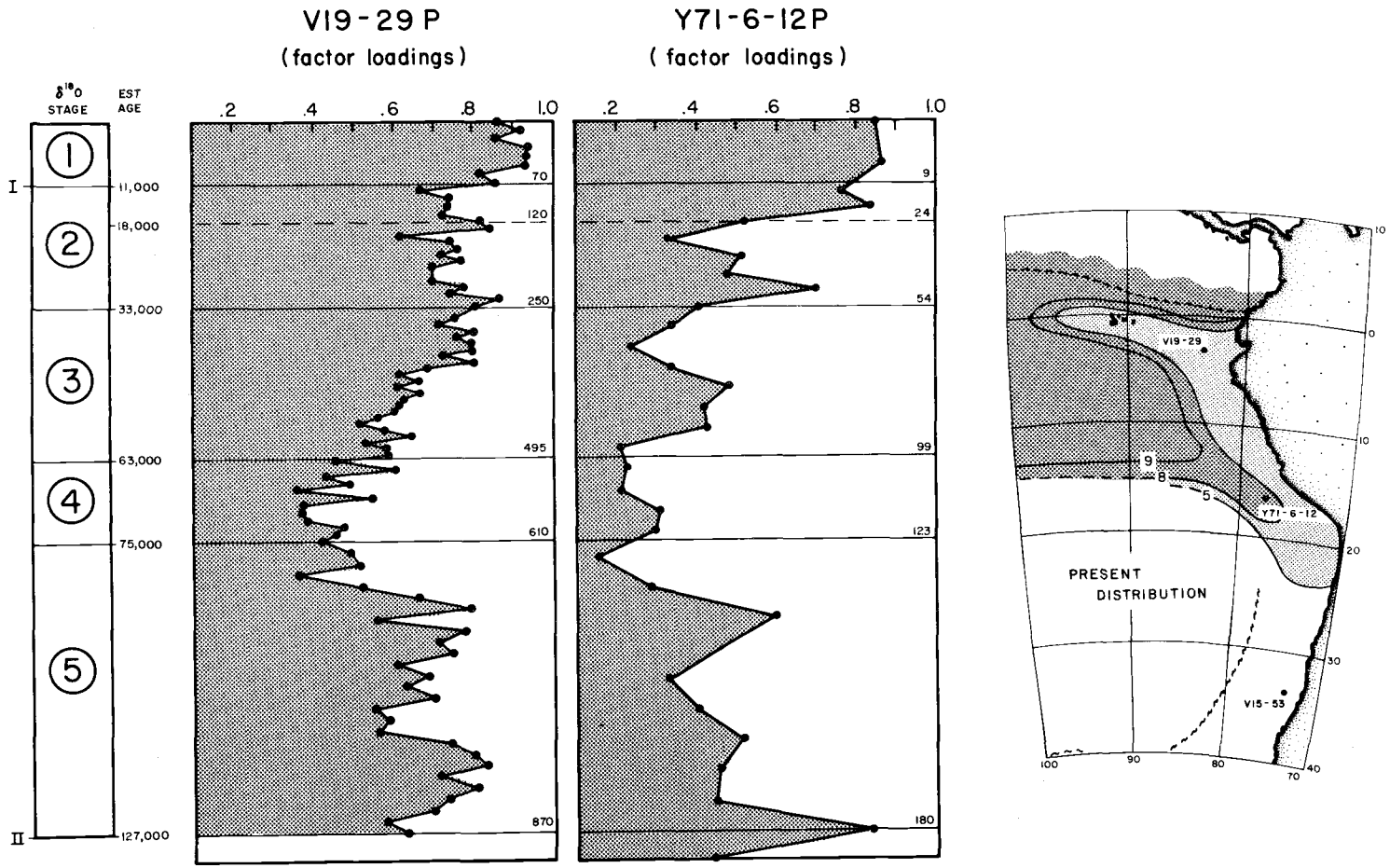

Figure 22. Down-core records of the "Subtropical" factor. The sample values were plotted down-core in accordance with the $\delta^{18}O$ based stratigraphic section shown in Figure 6.

FACTOR 6: "EQUATORIAL UNDERCURRENT"

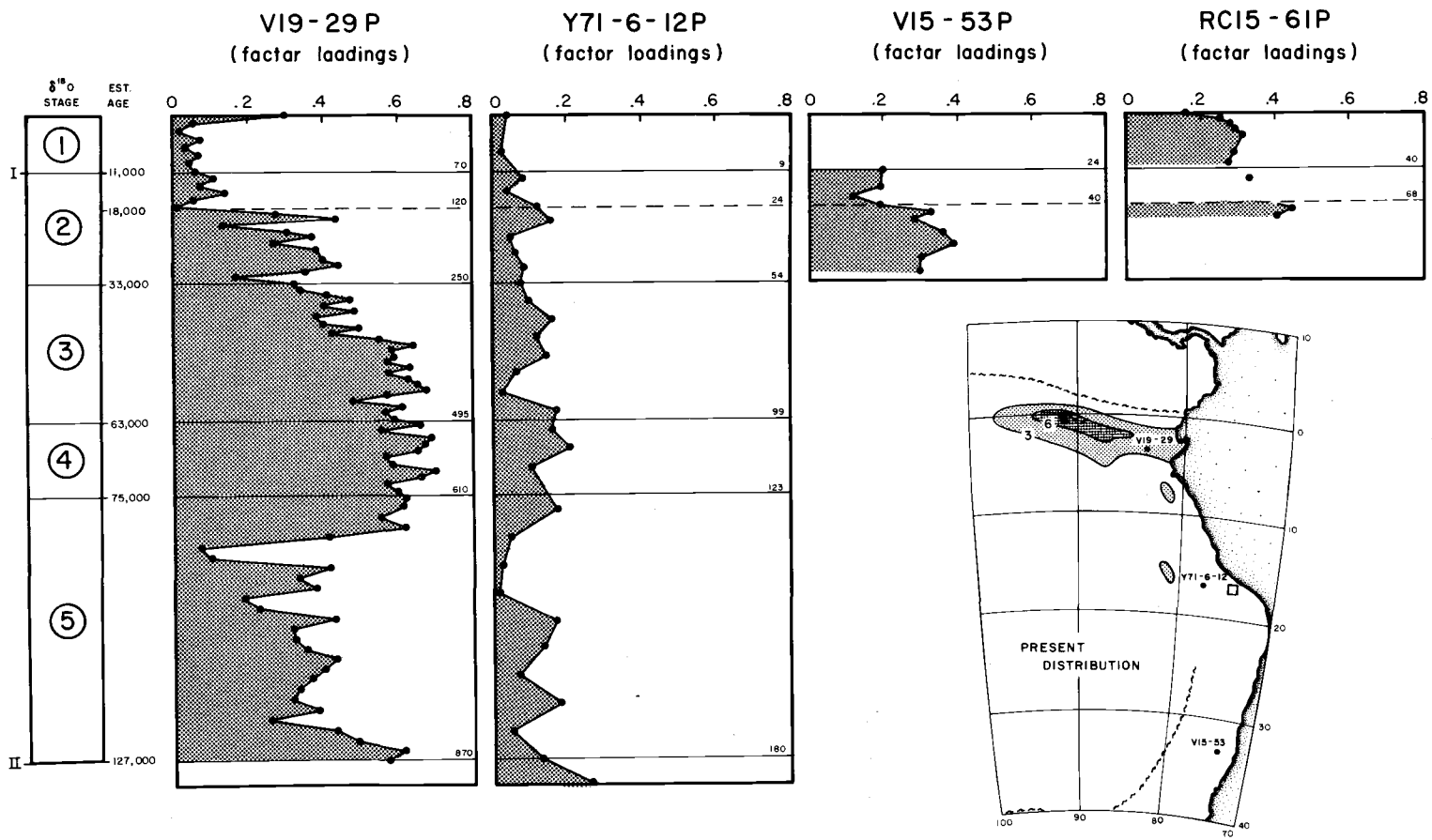

Figure 23. Down-core records of the "Equatorial Undercurrent" factor. The sample values were plotted down-core in accordance with the $\delta^{18}O$ based stratigraphic section shown in Figure 6.

Although the down-core records in Figure 23 represent variations in the dominance of the fauna associated with the Equatorial Undercurrent, it should be noted that these records also suggest the "mechanisms" by which the undercurrent reaches the surface and is thus able to influence the fauna. Variations in the strength of the Equatorial Undercurrent with time is poorly documented over long time periods (see the oceanographic setting). However, it is expected that in order to maintain continuity the strength of the undercurrent should vary more or less in phase with the South Equatorial Current (Wyrtki, 1967, 1974a). Nevertheless, the means by which the Equatorial Undercurrent surfaces are rather complex, since it has been suggested to involve either strong trade winds or markedly reduced trade winds.

It is known that the Equatorial Undercurrent occasionally surfaces (Cromwell et al., 1954; Wyrtki, 1963, 1965, 1967; Pak and Zaneveld, 1974); however, there are very few studies of the "mechanisms" by which this undercurrent reaches the surface. Jones (1969) suggested that surfacing of the Equatorial Undercurrent is the result of release of the prevailing westward surface wind stress. However, Taft et al. (1974) found a strong eastward Equatorial Undercurrent, even though strong westward surface winds were present. They suggested that the Undercurrent was brought to the surface because of intense equatorial divergence.

Noting that the observations of the surfacing of the Equatorial Undercurrent made by Jones (1969) were near the Galapagos Islands, while those made by Taft et al. (1974) were at 150°W longitude (far west of the Galapagos Islands) the hypothesis below (made by Molina-Cruz, 1977b) appears to hold. In the equatorial region to the east of the Galapagos Islands the northern boundary of the southern trade wind field trends northwest-southeast (Fig. 10), while the equatorial region to the west of the Galapagos Islands is normally under the influence of the southeastern trades. Thus, because of Ekman transport, upwelling of the Equatorial Undercurrent could be expected to occur to the west of the Galapagos Islands; where strong winds, more nearly parallel to the Equator, cause divergence. However to the east of the Galapagos, where atmospheric and oceanic circulation is more complex, surfacing of the Equatorial Undercurrent occurs when the S.E. trades, and consequently the Peru Current, are weaker. In summary, when the S.E. trades and surface circulation are intense, the surfacing of the undercurrent is increased to the west of the Galapagos Islands, while to the east of the islands it is diminished. The opposite occurs during weak S.E. trades and diminished surface circulation.

Intense mixing of water masses occurs to the east of the Galapagos Islands. Here the "cool" waters from the coastal upwelling area (Fig. 14) and those associated with the surfacing of the

Equatorial Undercurrent near the Galapagos (Fig. 16), often form an oceanic front (Pak and Zaneveld, 1974). This oceanic front (called herein the Galapagos front) develops and is shifted within this region, presumably in accordance with the position and intensity of the trade winds and currents of the mixed-layer (Wooster, 1970; Pak and Zaneveld, 1974). Core V19-29 is located within the region influenced by this oceanic front (Fig. 23) and thus has recorded the development and shifting of the Galapagos front through time.

It appears the Galapagos front was centered close to the site of core V19-29 at the $\delta^{18}O$ stage 5/6 boundary. Later, in early stage 5, the center of this front shifted northeastward to near its present position. This was concurrent with a shift to the north of the Chile Current environment (Fig. 20). During $\delta^{18}O$ stage 4, southeast trade winds stronger and more nearly parallel to the equator, even to the east of the Galapagos Islands (see page 66), enhanced surfacing of the Equatorial Undercurrent (through divergence); this in turn promoted dominance of the Equatorial undercurrent factor. In early stage 3, the dominance of the Equatorial Undercurrent factor at V19-29 location was as large as it was during stage 4; however, at early stage 3 surfacing of the Undercurrent was promoted by weak trade winds, as suggested by the quartz record (Fig. 17). Furthermore, during early stage 3, it is probable that the Galapagos front was centered close to the V19-29 site. During late stage 3 and

stage 2, strong trade winds drove strong mixed-layer water circulation, in particular coastal upwelling (Fig. 21). This produced a stronger development of the Galapagos front (and consequently water masses mixing) and centered it probably close to its present position.

Down-core Opal Records

It has been shown that the amount of opal in the sediments of the subtropical southeastern Pacific is related to the abundance of the radiolarian assemblage representing the Equatorial Undercurrent (Pisias, 1974; Molina-Cruz, 1977a). Thus it is not surprising to find that the down-core records of the opal concentrations and those of the "Equatorial Undercurrent" factor have a similar trend (Fig. 24). It is also observed that high concentrations of opal occur both during times when the Equatorial Undercurrent - South Equatorial Current and atmospheric circulation were intensified (e.g., stage 4) and during times when the surface winds (represented by the quartz record; Fig. 25) were diminished, allowing surfacing of the Equatorial Undercurrent to the east of the Galapagos Islands (e.g., early stage 3).

Down-core Records of Sea Surface Paleo-temperatures

One great advantage of the "transfer function technique" (Imbrie and Kipp, 1971; see evaluation of the micropaleontological

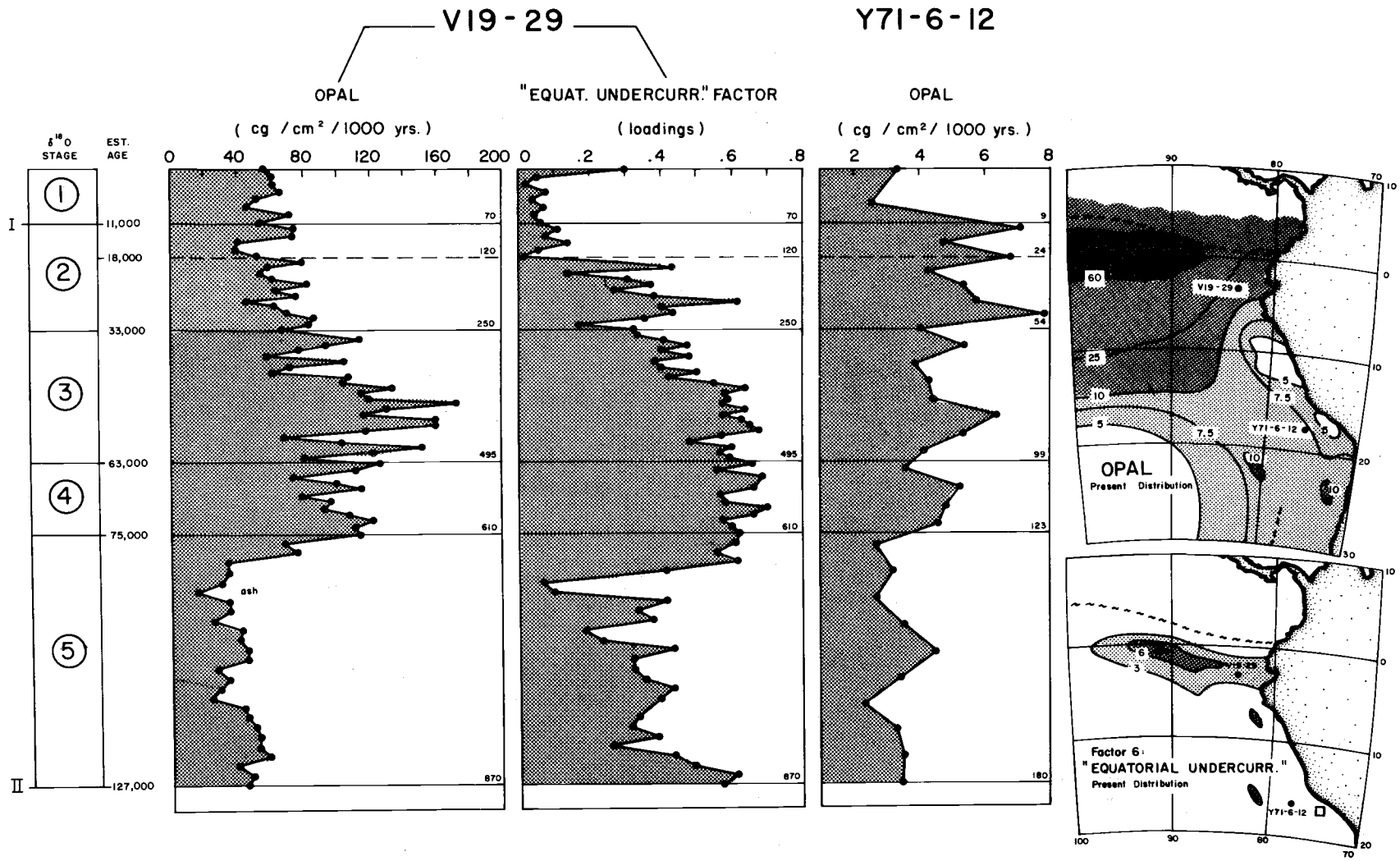

Figure 24. Down-core records of opal content and of the "Equatorial Undercurrent" factor. The sample values were plotted down-core in accordance with the $\delta^{18}O$ based stratigraphic section shown in Figure 6.

CORE V19-29P

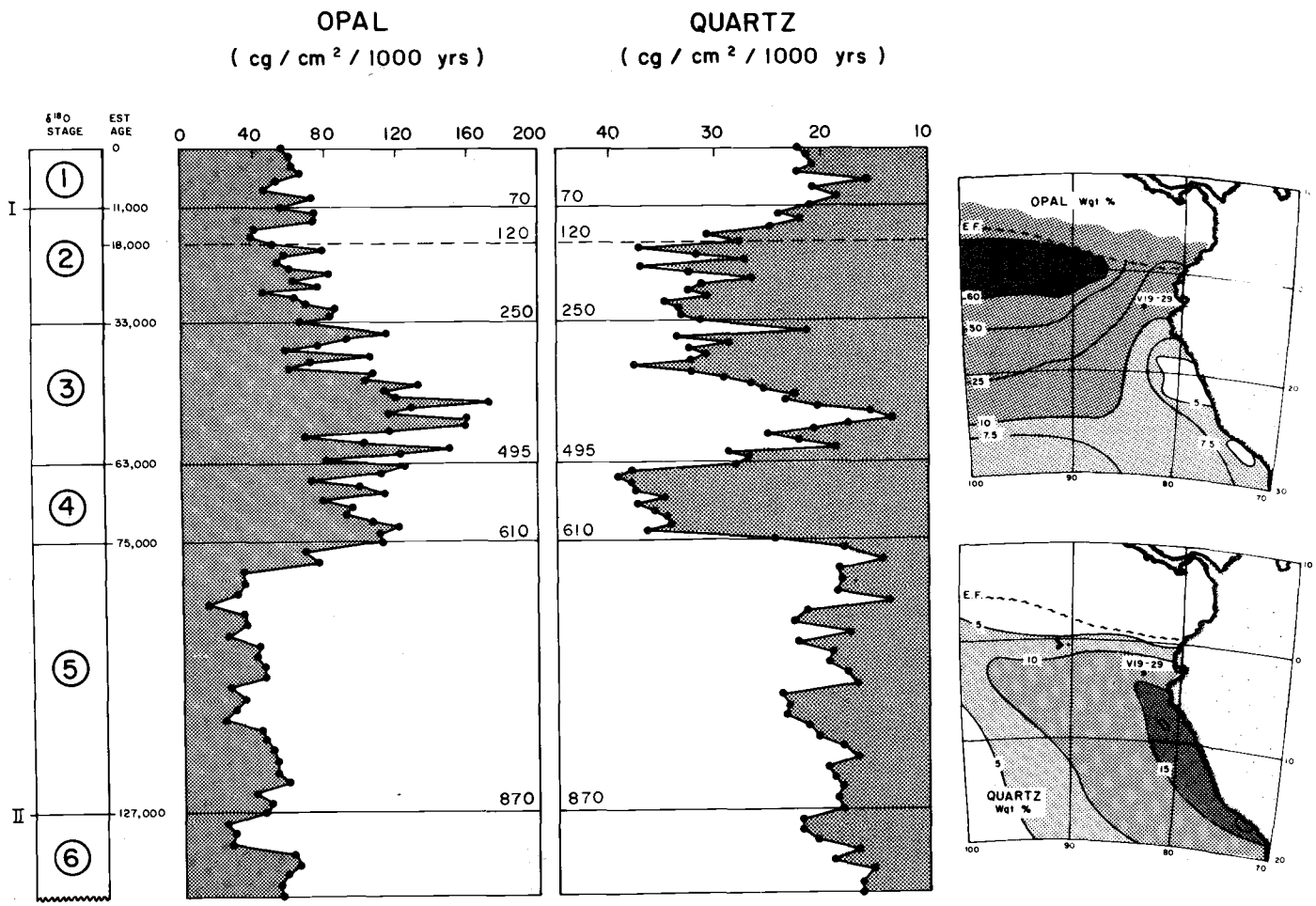

Figure 25. Down-core records of opal and quartz content for core V19-29. The sample values were plotted down-core according to the $\delta^{18}O$ based stratigraphy shown in Figure 6.

data in the Methods section) is its ability to make quantitative estimates of paleo-oceanographic variables (seawater paleo-temperatures, seawater paleo-salinities, etc.). The estimated paleo-oceanographic variables produce down-core records which are more directly interpretable by the oceanographer and reveal interesting features that are not readily apparent in the lithological and faunal stratigraphies discussed above.

Because water temperature is both an important biological controller and one of the conservative properties which define water masses, multi-regression equations have been developed to estimate August (austral winter) and February (austral summer) sea surface temperatures (Appendices 21 and 22). The estimated sea surface paleo-temperatures (shown in Appendices 23 to 25) are traced down-core in Figures 26 and 27 and contoured for the 18,000 B.P. level in Figures 29D and E.

Since each of the core-locations considered in this study are under the influence of different currents (Fig. 2), their down-core record of sea surface temperature are somewhat different (Figs. 26 and 27).

Variations in the strength of the Chile Current and/or changes in position of the subtropical anticyclonic gyre have been considered in this study as responsible for the shifting of subantarctic oceanographic characteristics into the subtropical Pacific region

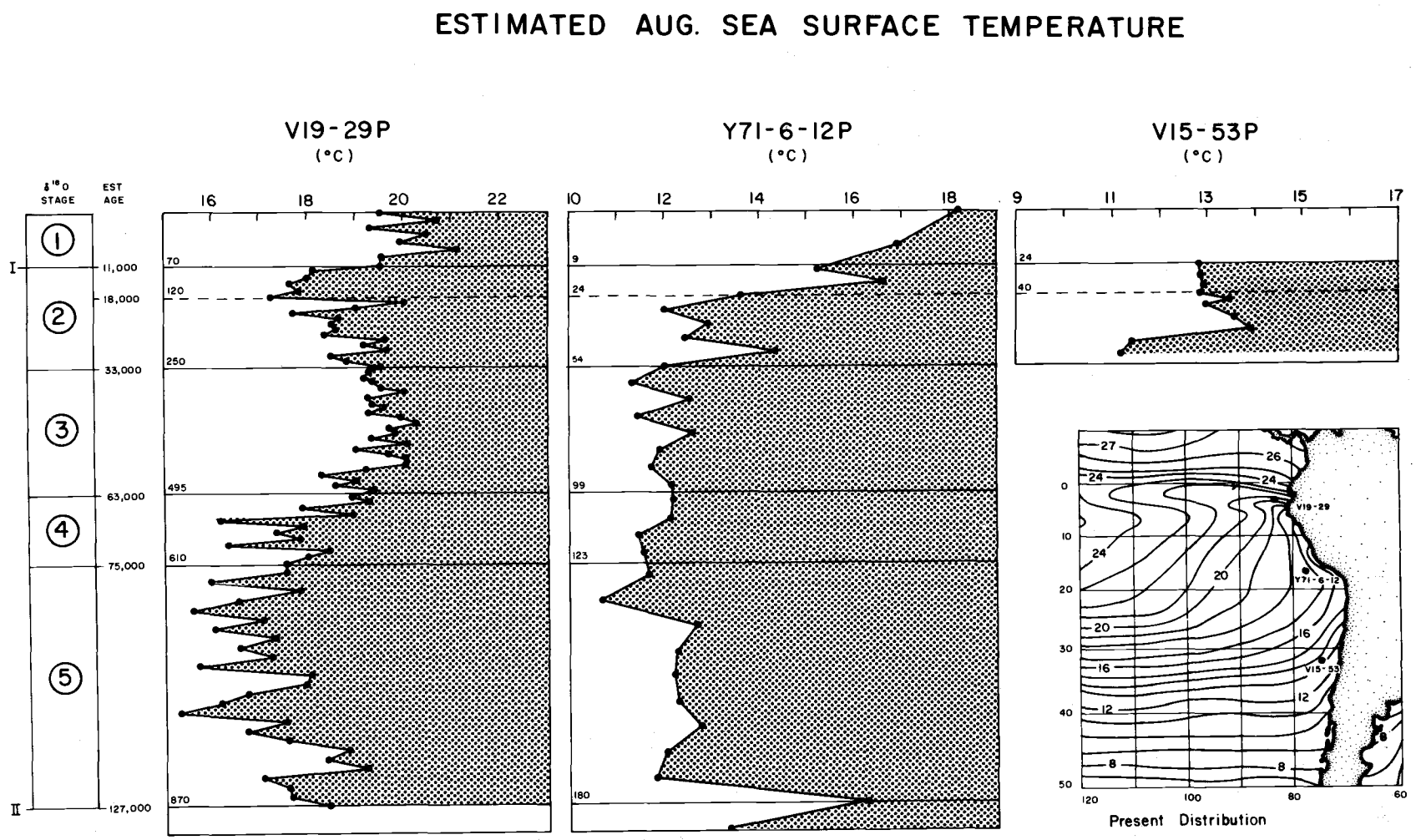

Figure 26. Down-core records of estimated August sea surface temperatures. The sample values were plotted down-core in accordance with the $\delta^{18}O$ based stratigraphic section shown in Figure 6.

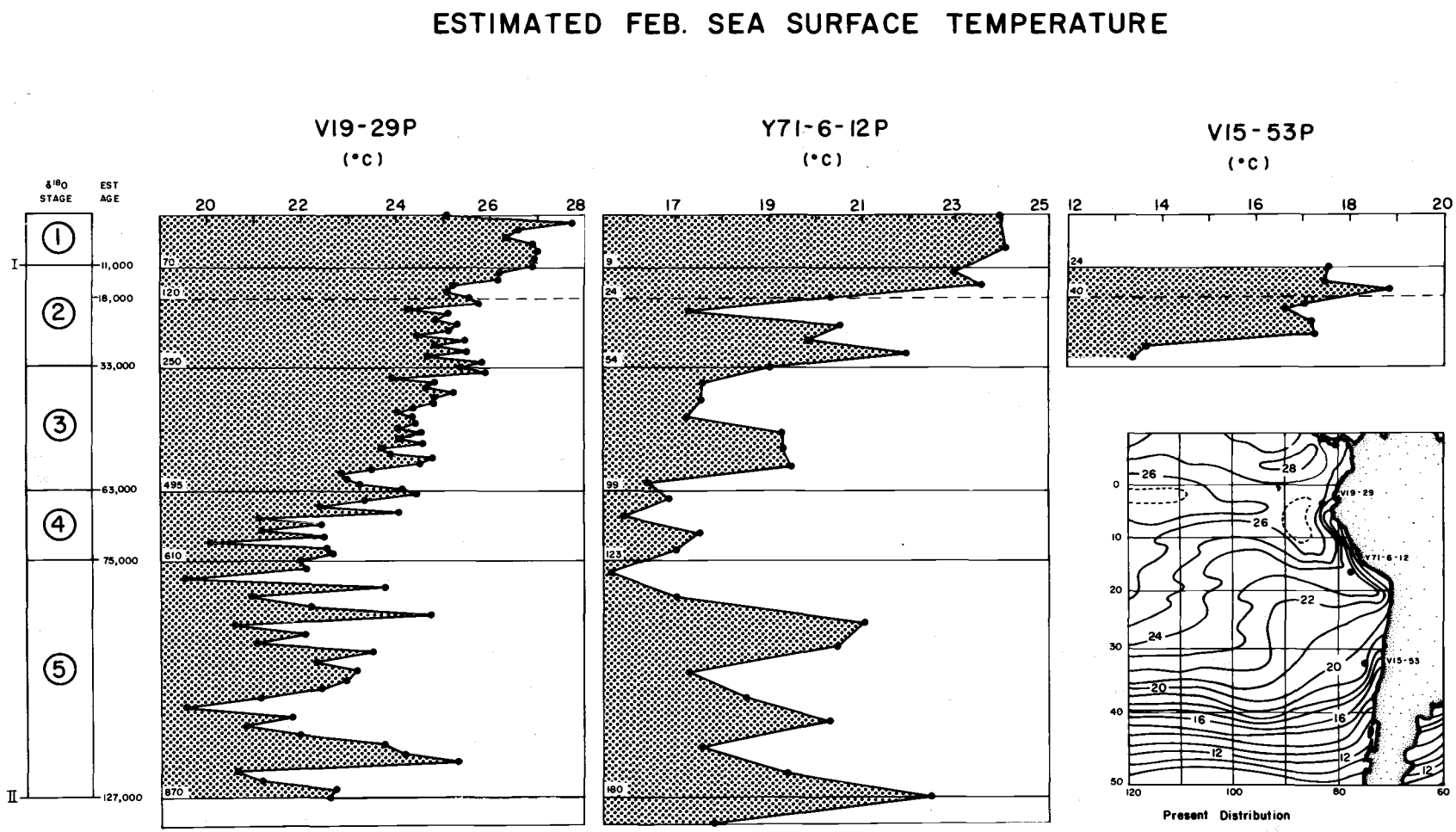

Figure 27. Down-core records of estimated February sea surface paleotemperatures. The sample values were plotted in accordance with the $\delta^{18}O$ based stratigraphic section shown in Figure 6.

(Figs. 19 and 20). Therefore, at the location of core Y71-6-12 (and probably V15-53) August sea surface temperatures were 6°C cooler than in modern times during most of the last 127,000 years. The exception to this general rule are the intervals representing the $\delta^{18}O$ stage 5/6 boundary and the uppermost part of stage 2. To explain these observations the following hypothesis is made: the marked melting of the ice masses stored on the continents which occurred at the $\delta^{18}O$ isotope "terminations" II and I (and correspond to $\delta^{18}O$ isotope boundaries 5/6 and 1/2, respectively; Broecker and van Donk, 1970; Shackleton and Opdyke, 1973) were associated with expansion and/or shifting to higher latitudes of the center of the southern anticyclonic gyre. This shift, in turn, was associated with southward shifts of the belt of the West Wind Drift (see page 62). Such oceanographic events, at the $\delta^{18}O$ stages 5/6 and 1/2 boundaries, reduced the input of subantarctic waters into the Chile Current; and consequently, permitted a rise in the sea surface temperature off the northern coast of Chile.

The location of core V19-29 is affected by a rather complex circulation. It is under the influence of the Peru Current and its associated coastal upwelling (Fig. 21) as well as under the influence of surfacing of the Equatorial Undercurrent (Fig. 23). Furthermore, occasional invasions of subtropical waters (Fig. 22) or of tropical waters are common in the V19-29 region, specially during the

oceanographic phenomenon known as "El Nino" (Bjerknes, 1966, 1972; Quinn, 1974; Wyrtki, 1975b; Wyrtki et al., 1976). Therefore, it is difficult to explain the processes leading to the V19-29 paleotemperature records (Figs. 26 and 27) without referring to the faunal data from which they were derived.

During the lowermost stage 5, just after the marked ice melting of the continental ice masses and the sea surface warming in higher latitudes occurred during termination II (see Y71-6-12 records in Figs. 26 and 27), the location of core V19-29 experienced sea surface temperatures similar to those of modern times. This was probably because of reduced circulation intensity and a southward shift of the anticyclonic gyre, such as it has been argued above. At the V19-29 location, the southward shift of the anticyclonic gyre is evidenced by the apparent southeastward shift of the Galapagos front (see page 73), from its present position to near the core V19-29 site. August temperatures during $\delta^{18}O$ stage 5 were cooler than present (sometimes -4°C; Fig. 26) and occurred together with weak trade winds (Fig. 17) and reduced coastal upwelling (Fig. 21). Thus, during stage 5, the trades and coastal upwelling, markedly decreased, had less influence on the westward deviation of the Chile Current. This permitted flow of the Chile Current (which was strong during this time) along the coast of Peru, advecting cool waters northward, even toward the location of core V19-29. From $\delta^{18}O$ stage 4 to

stage 2, the August sea surface temperature at the V19-29 location appears associated with the development and/or the position of the Galapagos front. August sea surface temperature was warmer when the Galapagos front developed and/or was positioned near to the location of core V19-29 (see page 73). At termination I, a southward shift in the center of the anticyclonic gyre might be inferred as sea surface temperatures rose to their present values.

The relaxation of the southern trade wind field during the austral summer (Wyrtki, 1974b; Wyrtki and Meyers, 1975a) allows surfacing of the southward (flowing) Peru Countercurrent (Wyrtki, 1965; see oceanographic setting). This countercurrent once at the surface carries warm waters southward, deflecting the isotherms as a wedge from the Equator to the northern coast of Chile (Figs. 1 and 29B). Such an oceanographic event is noted in the February (summer) sea surface paleo-temperature record at the core Y71-6-12 location during $\delta^{18}O$ stage 5, the lower part of stage 3 and stage 1 (Fig. 27). All of these times are assumed to have been associated with relaxed winds (Fig. 17).

Discussion

In Table 1, the generalized oceanographic conditions prevalent during each of the $\delta^{18}O$ stages 2 to 5 are compared to those prevalent in the present $\delta^{18}O$ stage 1.

Table 1: Summary of paleo-oceanographic events

$\delta^{18}O$ stage	Trade winds field (Quartz content)	Subantarc. water mass	Chile Current	Peru Current (coastal upwell.)	Subtrop. water mass	Galapagos front (Equator. Under-current factor)	Aug. sea surf. temp. (winter) V19-29	Aug. sea surf. temp. (winter) Y71-6-12	Feb. sea surf. temp. (summer) V19-29	Feb. sea surf. temp. (summer) Y71-6-12
1	Note: The oceanographic inferences below are compared to the oceanographic observations for this $\delta^{18}O$ stage 1 (present conditions)									
1/2	Alike	Alike	Alike	Area shifted to the north	Alike	Alike	Cooler	Alike	Slightly cooler	Alike
2	Stronger	Reached northern latitudes, largely incorporated in Chile Current	Stronger	Area shifted to the north	Slightly off the coast or area shifted to north	Slightly stronger developed	Cooler	Cooler	Slightly cooler	Slightly cooler alternating with cooler
3	Stronger	Same as stage 2	Stronger	Reduced area	Same as stage 2	Slightly stronger developed	Alike	Cooler	Slightly cooler	Cooler
	Alike	Same as stage 2	Stronger	Slightly reduced area	Slightly off the coast	Alike, but located nearer to the S. American coast	Alike	Cooler	Slightly cooler	Slightly cooler
4	Stronger, but more parallel to the equator	Same as stage 2	Stronger	Reduced area	Far off the coast	Stronger developed and located nearer to the S American coast	Cooler	Cooler	Cooler	Cooler
5	Alike but less parallel to the Peruvian coast	Same as stage 2	Stronger	Reduced area	Slightly off the coast alternated with alike	Alike, but shifting its position between the Galapagos I and S America	Cooler with alike at base	Cooler	Cooler alternated with slightly cooler (alike at base)	Cooler alternated with slightly cooler
5/6	Alike	Alike	Alike	Reduced area	Alike	Alike, but located nearer to the S. American coast	Cooler	Alike	Cooler	Alike

The $\delta^{18}O$ stage 5/6 boundary interval experienced oceanographic conditions which were similar to those presently observed in $\delta^{18}O$ stage 1; particularly in the higher latitudes. During both intervals large melting of the continental ice masses has occurred (Fig. 6). Also, the Chile Current, receiving smaller amounts of incoming subantarctic waters, as compared with the rest of the geological time considered here (Fig. 19), has been weaker (Fig. 20). These oceanographic events appear to have been associated with a shift to higher latitudes and/or expansion of the center of the subtropical anticyclonic gyre.

Stage 5 was characterized by relatively weak trade winds (Fig. 17) which probably also were less parallel to the Peruvian coast than they are at the present. As a result the development of coastal upwelling was reduced, even more than at present (Fig. 21). This together with a probable northward shift in the West Wind Drift allowed a larger influence of the Chile Current along the coast of Peru. Consequently the transport of subantarctic-temperate waters farther north along the coast caused cooler temperatures than at present, particularly during the austral winter (Fig. 26). However, austral summer relaxation of the Chile Current and intensification of the tropical countercurrent system (the North Equatorial Countercurrent, the Equatorial Undercurrent, the Peru Countercurrent) are still evident, in the February sea surface temperature records which

show alternately warm and cool peaks (Fig. 27). Stage 4 is a geological time of strong circulation. However, the reduced coastal upwelling area (Fig. 21) and the evidence of stronger surfacing of the Equatorial Undercurrent (Fig. 23) suggest that the trade winds were blowing somewhat less parallel to the coast of Peru and somewhat more parallel to the equator (Fig. 10), therefore reducing the coastal upwelling and allowing the surfacing of the Equatorial Undercurrent through increased divergence at the equator, the mechanisms by which it reaches the surface to the west of the Galapagos at the present time (Taft et al., 1974; Molina-Cruz, 1977b).

The melting of the continental ice masses occurring during $\delta^{18}O$ stage 3 is less dramatic than those occurring during $\delta^{18}O$ stages 5 and 1 (Fig. 6). Thus, it appears that a southward shift and/or a weakening of the Chile Current did not occur during this time (Fig. 20). However, the relaxation of the Trade Winds during the lower part of $\delta^{18}O$ stage 3 (Fig. 17) allowed surfacing of the Equatorial Undercurrent (Fig. 23), at least to the east of the Galapagos Islands. This surfacing probably occurred principally during the austral summer, since the February sea surface temperature record of core Y71-6-12 suggests that the Peru Countercurrent was invading this location with its associated warmer waters (Fig. 27).

During the upper part of $\delta^{18}O$ stage 3, the trade winds were intensified. However, according to Molina-Cruz (1977b), this was a

geological time of great seasonal contrast in the S.E. trade winds speed. This fact produced frequent alternations of surface westward flow, surfacing of the Equatorial Undercurrent and invasions of subtropical and tropical waters; thus causing strong mixing of radiolarian assemblages.

$\delta^{18}O$ stage 2 was in general characterized by cool sea surface temperatures as well as by strong winds and intensified circulation. These oceanographic conditions appear to have been coincident with contraction and shifting to the north of the center of the subtropical anticyclonic gyre (Luz, 1973). At about 11,000 years ago, near the $\delta^{18}O$ stage 1/2 boundary interval, probably due to the large melting of the continental ice masses (Fig. 6), the subtropical anticyclonic gyre was again expanded and/or shifted south, marking the onset of the present oceanographic conditions.

The sediment cores considered in this study were stratigraphically correlated through their $\delta^{18}O$ records (Fig. 6); thus, the accuracy in their chronostratigraphic correlation is limited by the mixing-time of the oceans (approximately 1,300 years; Shackleton and Opdyke, 1973; Pisias, 1974). Nevertheless, in accordance with Figures 26 and 27, it appears that the marked warmings of the sea surface waters, approximately at the $\delta^{18}O$ terminations I and II, occurred first at high latitudes (cores V15-53 and Y71-6-12) and later at the equator (core V19-29).

VI. THE SUBTROPICAL SOUTHEASTERN PACIFIC 18,000 YEARS BEFORE PRESENT

It has been inferred from the down-core study in the previous chapter that the subtropical anticyclonic gyre has not been significantly disrupted during the last 127,000 years, but that it has shifted in position or changed in size or shape. Under this assumption, it is possible to reconstruct, on the basis of a few sediment cores, the general oceanographic conditions prevalent in the subtropical southeastern Pacific at the climax of the last glaciation, about 18,000 years ago (CLIMAP Project Members, 1976).

The levels representing the last glacial maximum in these cores have been chosen following a stratigraphy based on the studies listed in Appendix 3.

Eighteen thousand years ago there was greater advection of subantarctic temperate water into the subtropical southeastern Pacific via the Chile Current (Fig. 28B). Furthermore, because of intensified upwelling, the Surface Subtropical Water mass was less evident along the Peruvian coast and along the equatorial region to the east of the Galapagos Islands (Fig. 28A). These two facts appear to have been the major causes of regional environmental changes in the subtropical southeastern Pacific.

Because of strong trade winds (Fig. 17), the coastal upwelling and the equatorial divergence intensified 18,000 years ago.

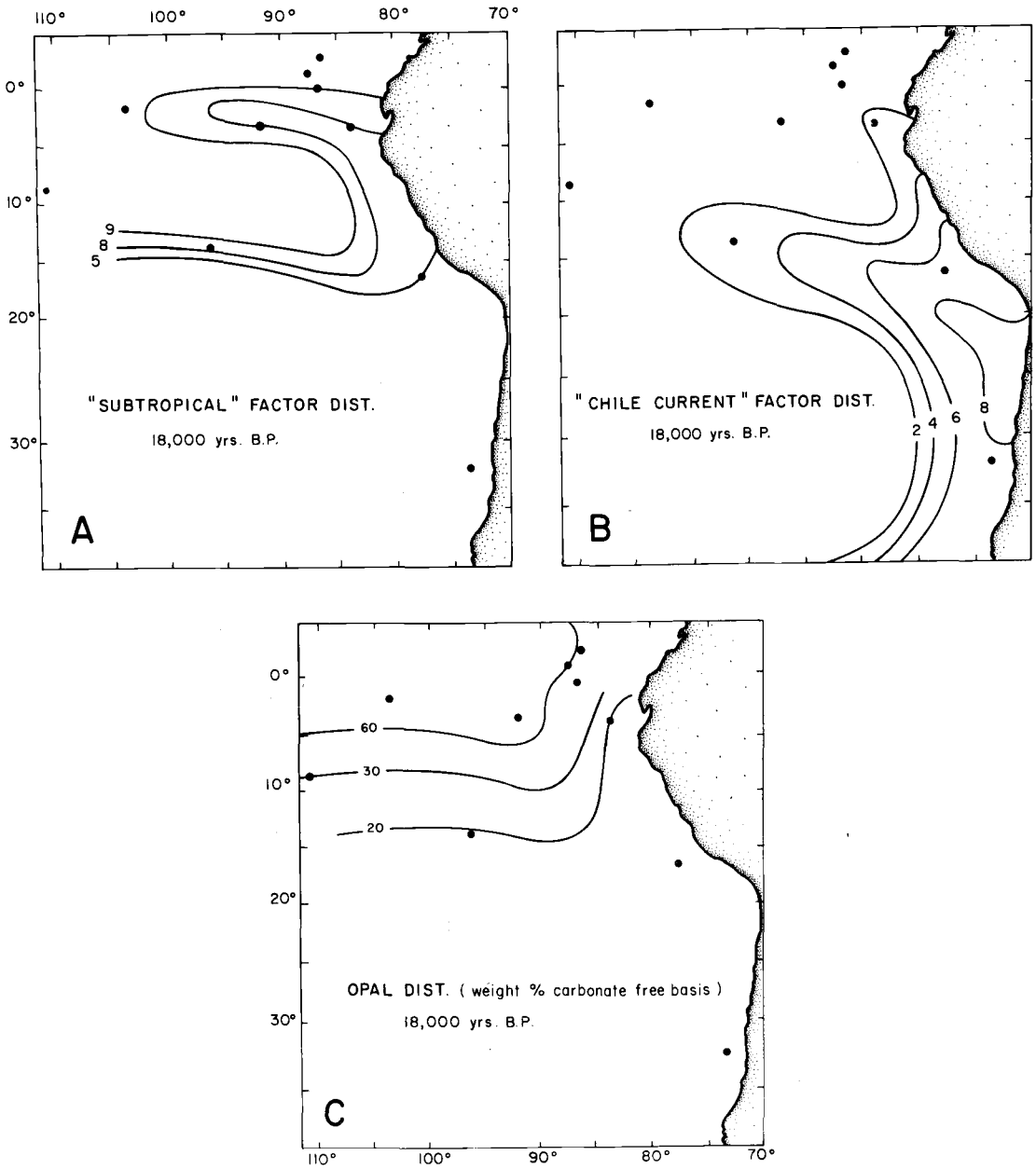

Figure 28. Radiolarian assemblages (Figs. A and B) and opal content (Fig. C) distributions in the subtropical southeastern Pacific 18,000 years ago.

Therefore, primary productivity increased and consequently a large amount of biogenic opaline remains were entombed in the sediments. Nevertheless, because we are using opal weight percentages to measure this oceanographic feature (Fig. 28C), the effect of terrigenous dilution on the distribution of opal along the Peruvian coast is apparent (see opal and quartz distribution section in Chapter IV).

At the present during the southern hemisphere winter (August) the sea surface temperature pattern (Fig. 29A) does not reflect the flow pattern of the Chile Current. However, during the southern hemisphere summer (February) the pattern of sea surface temperature delineates the advection of cooler waters by the Chile Current into a warmer subtropical southeastern Pacific (Fig. 29B).

The intensification of the anticyclonic gyre occurring during $\delta^{18}O$ stage 2 caused larger advection of subantarctic-temperate water into the subtropical southeastern Pacific via the Chile Current (Fig. 19). Once in the subtropical region, the current diverged from the coast, as it does at present, but to a greater degree. Consequently, this advection of subantarctic-temperate water appears both in the winter and summer sea surface paleo-temperature maps as a tongue of cool water extending to the west-northwest (Fig. 29D and E). The degree of the extension of such a tongue was also determined on the basis of paleo-temperature estimates kindly provided by members of the CLIMAP Project (unpublished; Appendix 25).

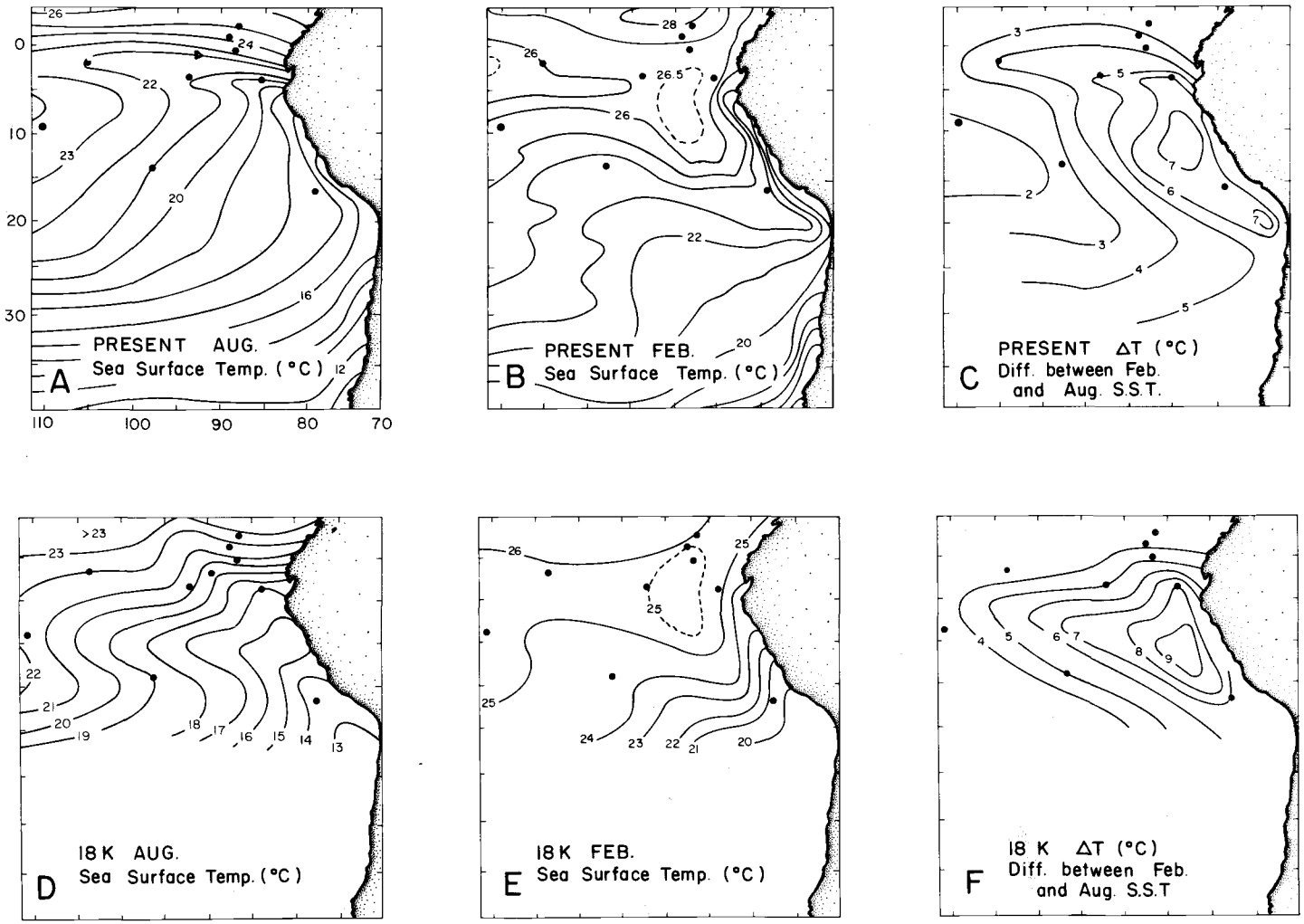

Figure 29. August and February sea surface temperatures and difference between February and August sea surface temperatures (Δt): A, B, C at the present and D, E, F 18,000 years before present (B.P.).

The effect of upwelling is also evident in the sea surface temperature pattern. It is expected that as upwelling intensifies, its regional expression increases proportionally. Accordingly, it is assumed that 18,000 years ago larger changes of sea surface temperature occurred on the fringes of the areas of upwelling than within their centers (Fig. 30A). This oceanographic feature is presently observed seasonally, particularly along the coast of Peru: as the coastal upwelling develops and expands during the winter (Aug.) and then reduces during the summer (Feb.), greater changes in temperature are observed along the fringes of the area of upwelling than in its core (Fig. 29C). Because of the increased advection of cool water by the Chile Current into the subtropical southeastern Pacific, as well as the expansion of the upwelling areas, the subtropical region was cooler 18,000 years ago than at present, particularly during the southern hemisphere winter (Fig. 30). Because of this relatively greater winter cooling there was a greater seasonal contrast 18,000 years ago than today (c.f. Figs. 29C and 29F).

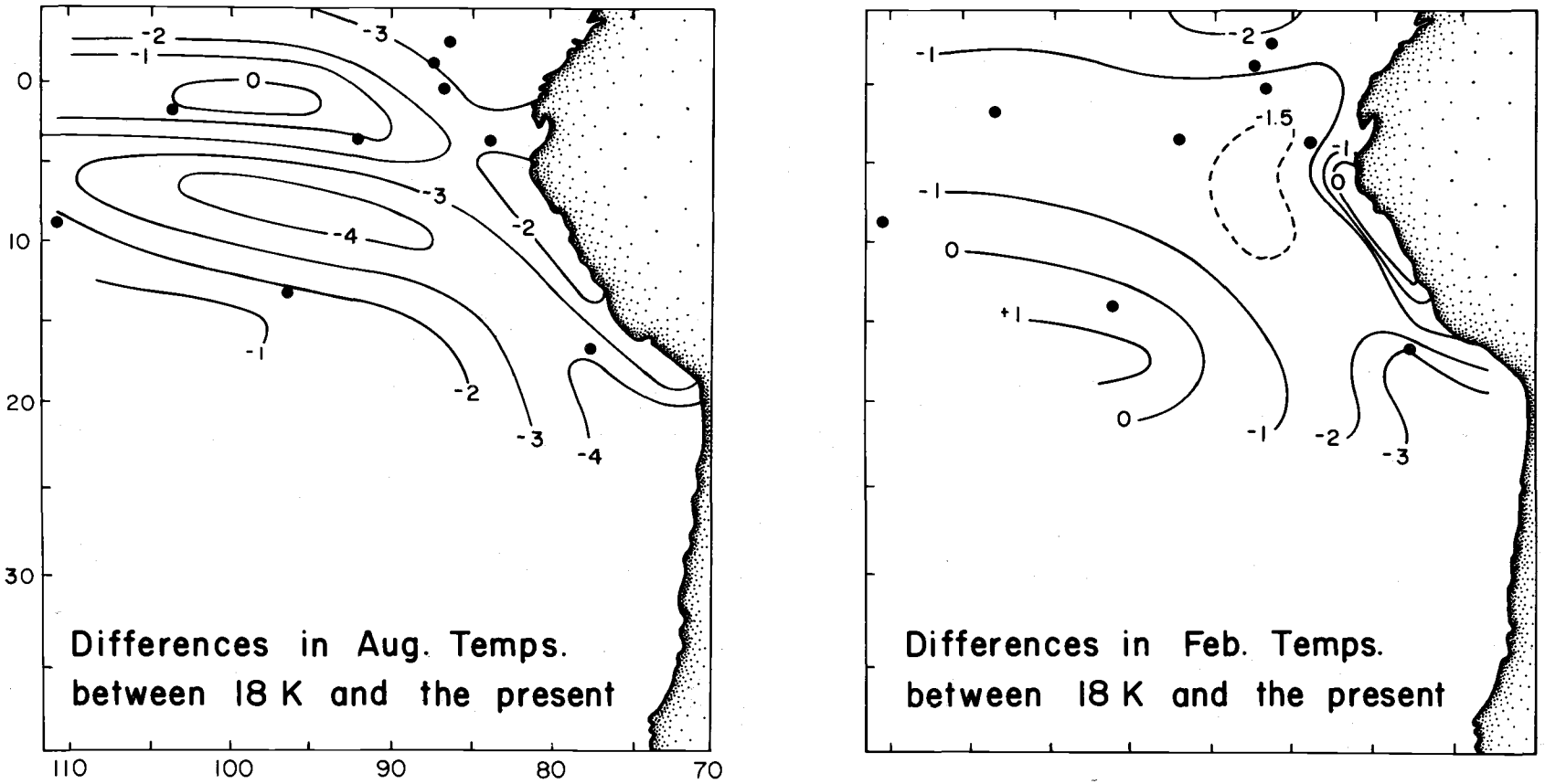

Figure 30. Difference in sea surface temperature between the 18,000 years (B.P.) datum and the present: Fig. A for August and Fig. B for February. The values were obtained by subtracting the modern temperatures from the 18 K temperatures.

VII. THE SUBPOLAR SOUTHEASTERN PACIFIC DURING THE BRUNHES PALEOMAGNETIC EPOCH: BRIEF PALEO-OCEANOGRAPHIC CONSIDERATION

Shifts in the position of the "Polar front zone" (Gordon, 1971b) have occurred concurrently with the waxing and waning of the Antarctica continental ice (Schott, 1939; Lisitzin, 1962). These shifts are recorded by the biostratigraphic and lithostratigraphic changes which are observed in sediment cores taken around Antarctica (Phillip, 1910; Hays, 1965, 1967; Donahue, 1967; Hays and Opdyke, 1967; Geitzenauer, 1969, 1972; Kennett, 1970; Huddlestun, 1971; Hays et al., 1976). However, it has been difficult to carry out paleo-oceanographic studies because of large differences in accumulation rates and erosional effects in cores located near and beneath the Antarctic Circumpolar Current (see the oceanographic setting). Furthermore, during certain geological intervals, different planktonic groups (e.g., radiolarians, forams, diatoms, coccoliths), apparently lead to opposite paleo-oceanographic inferences. For example, while one planktonic group appears to indicate "warm conditions" (Kennett, 1970; Huddleston, 1971), another group appears to point out "cool conditions" (Geitzenauer, 1969, 1972). One interval, the inferred "warm peak" which occurs at the base of Hays' (1965, 1967) radiolarian Ω biozone, has been supported both by foraminifera (peak no. 5 in Kennett, 1970) and coccolithophores (Geitzenauer,

1972). Also, the considerable cooling at the paleomagnetic Brunhes-Matuyama boundary (about 700,000 years in age) suggested by Fisher (1968) has been supported by Kennett and Watkins (1970).

In this investigation two cores, V17-92 and RC17-213 (Appendix 2; Fig. 32), from the extreme southern portion of the area of study, were examined. For each core, the radiolarian bio-zonation established by Hays (1965, 1967) and subsequently correlated to the paleomagnetic stratigraphy (Hays and Opdyke, 1967), was defined down-core to the Ψ/χ radiolarian bio-zone boundary (Fig. 32; approximately equivalent to the Brunhes-Matuyama boundary). The Ψ/χ boundary was defined relatively easily in core RC17-213; however, it was observed that the core lacks most of the Ψ bio-zone which is characterized principally by the presence of Stylatractus universus (Hays, 1970; Hays and Shackleton, 1976). In spite of this, a chronostratigraphic correlation between cores RC17-213 and V17-92 was tentatively established (Fig. 32).

The down-core records of the modern radiolarian assemblages (see Chapter IV) indicate that during most of the Brunhes epoch the location of core V17-92 has been dominated by the Antarctic surface water mass (Fig. 31C). Therefore, sea surface temperature has varied only slightly (Fig. 31B) in the region in which the core is located. Nevertheless, the V17-92 down-core record of quartz (Fig. 31A) suggests that the production of icebergs and consequently

CORE V17-92

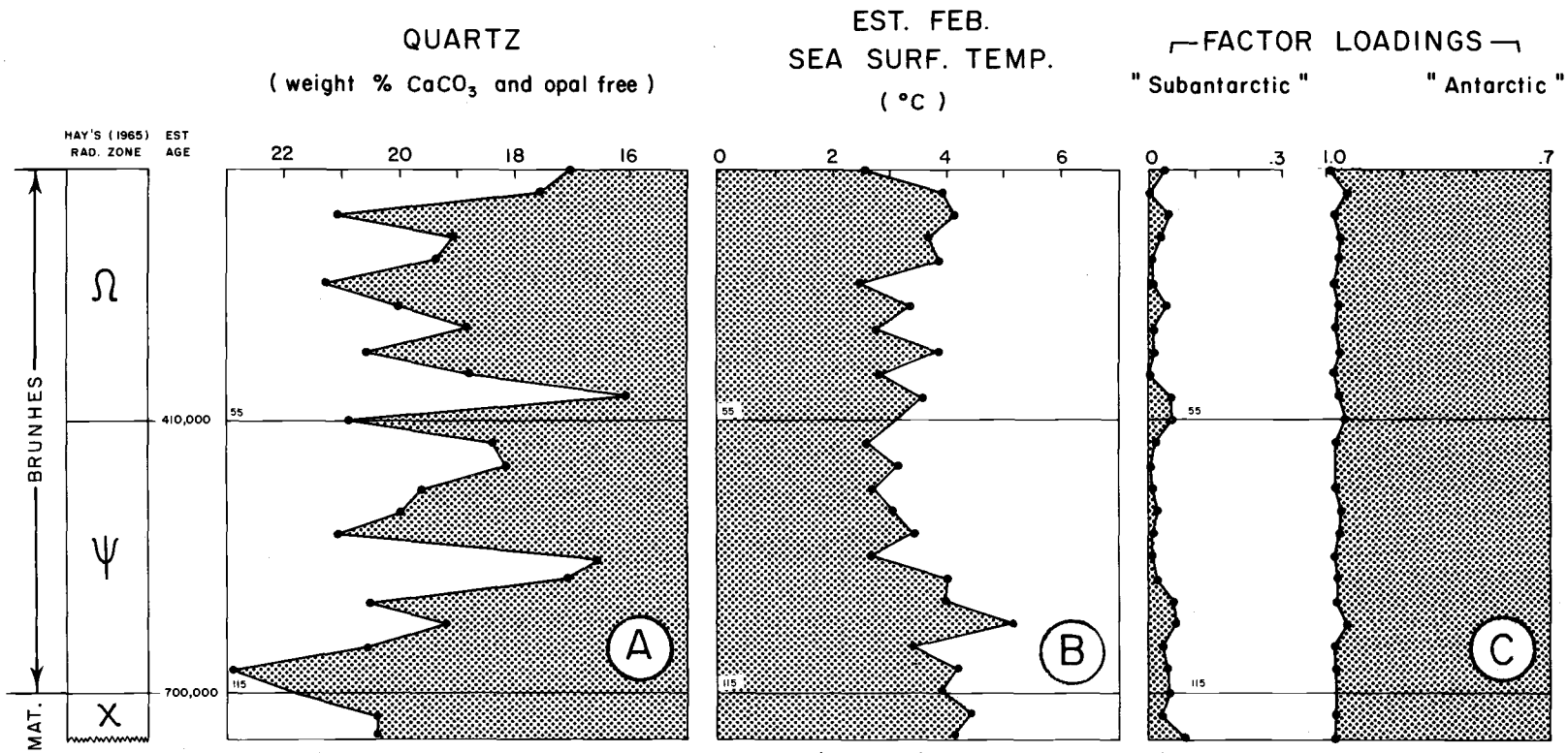

Figure 31. Down-core records of quartz (Fig. A) of estimated February sea surface paleotemperature (Fig. B) and of Radiolaria factor loadings (Fig. C) for core V17-92. The Radiolaria biozonation is according to Hays (1965, 1967). The correspondence of the Radiolaria zone boundaries to the paleo-magnetic stratigraphy (on the left margin of the figure) is according to Hays and Opdyke (1967).

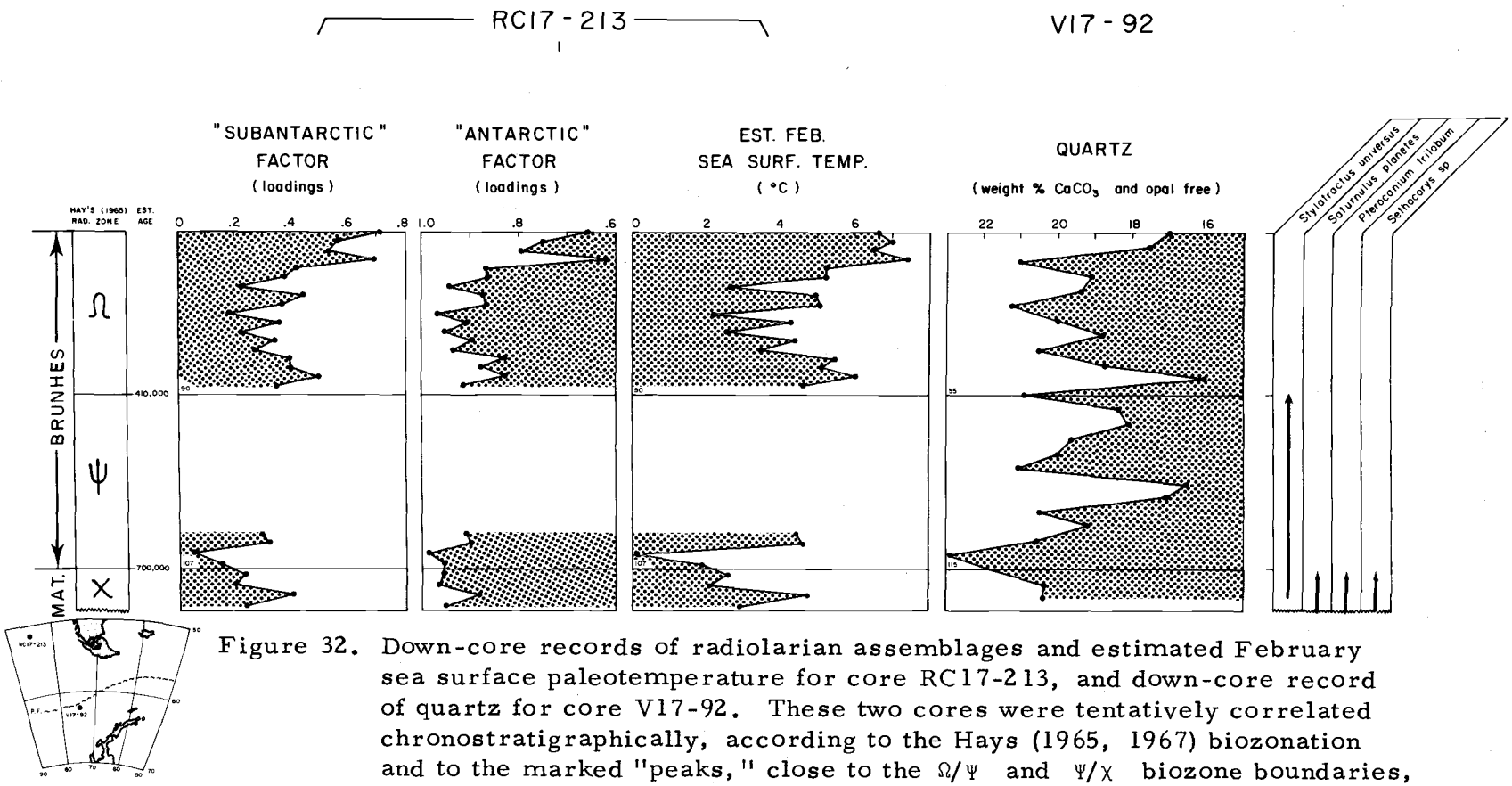

Figure 32. Down-core records of radiolarian assemblages and estimated February sea surface paleotemperature for core RC17-213, and down-core record of quartz for core V17-92. These two cores were tentatively correlated chronostratigraphically, according to the Hays (1965, 1967) biozonation and to the marked "peaks," close to the Ω/Ψ and Ψ/χ biozone boundaries, which suggest the climatic events discussed in the text.

of terrigenous input to sea has experienced large fluctuations several times during the Brunhes paleomagnetic epoch. Through the down-core record of variation in quartz concentration, the previously mentioned warm interval at the base of the Ω radiolarian bio-zone and the cool interval at the Brunhes-Matuyama boundary are clearly seen (Fig. 31A).

Core RC17-213 is located to the north of the polar frontal zone, in an ideal position to record shifting of the Antarctic and Subantarctic water masses. Through the faunistic and pale-temperature records of core RC17-213, it is apparently easy to recognize the marked warm and cool interval mentioned above. On the basis of these distinctively climatic intervals, as well as on the presence of the radiolarian index-species of Hay's (1965, 1967) bio-zonation, core RC17-213 has been chronostratigraphically correlated with core V17-92 (Fig. 32). The base of the Ψ bio-zone present in core RC17-213 shows reworked material.

Finally, from Figures 31 and 32, it is inferred that during the Brunhes, more dramatic changes have occurred in the modern Subantarctic environment than in the modern Antarctic environment. This is apparently because the range of shifting of the polar front is mostly from its present position to probably about 7° of latitude further north (Fisher, 1968; Hays et al., 1976).

VIII. SUMMARY AND CONCLUSIONS

The radiolarian taphocoenoses as well as the opal and quartz contents in the deep-sea sediments of the southeastern Pacific reflect the low troposphere and ocean mixed-layer circulation. Six radiolarian assemblages, defined mathematically through Q-mode factor analysis, have distribution patterns which reflect particularly the geographic extent of: 1) the surface Antarctic water masse, 2) the surface Subantarctic-Temperate water mass, 3) the Chile Current, 4) the Peru Current, 5) the surface Subtropical water mass, and 6) the Equatorial Undercurrent. Opal distribution follows the circulation around the subtropical central gyre and shows high concentrations under areas of divergences where primary productivity is increased. Along the continental margin, terrigenous debris dilute opal concentrations, even within areas characterized by strong upwelling, such as on the Peruvian coast. Quartz distribution suggesting its terrigenous derivation depicts a tongue in the same direction and position of the southeast trade wind field. High quartz concentrations decrease seaward along the coast. This occurs principally along southern South America where there is high rainfall and runoff and near Antarctica where icebergs carry terrigenous material out to sea.

Since low altitude winds and the oceanic circulation are strongly

correlated, the down-core records of the sediment variable representing atmospheric circulation (quartz) and the sediment variables representing the oceanic circulation (radiolarian assemblages and opal) have fluctuated concurrently in time. However, because the oceanic circulation is not only dependent on the strength of the winds of the lower troposphere but also on their direction, position and frequency, the relationship of the two types of records is not a simple one.

The surfacing of the Equatorial Undercurrent is a complex oceanographic process. It can occur both with strong or relaxed trade winds. With strong trade winds blowing nearly parallel to the equator, the Equatorial Undercurrent surfaces because of divergence at the equator. With very weak trade winds, the Undercurrent surfaces because it is not opposed by the surface wind-driven circulation. Only moderately strong trade winds, blowing in a generally northwestern direction, inhibit the surfacing of this Undercurrent to the east of the Galapagos Islands.

The oceanographic conditions at the base of $\delta^{18}O$ stage 5 were similar to those of modern times. During the rest of $\delta^{18}O$ stage 5 relaxed trade winds caused poor development of the coastal upwelling off Peru and had a lesser effect on the westward deviation of the Chile Current. Thus, the Chile Current flowed along the coast of Peru, advecting relatively cool waters northward. During

$\delta^{18}O$ stage 4, strong trade winds were experienced. However, these winds were probably more perpendicular to the South American coast, thus coastal upwelling was not as well developed and through equatorial divergence the Equatorial Undercurrent was brought to the surface, even to the east of the Galapagos Islands. The lower part of $\delta^{18}O$ stage 3 presents different oceanographic conditions than those in the upper part of the same stage. Relaxed trade winds during the lower $\delta^{18}O$ stage 3 allowed surfacing of the Equatorial Undercurrent at least to the east of the Galapagos Islands, causing a marked development of the radiolarian assemblage which is associated with this oceanographic feature. Since the development of the Equatorial Undercurrent radiolarian assemblage contributes to the opal production, the opal production was significantly increased during the lower $\delta^{18}O$ stage 3. The upper $\delta^{18}O$ stage 3 shows a transition toward the strong circulation, which prevailed during $\delta^{18}O$ stage 2. During the present $\delta^{18}O$ stage 1, which started 11,000 years ago, the Subtropical central gyre appears to have shifted to a southern position similar to the one which prevailed during the base of $\delta^{18}O$ stage 5. The inference that coastal upwelling is better developed now than it was during the $\delta^{18}O$ stage 5 suggests that, although diminished, the trade wind field is presently more parallel to the Peruvian coast than it was during $\delta^{18}O$ stage 5.

Marked warming of the sea surface temperature occurred about

the $\delta^{18}O$ "terminations" I and II. These, apparently, occurred first at high latitudes and later at the equator.

The major causes which changed the oceanographic conditions of the subtropical southeastern Pacific 18,000 years ago (the climax of the glaciated $\delta^{18}O$ stage 2) were the larger input of subantarctic-temperate water via the Chile Current and the intensification both of coastal upwelling and equatorial divergence. Sea surface temperature in the subtropical southeastern Pacific, as compared with the present temperature, was as much as 4°C cooler in some regions during the austral winter and as much as 1°C cooler in the austral summer. As a result of these changes greater seasonal contrast in sea surface temperature occurred in the subtropical southeastern Pacific 18,000 years ago than at the present.

The Antarctic and Subantarctic regions which are under the erosive effect of the Circumpolar Current show a very low deposition rate, making it difficult to correlate cores from these regions with cores in the subtropical and tropical regions.

Paleo-oceanographic interpretation of the radiolarian assemblages and quartz records of two cores (RC17-213 and V17-92) located near the Drake Passage suggests that at the base of Hay's Ω (1965, 1967) bio-zone (approximately equivalent to 400,000 years ago) a considerable waning of the Antarctic ice occurred. This was preceded by a singificant waxing of the Antarctic ice close to the

Brunhes-Matuyama paleomagnetic boundary (700,000 years ago). The study of these two cores suggests that during the last 700,000 years the polar front zone has shifted from its present position toward the north, probably as much as 7° of latitude.

As it was previously proposed by this author (Molina-Cruz, 1976), the extension of paleo-oceanographic studies in the southeastern Pacific, based on the analysis of the geographical distributions and down-core records of the siliceous components of the sediments, has revealed important oceanographic features which occur in this region. Thus, it is proposed that these kinds of studies be continued. A series of core-transects running perpendicular to the South American coast can be used to study waning and waxing both of the coastal upwelling area as well as of the subtropical anticyclonic gyre. Development of new techniques for chrono-stratigraphic control, better knowledge of the present physical oceanography and refinement of the radiolarian taxonomy will allow studies which will undoubtedly surpass the paleo-oceanographic base established in this study.

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X. APPENDICES

Appendix 1: Surface locations.

A).- LOCATICNS CONTAINING RADIOLARIA

LOC. NO.	ACCESS NUMBER	CORE NO.	LATITUDE DEG.MIN.	LONGITUDE DEG.MIN.	DEPTH (M)	DEPTH IN CORE CM
1	M008194	Y69-71P	00 06 N	-086 29 W	2740	4-5
2	M008193	Y69-80MG1	-01 01 S	-091 51 W	3408	0-4
3	M008014	Y69-103P	-00 05 S	-082 26 W	1808	1-3
4	M008015	Y69-104MG	-02 18 S	-081 31 W	3892	0-5
5	M008035	Y71-6-4P	-14 37 S	-079 07 W	4518	3-4
6	M008036	Y71-6-12P	-16 26 S	-077 34 W	2734	2-4
7	M008037	Y71-6-14G2	-17 40 S	-075 47 W	4625	1-3
10	M008034	Y71-7-27P	-10 14 S	-082 05 W	4569	2-4
11	M008033	Y71-7-28G2	-11 01 S	-085 00 W	4491	5-7
12	M008032	Y71-7-30G2	-10 03 S	-088 40 W	4237	2-3
13	M008030	Y71-7-32P	-10 45 S	-093 06 W	3850	2-3
14	M008031	Y71-7-33G4	-10 00 S	-092 40 W	4093	2-3
15	M008029	Y71-7-35P	-09 58 S	-097 56 W	4010	1-2
16	M008028	Y71-7-36G1	-10 08 S	-102 51 W	4541	4-5
17	M008027	Y71-7-38G3	-10 46 S	-106 20 W	3691	2-3
18	M008023	Y71-8-70P	-08 42 S	-082 13 W	4378	5-6
19	M008024	Y71-8-77P	-08 10 S	-081 36 W	5121	0-2
20	M008022	Y71-9-84P	-05 00 S	-085 57 W	4010	2-4
21	M008021	Y71-9-85P	-05 02 S	-087 28 W	3858	1-3
22	M008020	Y71-9-86P	-05 05 S	-090 47 W	3877	4-6
23	M008019	Y71-9-87P	-05 03 S	-093 04 W	3858	0-2
24	M008018	Y71-9-88P	-05 00 S	-099 26 W	3650	4-5
25	M008017	Y71-9-89P	-05 59 S	-101 01 W	3990	2-4
26	M008016	Y71-9-91P	-05 57 S	-104 52 W	3512	3-5
27	ML08178	V15-33TW	-06 08 S	-082 41 W	4040	0-2
28	ML08183	V15-46TW	-12 51 S	-084 28 W	4583	0-2
30	ML08047	V15-56TW	-34 22 S	-077 45 W	4137	0-3
34	ML11876	V16-131TW	-59 20 S	-117 24 W	5029	0-3
36	ML11878	V16-134TW	-61 54 S	-091 15 W	5138	0-3
39	ML11882	V17-58TW	-49 25 S	-078 46 W	3863	0-3
40	ML11883	V17-88TW	-57 02 S	-074 29 W	4063	0-2
41	ML11905	V17-92P	-62 11 S	-075 07 W	4087	0-3
42	ML11884	V17-93TW	-62 02 S	-068 15 W	3922	0-3
45	ML08176	V19-30TW	-03 23 S	-083 31 W	3091	0-2
46	ML08184	V19-36TW	-11 59 S	-081 31 W	4731	0-1
47	ML08182	V19-38TW	-12 30 S	-086 39 W	4276	0-1
48	ML08181	V19-39TW	-12 43 S	-089 08 W	4173	0-1
49	ML04907	V21-29TW	00 57 N	-089 21 W	0712	0-1
50	ML03978	V24-40TW	03 04 N	-097 08 W	3204	0-1
51	ML03979	V24-46TW	01 40 N	-105 09 W	3574	0-1
57	ML08180	RC8-98TW	-13 28 S	-092 35 W	3853	0-1
61	ML08042	RC9-86TW	-23 33 S	-072 29 W	4208	0-2
69	ML11894	RC10-69TW	-01 40 S	-116 30 W	4200	0-2
70	ML09104	RC11-230TW	-08 48 S	-110 48 W	3259	1-2
71	ML08179	RC11-234TW	-13 19 S	-100 57 W	3645	0-2
72	ML11847	RC12-225TW	-53 39 S	-123 08 W	2964	0-2
73	ML11848	RC12-227TW	-55 14 S	-111 56 W	3802	2-3
74	ML11849	RC12-228TW	-55 35 S	-100 18 W	4420	0-2
75	ML11850	RC12-230TW	-55 03 S	-088 57 W	4685	0-2
76	ML11851	RC12-231TW	-55 32 S	-082 57 W	5349	1-2
77	ML11852	RC12-232TW	-56 00 S	-077 17 W	4296	1-2
82	ML08039	RC13-100TW	-16 06 S	-081 17 W	4570	0-2
83	ML08177	RC13-105TW	-06 58 S	-086 01 W	4173	0-2
84	ML08175	RC13-111TW	-00 32 S	-098 41 W	3252	0-2
85	ML08174	RC13-117TW	-00 19 S	-106 54 W	3733	0-2
91	ML08046	RC15-55TW	-31 05 S	-074 56 W	4294	0-2
93	ML12971	RC15-61TW	-40 36 S	-077 12 W	3771	0-2
95	ML11857	RC15-63TW	-47 55 S	-077 59 W	3696	0-2
96	ML11858	RC15-64TW	-51 28 S	-076 25 W	3200	0-2
97	ML11859	RC15-67TW	-60 01 S	-080 35 W	5033	0-1
98	ML11860	RC15-71TW	-65 23 S	-071 22 W	3440	0-2

99	ML11861	RC15-73TW	-59	47	S	-066	36	W	3658	0-2
100	ML11862	RC15-75TW	-60	26	S	-062	17	W	3981	0-2
104	ML11902	RC17-211TW	-48	26	S	-101	42	W	4353	0-1
105	ML11866	RC17-213TW	-51	33	S	-084	58	W	4455	0-2
106	ML11867	RC18-3TW	-56	29	S	-057	45	W	4137	0-2
107	ML11868	RC18-4TW	-60	29	S	-056	38	W	4007	0-2
108	ML11869	RC18-9TW	-58	33	S	-074	26	W	4679	0-2
109	ML11870	RC18-17TW	-52	26	S	-077	00	W	2189	0-2
111	ML11903	RC18-34TW	-46	57	S	-094	59	W	4494	0-2
112	ME12634	E10-6P	-61	01	S	-082	54	W	4777	0-1
115	ME12551	E11-3TW	-56	54	S	-115	14	W	4004	0-2
116	ME12552	E11-7TW	-60	55	S	-114	47	W	5005	0-2
117	ME12553	E11-9TW	-62	50	S	-115	04	W	4986	0-2
118	ME12554	E11-13TW	-65	49	S	-115	01	W	4704	0-2
122	ME12639	E11-26P	-63	30	S	-086	36	W	4631	0-1
123	ME12640	E13-6P	-59	36	S	-089	28	W	4304	2-3
124	ME11901	E17-17P	-66	59	S	-120	03	W	4486	0-1
127	ME12642	E17-26P	-64	47	S	-095	07	W	4662	1-2
128	ME12557	E17-30TW	-58	09	S	-094	49	W	3745	0-2
129	ME12312	E19-7P	-67	09	S	-109	05	W	5026	0-1
130	ME12644	E20-13P	-55	00	S	-105	23	W	4313	0-1
131	ME12645	E20-15P	-51	57	S	-099	43	W	4204	1-2
141	ME12648	E21-13P	-43	59	S	-120	03	W	3931	3-4
142	ME12564	E21-14TW	-49	01	S	-120	04	W	3303	0-2
144	ME12324	E21-18P	-56	31	S	-119	32	W	4550	6-7
145	ME12325	E21-21P	-61	08	S	-120	16	W	4950	0-1
147	ME12327	E21-23P	-62	29	S	-099	48	W	4936	0-1
148	ME12649	E23-4P	-60	30	S	-095	05	W	4896	0-1
149	ME12331	E23-15P	-64	03	S	-115	51	W	4841	2-3
150	ME12333	E23-18	-58	59	S	-115	00	W	5247	0-1
156	ME12566	E25-7TW	-50	06	S	-094	54	W	4542	0-2
157	ME12567	E25-8TW	-50	02	S	-100	02	W	4049	0-2
158	ME12568	E25-9TW	-50	04	S	-105	07	W	3822	0-2
159	ME12569	E25-10TW	-50	06	S	-114	47	W	2876	0-2
160	ME12655	E42-7TW	-64	56	S	-119	44	W	4841	0-1

B).- LOC. CONTAINING SCARCE RADIOLARIA

LOC. NO.	ACCESS NUMBER	CORE NO.	LATITUDE DEG.MIN.			LONGITUDE DEG.MIN.			DEPTH (M)	DEPTH IN CORE CM
8	MO09619	Y71-6-18G2	-16	56	S	-074	21	W	7280	1-2
29	ML12784	V15-53TW	-33	27	S	-073	40	W	3915	0-2
35	ML11877	V16-133TW	-61	56	S	-095	03	W	5062	0-2
43	ML11906	V18-72TW	-60	29	S	-075	57	W	4695	0-2
44	ML11907	V18-75TW	-62	44	S	-069	49	W	3959	0-2
62	ML08041	RC9-87TW	-23	05	S	-076	21	W	4508	2-4
78	ML11896	RC13-89TW	-18	26	S	-111	17	W	3340	0-2
80	ML08038	RC13-98TW	-16	59	S	-086	56	W	4437	0-2
81	ML08185	RC13-99TW	-16	31	S	-084	34	W	4684	0-2
103	ML11865	RC17-210TW	-42	09	S	-104	15	W	3738	0-2
110	ML11871	RC18-18TW	-47	12	S	-076	51	W	3404	0-2
113	ME12635	E10-7P	-62	14	S	-083	18	W	4695	4-5
121	ME12638	E11-23P	-67	09	S	-089	39	W	4258	0-1
136	ME12560	E21-7TW	-38	19	S	-095	28	W	3348	0-2
137	ME12561	E21-8TW	-39	53	S	-096	54	W	3540	0-2
143	ME12565	E21-15TW	-52	01	S	-120	03	W	2984	0-2
153	ME12652	E25-3P	-39	57	S	-082	57	W	3995	0-1
163	ME12658	E42-10TW	-69	24	S	-087	51	W	3019	3-4
164	ME12659	E42-12TW	-68	59	S	-089	07	W	3536	3-4

C).- LOCATIONS BARREN OF RADIOLARIA

LOC. NO.	ACCESS NUMBER	CORE NO.	LATITUDE DEG.MIN.			LONGITUDE DEG.MIN.			DEPTH (M)	DEPTH IN CORE CM
9	MO09620	Y71-6-19G2	-17	03	S	-074	24	W	5791	0-1
31	ML11873	V15-62TW	-38	07	S	-074	25	W	2316	0-3
32	ML11874	V15-65TW	-41	14	S	-074	53	W	0989	0-2
33	ML11875	V15-70TW	-45	34	S	-076	35	W	2752	0-3

37	ML11880	V17-52TW	-37	13	S	-077	44	W	4147	0-2
38	ML11881	V17-55TW	-40	33	S	-075	10	W	3636	0-3
52	ML11885	RC8-87TW	-39	28	S	-125	30	W	4583	0-2
53	ML11886	RC8-88TW	-38	00	S	-121	55	W	4583	0-2
54	ML11887	RC8-90TW	-34	52	S	-114	48	W	3396	0-2
55	ML11888	RC8-91TW	-33	25	S	-111	54	W	2723	0-2
56	ML11889	RC8-92TW	-31	33	S	-108	30	W	2710	0-2
58	ML09621	RC9-81TW	-16	55	S	-073	43	W	3603	0-1
59	ML09622	RC9-82TW	-17	34	S	-073	08	W	5000	0-1
60	ML09121	RC9-83TW	-21	20	S	-073	54	W	4332	0-1
63	ML08040	RC9-89TW	-22	27	S	-081	03	W	4422	0-3
64	ML08186	RC9-90TW	-21	47	S	-087	13	W	4190	0-1
65	ML08049	RC9-91TW	-21	26	S	-090	58	W	5110	2-4
66	ML11891	RC9-94TW	-20	19	S	-102	14	W	3939	0-2
67	ML11892	RC9-96TW	-22	47	S	-110	59	W	3577	0-2
68	ML11893	RC9-102TW	-26	23	S	-119	56	W	3368	0-2
79	ML08187	RC13-96TW	-17	58	S	-092	53	W	4290	0-1
86	ML11897	RC15-43TW	-26	23	S	-113	10	W	2595	0-4
87	ML11853	RC15-51TW	-28	11	S	-093	54	W	3952	0-3
88	ML08043	RC15-52TW	-29	14	S	-085	59	W	3780	0-2
89	ML08044	RC15-53TW	-29	58	S	-082	07	W	4085	0-2
90	ML08045	RC15-54TW	-30	36	S	-078	13	W	4169	0-2
92	ML08048	RC15-58TW	-34	41	S	-073	27	W	5110	0-2
94	ML11856	RC15-62TW	-45	17	S	-077	13	W	2809	0-2
101	ML11863	RC17-208TW	-29	20	S	-108	53	W	3135	0-1
102	ML11864	RC17-209TW	-36	15	S	-106	24	W	3671	0-1
114	ME12636	E10-12P	-64	51	S	-078	38	W	4113	1-2
119	ME12637	E11-15P	-68	17	S	-114	44	W	4240	0-1
120	ME12555	E11-17TW	-70	14	S	-110	46	W	3458	0-2
125	ME12306	E17-20P	-67	55	S	-103	04	W	4386	0-1
126	ME12556	E17-22TW	-68	56	S	-095	19	W	4308	0-2
132	ME12646	E20-18P	-44	33	S	-111	20	W	2853	1-2
133	ME12647	E21-2P	-32	59	S	-087	57	W	3640	2-3
134	ME12558	E21-4TW	-35	44	S	-092	40	W	3285	0-2
135	ME12319	E21-6P	-37	25	S	-094	40	W	3075	0-1
138	ME12562	E21-9TW	-40	00	S	-105	04	W	3904	0-2
139	ME12563	E21-10TW	-39	59	S	-109	51	W	3130	0-2
140	ME12322	E21-12TW	-40	21	S	-119	35	W	4131	0-2
146	ME12326	E21-22P	-62	30	S	-101	56	W	4877	0-1
151	ME12650	E25-1P	-36	38	S	-083	15	W	3987	1-2
152	ME12651	E25-2P	-39	56	S	-085	55	W	3858	0-1
154	ME12653	E25-4P	-41	58	S	-081	57	W	3585	0-1
155	ME12654	E25-5P	-41	20	S	-078	35	W	3746	0-1
161	ME12656	E42-8TW	-64	31	S	-092	30	W	4615	5-6
162	ME12657	E42-9TW	-69	59	S	-080	24	W	564	0-1

Appendix 2. Core locations and sampling

Core	Lat. (S)	Long. (W)	Depth (m)	Sampled (~1 cm^3)
V19-29P	03°35'	083°56'	3157	every 10 cm from 0 to 950 cm
Y71-6-12P	16°26'	077°34'	2734	every 6 cm from 0 to 186 cm
V15-53P	33°27'	073°40'	3915	every 4 cm from 0 to 80 cm
RC15-61P	40°36'	077°12'	3771	every 4 cm from 0 to 80 cm
RC17-213P	51°33'	084°58'	4455	every 5 cm from 0 to 125 cm
V17-92P	62°11'	075°07'	4087	every 5 cm from 0 to 125 cm

Appendix 3. 18 K sample locations.

Core-Sample	O.S.U. Access No	Latitude	Longitude (W)	Depth (m)	Depth in Core (cm)	Stratigraphic Argument
Y69-71P	M007250	00°06'(N)	086°29'	2740	175-176	^{14}C
Y69-73P	M007287	01°27'(N)	087°56'	2707	132-133	$\delta^{18}O$
Y69-106P	M007256	02°59'(N)	086°33'	2870	33-35	$\delta^{18}O$
Y71-6-12P	M012807	16°26'(S)	077°34'	2734	24-25	$\delta^{18}O$
V19-29P	ML07268	03°35'(S)	083°56'	3157	120-121	$\delta^{18}O$
V19-41P	ML13183	14°06'(S)	096°12'	3248	30-31	$\delta^{18}O$
V21-33P	ML09201	03°48'(S)	092°05'	3726	46-47	$\delta^{18}O$
RC11-230	ML09176	08°48'(S)	110°48'	3259	45-46	$\delta^{18}O$
RC13-113	ML09181	01°39'(S)	103°38'	3195	50-51	Faunistic correlation to core RC11-209

Appendix 4: Notes on taxonomy

a) Introduction

The radiolarian fauna in the Pacific Ocean is diverse with over 200 extant species. However less than 60 species are usually found in abundances greater than 1% of the total population (Nigrini, 1968; Sachs, 1973; Moore, 1973). The taxonomic framework presented here contains 113 species which are commonly found in the Late Quaternary sediments of the southeastern Pacific. Some of the species were placed in morphologically similar groups, assuming they show a similar geographical distribution. These groups formed the categories used in the counting and in the subsequent factor analysis. Establishing of categories, in addition to avoiding problems of distinguishing between very alike species, provides a language which is easier to handle in the computer processes. The categories are prefixed by either the letter "S" for Spumellaria or "N" for Nassellaria and their species makeup is shown in part b of this appendix. (Most of this appendix has been published in Molina-Cruz, 1977).

b) Holocene-Late Pleistocene radiolarian taxonomic framework used for this study.

Category	Species name	Appendix page	Plate	Figs.
S1	Spongurus spp.	129	1	2
S1A	Spongurus cf. elliptica	129		
S3	Actinomma medianum	127	1	1
S3	Actinomma arcadophorum	127		
S4	Actinomma sp.	127		
S5	Cenosphaera cristata	128	1	3
S6	Acanthosphaera tenuissima	127		
S6	Haliomma erinaceum	128		
S6	Haliomma glisifra	128		
S6	Heliosphaera radiata	128		
S6	Hexastylus triaxonius	129		
S7	Echinomma cf. leptodermum	128	1	7
S8	Cromyechinus antarctica	128	1	8,9
S9	Amphirhopalum ypsilon	130	1	6
S10	Echinomma delicatulum	128	1	5
S11	Collosphaera tuberosa	126	2	6
S12	Euchitonia elegans	130		
S12	Euchitonia furcata	131	2	1,8
S13	Polysolenia spinosa	126		
S13A	Polysolenia flammabunda	126	2	4
S14	Heliodiscus asteriscus	130	2	2
S15	Actinomma antarctica	127		
S17	Hexacontium encanthum	129	2	3,5
S17A	Hexacontium laevigatum	129	2	7
S18	Hymeniastrium euclidis	131	3	12
S19	Larcospira quadrangula	133	3	3
S21	Cenosphaera coronata	128	1	4
S23	Ommatartus tetrathalamus	129	3	1,2
S24	Lithelius minor	134	3	13,14
S26	Lithelius solaris	134		
S27	Pylospira octopyle	134	3	9

Category	Species name	Appendix page	Plate	Figs.
S28	Spirema melonia	134		
S29	Larcopyle bütschlii	133	3	10,11
S30	Stylochlamydium asteriscus	132	4	6
S30A	Stylochlamydium asteriscus (var A)	132		
S30B	Stylochlamydium asteriscus (var B)	132		
S31	Lithelius alveolina	133		
S31	Lithelius (?) obscurus	134		
S31	Tholospira (?) sp A	134		
S33	Polysolenia lappacea	126		
S34	Polysolenia murrayana	126	3	5,6
S36	Dictyocoryne truncatum	130		
S36A	Dictyocoryne profunda	130	4	4
S36B	Hymeniastrium koellikeri	131		
S36C	Euchitonia triangulum	131	4	3,5
S36C	Euchitonia (?) spp.	131	4	1,2
S37	Siphonosphaera polysiphonia	127	5	14,15
S38	Siphonosphaera sp	127	5	11
S39	Disolenia quadrata	126	5	8,9
S39	Disolenia zanguebarica	126		
S39A	Otosphaera auriculata	126	5	10
S39A	Otosphaera polymorpha	126		
S40	Spongaster tetras	131	5	17
S41	Spongurus pylomaticus	129	9	6
S42	Spongocore puella	131	5	4
S45	Ommatodiscus sp A	131	2	8
S47	Stylodictya validispina	132	4	7
S48	Spongotrochus glacialis	132		
S48	Spongopyle osculosa	132	5	18
S48	Stylochlamydium venustum	132	5	16
S50	Axoprunum stauraxonium	127	3	4
S50	Stylosphaera lithatractus	129		
S51	Stylatractus spp.	130	3	7
S53	Hexapyle spp.	132	2	9,10

Category	Species name	Appendix page	Plate	Figs.
S54	Tetrapyle octacantha	132	5	5,6,7
S54	Octapyle stenozoa	133	5	1,2,3
S56	Phorticium clevei	133	9	1 to 5
S57	Cenosphaera (?) sp.	127	5	12,13
S58	Lithelious (?) nautiloides	133	9	8,9
S59	Lithelious (?) sp.	133	9	7
N1	Liriospyris reticulata	134	6	6
N1A	Tholospyris subquadrata	135		
N1B	Liriospyris toxarium	135	6	4,5
N1C	Liriospyris (?) toxarium (A)	135	6	1,2,3
N2	Anthocyrtidium ophirense	137	6	10
N3	Anthocyrtidium zanguebaricum	138	6	8
N4	Carpocanium spp.	137	6	12,13
N5	Lamprocyrtis haysi	138	6	9
N6	Pterocanium grandiporus	136	6	11
N7	Theoconus minythorax	138	7	1
N8	Dictyocryphalus papillosus	139	7	13
N9	Giraffospyris angulata	134	6	7
N10	Eucyrtidium acuminatum	135	7	3
N11	Eucyrtidium hexagonatum	135	7	4,5
N12	Phormospyris stabilis scaphipes	135	7	11,12
N14	Phormospyris stabilis antarctica	135	9	11
N15	Lamprocyclas junonis	138	7	2,10
N16	Lamprocyclas maritalis polypora	138	7	6
N16	Lamprocyclas maritalis ventricosa	138	7	7
N17	Lamprocyclas maritalis maritalis	138	7	8,9
N18	Lithostrobus (?) botrycyrtis	136	7	18
N18	Lithostrobus (?) lithobotrys	136	7	17
N18	Lithostrobus (?) seriatus	136	7	15,16
N19	Botryocyrtis scutum	139	6	14

Category	Species name	Appendix page	Plate	Figs.
N24	Dictyophimus infabricatus	135	8	1
N25	Pterocanium praetextum eucolpum	136		
N26	Pterocanium korotnevi	136		
N27	Pterocanium praetextum	136	8	2,3
N28	Pterocanium trilobum	137	8	5
N29	Pterocorys hirundo	138	8	9
N32	Siphocampe corbula	139	8	6
N33	Siphocampe aquilonaris	139	8	10,11
N35	Cycladophora davisiana	137	7	19
N35A	Cycladophora davisiana (var)	137		
N36	Theocalyptra bicornis (var)	137	9	13
N38	Theocalyptra bicornis	137	8	12,13
N39	Theoconus hertwigii	138	8	7,8
N40	Theoconus zancleous	138		
N42	Theocorythium trachelium	139	8	4
N43	Peripyramis circumtexta	136		
N43	Plectopyramis dodecomma	136		
N48	Saccospyris antarcticum	139	9	10
N48	Saccospyris conithorax	139		
N49	Antarctissa deuticulata	140	9	14
N49	Antarctissa denticulata clausa	140	9	15
N50	Antarctissa strelkovi	140	9	16,17

Biostratigraphic Index Species

Stylatractus universus	130	10	5,6
Saturnulus planetes	130	10	1
Sethocorys sp	138	10	2,3
Pterocanium trilobum	137	10	4

c) Taxonomy

SUBCLASS RADIOLARIA Müller 1858

ORDER POLYCYSTINA Ehrenberg 1875

SUBORDER SPUMELLARIA Ehrenberg 1875

FAMILY COLLOSPHAERIDAE Müller 1858

GENUS COLLOSPHAERA Müller 1855

Collosphaera tuberosa (Haeckel)
S11

Haeckel, 1887, p. 97: Nigrini, 1971, p 445, pl 34, fig 1

GENUS DISOLENIA Ehrenberg, 1860b

Disolenia quadrata (Ehrenberg)
S39

Tetrasolenia quadrata Ehrenberg, 1872b, p 301, pl x, fig 20
Disolenia quadrata (Ehrenberg), Nigrini, 1967, p 19, pl 1, fig 5

Disolenia zanguebarica (Ehrenberg)
S39

Trisolenia zanguebarica Ehrenberg, 1872a, p 321
Disolenia zanguebarica (Ehrenberg), Nigrini, 1967, p 20, pl 1, fig 6

GENUS OTOSPHAERA Haeckel 1887, emend. Nigrini 1967

Otosphaera auriculata (Haeckel)
S39A

Haeckel, 1887, p 116, pl 7, fig 5; Nigrini, 1967, p 22, pl 1, fig 7

Otosphaera polymorpha (Haeckel)
S39A

Haeckel, 1887, p 23, pl 1, fig 8: Nigrini, 1967, p 23, pl 1, fig 8

GENUS POLYSOLENIA Ehrenberg 1872a, emend. Nigrini, 1967

Polysolenia flammabunda (Haeckel)
S13A

Choenicosphaera flammabunda Haeckel 1887, p 103, pl 8, fig 5
Acrosphaera flammabunda (Haeckel) Popofsky, 1917, p 253, text figs. 14-16 (part)
Polysolinia flammabunda (Haeckel), Nigrini, 1967, p 15, pl 1, fig 2

Polysolenia lappacea (Haeckel)
S33

Polysolenia lappacea (Haeckel); Nigrini, 1967, p 16, pl 1, fig 3

Polysolenia murrayana (Haeckel)
S34

Choenicosphaera murrayana Haeckel 1887, p 102, pl 8, fig 6
Acrosphaera murrayana (Haeckel) Popofsky, 1917, p 259, text figs. 22-23
Polysolenia murrayana (Haeckel) Nigrini, 1968, p 52, pl 1, fig 1a, b
Remarks: It is mostly abundant in areas of coastal upwelling

Polysolenia spinosa (Haeckel)
S13

Collosphaera spinosa Haeckel 1860, p 845
Acrosphaera spinosa (Haeckel), Haeckel, 1887
Polysolenia spinosa (Haeckel), Nigrini 1967, p 14, pl 1, fig 1
Polysolenia ? sp., Benson 1966, p 119, pl 2, figs 1,2

GENUS SIPHONOSPHAERA Müller 1858

Siphonosphaera polysiphonia (Haeckel)
S37

Haeckel 1887, p 106: Nigrini, 1967, p 18, pl 1, fig 4a, b

Siphonosphaera sp.
S38

Remarks: This species resembles Siphonosphaera polysiphonia, but it does not show tubes and the size of the pores is more irregular.

FAMILY ACTINOMMIDAE Haeckel 1862, emend. Riedel 1967

GENUS ACANTHOSPHAERA Ehrenberg, 1858

Acanthosphaera tenuissima (Haeckel)
S6

Haeckel, 1862, p 351, pl 9 fig 2

Acanthosphaera tenuissima (Haeckel), Renz 1973, p 150, pl 2 fig 11
Remarks: One of several simple spherical spumellarians grouped and counted together in category S6.

GENUS ACTINOMMA Haeckel 1860, emend. Nigrini 1967

Actinomma arcadophorum (Haeckel)
S3

Haeckel 1887, p 225, pl 29 fig 7, 8: Nigrini 1967, p 29, pl 2, fig 3

Remarks: As noted by Nigrini (1967) it is more delicate than A. medianum. It is assumed that this species is a morphological variant of A. medianum and was grouped with this species in the counts.

Actinomma medianum (Nigrini)
S3

Nigrini 1967, p 27, pl 2, fig 2a, b

Actinomma antarctica (Haeckel)
S15

Spongoplegma antarcticum Haeckel, 1887, p 90; Hays, 1965, p 165, pl 1, fig 1
Diploplegma banzare Riedel, 1958, p 223, pl 1, figs 3,4
Actinomma antarcticum Nigrini, 1967, p 26, pl 2, figs 1a-1d

Actinomma sp.
S4

Actinomma sp., Benson, 1966, p 164 (in part), pl 5, fig 6 (only); Sachs, 1973, p 137, pl 2.1g

GENUS AXOPRUNUM Haeckel 1887

Axoprunum stauraxonium
S50

Remarks: This species was counted together with Stylosphaera lithatractus.

GENUS CENOSPHAERA Ehrenberg 1854

Cenosphaera (?) sp.
S57

Remarks: This species is a robust sphere devoid of radial spicules (Pl 5, figs. 12, 13) and with regular pores which are generally 5-6 in half equator. It occurs abundantly along the coast of South America near the area where the Subtropical Convergence vanishes and several water masses mix together. However, it was not employed in the micropaleontology evaluation (factor analysis) because this species occurs with higher frequencies down the core Y71-6-12 (16°26'S-77°33'W) than in any of the surface-locations analyzed for this study, and this alters future evaluations (Sachs, 1973).

Cenosphaera coronata (Haeckel)
S21

Haeckel 1887, p 67, pl 26, fig 11

Cenosphaera cristata (Haeckel)?
S5

Cenosphaera cristata Haeckel, 1887, p 66; Riedel, 1958, p 223, pl 1, fig 1, 2

GENUS CROMYECHINUS Haeckel 1881

Cromyechinus antarctica (Dreyer)
S8

Prunopyle antarctica Dreyer, 1889, p 24, fig 75; Riedel, 1958, p 225, pl 1 fig 7, 8
Actinomma imperfecta Popofsky, 1908, p 215, pl 24, fig 4; Riedel, 1958, p 224, pl 1, fig 5
Cromyechinus antarctica (Dreyer) Petrushevskaya, 1968, p 22-26, fig 13, I-VII
Cromyechinus sp. Sachs 1973, p 139, pl 2. 1h,i

GENUS ECHINOMMA Haeckel 1881

Echinomma delicatulum (Dogiel)
S10

Heliosoma delicatum Dogiel, 1952
Echinomma delicatum (Dogiel); Petrushevskaya, 1968, p 18, fig 11; Sachs, 1973, p 141, pl 2.2a,b
Remarks: Most abundant in cooler waters. However, as it is a robust form, it could appear abundant in areas of presumed dissolution.

Echinomma cf. leptodermum (Jörgensen)
S7

Echinomma leptodermum Jorgensen, 1905, p 116, pl 8, fig 33
Echinomma cf. leptodermum Jorgensen, Sachs, 1973, p 142, pl 2.2c,d; Moore, 1973, p 103.

GENUS HALIOMMA Ehrenberg 1838

Haliomma erinaceum (Haeckel)
S6

Haeckel 1862, p 427, pl 23, fig 3,4; Popofsky 1912, p 102, pl 4, fig 1; Renz, 1973, p 152, pl 2 fig 4a,b
Remarks: One of several simple spherical spumellarians grouped and counted together in category S6.

Haliomma glisifra (Renz)
S6

Renz, 1973, p 153, pl 2, fig 10
Remarks: One of several simple, spherical spumellarians grouped and counted together in category S6.

GENUS HELIOSPHAERA Haeckel 1962 emend Haeckel 1881

Heliosphaera radiata (Popofsky)
S6

Popofsky, 1913, p 98, text fig 10
Remarks: One of several simple spherical spumellarians grouped and counted together in category S6.

GENUS HEXACONTIUM Haeckel 1881

Hexacontium encanthum (Jörgensen)
S17

Jörgensen, 1899, p 52, pl 2, fig 14, pl 4, fig 20; Benson, 1966, p 149, pl 3, fig 13-14, pl 4, fig 1-3.

Hexacontium laevigatum (Haeckel)
S17A

Haeckel, 1887, p 193, pl 24, fig 6; Benson, 1966, p 154, pl 4, fig 4-5

GENUS HEXASTYLUS Haeckel 1881

Hexastylus triaxonius (Haeckel)
S6

Haeckel 1887, p 175, pl 21, fig 2
Remarks: One of several simple, spherical spumellarians grouped and counted together in category S6.

GENUS OMMATARTUS Haeckel 1881, emend. Riedel 1971

Ommatartus tetrathalamus (Haeckel)
S23

Panartus tetrathalamus Haeckel, 1887, p 378, pl 40, fig 3; Nigrini, 1967, p 30, pl 2, fig 4a-4d; 1970, p 168, pl 1, fig 12; Moore (1973), p 103
Ommartartus tetrathalamus (Haeckel), Renz 1973, p 158, pl 1, fig 6
Remarks: The subspecies of Panartus tetrathalamus described by Nigrini (1970) are grouped together in this study.

GENUS SPONGURUS Haeckel 1860

Spongurus pylomaticus (Riedel)
S41

Riedel, 1958, p 225, pl 1, fig 10,11; Ling et al., 1971, pl 1, fig 5; Sachs, 1973, p 163 pl 2.4j

Spongurus cf. elliptica (Ehrenberg)
S1A

?Acanthosphaera elliptica Ehrenberg, 1873, pl 7, fig 4
Spongurus cf. elliptica (Ehrenberg) Benson, 1966, p 189, pl 8, fig 4,5
Remarks: It was found only in the equatorial and subtropical regions; and it is not common in this study.

Spongurus sp.
S1

Spongurus (?) sp., Petrushevskaya, 1968, p 30, fig 16, III; 26, I
Spongurus sp. Sachs, 1973, p 164, pl 2.4k
Remarks: It is most abundant in coastal and cool waters.

GENUS STYLOSPHAERA Ehrenberg 1847

Stylosphaera lithatractus (Haeckel)
S50

Haeckel 1887, pl 16, fig 4; Renz, 1973, p 156, pl 2, fig 7
Remarks: This species was counted together with Axoprunum stauraxonium.

GENUS STYLOTRACTUS Haeckel 1887

Stylatractus spp.
S51

Stylatractus neptunus, Haeckel 1887, p 328, pl 17, fig 6
Xiphatractus cronos (Haeckel), Benson 1966, p 182, pl 7, fig 12-13
Xiphatractus pluto (Haeckel), Benson 1966, p 184, pl 7, fig 14-17
Stylatractus sp. Sachs, 1973, p 147, pl 2.3c,d
Remarks: This species group is distinguished from Stylasphaera lithatractus by its generally smaller size and strongly bladed polar spines.

Stylatractus universus (Hays)

Stylatractus sp Hays, 1965, p 167, pl I, fig 6
Stylatractus universus Hays, 1970, p 215, pl 1, figs 1,2
Remarks: This species is considered a biostratigraphic index. S. universus is not found in recent sediments and its range of occurrence was from approximately 750,000 years ago to 410,000 years ago.

GENUS SATURNULUS Haeckel 1882

Saturnulus planetes (Haeckel)

Saturnulus planetes Haeckel, 1887, p 142, pl 16, fig 17; Hays, 1965, p 167 pl I, fig 5
Remarks: This species is considered a biostratigraphic index south of the (Antarctic) Polar front. It became extinct at about 700,000 years ago in such region.

FAMILY PHACODISCIDAE Haeckel 1881

GENUS HELIODISCUS Haeckel 1862, emend. Nigrini 1967

Heliodiscus asteriscus (Haeckel)
S14

Haeckel, 1887, p 445, pl 33, fig 8; Nigrini, 1967, pl 32, pl 3, fig 1a, 1b; 1970, pl 2, fig 1

FAMILY SPONGODISCIDAE Haeckel 1862, emend. Riedel 1967

GENUS AMPHIRHOPALUM Haeckel 1881, emend. Nigrini 1967

Amphirhopalum ypsilon (Haeckel)
S9

Haeckel, 1887, p 522; Nigrini, 1967, p 35, pl 3, fig 3a-3d; 1970, p 168, pl 2, fig 2

GENUS DICTYOCORYNE Ehrenberg 1860

Dictyocoryne profunda (Ehrenberg)
S36A

Ehrenberg, 1872b, p 307, pl 7, fig 23; Renz, 1973, p 144, pl 3, fig 1

Dictyocoryne truncatum (Ehrenberg)
S36

?Rhopalodictyum truncatum Ehrenberg, 1861, p 301; Haeckel, 1887, p. 589-90.
Dictyocoryne cf. truncatum (Ehrenberg), Benson, 1966, p 235, pl 15, fig 1

GENUS EUCHITONIA

Euchitonia elegans (Ehrenberg)
S12

Pteractis elegans Ehrenberg, 1972a, p 319
Euchitonia elegans (Ehrenberg), Haeckel, 1887, p 535; Ling and Anikouchine, 1967, p 1486, pl 189, 190, figs 3, 4
Remarks: This species was grouped and counted together with Euchitonia furcata.

Euchitonia furcata (Ehrenberg)
S12

Ehrenberg, 1860a, p 767; Ling and Anikouchine, 1967, p 1484, pl 189, 190, figs 1-2, 5-7; Nigrini, 1970, p 169, pl 2, fig 5

Euchitonia triangulum (Ehrenberg)
S36C

Stylactis triangulum Ehrenberg 1872a, p 320; 1872b, p 298-299, pl 8, fig 9
Euchitonia triangulum (Ehrenberg), Haeckel 1887, p 533; cf. E. triangulum, Ling and Anikouchine 1967, p 1487, pl 189, 190, fig 8,9

Euchitonia (?) spp.
S36C

Remarks: All unidentified SPONGOCIDAE with "helix" forms were counted together in this category.

GENUS HYMENIASTRUM Ehrenberg 1847

Hymeniastrum euclidis (Haeckel)
S18

Haeckel, 1887, p 521; Benson, 1966, p 222, pl 12, fig 1-3; Ling and Anikouchine, 1967, p 1488, pl 191, fig 3, pl 192, fig 3; Nigrini, 1970, p 168, pl 2, fig 3

Hymeniastrum koellikeri (Haeckel)
S36B

Haeckel 1887, p 530; Benson 1966, p 225, pl 12, fig 4-6

GENUS OMMATODISCUS Stohr 1880

Ommatodiscus sp. A
S45

Ommatodiscus sp. Sachs 1973, p 149, pl 2.3f
Remarks: This species is distinguished from Ommatodiscus sp. B by the regular concentric nature of the internal rings.

Ommatodiscus sp. B

Ommatodiscus sp., Benson 1966, p 210, pl 10, fig 4 (only)
Stylochiamydium venustum (Bailey) Renz, 1973, p 161, pl 3, fig 11
Remarks: This species is distinguished by the irregular discontinuous internal rings.

GENUS SPONGASTER Ehrenberg 1860b

Spongaster tetras (Ehrenberg)
S40

Ehrenberg 1860b, p 833; Nigrini, 1967, p 41, pl 5, fig 1a,b; 1970, p 169, pl 2, fig 7

GENUS SPONGOCORE Haeckel, 1887

Spongocore puella (Haeckel)
S42

Spongocore puella (Haeckel), Benson 1966, pl 8, figs 1-3, Nigrini 1970, p 168

GENUS SPONGOPYLE Dreyer 1889

Spongopyle osculosa (Dreyer)
S48

Dreyer, 1889, p 42, pl 6, fig 99, 100; Riedel, 1958, p 226, pl 1, fig 12
Remarks: This species was grouped and counted together in category S44. This was a mistake, since it appears that each of the species in this category has a defined distribution. Consequently, this category was not used in the evaluation of the micropaleontological data (factor analysis).

GENUS SPONGOTROCHUS Haeckel 1860

Spongotrochus glacialis (Popofsky)
S48

Popofsky, 1908, p 228, pl 26, fig 8, pl 27, fig 1, pl 28, fig 2; Riedel, 1958 p 227, pl 2 fig 1,2
(See remarks in Spongopyle osculosa.)

GENUS STYLOCHLAMYDIUM Haeckel 1887

Stylochlamydium asteriscus (Haeckel)
S30

Haeckel, 1887, p 514, pl 41, fig 10; Renz, 1973, p 160, pl 3, fig 12

Remarks: This species presented three variants. Thus, it was divided into three categories: (1) S30, (2) S30A, and (3) S30B. S30 has an opaque center and is mostly abundant in the equatorial region. S30A has a clear and concentric center. S30B has a clear center but it is in the form of a spiral. S30B was not common in this study.

Stylochlamydium venustum (Bailey)
S48

Perichlamidium venustum Bailey, 1856, p 5, pl 1, fig 16, 17
Stylochlamydium venustum (Bailey), Ling et al., 1971, p 711, fig 7,8
Sachs, 1973, p 152, pl 2.3i,j
(See remarks in Spongopyle osculosa)

GENUS STYLODICTYA Ehrenberg 1847

Stylodictya validispina (Jörgensen)
S47

Jörgensen, 1905, p 119, pl 10, fig 40; Benson, 1966, p 203, pl 9, fig 5-6
Petrushevskaya, 1968, p 30, pl 17; Sachs, 1973, p 150, pl 2.3g

FAMILY PYLONIIDAE Haeckel 1881

GENUS HEXAPYLE Haeckel, 1882

Hexapyle spp.(Haeckel)
S53

Hexapyle dodecantha (Haeckel), Benson, 1966, p 275, pl 18, figs 14-16

GENUS TETRAPYLE Muller 1858

Tetrapyle octacantha (Muller)
S54

Muller, 1858, p 33, pl 2, fig 12, 13, pl 3, fig 1-12; Benson, 1966, pl 15, fig 3-10, pl 16, fig 1; Sachs, 1973, p 154, pl 2.3m

GENUS OCTAPYLE Haeckel 1881

Octopyle stenozoa (Haeckel)
S54

Haeckel, 1887, p 652, pl 9, fig 11
Remarks: This species was counted together with Tetrapyle octacantha. However, Octopyle stenozoa is much less abundant than Tetrapyle octacantha.

GENUS PHORTICIUM Haeckel, 1882

Phorticium clevei (Jörgensen)
S56

Phorticium pylonium (Cleve); Riedel 1958, vol 6, p 229, pl 2, fig 5;
Phorticium clevei (Jorgesen); Petrushevkaya, 1968, p 56, figs 32 I,II; 33. I-III.

FAMILY LITHELIIDAE Haeckel 1862

GENUS LARCOPYLE Dreyer 1889

Larcopyle butschlii (Dreyer)
S29

Dreyer, 1889, p 124, pl 10, fig 70; Benson, 1966, p 280, pl 19, fig 3-5;
Sachs, 1973, p 155, pl 2.3k, l

GENUS LARCOSPIRA Haeckel 1887

Larcospira quadrangula (Haeckel)
S19

Haeckel, 1887, p 696, pl 49, fig 3; Benson, 1966, p 266, pl 18, fig 7-8;
Nigrini, 1970, p 169, pl 2, fig 9

GENUS LITHELIUS Haeckel 1862

Lithelius alveolina (Haeckel)
S31

Haeckel, 1887, p. 694; Renz 1973, p 142, pl 1, fig 16
Remarks: Grouped and counted together in category S31 with several similar forms.

Lithelious (?) nautiloides (Popofsky)
S58

Lithelious nautiloides Popofsky, 1908, p 230-231, pl 27, figs 244;
Riedel, 1958, p 228, pl 2, figs 3,4
Lithelious (?) nautiloides Popofsky, Petrushevskaya, 1968, p 50, figs 27; 28I; 29I

Lithelious (?) sp.
S59

Remarks: This form is somewhat similar to spongorus spp. (S1).

Lithelius minor (Jörgensen)
S24

Jorgensen, 1899, p 65-66, pl 5, fig 24; Benson, 1966, p 262, pl 17, fig 9-10, pl 18, fig 1-4; Sachs 1973, p 157, pl 2.3o, 2.3p
Remarks: This species appeared very cosmopolitan. It probably needs a taxonomic review, since the specimens may represent more than one species with markedly different ecological responses.

Lithelius solaris (Haeckel)
S26

Haeckel, 1887, p 695, pl 49, fig 2

Lithelius (?) obscurus (Popofsky)
S31

Popofsky, 1908, p 231-232, pl 27, fig 5, 6, pl 28, fig 3, 4;
Petrushevskaya, 1968, p 53, fig 30
Remarks: Grouped and counted with several similar forms in category S31.

GENUS PYLOSPIRA Haeckel 1887

Pylospira octopyle (Haeckel)?
S27

Haeckel, 1887, p 698, pl 49, fig 4
Tholospira (?) sp 2, Sachs, 1973, p 160, pl 2.4f, g
Remarks: The identification of this species is questionable because the test illustrated by Haeckel is much more regular than the forms observed in this study.

GENUS SPIREMA Haeckel 1881

Spirema melonia (Haeckel)?
S28

Haeckel 1887, p 692, pl 49, fig 1
Thlospira (?) sp 3 Sachs, 1973, p 161, pl 2.4h,i

GENUS THOLOSPIRA Haeckel 1887

Tholospira (?) sp A
S31

Tholospira (?) sp 1, Sachs 1973, p 159, pl 2.4d,e
Remarks: Grouped and counted with several similar forms in category S31.

SUBORDER NASSELLARIA Ehrenberg 1875

FAMILY TRISSOCYCLIDAE Haeckel 1881, emend. Goll, 1968

GENUS GIRAFFOSPYRIS Haeckel 1881, emend. Goll 1968

Giraffospyris angulata (Haeckel)
N9

Eucoronis angulata Haeckel 1887, p 978, pl 82, fig 3
Giraffospyris angulata (Haeckel) Goll, 1969, p 331, pl 59, fig 4,6,7,9

GENUS LIRIOSPYRIS Haeckel 1881, emend. Goll, 1968

Liriospyris reticulata (Ehrenberg)
N1

Dictyospyris reticulata Ehrenberg 1872b, p 307
Amphispyris reticulata (Ehrenberg) Haeckel 1887, p 1096
Amphispyris costata Haeckel 1887, p 1097, pl 88, fig 3
Amphispyris thorax Haeckel 1887, p 996, pl 93, fig 18
Liriospyris reticulata (Ehrenberg) Goll, 1968, p 1429, pl 176, fig 9,11,13

Lyriospyris toxarium (Haeckel, 1887)
N1B

Amphispyris toxarium Haeckel 1887, p 1097, pl 88, fig 7.
Lyriospyris toxarium Benson 1966, p 293, pl 20, figs 3-7.

Lyriospiris toxarium (A)
N1C

Lyriospiris toxarium Benson 1966, pl 20, fig 2
Remarks: It is presumably the sagittal ring of Lyriospiris toxarium (N1B). However, as this ring could be confused with sagittal rings from another species, it was counted in a separate category. This category occurs abundantly in subtropical waters.

GENUS THOLOSPYRIS Haeckel 1881, emend. Goll 1968

Phormospyris stabilis scaphipes
N12

Tristylospyris scaphipes Haeckel 1887, p 1033, pl 84, fig 13
Tholospyris scaphipes (Haeckel) Goll 1969, p 328, pl 58, fig 1-8,13,14
Phormospyris stabilis scaphipes (Haeckel) Goll, 1976, p 394, pls 8,9

Phormospyris stabilis antarctica (Haecker)
N14

Triceraspyris antarctica (Haecker), Riedel, 1958, p 230, pl 2, figs 6,7
Triceraspyris (?) antarctica Petrushevskaya, 1968, p 62, fig 37.
Phormospyris stabilis antarctica (Haecker), Goll, 1976, p 394, pl 5, figs 3-6.

Tholospyris subquadrata (Haeckel)
N1A

Amphispyris subquadrata Haeckel, 1887, p 1097, pl 88, fig 5; Benson 1966, p 297, pl 20, fig 9-12
Tholospyris procera Goll 1969, p 328, pl 59, fig 8, 10-12

FAMILY THEOPERIDAE Haeckel 1881, emend, Riedel 1967

GENUS DICTYOPHIMUS Ehrenberg 1847, emend. Nigrini 1968

Dictyophimus infrabricatus (Nigrini)
N24

Nigrini 1968, p 56, pl 1, fig 6

GENUS EUCYRTIDIUM Ehrenberg 1847, emend. Nigrini 1967

Eucyrtidium acuminatum (Ehrenberg)
N10

Lithocampe acuminata (Ehrenberg) 1844, p 84

Eucyrtidium acuminatum (Ehrenberg) 1847; Nigrini, 1967, p 81, pl 8, fig 3a,b; 1970, p 171, pl 4, fig 1

Eucyrtidium hexagonatum (Haeckel)
N11

Haeckel 1887, p 1489, pl 80, fig 11; Nigrini 1967, p 83, pl 8, fig 4a,b; 1970, p 171, pl 4, fig 2

GENUS LITHOSTROBUS Butschli 1882

Lithostrobus (?) botryocyrtis (Haeckel)
N18

Haeckel 1887, p 1475, pl 79, fig 18; Petrushevskaya, 1968, p 141, 142, fig 80, IV, fig 81, I-IV

Lithostrobus (?) lithobotrys (Haeckel)
N18

Haeckel 1887, p 1475, pl 79, fig 17; Petrushevskaya 1968, p 143, fig 81, V-VI

Lithostrobus (?) seriatus (Haeckel)
N18

Lithostrobus seriatus Haeckel 1887, p 1474, pl 79, fig 15
Lithostrobus (?) seriatus (Haeckel), Petrushevskaya, 1968, p 143, fig 81 I-IV; Sachs, 1973, p 172, pl 2.5k
Remarks: Lithostrobus (?) seriatus, L. (?) botryocyrtis, and L. (?) lithobotrys were grouped and counted together. This category is mostly abundant in waters of equatorial upwelling (divergences).

GENUS PERIPYRAMIS Haeckel 1881, emend. Riedel 1958

Peripyramis circumtext (Haeckel)
N43

Haeckel 1887, p 1162, pl 54, fig 5; Riedel, 1958, p 231, pl 2, fig 8,9; Petrushevskaya, 1968, p 111, fig 64, I-II, fig 64, I-II

GENUS PLECTOPYRAMIS Haeckel 1881

Plectopyramis dodecomma (Haeckel)
N43

Haeckel 1887, p 1258, pl 54, fig 6; Benson 1966, p 424, pl 29, fig 3

GENUS PTEROCANIUM Ehrenberg 1847

Pterocanium grandiporus (Nigrini)
N6

Nigrini 1968, p 57, pl 1, fig 7

Pterocanium korotnevi (Dogiel)
N26

Pterocorys korotnevi Dogiel, Dogiel and Reshetnyak 1952, p 17, fig 11
Pterocanium korotnevi (Dogiel) Nigrini 1970, p 170, pl 3, fig 10,11
Remarks: It was rare in this study.

Pterocanium praetextum (Ehrenberg)
N27

Lychnocanium praetextum Ehrenberg 1872a, p 316
Pterocanium praetextum (Ehrenberg) Haeckel 1887, p 1330, pl 73, fig 6
Pterocanium praetextum praetextum (Ehrenberg) Nigrini 1967, p 68, pl 7, fig 1

Pterocanium praetextum eucolpum (Ehrenberg)
N25

Pterocanium praetextum (Ehrenberg) eucolpum Haeckel, Nigrini, 1967, p 70 pl 7 fig 2

Pterocanium trilobum (Haeckel)
N28

Dictyopodium trilobum Haeckel 1860, p 839
Pterocanium trilobum Haeckel 1887, p 1333; Nigrini 1967, p 91, pl 7, fig 3a,b

GENUS STICHOPILIUM Haeckel, 1881

Stichopilium bicorne (Haeckel)
N34

Stichopilium bicorne Haeckel; Benson 1966, p 422, pl 29, figs 1,2

GENUS THEOCALPYTRA Haeckel 1887

Theocalyptra bicornis (Popofsky)
N38

Halicalyptra (?) cornuta Bailey 1856, p 5, pl 1, fig 13
Theocalyptra cornuta (Bailey), Haeckel 1887, p 1398
Pterocorys bicornis Popofsky 1908, p 288, pl 34, fig 7,8
Theocalyptra bicornis (Popofsky), Riedel 1958, p 240, pl 4, fig 4; Petrushevskaya, 1968, p 124, fig 71, I-VIII

Theocalyptra bicornis (var) (Ehrenberg)
N36

Coracalyptra cervus (Ehrenberg); Benson, 1966, p 447-450, pl 30, figs 3-5
Theocalyptra bicornis (var) Moore 1973

GENUS CYCLADOPHORA

Cycladophora davisiana (Ehrenberg)
N35

Cyladoohora (?) davisiana Ehrenberg, 1861, p 297
Theocalyptra davisiana (Ehrenberg), Riedel, 1958, p 239, pl 4, fig 2,3
Cycladophora davisiana Ehrenberg, Petrushevskaya 1968, p 120, fig 69 I-VII fig 70, I-VI; Ling et al., 1971, p 714, pl 2, fig 6,7
Remarks: In this study it was mostly abundant along the coast.

Cycladophora davisiana (var) (Ehrenberg)
N35A

Cycladophora davisiana (Ehrenberg) (var), Petrushevskaya, 1968, p 122, Fig 70 IV-VII

FAMILY CARPOCANIIDAE Haeckel 1881, emend. Riedel 1967

GENUS CARPOCANIUM

Carpocanium spp.
N4

Carpocanium spp., Nigrini 1970, p 171, pl 4, fig 4-6
Carpocanium sp. A, Nigrini 1968, p 55, pl 1, fig 4
Carpocanium spp., Sachs 1973, p 176, pl 2.6c

FAMILY PTEROCORYIDAE Haeckel 1881, emend. Riedel 1967

GENUS ANTHOCYRTIDIUM Haeckel 1881

Anthocyrtidium ophirense (Ehrenberg)
N2

Anthocyrtis ophirensis Ehrenberg 1872a, p 301; Haeckel 1887, p 1270
Anthocyrtidium cineraria Haeckel 1887, p 1278, pl 62, fig 16
Anthocyrtidium ophirense (Ehrenberg) Nigrini 1967, p 56, pl 6, fig 3

Anthocyrtidium zanguebaricum (Ehrenberg)
N3

Anthocyrtis zanguebarica Ehrenberg 1872, p 301
Anthocyrtidium cineraria Haeckel 1887; Riedel 1957, p 84 (partim.)
Anthocyrtidium zanguebaricum (Ehrenberg), Nigrini, 1967, p 58, pl 6, fig 4

GENUS SETHOCORYS Haeckel 1882

Sethocorys sp (Haeckel)

Sethocorys sp. Haeckel, Hays, 1965, p 177, pl III, fig 8
Remarks: This species is considered a biostratigraphic index south of the (Antarctic) Polar front. It became extinct about 700,000 years ago in this region.

GENUS LAMPROCYCLAS Haeckel 1881

Lamprocyclas junonis (Haeckel)
N15

Theoconus junonis Haeckel 1887, p 1401, pl 69, fig 7
Lamprocyclas maritalis maritalis Haeckel in Sachs 1973, p 177, pl 2.6d,e

Lamprocyclas maritalis maritalis (Haeckel)
N17

Haeckel 1887, p 1390, pl 74, fig 13, 14; Nigrini, 1967, p 74, pl 7, fig 5

Lamprocyclas maritalis polypora (Nigrini)
N16

Lamprocyclas maritalis Haeckel 1887, p 1390, pl 74, fig 13, 14
Lamprocyclas maritalis Haeckel polypora Nigrini, 1970, p 171, pl 4, fig 9
Remarks: Counted together with L. maritalis ventricosa

Lamprocyclas maritalis ventricosa (Nigrini)
N16

Lamprocyclas maritalis Haeckel 1887, p 1390, pl 74, fig 13,14
Lamprocyclas maritalis Haeckel ventricosa Nigrini 1968, p 57, pl 1, fig 9

GENUS LAMPROCYRTIS Kling 1973

Lamprocyrtis hayse (Kling)
N5

Conarachnium (?) sp. Nigrini 1968, p 56, pl 1, fig 5a,b; Moore, 1973, p 103
Lamprocyrtis hayse Kling 1973, p 639, pl 5, fig 15, 16, pl 15, fig 1-3

GENUS PTEROCORYS Haeckel 1881

Pterocorys hirundo (Haeckel)
N29

Haeckel 1887, p 1318, pl 71, fig 4; p 114, fig 67, I-V

GENUS THEOCONUS Haeckel 1887

Theoconus hertwigii (Haeckel)
N39

Eucyrtidium hertwigii Haeckel 1887, p 1491, pl 80, fig 12
Theoconus hertwigii (Haeckel), Nigrini, 1967, p 73, pl 6, fig 4a,b

Theoconus minythorax (Nigrini)
N7
Nigrini 1968, p 57, pl 1, fig 8

Theoconus zancleus (Muller)
N40

Eucyrtidium zanclaeum Muller, 1958, p 41, pl 6, fig 1-3
Theoconus zancleus (Muller), Benson 1966, p 482, p- 33, fig 4,5; Sachs, 1973 p 179, pl 2.6h,i

GENUS THEOCORYTHIUM Haeckel 1887

Theocorythium trachelium
N42

Eucyrtidium trachelius Ehrenberg 1872a, p 312
Calocyclas amicae Haeckel 1887, p 1382, pl 74, fig 2
Theocyrtis trachelius (Ehrenberg) Haeckel 1887, p 1405
Theocorythium trachelium trachelium (Ehrenberg) Nigrini, 1967, p 79, pl 8, fig 2, pl 9, fig 2
Theocorythium trachelium (Ehrenberg) dianae (Haeckel) Nigrini, 1967, p 77, pl 8, fig 1a, b, pl 9, fig 1a, b
Remarks: The two subspecies described by Nigrini (1967) are grouped together in this study.

FAMILY ARTOSTROBIIDAE Riedel 1967

GENUS SIPHOCAMPE Haeckel 1881

Siphocampe corbula (Harting)
N32

Siphocampe corbula (Harting); Nigrini, 1967, p 85, pl 8, fig 5; pl 9, fig 3

Siphocampe aquilonaris (Bailey)
N33

Eucyrtidium aquilonaris Bailey 1856, p 4, pl 1, fig 9
Eucyrticium tumidulum Bailey 1856, p 5, pl 1, fig 11; Hays, 1965, p 181, pl 3, fig 7
Siphocampium erucosum (Haeckel) Benson, 1966, p 527, pl 35, fig 18-20
Lithocampe (?) aquilonaris (Bailey), Petrushevskaya, 1968, p 140, fig 79, I-II
Siphocampe acquilonaris (Bailey), Long et al., 1971, p 716, pl 2, fig 12

GENUS DICTYOCRYPHALUS Haeckel, 1881

Dictyocryphalus papillosus (Ehrenberg)
N8

Dictyocryphalus papillosus (Ehrenberg); Nigrini 1967, p 63, pl 6, fig 6

FAMILY CANNOBOTRYIDAE Haeckel 1881, emend. Riedel 1967

GENUS BOTRYOCYRTIS Ehrenberg 1860b

Botryocyrtis scutum (Harting)
N19

Haliomma scutum Harting 1863, p 11, pl 1, fig 18

Botryocyrtis scutum (Harting) Nigrini, 1967, p 52, pl 6, fig 1a-c; 1970

GENUS SACCOSPYRIS (Haecker)

Saccospyris conithorax (Petrushevskaya)
N48

Botryopyle antarctica (Haeckel), p 224-225 (in part);
Saccospyris conithorax, Petrushevskaya, 1968, p 149-150, fig 85-I

Saccospyris antarcticum (Haecker)
N48

Saccospyris antarctica Haecker, 1907, p 124, fig 10a, b

Botryopyle antarctica (Haecker), Riedel, 1958, p 224, pl 4, fig 12 (in part)
Saccospyris antarctica (Haecker), Petrushevskaya, 1968, p 149, figs 85, II.

FAMILY PLAGONIIDAE Haeckel, 1881, emend Riedel, 1967

GENUS ANTARCTISSA Petrushevskaya, 1968, p 83

Antarctissa denticulata (Ehrenberg)
N49

Peromelissa denticulata (Ehrenberg), Riedel, 1958, p 236, pl 3, fig 9, text-figure 7
Antarctissa denticulata (Ehrenberg), Petrushevskaya, 1968, p 84, figs 49, I-IV

Antarctissa denticulata clausa (Popofsky)
N49

Antarctissa denticulata (Ehr.) var. clausa (Popfsky), Petrushevskaya, 1968, p 86, fig 49,V

Antarctissa strelkovi
N50

Helotholus histricosa Jorgensen, 1905, p 137, pl 16, figs 86
Popofsky, 1908, p 279, pl 32, figs 105; pl 36, fig 2
Riedel, 1958, p 234, pl 3, fig 8, text-figure 6
Antarctissa strelkovi Petrushevskaya, 1968, p 88, figs 51, III-VI
Remarks: Because specimens of A. strelkovi are often badly preserved, it is difficult sometimes to clearly identify this category. A. strelkovi (N50) has an internal skeletal structure similar to that of A. denticulata (N49) (Riedel, 1958). Nevertheless, all specimens far from presenting shape of an equilateral triangle, as does category N49, were counted in this category.

Plate 1

1. *Actinomma medianum* (S3)
   V19-30 TW

2. *Spongurus* sp. (S1)
   Y69-104 MG-1

3. *Cenosphaera cristata* (S5)
   V19-30 TW

4. *Cenosphaera coronata* (S21)
   Y71-9-89P

5. *Echinomma delicatulum* (S10)
   Y71-6-4P

6. *Amphirhopalum ypsilon* (S9)
   Y69-103P

7. *Echinomma* cf. *leptodermum* (S7)
   RC9-86 TW

8,9. *Cromyechinus antarctica* (S8)
   Y69-104 MG-1

PLATE I

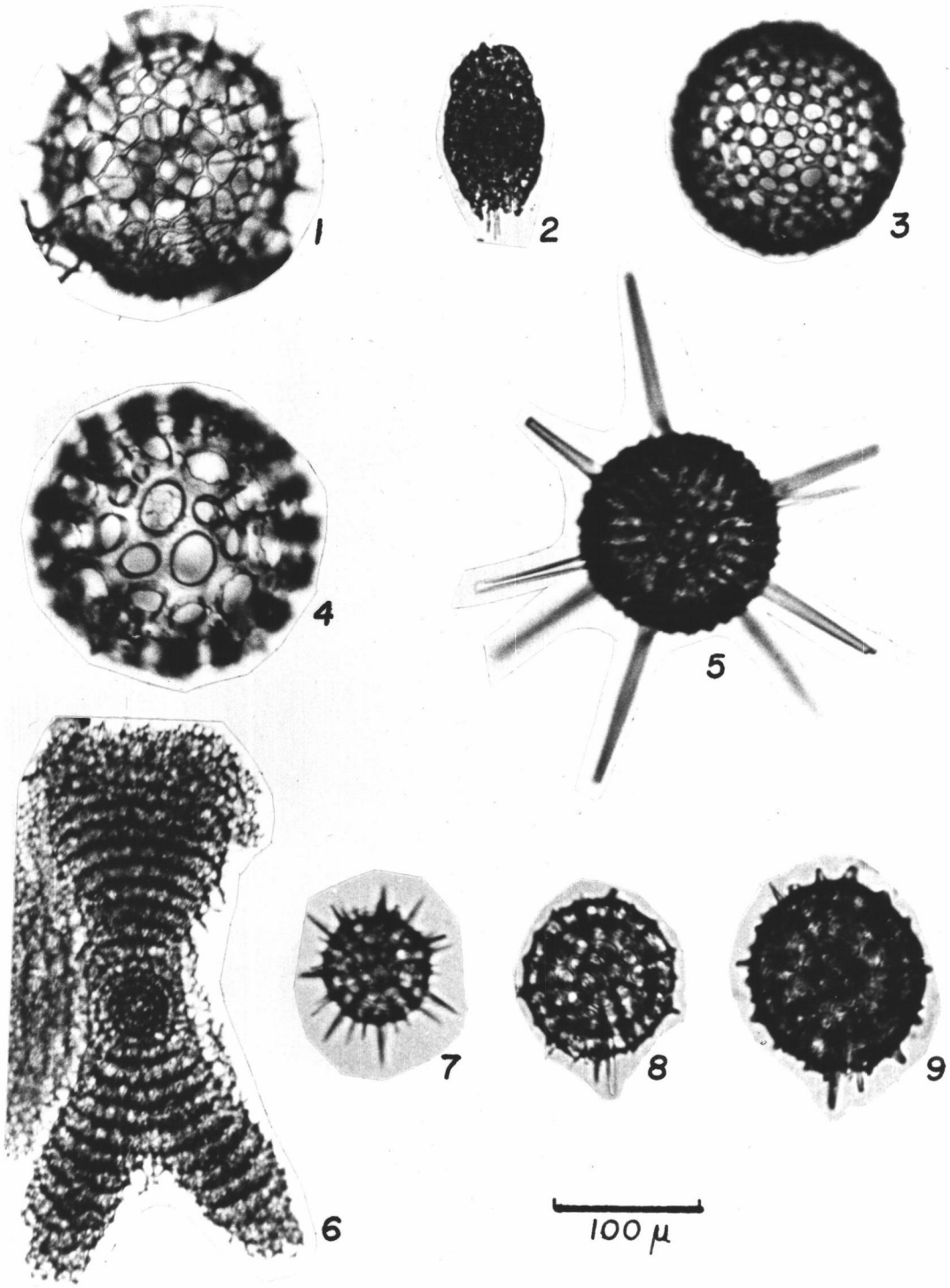


Plate 2

1. Euchitonia furcata (S12)
   Y71-9-89P

2. Heliodiscus asteriscus (S14)
   RC13-117 TW

3. Hexacontium encanthum (S17)
   Y71-9-89P

4. Polysolenia flammabunda (S13A)
   Y71-9-88P

5. Hexacontium encanthum (S17)
   RC13-117 TW

6. Collosphaera tuberosa (S11)
   Y71-9-89P

7. Hexacontium laevigatum (S17A)
   Y69-104 MG-1

8. Euchitonia furcata (S12)
   Y69-103P

9. Hexapyle sp. (S53)
   Y71-9-84P

10. Hexapyle sp. (S53)
    Y69-104 MG-1

PLATE 2

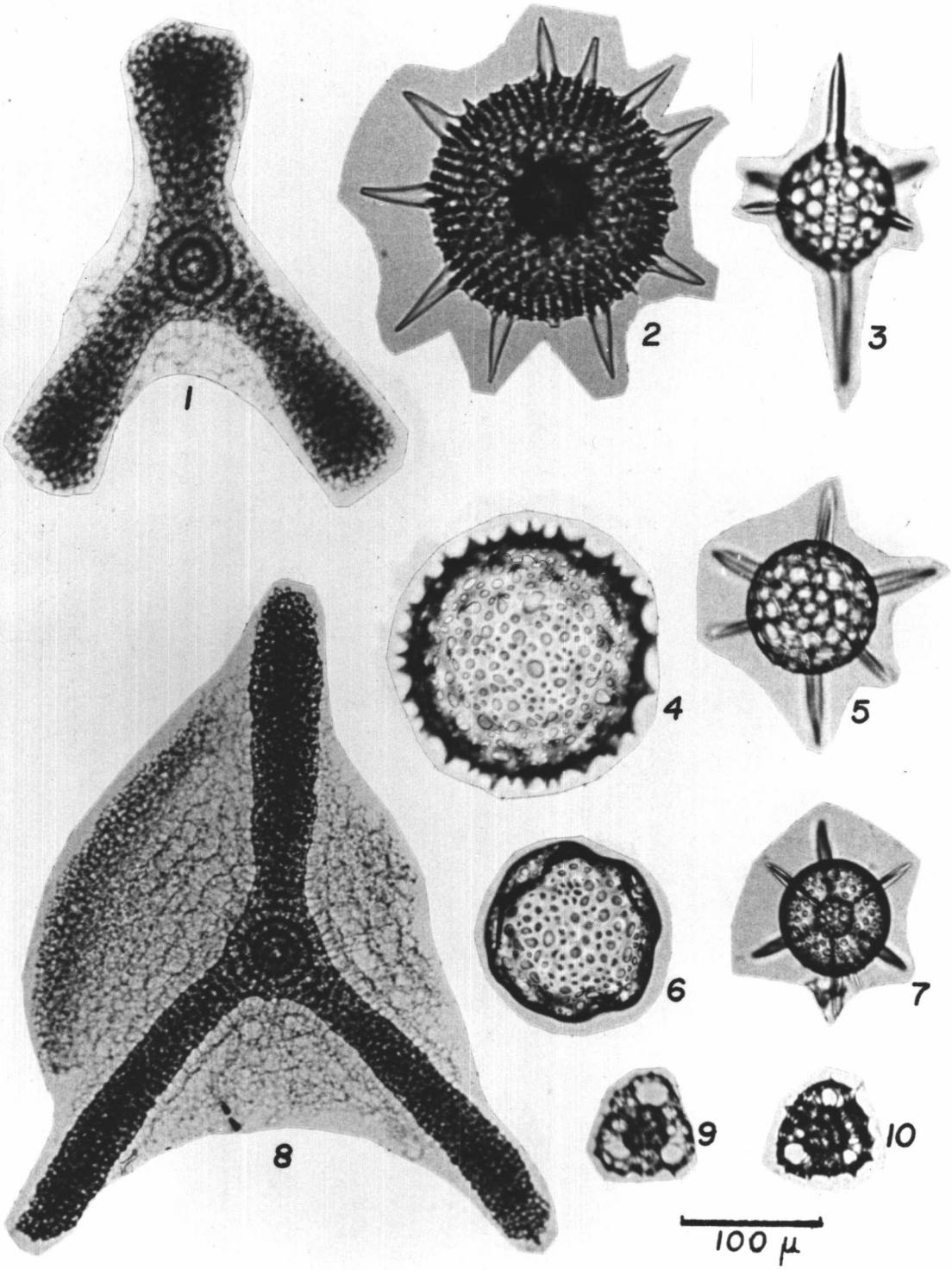


Plate 3

1. *Ommatartus tetrathalamus* (S23)
   Y71-9-89P

2. *Ommatartus tetrathalamus* (S23)
   Y71-9-88P

3. *Larcospira quadrangula* (S19)
   RC13-117 TW

4. *Axoprunum stauraxonium* (S50)
   RC9-86 TW

5. *Polysolenia murrayana* (S34)
   Y71-7-28 MG-2

6. *Polysolenia murrayana* (S34)
   Y71-7-27P

7. *Stylatractus* sp. (S51)
   RC9-87 TW

8. *Ommatodiscus* sp. A (S45)
   Y71-7-38 MG-3

9. *Pylospira octopyle* (S27)
   V24-40 TW

10. *Larcopyle bütschlii* (S29)
    Y71-9-88P

11. *Larcopyle bütschlii* (S29)
    Y71-7-33 MG-4

12. *Hymeniastrium euclidis* (S18)
    Y71-7-28 MG-2

13. *Lithelius minor* (S24)
    RC9-87 TW

14. *Lithelius minor* (S24)
    RC15-55 TW

PLATE 3

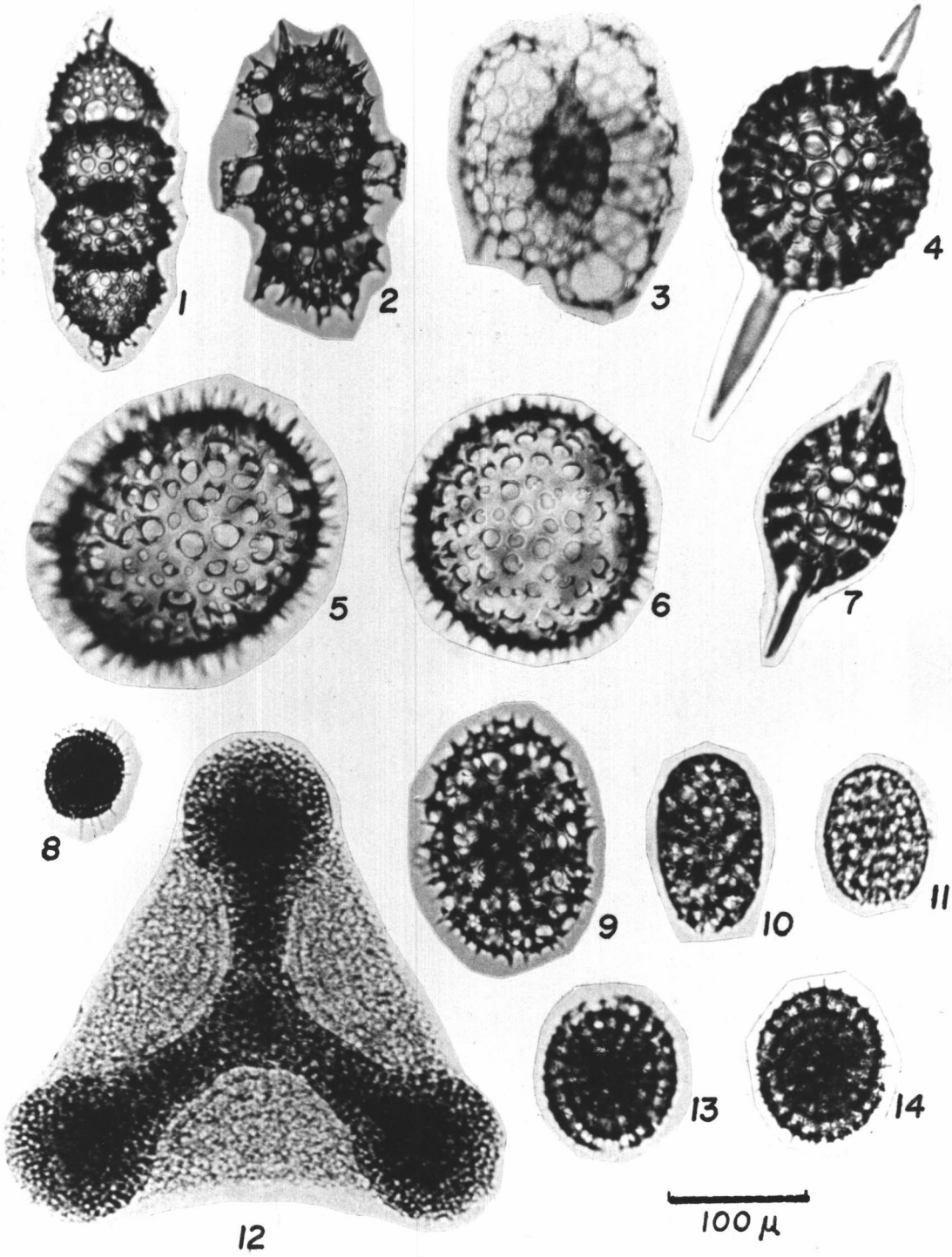


Plate 4

1. *Euchitonia* sp. (S36C)
   Y71-8-70P

2. *Euchitonia* sp. (S36C)
   Y69-104 MG-1

3. *Euchitonia triangulum* (S36C)
   Y69-104 MG-1

4. *Dictyocoryne profunda* (S36A)
   Y69-103P

5. *Euchitonia triangulum* (S36C)
   Y71-88-77P

6. *Stylochlamydium asteriscus* (S30)
   Y71-9-88P

7. *Stylodictya validispina* (S47)
   V15-56 TW

PLATE 4

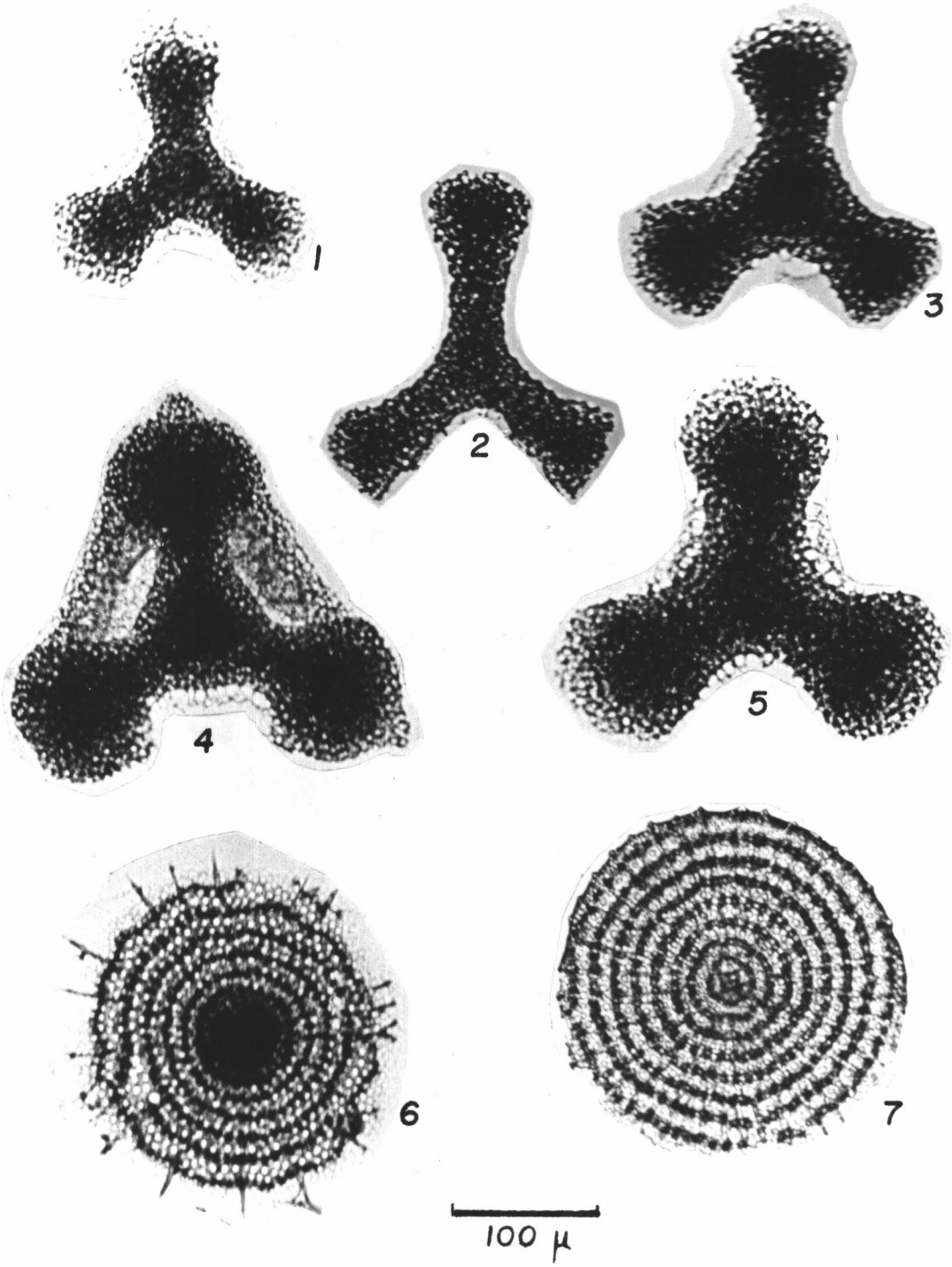


Plate 5

1. Ocypyle stenozoa (S54)
   Y71-9-88P

2. Octapyle stenozoa (S54)
   V21-29W

3. Octapyle stenozoa (S54)
   Y69-104 MG-1

4. Spongocore puella (S42)
   Y69-104 MG-1

5. Tetrapyle octacantha (S54)
   Y69-104 MG-1

6. Tetrapyle octacantha (S54)
   Y71-8-77P

7. Tetrapyle octacantha (S54)
   Y71-9-89P

8, 9. Disolenia quadrata (S39)
   Y71-8-77P

10. Otosphaera auriculata (S39A)
   RC13-117 TW

11. Siphonosphaera sp. (S38)
   V19-30 TW

12. Cenosphaera (?) sp. (S57)
   Y71-7-28 MG-2

13. Cenosphaera (?) sp. (S57)
   Y71-6-12 MG-2

14. Siphonosphaera polysiphonia (S37)
   Y71-9-89P

15. Siphonosphaera polysiphonia (S37)
   RC13-117

16. Stylochlamydium venustum (with radial spines broken) (S48)
   Y69-104 MG

17. Spongaster tetras (S40)
   Y69-163P

18. Spongoyyle osculosa (S48)
   V19-30 TW

PLATE 5

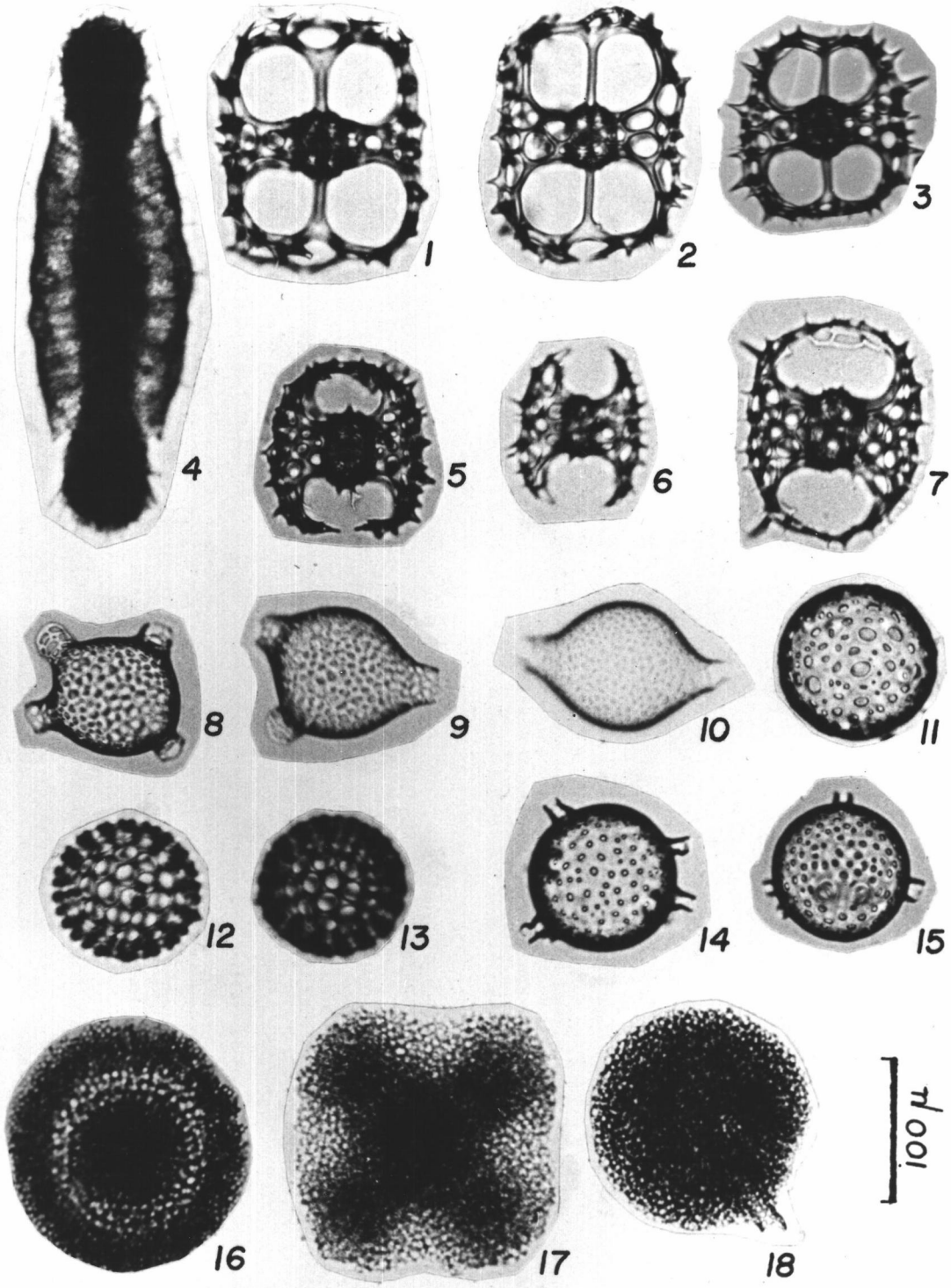


Plate 6

1. *Liriospyris* (?) *toxarium* A (NIC)
   V21-29 TW

2. *Liriospyris* (?) *toxarium* A (NIC)
   RC13-117 TW

3. *Liriospyris* (?) *toxarium* A (NIC)
   Y71-9-89P

4. *Liriospyris toxarium* (NIB)
   V19-30

5. *Liriospyris toxarium* (NIB)
   Y69-109 MG-1

6. *Liriospyris reticulata* (N1)
   RC13-111 TW

7. *Giraffospyris angulata* (N9)
   Y69-103P

8. *Anthocyrtidium zanguebaricum* (N3)
   Y69-104 MG-1

9. *Lamprocyrtis haysi* (N5)
   Y69-104 MG-1

10. *Anthocyrtidium ophiruese* (N2)
    RC13-117 TW

11. *Pterocanium grandiporus* (N6)
    Y71-8-77P

12. *Carpocanium* sp. (N4)
    Y69-104 MG-1

13. *Carpocanium* sp. (N4)
    Y71-9-89P

14. *Botryocyrtis scutum* (N19)
    V19-30TW

PLATE 6

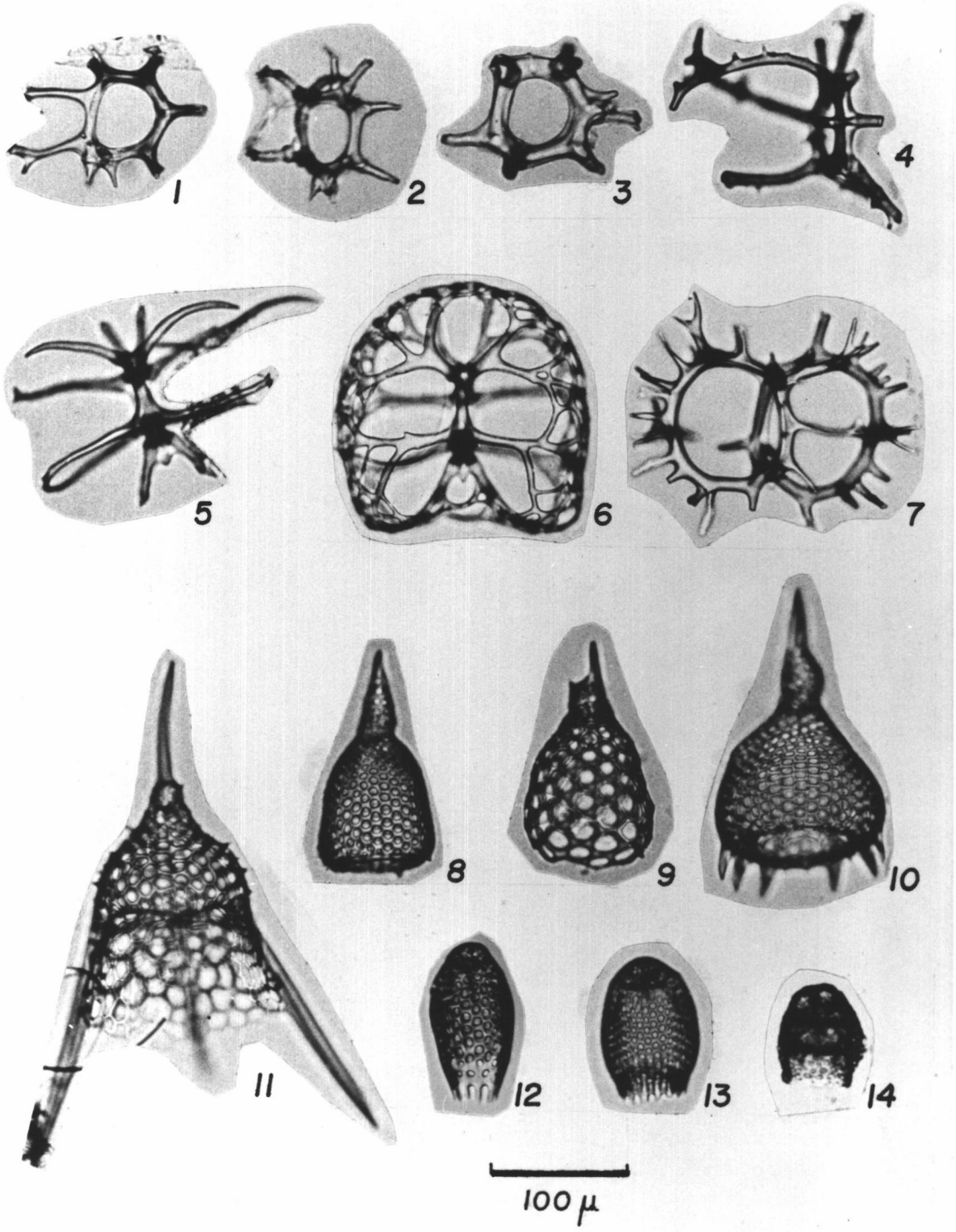


Plate 7

1. Theoconus minythorax (N7)
   RC13-117 TW

2. Lamprocyclas junonis (N15)
   Y71-6-14 MG-2

3. Eucyrtidium acuminatum (N10)
   Y71-6-4P

4. Eucyrtidium hexagonatum (N11)
   RC13-117 TW

5. Eucyrtidium hexagonatum (N11)
   Y69-104 MG-1

6. Lamprocyclas maritalis polypora (N16)
   RC9-86 TW

7. Lamprocyclas maritalis ventricosa (N16)
   Y69-104 MG-1

8. Lamprocyclas maritalis maritalis (N17)
   RC13-117 TW

9. Lamprocyclas maritalis maritalis (N17)
   Y69-104 MG-1

10. Lamprocyclas junonis (N15)
    RC15-55 TW

11. Phormospyris stabilis scaphipes (N12)
    Y71-8-70P

12. Phormospyris stabilis scaphipes (N12)
    Y71-8-77P

13. Dictyocryphalus papillosus (N8)
    Y71-8-77P

14. Stichopilium bicorne (N34)
    Y69-104 MG-1

15. Lithostrobus (?) seriatus (N18)
    RC13-117 TW

16. Lithostrobus (?) seriatus (N18)
    Y69-104 MG-1

17. Lithostrobus lithobotrys (N18)
    V19-30 TW

18. Lithostrobus botrycyrtis (N18)
    Y69-80 MG-1

19. Cycladophora davisiana (N35)
    Y71-6-18 MG-2

PLATE 7

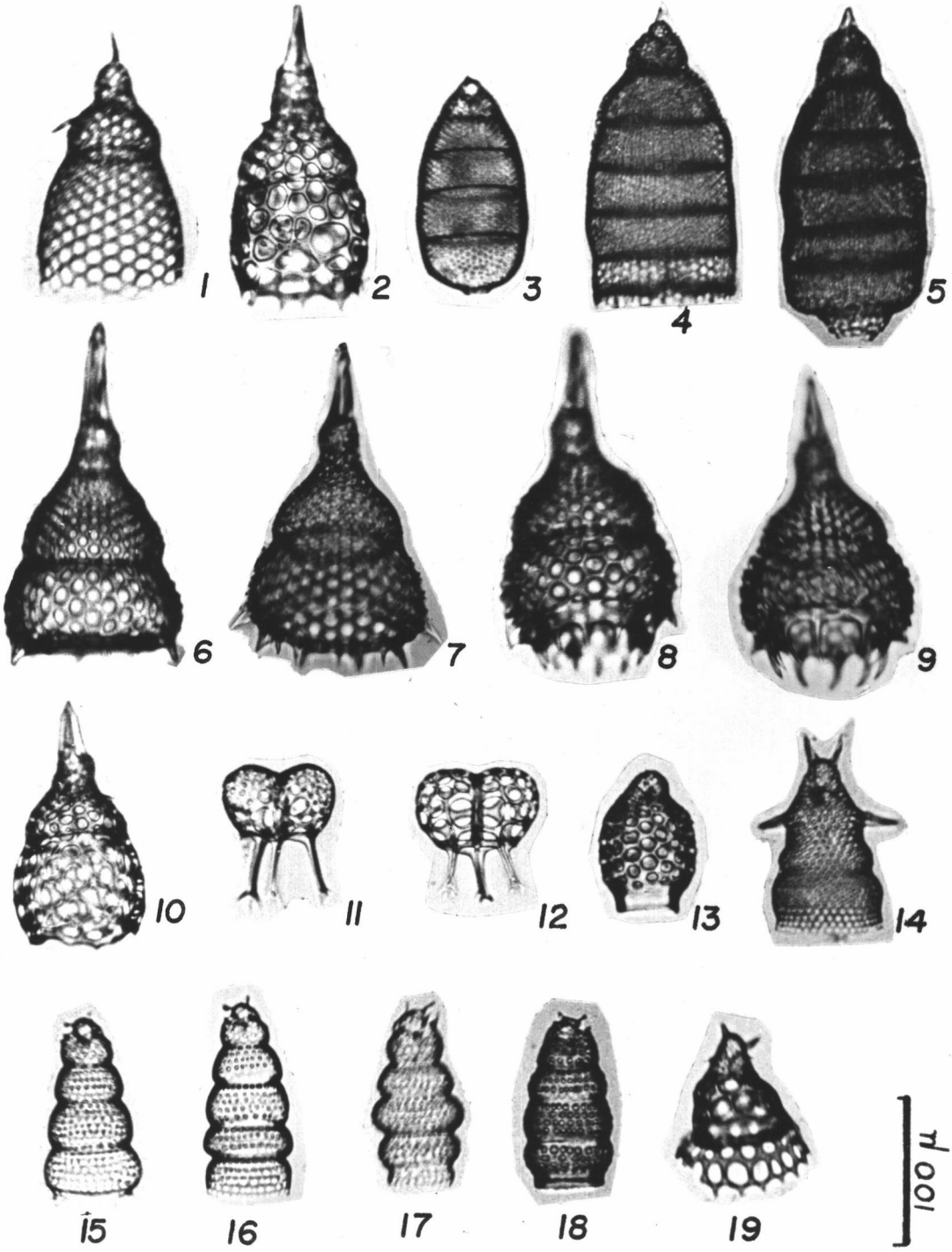


Plate 8

1. Dictyophimus infabricatus (N24)
   Y69-104 MG-1

2. Pterocanium praetextum (N27)
   Y69-104 MG-1

3. Pterocanium praetextum (N27)
   Y71-9-89P

4. Theocorythium trachelium (N42)
   RC13-117 TW

5. Pterocanium trilobum (N28)
   V19-30 TW

6. Siphocampe corbula (N32)
   RC13-117 TW

7. Theoconus hertwigii (N39)
   Y71-9-89P

8. Theoconus hertwigii (N39)
   RC13-117 TW

9. Pterocorys hirundo (N29)
   Y71-8-77P

10. Siphocampe aquilonaris (N33)
    RC15-55TW

11. Siphocampe aquilonaris (N33)
    V15-46 TW

12. Theocalyptra bicornis (N38)
    Y69-71P

13. Theocalyptra bicornis (N38)
    Y69-104 MG-1

PLATE 8

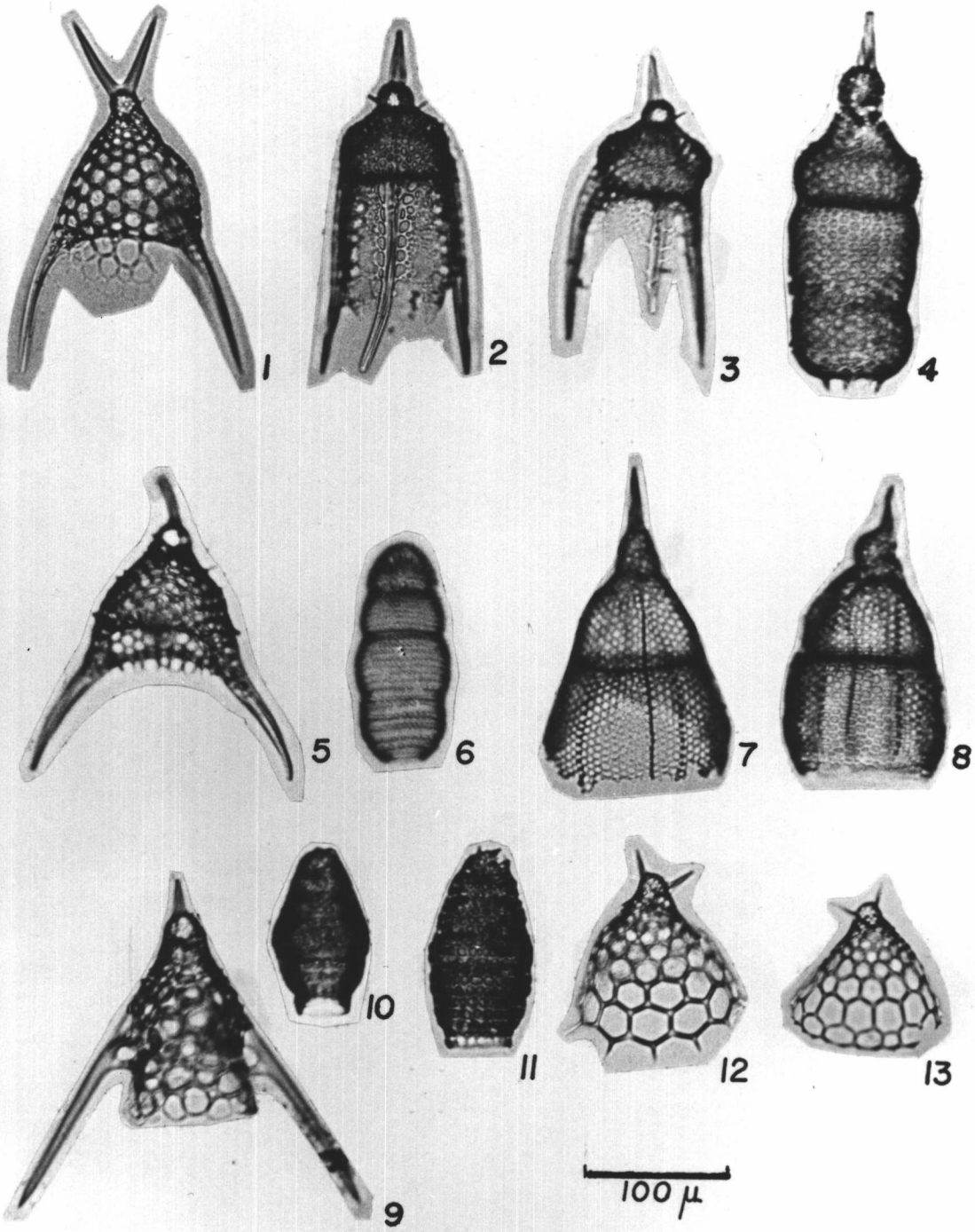


Plate 9

1. Phorticium clevei (S56)
   E19-7P

2. Phorticium clevei (S56)
   RC12-225TW

3. Phorticium clevei (S56)
   RC18-17TW

4. Phorticium clevei (S56)
   E42-7TW

5. Phorticium clevei (S56)
   V17-88TW

6. Spongurus pylomaticus (S41)
   V16-131TW

7. Lithelious(?) sp. (S59)
   E21-14TW

8. Lithelious(?) nautiloides (S58)
   RC17-213P (115-117 cm)

9. Lithelious nautiloides (S58)
   RC12-225TW

10. Saccospyris antarcticum (N48)
    V17-88TW

11. Phormospyris stabilis antarctica (N14)
    E21-23P

12. Actinomma antarctica (S15)
    E13-6P

13. Theocalyptra bicornis (var) (N36)
    E13-6P

14. Antarctissa denticulata (N49)
    V16-131TW

15. Antarctissa denticulata clausa (?) (N49)
    V17-88TW

16. Antarctissa strelkovi (N50)
    V17-88TW

17. Antarctissa streklovi (N50)
    E13-6TW

PLATE 9

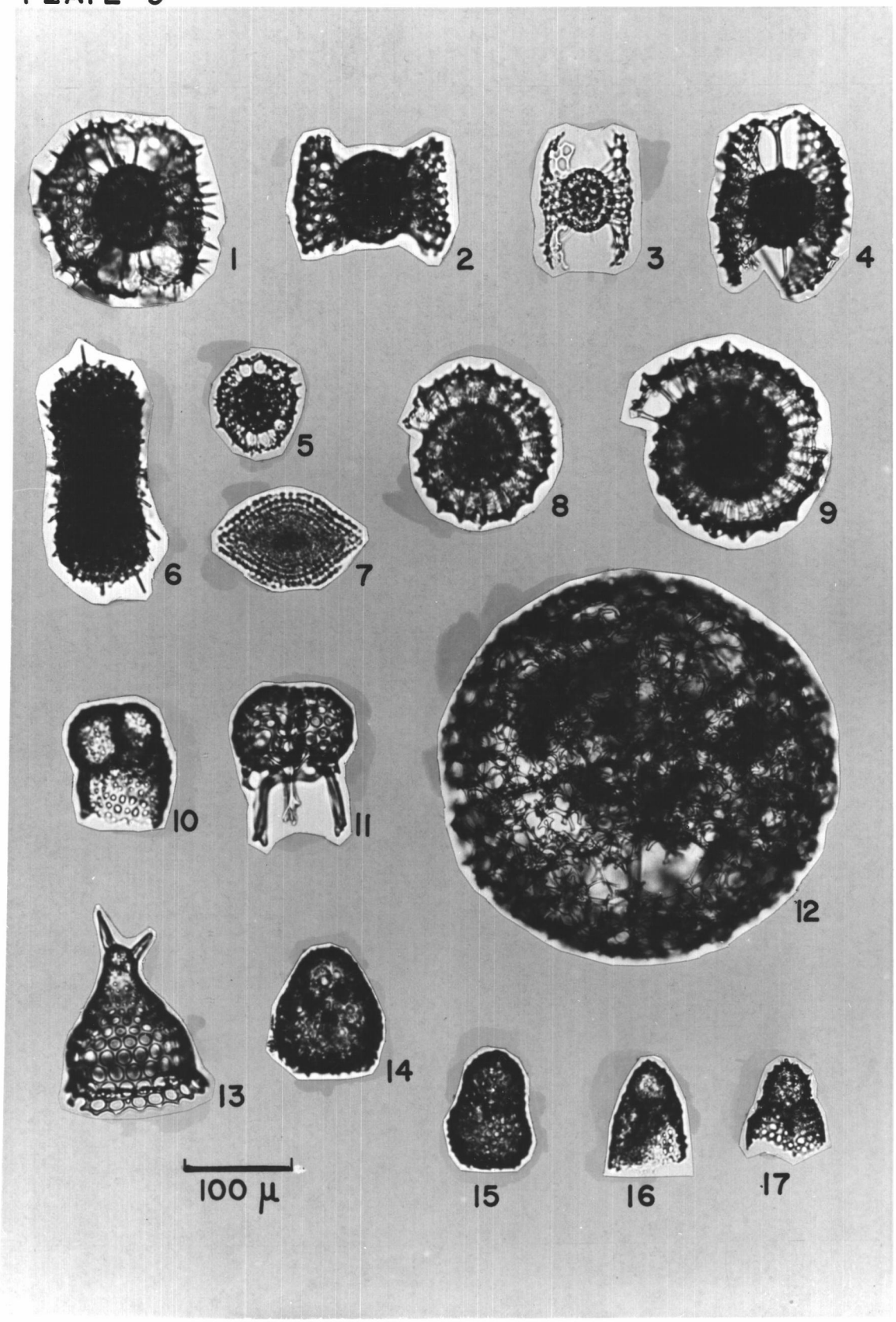


Plate 10

1. *Saturnulus planetes*
   RC17-213p (95-97 cm)

2. *Sethocorys sp.*
   RC17-213P (120-122 cm)

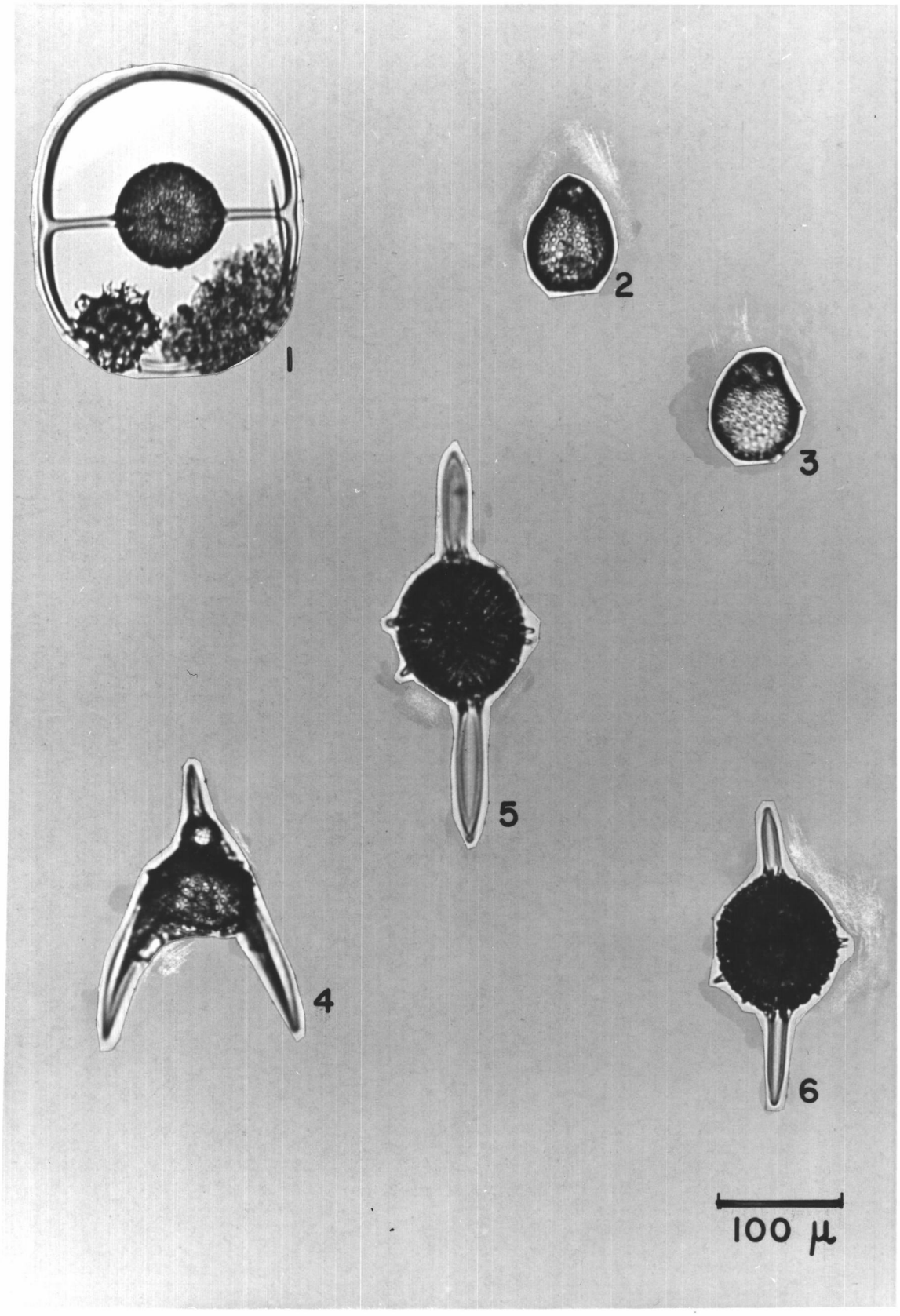
3. *Sethocorys sp.*
   RC17-213P (115-117 cm)

4. *Pterocanium trilobum*
   RC17-213P (90-92 cm)

5. *Stylatractus universus*
   V17-92P (100-102 cm)

6. *Stylatractus universus*
   V17092P (105-107 cm)

PLATE 10



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Appendix 5: Percentages of Radiolaria categories of surface samples.

FORMAT:

ACCESS LOC.	S1	S1A	S3	S4	S5	S6	S7
S8	S9	S10	S11	S12	S13	S13A	S14
S15	S17	S17A	S18	S19	S21	S23	S24
S26	S27	S28	S29	S30	S30A	S30B	S31
S33	S34	S36	S36A	S36B	S36C	S37	S38
S39	S39A	S40	S41	S42	S45	S47	S48
S50	S51	S53	S54	S56	S57	S58	S59
N1	N1A	N1B	N1C	N2	N3	N4	N5
N6	N7	N8	N9	N10	N11	N12	N14
N15	N16	N17	N18	N19	N24	N25	N26
N27	N28	N29	N32	N33	N35	N35A	N36
N38	N39	N40	N42	N43	N48	N49	N50
M008194	.90	0	0	0	.10	.40	.10
0	.50	1.50	.50	1.20	.10	.30	.10
0	1.10	.10	.10	1.30	0	1.80	2.10
.20	3.90	0	4.20	3.70	.20	.10	2.10
0	.40	.20	0	.30	.30	.60	0
.40	0	.40	.30	.30	.20	.70	14.90
.60	.30	.30	16.00	.40	.30	0	0
.40	.20	.70	2.00	.60	2.10	.50	.60
.20	6.10	.40	2.10	.20	1.80	1.10	0
.20	.60	.40	3.60	.70	.30	.40	0
.20	.90	.20	.60	.90	1.40	0	.10
.20	.10	.40	.10	.10	.40	0	0
M008193	1.60	0	0	0	0	.10	0
.10	.10	1.10	.30	1.00	.10	0	0
0	.10	.30	.20	.90	.10	.70	2.00
0	4.60	.10	4.90	4.20	2.10	.20	1.40
.10	.10	.10	0	.10	.40	.80	0
.70	.10	0	.30	.20	.30	1.90	17.50
.50	0	1.40	8.00	.50	0	0	0
0	.10	.10	1.50	.30	.90	.50	.30
0	9.10	0	.80	.50	3.50	2.40	0
.10	.90	.20	6.00	2.00	1.00	.50	0
.40	1.10	.10	.40	.30	1.70	0	.10
.50	0	.30	.20	.10	.30	0	0
M008014	1.30	0	.30	0	.30	.10	.70
0	10.80	1.80	.10	1.50	.30	.70	.60
0	.80	0	.50	.20	0	2.10	3.10
.50	2.60	0	2.90	4.30	3.50	.40	2.90
0	.90	.70	0	.50	1.10	.20	.10
.20	0	0	.50	.30	.10	1.00	9.40
.20	.40	.20	17.70	.10	0	0	0
.40	.10	.10	.80	.20	.50	.50	.80
.20	2.00	.40	1.00	.20	1.80	1.30	0
0	1.00	.50	1.50	.40	.10	.10	0
.30	.50	.20	.50	.80	.30	0	.10
.20	0	.80	.30	.20	.20	0	0
M008015	2.10	0	.20	0	.20	.20	1.40
0	.70	1.20	0	1.80	0	.10	.10
0	1.20	.10	.60	0	0	1.00	2.50
.30	2.30	.10	3.60	3.30	3.70	.10	2.40
0	1.20	.10	0	0	.90	.30	.10
.10	0	.10	.30	1.10	.60	1.20	13.80
.20	.30	.20	9.80	0	0	0	0
.80	.30	0	1.50	.50	.90	.30	.50
.70	1.90	.20	1.70	1.00	2.30	2.80	0
.10	.20	.10	2.90	.60	1.80	0	0
.50	1.00	0	.20	.80	7.50	0	.20
.30	0	.60	0	.60	.20	0	0
M008035	2.40	0	.60	0	0	1.20	0
0	.60	2.10	0	.90	0	0	0
0	.30	0	1.50	2.40	0	2.70	2.10
0	.60	0	0	3.00	0	0	.30
0	11.70	0	0	0	2.40	0	0
.60	0	0	.30	.60	0	.30	14.50
.30	.30	0	15.10	.30	5.50	0	0
0	0	.30	2.40	0	0	.90	0
0	2.40	1.20	.30	.60	0	.90	0
.30	0	0	.60	0	1.50	.30	0
0	0	.60	0	0	2.40	.30	.30
.90	0	0	0	1.50	.30	0	.30
M008036	5.00	0	.10	0	0	.70	0
.30	.40	6.20	0	1.00	0	0	.20

0	.30	.20	.10	.30	.10	2.50	3.10
0	1.10	0	.70	1.20	.40	0	.20
0	9.00	.20	0	0	.40	.40	0
0	.10	.10	0	.10	.30	.70	7.70
.90	1.40	1.20	20.80	0	3.40	0	0
.20	0	0	1.70	0	.10	0	1.20
.10	2.50	1.90	.10	.50	.40	1.80	0
.50	.40	.20	1.20	0	.60	0	0
0	0	1.00	.50	1.10	10.20	0	0
.50	0	0	0	.10	.10	0	0
M0080 37	4.80	0	.70	0	0	1.00	.10
.30	.30	5.20	0	2.10	0	.10	0
0	.50	.10	.90	.30	0	3.40	2.10
0	1.00	0	1.20	1.00	.90	0	0
0	3.90	0	0	0	0	.50	0
0	0	0	0	.10	.90	.90	10.10
1.00	.50	.70	17.90	0	2.80	0	0
1.40	0	.10	.30	0	0	.10	.70
0	2.80	.50	0	.50	0	2.80	0
.50	.50	0	1.80	0	3.00	.30	0
0	.10	1.90	.10	.90	9.90	0	0
.10	0	.10	0	.70	0	0	0
M0080 34	2.20	0	.20	.10	0	.10	0
.20	.10	3.20	.20	.20	.20	0	.10
0	.70	.10	.10	.90	0	2.80	1.80
0	1.00	0	.30	1.60	.30	0	.10
0	17.50	.10	0	0	.90	0	.20
0	0	0	.10	.30	0	.80	8.50
.80	.70	.30	13.40	0	4.30	0	0
0	0	0	1.80	0	0	.40	1.40
.10	5.70	1.40	.70	.50	1.00	.80	0
.40	.90	0	1.80	0	3.40	.10	0
.20	.10	.40	0	.40	2.90	.50	.60
1.10	0	0	0	.60	.10	0	.90
M0080 33	1.90	0	0	0	.10	1.40	.10
0	.20	4.50	.20	1.10	0	0	0
0	.60	.10	.40	.60	.60	2.20	6.60
.10	.80	0	.80	.70	.70	.10	1.80
0	6.20	0	0	.20	1.10	.20	0
.30	0	0	.10	.20	.50	.90	9.60
2.10	1.10	.20	15.60	.30	9.80	0	0
.20	0	.10	2.70	.50	.10	.50	.30
.50	7.80	.90	.20	.20	1.20	0	0
0	.10	0	1.30	0	.90	0	0
.20	.20	.50	.20	1.50	1.60	0	0
.10	0	.20	0	.20	0	0	0
M0080 32	.90	0	.30	0	.20	1.50	0
0	.30	5.10	0	1.60	0	0	0
0	.20	.20	0	.70	.50	4.00	4.20
0	.60	0	.50	.80	.90	0	2.10
0	3.30	.10	0	0	.60	.20	0
.70	0	0	0	.20	.60	.30	7.30
1.20	1.30	0	17.30	.30	6.80	0	0
1.00	.20	.50	7.50	.30	.10	.50	.50
.40	6.70	.80	1.20	.10	1.70	.60	0
0	.70	.10	1.70	.20	.60	.20	0
.70	.30	.20	.40	.60	1.00	0	0
0	0	.50	0	.10	0	0	0
M0080 30	1.20	.10	.20	0	0	.80	.10
0	.70	.90	.40	2.30	.20	0	.60
0	.40	0	.30	.40	0	6.30	2.00
.20	1.10	0	.70	2.60	1.20	.10	1.80
.10	.70	.70	0	.20	.80	1.20	.10
.40	0	.40	.20	.30	1.40	1.20	9.40
.40	.40	.90	25.60	.70	.30	0	0
.90	.40	.20	7.30	.10	0	.70	0
.10	3.90	1.10	2.00	0	.40	0	0
0	1.10	0	.40	1.40	.20	0	0
1.70	.20	0	.20	.60	.20	0	.10
.10	0	1.10	0	.10	.10	0	0
M0080 31	.40	0	.70	0	.10	.80	.10
0	.50	.50	.20	1.40	.50	0	.50
0	.40	.10	0	1.00	.20	6.80	1.40
.10	1.20	0	1.00	1.90	1.00	0	1.60
.10	.90	.30	0	.30	.10	.60	0
1.50	0	.80	.10	0	.40	.30	7.70
.50	.40	.90	25.80	.30	.10	0	0
1.40	.90	.10	4.50	.20	.20	.90	0

.10	4.60	.40	2.40	.10	1.70	.50	0
.60	.60	0	1.00	1.40	.20	0	0
2.90	.10	.20	.30	.70	1.20	0	.20
.30	0	.40	0	.20	.10	0	0
MO08029	1.00	.10	.10	0	.30	.70	.30
.10	.50	1.30	.40	1.00	.20	0	.10
0	.20	.10	.10	.60	.60	7.00	2.30
.20	1.30	.10	1.40	1.30	.70	.20	2.00
.10	.50	.40	.10	0	.60	.90	.20
1.60	0	.50	.10	0	1.10	.50	8.20
.70	.80	0	24.00	0	.20	0	0
.60	.30	.10	9.30	.40	.30	1.40	.20
.20	4.10	.70	2.10	0	.90	.60	0
0	.80	0	2.10	.80	.10	0	0
2.00	.20	.20	.30	.60	1.80	0	0
.20	0	1.00	.20	.60	.20	0	0
MO08028	.60	0	.30	0	.30	1.10	.20
.10	.10	1.00	.80	1.10	.90	0	1.00
0	.40	.20	.10	.50	0	7.40	2.30
0	.40	0	.50	1.20	.60	.10	1.70
.30	.30	.60	.10	.10	.40	.90	.30
1.20	0	1.30	.30	.30	0	0	5.00
.60	.40	.40	21.90	.50	.60	0	0
2.00	0	0	18.70	.20	0	1.00	.20
.10	1.70	.90	3.50	.80	.70	.50	0
.10	.60	0	1.00	.70	0	0	0
3.10	.30	.10	.20	.50	.30	0	.20
.30	.30	.60	.10	.30	0	0	0
MO08027	.40	0	0	0	.20	.90	0
0	0	1.70	1.40	2.00	.70	0	1.00
0	.10	0	0	.50	.10	9.30	1.10
.20	.60	0	.10	3.40	2.60	0	.80
.10	0	.10	0	.20	.50	.90	0
.50	0	1.40	0	0	0	1.00	6.00
.70	.40	.10	22.30	0	0	0	0
1.30	.80	0	19.70	.20	0	.40	0
0	0	.70	2.00	.10	.30	0	0
0	.50	0	0	.30	0	0	0
1.10	.10	0	0	.10	.20	0	0
0	0	0	.50	.50	0	0	0
MO08023	.70	0	.20	.20	0	.10	0
.40	.70	2.50	.20	1.40	.20	0	.20
0	1.10	0	.10	.20	0	2.40	1.70
0	1.40	0	.50	1.40	.20	0	.20
.10	21.20	.10	0	0	2.90	.20	0
.20	0	0	.10	.20	0	.50	10.90
.70	.50	.20	11.30	.20	3.50	0	0
0	0	0	.70	.50	0	.20	1.50
.10	4.20	.40	.40	.20	.90	1.10	0
.20	2.10	.20	1.10	0	1.80	.10	0
.10	.50	1.20	0	0	1.90	.20	.20
1.20	0	0	0	.50	0	0	.10
MO08024	2.60	.10	.30	.20	0	.10	0
.20	.20	2.30	.10	.10	0	.30	.10
.10	1.70	.30	.20	0	0	.90	.30
0	1.40	.30	.30	1.40	.10	0	.20
0	11.70	0	.20	0	1.10	0	.10
.10	0	0	0	.70	.10	.60	7.30
.60	.60	0	8.30	0	2.00	0	0
0	.20	0	.30	.40	.20	.40	2.50
.60	5.60	.90	.30	1.30	1.50	2.20	0
.30	.20	0	3.60	0	6.00	.20	0
.10	.30	.70	.30	.40	10.00	.80	1.50
.90	0	.10	0	.70	.20	0	0
MO08022	1.10	0	.30	0	.20	.10	.90
0	.50	1.60	.70	1.30	0	.30	.40
0	1.10	.10	.30	1.20	.10	4.70	3.30
.10	1.50	0	1.50	1.90	1.40	.30	3.70
0	4.70	.20	0	0	1.10	1.00	.30
.40	0	0	.20	.30	.90	.60	10.80
0	.60	.70	15.50	.40	.50	0	0
1.10	.30	.30	2.70	.50	.10	.60	.60
.60	2.60	1.10	2.60	.40	2.60	.70	0
.20	1.30	0	2.30	.30	.40	0	.10
.40	.30	.20	.10	.70	1.70	0	.10
.70	0	.80	.10	.10	.10	0	0
MO08021	1.70	0	.20	0	.20	.30	.70

0	.20	1.90	.20	.70	.30	0	0
0	.60	0	.10	.70	0	3.40	3.10
0	1.70	.10	1.10	.60	.50	0	3.40
0	1.40	.70	0	.30	1.00	1.00	0
1.70	0	0	.20	.30	.70	1.10	9.70
.10	.80	.20	12.00	.70	.30	0	0
.80	.10	0	1.00	.90	.20	1.30	1.10
0	5.90	.50	.70	.30	5.00	1.40	0
.10	1.60	.20	10.30	.30	.70	0	0
.40	.50	0	0	.70	2.10	0	0
.50	0	2.00	0	.50	0	0	0
MOO8020	.80	0	.40	0	.10	.40	.60
.10	.50	2.10	1.40	1.90	.50	.60	1.00
0	.90	0	.40	.90	.50	6.30	3.40
.20	1.20	.20	.90	1.30	1.10	.10	2.80
0	2.00	.40	0	.20	.80	1.40	.40
1.20	0	.50	.40	.20	1.00	1.10	6.80
0	.60	.30	17.60	0	0	0	0
2.70	.40	0	3.20	.60	.20	.80	.40
0	3.50	.60	2.40	.40	2.10	.70	0
.10	1.90	.20	3.20	.90	.10	0	0
.60	.40	.20	.30	.70	.40	0	0
.40	0	.60	.30	.40	.40	0	0
MOO8019	1.40	0	.50	0	.60	.40	.20
0	.20	2.50	1.00	.70	.90	0	.20
0	.90	0	0	.40	0	6.80	4.10
.10	1.10	0	.70	.90	.40	.10	2.50
0	2.60	.10	0	.10	.50	1.70	.30
2.40	0	0	.10	0	.40	.30	5.80
0	.60	.60	18.00	0	.20	0	0
2.40	0	0	2.00	.80	.20	1.10	.40
.40	6.80	.90	2.40	.20	2.50	.40	0
.10	1.40	.10	5.30	1.00	.10	0	0
.30	.20	.40	.40	.90	.80	0	0
.10	0	.50	0	.20	.30	0	0
MOO8018	.80	0	.10	0	0	.50	.40
0	.70	2.20	.60	3.80	.90	.20	.10
0	.90	.10	.20	.60	0	4.80	3.50
0	1.00	0	1.80	1.70	1.00	.30	1.90
.20	1.60	.90	0	.30	1.20	1.20	.40
1.90	0	1.10	.60	.10	.90	1.00	8.00
0	.40	.40	19.10	0	0	0	0
1.70	.20	0	5.50	.40	0	.90	.50
.10	3.50	.30	2.20	.20	1.80	0	0
0	1.30	.30	1.70	.60	.30	0	0
.70	.30	0	.80	.60	.80	0	0
.20	.70	.60	.10	.20	.10	0	0
MOO8017	.70	0	0	0	.30	.50	.30
0	.50	1.30	.80	1.80	.90	0	.50
0	.90	0	.20	.30	.20	5.80	3.40
0	1.50	0	1.00	1.30	.80	0	1.00
0	1.10	.40	0	0	.90	1.60	.10
3.50	0	.40	.50	0	.80	2.50	8.90
.20	.50	.50	22.30	0	0	0	0
2.20	0	0	8.60	.30	.20	.60	0
0	4.10	.50	1.90	0	1.20	.30	0
0	1.20	0	.90	.60	0	0	0
1.10	.30	.30	.30	.20	.20	0	0
0	.30	.40	.10	.20	0	0	0
MOO8016	1.00	0	0	0	0	.40	0
0	0	1.00	1.70	2.30	.70	0	0
0	.40	0	0	.40	0	2.90	1.60
.20	1.10	0	.70	2.40	1.40	0	1.50
.20	.40	.20	0	0	.90	2.60	.80
5.20	0	.40	.40	.10	1.10	1.00	7.90
.20	.40	.40	19.40	0	0	0	0
2.50	.30	0	6.70	.50	.20	1.30	0
0	4.80	0	2.70	.30	2.00	.40	0
0	.30	0	1.20	1.10	0	0	0
3.30	.50	.10	.30	.30	1.00	0	0
.30	.70	1.10	.10	0	.10	0	0
ML08178	2.20	0	.20	0	.20	.30	.20
.50	.70	1.40	0	1.70	.20	.40	.50
0	.40	.20	.30	.50	.10	1.60	1.60
0	1.70	.40	.90	2.10	.50	0	1.70
.20	9.10	.20	0	.40	.80	.70	0
.20	0	0	.20	.80	.70	.70	18.20
.90	.40	1.50	10.40	.40	1.60	0	0

.50	.20	0	1.50	.70	.20	0	1.30
.40	5.00	.30	.40	.50	1.30	1.30	0
.20	1.00	.20	1.50	.20	1.50	.20	0
0	.50	0	.20	.90	6.90	0	0
.40	0	0	0	.20	0	0	0
ML08183	.50	0	0	0	0	0	0
.50	.50	1.60	0	.80	0	0	.20
0	.20	0	.50	.50	0	3.00	1.00
0	0	0	0	3.00	.80	0	.20
.20	4.60	0	.80	0	1.60	0	.20
0	0	0	0	0	0	2.70	11.70
1.00	.50	.50	26.00	1.60	3.50	0	.20
0	0	0	7.90	0	0	.50	0
.20	3.20	.50	.20	.80	.20	.20	0
.20	.80	0	.80	0	.80	.50	0
0	0	.50	0	.50	.80	.20	.20
.50	0	0	0	.20	0	0	.50
ML08047	.20	0	.40	0	0	1.50	0
.40	0	13.90	0	0	0	0	.10
0	.10	0	0	0	0	0	8.50
0	0	0	.20	1.10	1.80	0	.10
0	0	0	0	0	0	0	0
0	0	0	0	.10	.70	3.80	38.40
2.50	6.60	0	.50	.40	1.10	0	.70
0	0	0	0	0	0	0	.50
.10	0	0	0	0	.10	0	0
.70	5.10	.10	.70	0	.10	0	.10
0	0	.40	0	.80	.10	0	0
0	0	0	0	.70	0	0	0
ML11876	3.00	0	0	0	0	.70	0
1.00	0	1.80	0	0	0	0	0
.70	0	.20	0	0	0	0	.70
0	.20	0	0	.20	.10	0	.20
0	0	0	0	0	0	0	0
0	0	0	.20	0	0	1.70	7.00
.10	.20	0	0	.50	.40	3.00	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	.10	1.20
0	0	0	.50	0	0	0	.10
0	0	.20	0	.20	7.30	1.10	1.50
.80	0	.10	0	1.20	4.10	18.50	35.90
ML11878	1.90	0	0	0	0	2.10	0
.20	0	2.70	0	0	0	0	0
1.90	0	0	0	0	0	0	2.70
0	0	0	0	.20	0	0	.50
0	0	0	0	0	0	0	0
0	0	0	.50	0	0	.50	10.30
.20	.50	0	0	2.70	.20	1.60	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	3.20
0	0	0	0	0	0	0	0
0	0	0	0	0	1.00	.20	1.00
.50	0	.50	0	.50	5.10	10.30	41.80
ML11882	.90	0	0	0	0	.50	0
.10	0	4.10	0	0	0	0	.10
.10	.10	0	.70	0	0	0	6.10
0	.10	0	1.50	3.50	1.10	.10	.10
.10	0	0	0	0	.30	0	0
0	0	0	.10	.10	.70	6.90	17.90
.30	1.10	0	2.50	4.90	.50	0	2.90
0	0	0	.10	0	0	.30	.10
0	0	1.90	0	.30	.30	.10	.10
.70	0	0	3.10	0	0	0	0
0	0	.30	0	.70	2.10	1.10	.50
1.10	0	9.60	0	1.70	.90	.30	6.10
ML11883	.80	0	.10	0	0	0	2.80
.60	0	1.90	0	0	0	0	.10
.40	.10	0	.10	0	0	0	.30
0	.20	0	.60	.90	.20	0	.30
0	0	0	0	0	0	0	0
0	0	0	1.20	0	.20	1.70	16.80
.30	.20	.10	.20	16.30	.60	1.10	.20
0	0	0	0	0	0	0	0
0	0	.20	0	0	.20	.40	1.90
0	0	0	.20	0	.10	0	0
0	0	1.70	0	0	1.20	0	1.60
1.20	0	.10	0	.10	4.70	5.50	27.90

ML11905	1.40	0	.20	0	0	1.40	0
.20	0	1.40	0	0	0	0	.20
1.10	0	0	0	0	0	0	.50
0	.20	0	.50	0	.80	.20	0
0	0	0	0	0	0	0	0
0	0	0	.80	0	.80	1.10	9.10
0	0	0	.20	3.80	.20	1.70	0
0	0	0	0	0	0	0	0
0	0	.20	0	0	0	0	1.40
0	0	0	.50	0	0	0	0
0	0	0	0	.20	1.10	.20	.50
1.40	0	0	0	.50	2.00	9.40	45.20
ML11884	1.80	0	0	0	0	.10	0
.10	0	1.60	0	0	0	0	0
.90	0	0	0	0	0	0	.10
0	0	0	.10	.50	0	0	.10
0	0	0	0	0	0	0	0
0	0	0	1.20	0	.10	1.30	4.10
.10	0	0	0	1.60	.80	1.60	.10
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	2.90
0	0	0	.40	0	0	0	.10
0	0	.20	0	.20	1.00	.40	.80
.80	0	0	0	.10	3.70	14.70	54.30
ML08176	1.80	0	0	0	.10	.20	.10
0	.20	.70	.10	1.90	0	0	.10
0	.50	.30	.30	.30	.10	1.20	2.90
0	2.10	0	3.30	3.50	2.90	0	1.40
0	4.70	.20	0	.50	.80	.30	0
0	0	0	.60	.70	.30	2.20	26.10
0	.10	.90	10.80	.10	.10	0	0
.10	0	.30	.80	0	.70	.30	.50
.20	3.40	.20	.10	.50	1.30	2.40	0
.40	.90	.20	1.80	.70	.60	.10	0
.10	.90	.60	.40	.70	4.30	0	.10
0	0	.30	.10	0	.20	0	0
ML08184	.90	0	0	0	0	1.10	.10
.30	.50	7.60	0	.30	.10	0	0
0	.10	0	0	.20	0	2.30	2.50
0	.10	.10	.10	.50	.20	0	0
0	21.20	0	0	0	1.60	0	0
0	0	0	0	.10	.10	.30	5.80
1.50	2.90	.70	16.80	.20	9.80	0	0
.70	.10	0	3.70	0	0	.10	.10
0	3.20	1.70	.30	.10	.30	.20	0
.20	1.00	0	.10	0	.30	0	0
0	0	.40	0	2.10	1.00	.20	0
.70	0	0	0	.70	.10	0	.10
ML08182	1.80	0	0	0	0	2.00	0
0	.40	7.60	0	1.50	0	0	0
0	.30	0	.10	.30	.70	2.00	4.20
0	.30	0	.30	.90	.60	0	0
0	5.40	0	0	.30	.60	0	0
0	0	0	0	0	.40	.80	9.40
4.10	3.30	0	18.50	0	12.70	0	0
.70	0	0	5.30	0	0	.10	.10
0	3.50	1.40	.10	0	.60	.30	0
0	.50	0	.20	0	.20	0	0
0	0	.60	0	2.30	.30	0	0
0	0	0	0	.30	0	0	0
ML08181	1.90	0	0	0	0	.80	0
0	1.30	2.90	0	2.80	0	0	0
0	.20	0	.10	1.00	0	2.60	2.90
0	.60	.10	.10	2.00	1.30	0	1.20
0	4.20	.30	.10	.90	1.00	.60	.10
0	0	.10	0	.10	.70	.80	20.30
1.40	.60	.90	26.30	.20	2.10	0	0
.10	0	0	5.00	.10	0	.40	.10
0	2.30	1.20	.10	0	0	.10	0
0	.30	0	.20	.40	.30	0	0
.10	.10	.40	0	1.00	1.00	0	0
.30	0	.20	0	.10	0	0	0
ML04907	.40	0	.60	0	.40	.10	.10
0	.40	2.40	.90	2.00	.60	1.20	.70
0	1.20	.20	0	.20	.10	5.50	2.50
.20	2.60	.10	2.90	4.30	3.60	.20	1.00
0	1.40	.40	0	0	1.20	.10	.30
.60	.10	.30	0	.10	.10	.10	11.30

.30	.10	1.00	21.80	.40	.10	0	0
.90	.60	.40	3.00	1.30	1.60	.60	.20
.20	4.00	0	2.30	0	.30	.60	0
0	2.40	.30	.60	0	.20	.70	0
.30	0	0	.10	.10	.10	0	.10
0	0	.10	.10	0	.20	0	0
ML03978	.40	0	.50	0	0	.40	.10
0	.50	2.10	1.50	1.70	.50	.50	1.00
0	.80	.10	.30	.50	0	6.10	2.60
0	2.40	.10	1.90	3.50	1.80	.20	.10
0	.90	1.40	.10	0	.30	1.10	.20
.60	.10	1.40	.20	.10	.20	.60	7.90
.50	.70	.60	25.00	.20	.10	0	0
1.60	.60	.40	3.60	.60	.30	1.50	.20
.20	2.80	.20	1.90	.10	2.60	.30	0
.30	1.50	.80	1.70	.20	.20	.10	0
.10	.70	.10	.70	.70	.80	0	0
.20	.10	.20	.60	.30	.20	0	0
ML03979	.40	.10	.50	0	0	.10	.20
.10	.60	2.70	.50	2.60	1.00	.20	1.20
0	1.20	0	.20	.40	.10	3.50	2.70
.10	3.40	0	3.70	3.70	1.00	0	.80
.10	.40	.90	.10	0	.80	1.40	.30
1.60	.10	1.90	.10	.20	.10	.50	9.80
.50	1.00	.70	16.00	.30	.10	0	0
1.60	.40	.20	2.50	1.00	.40	1.30	.50
0	4.30	.60	1.70	.10	2.60	.30	0
.20	1.00	.60	2.80	.40	.10	0	0
.60	1.00	0	0	.70	.20	0	0
.20	.40	.70	.90	.10	0	0	0
ML08180	.60	0	0	0	0	1.80	.10
0	.70	4.00	.40	2.80	.10	.10	.10
0	0	0	.30	.60	0	7.90	2.80
.10	.40	.20	.10	2.30	1.60	.10	.40
.20	1.50	.90	.20	1.90	1.30	.50	.30
.70	.10	1.10	.30	.10	.80	.40	15.20
2.80	2.10	.60	20.30	0	.80	0	0
.80	.20	0	9.00	0	0	0	.10
0	.90	.50	1.00	0	0	0	0
.10	.60	.20	.10	.10	.10	.10	0
0	.10	.60	0	.80	0	0	0
0	0	.10	0	.50	0	0	0
ML08042	1.90	0	1.30	.50	0	2.50	.10
.10	0	3.90	0	.30	0	0	0
0	.30	0	.70	.30	0	1.70	3.10
0	.30	0	1.10	1.10	1.30	0	0
0	1.70	0	0	.10	1.50	.10	.10
0	0	0	0	0	.30	2.70	18.30
2.30	4.10	0	7.10	.10	9.00	0	.30
0	0	0	.50	0	.10	.30	1.10
.10	1.90	.90	0	.50	0	.30	.10
.50	4.10	0	1.10	0	.50	0	0
0	0	.30	0	.30	2.70	.50	0
.90	0	0	0	1.30	0	0	0
ML11894	.10	.10	.20	0	0	.30	0
.20	.20	1.60	.40	.40	.30	.20	1.10
0	1.20	.20	.30	.40	0	3.10	.40
0	2.30	0	1.70	4.60	.50	0	.30
.10	.10	0	0	0	.60	.30	0
2.50	.60	.20	0	.10	0	.50	4.00
.10	.10	.40	20.60	0	.30	0	0
1.00	.40	.20	3.10	1.00	.20	2.10	.10
.10	3.20	0	3.10	.20	3.50	.40	0
0	.50	.10	1.00	.60	.20	.20	0
2.60	1.50	0	.10	.30	.20	.10	1.00
.50	.30	0	.10	.30	.20	0	0
ML09104	.10	0	0	0	.10	0	0
0	.20	2.50	2.40	3.60	1.90	.20	.30
0	.20	0	0	.30	0	9.00	1.30
0	.10	0	0	.80	.40	0	.20
.40	.20	.60	.10	0	.30	1.60	.20
3.90	.20	.40	.10	0	.10	.10	5.30
.90	.60	.30	24.10	.10	.20	0	0
1.90	.90	0	18.90	0	0	.30	.10
0	.70	.40	5.50	0	.10	0	.10
0	.40	0	.10	0	0	0	0
1.20	.10	0	0	0	.20	0	0
0	.20	0	.80	.30	0	0	0

ML08179	.20	0	0	.10	.10	.80	0
.10	.10	2.30	.60	2.10	1.00	.30	.20
0	.20	.10	.30	.40	.20	8.70	2.50
0	.20	0	.10	2.40	.60	0	.90
.20	.10	.40	.10	.80	.80	.70	.30
.80	.30	.50	.10	.20	.20	.20	12.80
1.60	.90	.20	24.10	0	.30	0	0
2.70	.80	0	15.40	0	0	.20	.10
0	.40	.40	2.50	0	.10	0	0
0	.90	0	.20	.20	0	0	0
.70	.20	.30	0	.60	.10	0	0
.30	0	.10	.20	.60	0	0	0
ML11847	1.00	0	.10	.10	0	.70	.10
.50	0	3.10	0	0	0	0	0
1.40	.10	0	0	0	0	0	1.70
0	.70	.50	.20	.20	0	0	1.00
0	0	0	0	0	0	0	0
0	0	0	1.20	0	.20	2.00	18.00
.20	.10	0	.40	9.70	.20	.80	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1.70
0	0	0	.10	0	0	0	0
0	0	.80	0	.70	2.20	1.00	5.00
1.20	0	.40	0	0	2.20	4.50	27.70
ML11848	.60	0	.40	0	0	3.30	1.90
.30	0	3.00	0	.10	0	0	0
1.10	.30	0	.10	0	0	0	1.70
0	.60	.10	.60	1.40	.70	.10	.30
0	0	0	0	0	0	0	0
0	0	0	.60	.10	.70	2.70	19.80
.60	2.20	0	.40	8.30	0	.60	0
0	0	0	0	0	0	0	.10
0	0	0	0	.60	0	0	2.00
.10	0	0	.30	0	0	0	.10
0	0	.10	0	3.00	1.70	1.20	1.90
.90	0	.30	0	0	3.30	2.70	19.60
ML11849	2.40	0	0	0	0	1.20	1.00
.20	0	2.20	0	0	0	0	.40
1.80	0	0	.20	0	.20	0	1.40
0	1.00	.20	0	.20	.80	.20	.80
0	0	0	0	0	0	0	0
0	0	0	.80	0	.40	1.60	20.80
.60	.60	0	.40	5.80	.20	1.00	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	.40	.80
.20	0	0	.60	0	0	0	.20
0	.20	.40	0	.80	2.00	1.00	1.40
1.20	0	.20	0	0	5.00	7.20	26.00
ML11850	.90	0	.10	0	0	1.20	.20
.10	0	2.50	0	0	0	0	0
1.30	0	0	.10	0	0	0	1.00
0	.60	0	.10	.10	.40	.80	.40
0	0	0	0	0	0	0	0
0	0	0	.90	0	.50	2.00	15.40
.40	.80	0	0	5.00	.10	1.70	0
0	0	0	0	0	0	0	.10
0	0	0	0	0	0	.40	1.40
.10	0	0	.20	0	0	0	.10
0	0	.40	0	.20	1.30	.40	2.70
1.20	0	.40	0	0	2.80	7.00	26.20
ML11851	1.50	0	0	0	0	2.00	1.50
.40	0	1.30	0	0	0	0	0
1.20	.10	0	.10	0	0	0	1.70
0	.60	.10	.10	1.00	.80	.90	.40
0	0	0	0	0	0	0	0
0	0	0	.90	0	.60	3.20	15.20
.10	.50	0	.10	9.70	0	1.70	0
0	0	0	0	0	0	0	.10
0	0	0	0	0	0	.10	1.90
.10	0	0	0	0	.10	0	.20
0	0	.90	0	.10	1.20	.50	2.10
.80	0	.60	0	0	6.00	6.40	26.90
ML11852	1.20	0	.10	.10	0	.70	4.70
.10	0	2.10	0	0	0	0	.10
1.00	0	0	.30	0	0	0	1.80
0	.50	0	0	.90	.50	.10	.30
0	0	0	0	0	.10	0	0

0	0	0	1.00	0	.70	3.20	12.50
.10	0	0	.10	7.40	.30	.10	.10
0	0	0	0	0	0	0	0
0	0	.10	0	0	.10	.10	1.80
.30	0	0	1.40	0	.10	0	0
0	0	.70	0	.10	.90	.50	1.40
3.00	0	1.00	0	1.20	3.80	5.20	29.50
ML08039	.90	0	.50	.20	0	.70	.20
.10	.20	9.30	0	.20	0	0	.20
0	.30	0	.30	.80	.10	1.90	2.00
0	.40	0	.70	1.40	.50	0	0
0	2.90	.10	.10	0	1.00	.30	0
0	0	0	0	.10	.30	1.60	9.20
2.40	2.10	.70	16.70	.30	14.80	0	0
0	0	0	2.20	0	0	.10	.30
.10	2.30	1.50	0	.30	.10	.30	0
.70	1.30	0	.30	0	.20	.20	0
0	0	1.30	.10	1.70	3.80	.10	0
.20	0	0	0	.90	0	0	0
ML08177	1.40	0	0	0	0	.80	.20
0	.50	4.60	0	2.30	0	0	.10
0	.70	0	.20	.90	.10	3.60	2.90
0	1.00	0	.30	.60	.40	0	1.10
0	5.10	0	0	.60	.70	.10	0
.10	0	0	.10	0	.40	1.10	13.20
.60	.60	1.30	18.50	.40	1.60	0	0
0	.20	.10	5.70	0	0	1.00	.10
.10	5.30	.40	1.00	0	1.30	.60	0
.30	1.70	0	1.10	.30	.30	0	0
0	.30	.30	0	.30	.40	0	0
0	0	.40	0	0	0	0	0
ML08175	1.30	0	0	0	.10	0	0
.20	.80	1.40	.30	1.60	.10	0	.40
0	3.80	.70	0	1.00	0	1.70	1.40
0	3.00	.30	3.50	5.40	.90	0	1.00
0	.20	.20	0	0	.50	1.50	.40
1.30	.30	.50	0	.40	.60	.60	17.80
0	.20	.40	17.30	.20	.10	0	0
.70	.30	.20	1.20	.70	.20	.60	.40
0	4.50	.30	.50	.10	2.00	1.20	0
.10	.60	.50	2.00	1.00	0	0	0
.20	1.10	.10	.30	1.30	.20	0	0
.20	.40	1.00	.30	.10	.20	0	0
ML08174	.20	.10	0	0	0	0	.10
.10	.40	1.90	.20	1.70	.90	0	.90
0	1.30	.20	.50	1.10	0	2.70	2.90
.20	4.10	.30	3.40	5.10	.70	0	.80
0	.20	.30	0	.20	.60	.80	.30
.80	.10	.30	.20	.30	.30	.30	16.10
.10	.30	1.00	18.40	.30	0	0	0
1.00	1.50	.30	1.20	.80	.10	.70	0
0	6.20	0	1.40	.30	1.90	.90	0
.10	.60	.20	.90	.20	.20	.40	0
.40	1.50	0	.20	.40	0	0	0
.20	.10	.10	.10	.10	0	0	0
ML08046	1.90	0	.80	.10	0	2.30	.70
.60	0	12.20	0	.10	0	0	.10
0	.60	0	.20	0	0	0	10.70
0	.30	.10	1.90	.50	2.80	0	0
0	0	.10	0	0	.70	0	0
0	0	0	.10	.50	1.00	5.20	20.50
2.00	2.10	0	1.20	.60	2.50	0	.60
0	0	0	0	0	0	0	.20
0	.30	.30	0	0	0	0	0
1.50	3.10	.10	.80	0	.30	0	0
0	.20	.50	0	5.70	3.30	.30	.10
.70	0	0	0	.80	0	0	0
ML12979	3.20	0	.70	.10	.70	.40	1.00
1.00	0	5.30	0	0	.30	0	0
.10	.90	0	0	.10	0	0	8.60
0	.30	.30	5.90	.70	1.70	0	0
0	0	0	0	0	.30	0	0
0	0	0	.40	.40	.40	10.30	15.00
1.00	2.60	0	.60	.40	0	0	.10
0	0	0	0	0	0	0	.60
0	0	0	0	.40	1.00	0	0
5.40	2.30	0	.60	0	.30	0	.10
0	.10	.30	0	2.10	2.80	.70	2.10

1.80	0	1.40	.90	.70	0	0	0
ML11857	1.50	0	.50	.10	0	.90	.30
.30	0	3.60	0	0	0	0	.50
.50	.70	0	.50	0	0	0	5.60
0	.70	.10	2.40	3.00	1.50	.70	0
0	0	0	0	0	.50	0	0
0	0	0	.70	.90	.70	5.80	19.50
2.60	1.30	0	1.80	8.50	.50	0	.10
0	0	0	0	0	0	.10	.10
0	.70	1.10	0	1.10	.30	0	0
3.00	1.10	0	.90	0	0	0	.30
0	0	0	0	.30	1.70	1.30	.30
.70	0	4.10	.10	1.10	0	.50	2.20
ML11858	.70	0	.20	.20	0	.50	1.00
0	0	2.30	0	0	0	0	0
.50	0	0	1.30	0	0	0	3.90
0	.70	0	1.00	3.60	2.30	.70	0
0	0	0	0	0	.70	0	0
0	0	0	1.30	.50	1.50	6.50	20.50
.50	1.30	0	2.30	5.00	1.00	0	2.80
0	0	0	0	0	0	.20	.50
0	.20	1.80	0	0	.50	.20	.20
1.00	0	0	.50	0	0	0	.20
0	0	.50	0	7.30	.70	2.30	1.00
.20	0	2.80	0	1.00	.50	1.00	5.50
ML11859	1.50	0	.10	0	0	1.60	1.20
.90	0	1.80	0	0	0	0	0
.70	0	0	0	0	0	0	1.60
0	.10	0	.30	.90	.30	0	.30
0	0	0	0	0	0	0	0
0	0	0	.40	0	.30	1.80	10.20
.30	.40	0	0	4.40	.60	1.00	0
0	0	0	0	0	0	0	0
0	0	.10	0	0	0	.10	1.90
0	0	0	0	0	.10	0	.10
0	.10	.30	0	.70	1.30	.30	1.80
1.50	0	.30	0	.10	4.40	12.00	37.20
ML11860	2.50	0	0	0	0	0	0
1.00	0	.70	0	0	0	0	0
0	0	0	0	0	0	0	.50
0	0	0	0	.20	0	0	0
0	0	0	0	0	0	0	0
0	0	0	1.20	0	0	.50	4.90
.70	.20	0	0	.50	1.20	.50	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1.20
0	0	0	.20	0	0	0	.20
0	0	.70	0	0	.20	.50	.50
.70	0	0	0	.20	5.70	19.70	48.80
ML11861	.60	0	0	0	0	0	.30
.60	0	2.70	0	0	0	0	0
1.00	0	0	0	0	0	0	.30
0	.60	0	.30	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	.60	0	0	1.00	6.50
0	1.00	0	0	1.70	1.30	1.00	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1.30
0	0	0	.60	0	0	0	0
0	0	.30	0	.30	.60	0	.30
1.00	0	0	0	0	2.00	26.30	40.20
ML11862	.80	0	0	0	0	.40	0
.40	0	1.00	0	0	0	0	0
1.30	0	0	0	0	0	0	0
0	0	0	.20	.80	0	0	0
0	0	0	0	0	0	0	0
0	0	0	.60	0	0	.60	7.00
.20	.20	0	0	.80	.40	.40	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	2.10
0	0	0	0	0	0	0	.20
0	0	.20	0	0	1.30	.60	.40
1.50	0	0	0	.20	4.60	16.70	51.80
ML11902	.40	0	1.40	0	0	.20	.50
.40	0	7.10	0	0	0	0	5.00
.20	.40	0	1.10	0	0	0	2.90
0	.70	.10	1.00	2.30	1.70	0	.10

0	0	0	0	0	.70	0	0
0	0	0	.10	0	.20	.20	35.50
2.70	4.00	0	.70	10.30	1.80	.10	9.20
0	0	0	0	0	0	0	0
0	0	0	0	.50	0	.20	0
0	0	0	.20	0	0	0	0
0	0	0	0	.80	.10	0	.40
.10	0	0	0	.10	0	.10	1.10
ML11866	.60	0	.10	0	0	1.00	.80
.10	0	2.40	0	.40	0	0	.80
.10	.10	0	0	0	0	0	1.40
0	.50	.10	.10	.50	.80	.50	.20
0	0	0	0	0	0	0	0
0	0	0	.50	0	.40	3.80	17.30
.90	2.20	0	.80	12.60	0	1.20	0
0	0	0	0	0	0	0	0
0	0	0	0	1.20	.10	.20	1.00
.40	0	2.40	1.00	0	0	0	.10
0	0	.50	0	1.20	.20	.50	.90
1.60	0	1.00	0	1.60	2.80	4.10	22.80
ML11867	.70	0	0	0	0	.10	2.80
.40	0	1.90	0	0	0	0	.10
1.50	0	0	.30	0	0	0	.60
0	0	.30	.40	.90	.30	0	0
0	0	0	0	0	0	0	0
0	0	0	.30	0	.10	1.70	14.10
.10	1.10	.10	0	10.10	1.20	.30	.30
0	0	0	0	0	0	0	0
0	.10	.10	0	0	0	.30	3.00
.30	0	0	.10	0	.30	0	.30
0	0	0	0	1.20	.90	.70	.90
2.30	0	0	0	.10	3.00	9.30	32.00
ML11868	2.30	0	0	0	0	.10	.30
1.00	0	1.40	0	0	0	0	0
.50	.10	0	0	0	0	0	.30
0	0	.10	.10	1.00	0	0	0
0	0	0	0	0	0	0	0
0	0	0	.80	0	0	1.40	4.60
0	.10	0	0	1.00	.10	.50	0
0	0	0	0	0	0	0	0
0	0	0	0	.10	0	0	1.40
0	0	0	.30	0	0	0	.30
0	.10	.30	0	.10	1.00	1.50	.80
.10	0	0	0	.50	4.00	17.70	49.10
ML11869	1.10	0	0	0	0	.10	1.30
1.00	0	2.30	0	0	0	0	0
1.80	0	0	0	0	0	0	.10
0	.50	.10	.50	1.00	.30	.10	.10
0	0	0	0	0	0	0	0
0	0	0	1.00	0	.10	1.50	5.10
.10	.30	0	.30	4.60	.60	1.10	0
0	0	0	0	0	0	0	0
0	0	.10	0	0	0	.10	1.80
0	0	0	.50	0	0	0	0
0	0	1.00	0	0	3.90	0	1.10
2.30	0	.10	0	.30	5.40	6.30	44.60
ML11870	2.20	0	0	0	0	.40	1.10
.30	0	2.40	0	0	0	0	0
0	.10	0	.30	0	0	0	2.10
0	.40	0	.60	1.30	1.40	.30	0
0	0	0	0	0	.10	0	.80
0	0	0	.30	.10	.10	5.80	19.80
.10	.90	0	1.10	7.00	.40	.10	.60
0	0	0	0	0	0	0	.10
0	0	.90	0	.30	.40	.30	.10
1.30	0	0	1.70	0	.10	0	0
0	0	.60	0	0	1.10	1.10	1.90
0	0	3.40	0	1.10	.80	4.50	19.50
ML11903	.50	0	.80	.10	0	.70	.10
1.00	0	4.60	0	0	0	0	1.40
.70	0	0	.20	0	0	0	2.60
0	.50	.50	2.40	3.90	.80	0	.40
0	0	0	0	0	.20	0	0
0	0	0	.70	0	.50	1.10	26.30
.80	1.00	0	.20	18.40	.40	.10	2.30
0	0	0	0	0	0	0	0
0	.40	.10	0	1.40	0	.20	1.70
.40	0	0	1.30	0	0	0	0

0	0	.20	0	.40	0	.80	1.10
2.70	0	1.50	0	1.40	.50	1.00	5.00
ME12634							
.20	.60	0	.20	0	0	1.60	.40
.90	0	1.60	0	0	0	0	.20
0	0	0	0	0	0	0	.80
0	0	0	.90	1.10	.20	0	.20
0	0	0	0	0	0	0	0
0	0	0	.40	0	.20	1.30	10.70
0	2.70	0	0	5.70	.20	.90	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	3.20
0	0	0	0	0	0	0	0
2.50	0	0	0	.20	.20	.20	4.10
				.90	3.80	5.90	41.20
ME12551							
.20	.50	0	.10	0	0	.70	1.00
2.80	0	2.10	0	0	0	0	0
0	0	0	0	0	0	0	1.90
0	.60	.10	.10	.50	.20	0	.10
0	0	0	0	0	0	0	0
.20	0	0	.50	0	.20	1.70	28.00
0	1.10	0	0	7.60	.20	1.10	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	.10	2.20
0	0	0	.10	0	0	0	0
.50	0	.30	0	1.30	.90	.90	3.10
	0	0	0	.20	2.30	7.30	25.30
ME12552							
.90	.50	0	.10	0	0	.70	.10
.70	0	.60	0	0	0	0	0
0	0	0	0	0	0	0	.30
0	.50	.10	.30	0	0	0	.20
0	0	0	0	0	0	0	0
.10	0	0	.20	0	.10	.20	4.40
0	0	0	0	2.40	0	.30	0
0	0	0	0	0	0	0	0
0	0	0	0	.10	0	0	3.10
0	0	0	.50	0	0	0	0
.30	0	.10	0	0	.50	1.30	2.20
	0	0	0	.90	1.30	7.10	65.70
ME12553							
0	.80	0	.10	0	0	.30	.10
1.60	0	1.60	0	0	0	0	0
0	0	0	0	0	0	0	.40
0	.80	0	.10	0	0	0	.30
0	0	0	0	0	0	0	0
0	0	0	.80	0	.10	.60	7.30
0	0	0	0	1.70	.10	1.20	0
0	0	0	0	0	0	0	0
0	0	0	0	.10	0	0	3.90
0	0	0	.10	0	0	0	0
.40	0	0	.30	.10	.50	.60	1.80
	0	0	0	.90	3.60	10.00	54.70
ME12554							
.30	1.10	0	0	0	0	1.00	0
2.10	0	.90	0	0	0	0	0
0	0	0	0	0	0	0	.60
0	.10	0	.10	.10	.10	0	.20
0	0	0	0	0	0	0	0
.30	0	0	.70	0	.30	1.10	7.50
0	.30	0	0	1.10	0	.50	0
0	0	0	0	0	0	0	0
.10	0	0	0	.10	0	.10	3.10
0	0	0	.50	0	0	0	.10
1.00	0	0	.70	0	.30	1.80	1.40
	0	0	0	1.10	3.90	11.10	50.30
ME12639							
.60	.60	0	0	0	0	.60	0
.40	0	2.30	0	0	0	0	0
0	0	0	0	0	0	0	.40
0	0	.10	.30	.10	0	0	.10
0	0	0	0	0	0	0	0
.40	0	0	.70	0	.10	.70	6.80
0	.60	0	0	3.40	.40	.90	.10
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	4.60
0	0	0	0	0	0	0	.10
1.20	0	.30	0	0	.30	0	1.20
	0	0	0	.40	2.90	13.30	49.10
ME12640							
.50	.50	0	.10	1.10	0	.50	.20
11.60	0	1.60	0	0	0	0	0
	0	0	0	0	0	0	.10

0	.40	.10	.20	.10	0	0	0
0	0	0	0	0	0	0	0
0	0	0	.90	0	.10	1.20	11.80
.20	.10	0	0	2.20	.10	3.30	0
0	0	0	0	0	0	0	0
0	0	0	0	.10	0	0	3.00
0	0	0	.10	0	0	0	0
0	0	0	0	.20	3.70	.40	1.50
.60	0	0	0	.50	3.00	11.10	37.00
ME11901	2.20	0	0	0	0	.40	.10
1.10	0	3.20	0	0	0	0	0
.40	0	0	0	0	0	0	.80
0	.40	0	.30	.30	0	0	.10
0	0	0	0	0	0	0	0
0	0	0	.80	0	.30	.80	12.20
0	.10	0	0	1.40	0	1.90	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	3.00
0	0	0	.40	0	0	0	0
0	0	0	0	0	.40	.80	.10
.90	0	0	0	.30	3.30	13.40	29.90
ME12642	.90	0	0	.30	0	1.10	.10
.50	0	2.40	0	0	0	0	0
3.90	0	0	0	0	0	0	.50
0	0	.10	.10	0	0	0	.10
0	0	0	0	0	0	0	.50
0	0	0	.30	0	.10	.10	7.40
.10	.30	0	0	1.10	.50	.70	.10
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	2.60
0	0	0	.30	0	0	0	0
0	0	0	0	.10	1.80	.70	1.40
0	0	.30	0	0	4.60	13.40	48.40
ME12557	1.20	0	.20	0	0	.20	0
.10	0	.40	0	0	0	0	0
2.00	0	0	0	0	0	0	.20
0	0	0	.10	.50	.10	0	.10
0	0	0	0	0	0	0	0
0	0	0	.50	0	0	.90	5.60
0	.10	0	0	.40	.20	.80	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1.20
0	0	0	.50	0	0	0	.10
0	0	.20	.20	0	9.10	.60	1.40
.50	0	0	0	.80	3.20	10.60	49.80
ME12643	.20	0	.10	.20	0	.10	0
.20	0	1.00	0	0	0	0	0
1.30	0	0	0	0	0	0	.20
0	.20	.20	0	0	0	0	.20
0	0	0	0	0	0	0	0
0	0	0	.20	0	0	.40	11.20
.20	0	0	0	2.40	0	.40	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	4.50
0	0	0	.10	0	0	0	.20
0	0	0	0	.10	1.00	.50	3.20
2.70	0	.10	0	.20	2.00	10.80	50.50
ME12644	1.50	0	0	0	.10	.90	2.10
.10	0	2.50	0	0	0	0	.40
.90	.10	0	.30	0	0	0	3.30
0	1.20	.40	.40	1.20	1.80	0	.10
0	0	0	0	0	.30	0	0
0	0	0	.30	0	1.00	2.70	25.90
.40	.60	0	.30	3.90	1.00	1.00	2.20
0	0	0	0	0	0	0	0
0	.10	0	0	.30	0	.40	.90
0	0	0	.30	0	.10	0	.30
0	0	.10	0	.30	1.20	.60	1.60
1.20	0	.30	0	.30	1.30	3.40	23.20
ME12645	.40	0	.10	.10	0	.40	0
.10	0	2.60	0	0	0	0	0
1.10	0	0	0	0	0	0	2.00
0	.40	.40	1.00	.20	.10	0	0
0	0	0	0	0	0	0	0
0	0	0	1.10	.10	.50	1.10	20.40
.20	1.00	0	0	6.60	1.10	1.30	7.20
0	0	0	0	0	0	0	0
0	0	.10	0	0	0	.10	3.10

0	0	0	0	0	0	0	0
0	0	1.80	0	0	.20	.10	2.30
1.00	0	.10	0	.70	1.70	5.50	27.10
ME12648	.80	0	.20	.20	0	.20	.20
0	0	6.60	0	0	0	0	.20
0	.20	0	0	0	0	0	3.60
0	.20	.20	.80	3.20	2.60	.40	0
0	0	0	4.20	0	0	0	0
0	0	0	0	1.40	1.80	6.80	23.10
1.00	1.40	0	.80	5.80	1.20	0	10.40
0	0	0	0	0	0	.20	0
0	.20	0	0	.40	.60	0	0
.40	1.00	0	0	0	0	0	.40
0	0	.20	0	1.00	0	.60	.60
.40	0	1.60	0	1.00	0	0	.20
ME12564	.20	0	.20	0	0	3.50	.80
0	0	10.00	0	0	0	0	0
.40	0	0	.50	0	0	0	9.70
0	.20	.10	.80	.90	.90	.10	.10
0	0	0	0	0	0	0	0
0	0	0	.30	.10	.90	.80	22.40
1.10	3.40	0	.40	5.60	2.10	.30	15.60
0	0	0	0	0	0	0	0
0	0	0	0	0	.50	0	.10
.60	0	0	0	0	0	0	.30
0	0	.20	0	3.70	.30	0	.90
.50	0	.80	0	.60	0	0	1.00
ME12324	1.80	0	0	0	0	.50	1.00
.30	0	1.80	0	0	0	0	.10
.70	0	0	0	0	0	0	1.20
0	.50	.50	.60	.70	.10	0	.50
0	0	0	0	0	0	0	0
0	0	0	.20	0	.60	1.00	15.80
.50	.90	0	0	4.40	.10	.90	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1.80
0	0	0	.30	0	0	0	0
0	.10	0	0	.20	6.80	1.00	2.20
.90	0	.20	0	.30	2.50	8.10	35.80
ME12325	1.50	0	0	0	0	.90	0
.60	0	.50	0	0	0	0	0
.90	0	0	0	0	0	0	.20
0	.10	.10	.10	.50	0	0	0
0	0	0	0	0	0	0	0
0	0	0	.60	0	.10	.80	4.60
.10	0	0	.10	1.50	0	.90	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	2.00
0	0	0	0	0	0	0	0
0	0	.10	0	.20	2.10	.50	.20
.40	0	.20	.20	0	5.30	12.10	59.50
ME12327	.50	0	0	0	0	.40	.10
.50	0	4.30	0	0	0	0	0
.90	0	0	0	0	0	0	.20
0	.40	.20	.10	.40	.20	0	0
0	0	0	0	0	0	0	0
0	0	0	.20	0	.50	1.10	11.90
.10	.70	0	.10	2.90	.20	2.10	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	.10	4.60
0	0	0	0	0	0	0	0
0	0	.10	0	.50	.50	.20	1.60
1.40	0	0	0	0	5.00	11.10	42.60
ME12649	0	0	0	0	0	0	.10
.10	0	2.20	0	0	0	0	0
5.30	0	.10	0	0	0	0	.40
0	1.90	.70	1.20	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	.50	0	0	1.80	7.30
.20	.10	0	0	.50	.50	3.30	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1.10
0	0	0	0	0	0	0	0
0	0	.20	0	.40	.40	.20	.10
.20	0	0	0	.20	2.10	5.50	59.40
ME12331	1.30	0	0	0	0	.50	.10
.30	0	1.60	0	0	0	0	0

.50	0	0	0	0	0	0	0
0	.30	.10	0	.50	.10	0	.20
0	0	0	0	0	0	0	0
0	0	0	.20	0	.10	.50	7.90
.30	.10	0	0	1.10	0	.50	0
0	0	0	0	0	0	0	0
0	0	.10	0	0	0	0	2.70
0	0	0	.30	0	0	0	0
0	0	0	0	0	.60	.60	1.70
1.30	0	0	0	.10	4.10	21.30	47.70
ME12333	1.30	0	.10	0	0	.20	.50
.60	0	2.10	0	0	0	0	0
1.10	0	0	0	0	0	0	.20
0	1.00	.30	.20	.10	0	0	.20
0	0	0	0	0	0	0	0
0	0	0	.20	0	.20	.70	14.30
.20	.60	0	0	4.60	.20	.90	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	2.20
0	0	0	.60	0	0	0	0
0	0	.20	0	.30	.90	.60	2.10
1.00	0	0	0	.20	2.70	12.40	42.00
ME12566	.60	0	0	0	0	1.00	0
.60	0	6.00	0	0	0	0	3.20
0	0	0	.20	0	0	0	2.50
0	.40	.20	.20	1.50	.20	0	.20
0	0	0	0	0	0	0	0
0	0	0	0	0	0	3.60	21.10
.20	.40	0	0	1.00	1.20	.40	3.40
0	0	0	0	0	0	0	0
0	.20	.20	0	.20	.20	0	.60
0	0	0	0	0	0	0	.20
0	0	1.00	0	1.00	.60	0	.60
0	0	1.00	0	.80	3.00	2.30	33.90
ME12567	0	0	.30	0	0	.90	0
.60	0	4.20	0	0	0	0	0
.90	.30	0	0	0	0	0	3.60
0	0	0	0	1.20	.30	0	.60
0	0	0	0	0	0	0	0
0	0	0	.60	0	.60	1.80	24.30
0	.30	0	0	8.20	1.50	.30	12.70
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	2.40
0	0	0	0	0	0	0	0
0	0	2.70	0	.60	.90	.30	3.90
1.50	0	.60	0	.60	.90	.90	14.50
ME12568	.70	0	.50	0	0	1.00	4.30
.10	0	5.20	0	.10	0	0	2.90
.50	.50	0	.80	0	0	0	4.90
0	1.00	0	1.10	1.70	.80	0	.60
0	0	0	0	0	0	0	0
0	0	0	0	0	.50	2.40	29.40
1.00	1.60	0	0	9.40	.50	.10	3.80
0	0	0	0	0	0	0	.10
0	0	.10	0	.70	.20	.30	.30
.30	0	0	.10	0	0	0	0
0	0	.50	.10	3.10	.10	.10	2.10
.70	0	1.60	0	.60	.10	.10	4.70
ME12569	.50	0	.70	0	0	.90	2.70
0	0	4.90	0	0	0	0	1.20
2.30	0	0	0	0	0	0	2.50
0	0	0	0	2.00	.90	0	.30
0	0	0	0	0	0	0	0
0	0	0	0	0	.90	2.70	34.30
1.40	1.60	0	.50	10.80	0	.30	.70
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1.10
0	0	0	0	0	0	0	0
0	0	0	0	1.10	.50	.70	1.80
1.20	0	.10	0	.30	0	1.10	7.10
ME12655	1.00	0	0	0	0	0	.20
.50	0	.70	0	0	0	0	0
2.10	0	0	0	0	0	0	.20
0	.10	.30	.30	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	.90	0	0	.30	9.50
0	0	0	0	1.50	.30	1.40	.10
0	0	0	0	0	0	0	0

0	0	0	0	0	0	0	2.50
0	0	0	.20	0	0	0	0
0	0	0	0	0	.40	.50	1.60
.50	0	0	0	.10	3.90	17.80	48.80

DUPLICATED SAMPLES

M008035	3.80	0	0	0	.70	.90	0
0	.70	.90	0	2.30	0	0	0
0	.70	0	0	1.40	0	1.90	4.20
0	.70	0	.90	2.30	1.10	0	1.90
0	14.20	0	0	.90	.90	.70	0
.70	0	0	.40	1.10	.70	1.60	10.40
0	.70	.90	14.00	.90	2.10	0	0
.70	0	.90	2.60	0	0	0	.70
.70	2.30	1.10	.70	.70	.90	.90	0
0	0	0	1.10	0	1.40	0	0
0	0	.90	0	0	3.80	0	0
.90	0	.70	0	1.40	.90	0	0
M008034	3.10	0	0	0	.10	1.60	.10
0	.10	2.50	.10	.50	.20	0	.10
0	.10	.20	0	.50	.30	2.20	4.70
.10	1.20	0	.30	1.40	.40	0	4.20
0	17.00	0	0	.20	.70	.10	.30
0	0	0	.20	.20	.50	1.10	8.80
.40	.70	1.00	16.00	.30	.50	0	0
.40	.10	0	1.70	.10	0	.20	1.60
.40	5.00	1.20	.40	.40	1.10	.70	0
.10	.20	0	1.10	0	2.00	.20	0
0	.20	.40	0	.90	3.60	0	0
.30	0	.50	0	0	0	0	0
M008023	2.00	0	0	.20	.20	.20	.20
.20	.50	2.40	.30	1.70	.20	.20	.30
0	.60	.30	0	0	0	2.40	3.70
.50	1.00	0	.60	.50	.20	0	4.10
0	17.80	0	0	.30	1.90	.50	0
.20	0	0	.20	.50	.30	.60	11.20
.90	.90	.60	11.30	.70	1.80	0	0
0	0	.30	.90	.60	0	0	1.80
.90	4.40	.20	.90	.20	1.40	1.30	0
.30	1.40	.30	1.00	.20	1.10	0	0
0	.30	.50	0	.20	2.70	0	.20
.50	0	.30	0	.60	0	0	0
M008024	4.10	0	.30	.40	.30	0	.50
.20	.30	1.70	.40	.80	.20	.40	.20
0	1.00	.90	0	.20	.50	1.40	1.80
0	2.10	.20	.90	.30	.30	.30	2.20
0	16.20	.20	0	0	.40	.20	0
.20	0	0	.30	.30	0	.80	7.80
.40	.80	0	5.90	.40	0	0	0
.20	0	0	.70	.50	.40	.30	3.00
.50	4.00	1.00	.50	.80	2.00	1.80	0
0	.30	0	3.00	0	2.60	.40	0
.20	.20	1.00	0	1.00	10.60	0	.30
1.50	0	.90	0	.20	.20	0	0
ML08183	2.10	0	0	0	0	1.40	0
.30	.80	3.30	0	1.70	0	0	0
0	.50	0	0	1.70	.80	2.30	2.60
.50	1.00	0	1.00	1.50	1.20	.50	1.70
0	5.30	.50	0	0	.80	.50	0
.50	0	0	.10	.30	.50	1.70	13.60
1.50	.80	1.20	23.60	.50	1.50	0	0
1.00	.50	0	4.40	0	0	.50	0
0	1.70	.50	.50	0	.70	.50	0
.50	1.00	0	.50	0	.70	.50	0
0	0	1.40	0	.80	1.40	0	0
.70	0	0	0	0	0	0	0
ML08184	1.10	0	.10	0	0	1.00	0
0	.20	6.70	0	.80	0	0	.10
0	0	0	0	.20	.30	1.20	3.90
.10	.80	0	.30	.90	.20	0	2.10
0	22.50	0	.10	0	.50	.20	0
0	0	0	.10	0	.20	.50	9.30
0	.80	1.90	20.60	.10	4.40	0	0
.40	.10	.20	1.40	.10	0	.30	.70
.20	4.20	1.10	.10	.10	.10	.20	0
0	.50	0	.30	0	.80	.10	0
0	.10	1.20	0	1.40	1.60	0	0

.40	0	.30	0	.30	0	0	0
ML11902	.30	0	1.50	0	0	.70	.50
.10	0	4.50	0	.10	0	0	5.90
.30	.70	.10	1.70	0	0	0	4.50
0	1.70	0	.10	1.50	1.20	.50	.10
0	0	0	0	0	0	0	0
0	0	0	.30	.10	.70	.80	37.90
3.50	5.60	0	1.90	5.70	2.90	.10	0
0	0	0	0	0	0	0	0
0	.10	0	0	.50	0	.30	.10
0	0	0	.50	0	0	0	0
0	0	0	0	1.50	0	0	.70
.30	0	.10	0	.10	0	0	1.40
ML12908	.60	0	0	0	0	.10	1.00
.30	0	.60	0	0	0	0	.40
1.40	.10	0	.30	0	0	0	.70
0	.30	.10	.90	1.40	.10	0	0
0	0	0	0	0	.30	0	0
0	0	0	.90	0	.10	1.70	22.90
0	.30	0	.70	21.10	0	.30	.30
0	0	0	0	0	0	0	.10
0	.10	0	0	.10	.30	1.80	0
0	0	0	.30	0	.10	0	.10
0	0	.60	0	.10	.40	.60	3.70
2.10	0	1.80	0	.40	2.30	5.40	15.60
ML11869	.90	0	0	0	0	0	.70
1.40	0	2.00	0	0	0	0	0
1.30	0	0	0	0	0	0	.70
0	.50	0	.30	.90	.30	.10	.10
0	0	0	0	0	0	0	0
0	0	0	.10	0	.10	2.40	6.30
0	.30	0	.10	4.30	.10	.90	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	2.80
0	0	0	.50	0	0	0	0
0	0	1.30	0	0	3.10	.50	2.20
3.30	0	.10	0	.30	5.20	8.00	42.80
ME12312	.60	0.00	.10	0.00	0.00	.30	0.00
.60	1.00	1.40	0.00	0.00	0.00	0.00	0.00
3.20	0.00	0.00	0.00	0.00	0.00	0.00	.60
0.00	.80	.30	0.00	.30	.10	0.00	.30
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	.20	0.00	.10	.30	13.70
.30	.20	0.00	0.00	1.70	.30	1.70	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.50
0.00	0.00	0.00	.20	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	.20	.50	.30	3.40
.80	0.00	0.00	0.00	.50	2.50	16.10	39.70

SAMPLES CONTAINING SCARCE RADIOLARIA

M009619	6.70	0	0	0	0	0	.90
.60	0	.60	0	0	0	0	0
0	.30	.60	.90	.30	0	1.90	2.20
0	2.20	.30	.30	1.60	.60	0	0
0	6.00	0	0	0	.60	.90	0
0	0	0	0	.30	.30	.30	9.20
1.60	.30	.60	7.00	0	3.20	0	0
0	0	0	.30	0	0	.30	1.60
0	1.60	.90	0	1.20	.60	3.20	0
.30	.60	0	1.90	0	1.90	0	.30
0	0	0	.30	.90	9.20	3.50	1.60
1.60	0	.60	0	1.60	0	0	.30
ML12784	2.90	0	.80	0	0	.60	1.50
1.30	.10	7.40	0	.10	0	0	0
.10	.10	0	.80	0	0	0	6.10
0	.20	1.60	3.20	1.10	.50	0	0
0	0	0	0	0	.20	0	0
0	0	0	.90	.50	1.20	4.40	10.70
0	.90	0	.90	2.00	.50	0	0
0	0	0	0	0	0	0	2.70
0	.80	.40	0	.10	.10	.10	0
.80	.10	0	.60	0	.10	0	.20
0	1.20	0	0	19.50	7.50	.50	.40
1.10	0	.50	0	1.10	0	0	0
ML11877	1.00	0	0	0	3.20	4.90	0

.50	0	3.80	0	0	0	0	0
0	0	0	0	0	0	0	.50
0	0	0	0	1.60	0	1.00	0
0	0	0	0	0	0	0	0
0	1.00	0	1.00	0	.50	1.00	15.30
0	0	0	0	.50	0	1.60	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	2.70
0	0	0	0	0	0	0	0
0	0	0	0	0	1.00	0	0
				.50	6.50	14.20	27.40
ML11906	.60	0.00	0.00	0.00	0.00	.60	1.30
.60	0.00	4.60	0.00	0.00	0.00	0.00	0.00
7.30	0.00	0.00	0.00	0.00	0.00	0.00	2.60
0.00	.60	0.00	2.00	.60	0.00	.60	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	.60	0.00	0.00	0.00	.60	0.00	18.10
0.00	0.00	0.00	0.00	4.60	1.30	1.30	2.60
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	.60
0.00	0.00	0.00	0.00	0.00	0.00	0.00	.60
1.30	0.00	0.00	0.00	2.00	0.00	0.00	1.30
				.60	0.00	4.00	32.20
ML11907	1.30	0	0	0	0	1.30	0
0	0	1.30	0	0	0	0	0
3.30	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	1.30	0	.60	.60	12.10
0	.60	0	0	.60	.60	2.70	.60
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	2.00
0	0	0	.60	0	0	0	0
.60	0	0	0	0	0	.60	.60
					2.00	14.10	47.20
ML08041	.50	0	.20	0	0	.80	0
.50	0	7.70	0	0	0	0	.20
0	0	0	0	0	0	1.70	4.40
0	0	0	.20	1.40	.80	.20	0
.20	0	0	0	0	0	.20	0
0	0	0	0	0	.20	.20	16.00
8.90	23.20	0	2.30	.20	3.20	0	0
0	0	0	0	0	0	0	.50
0	0	2.30	0	0	0	0	0
0	7.10	0	.20	0	0	0	0
0	0	.20	0	1.70	0	0	0
0	0	0	0	1.70	0	0	0
ML08038	.40	0	0	.40	0	.80	0
.40	.40	6.20	0	0	0	0	1.70
0	0	0	0	0	0	7.10	4.90
0	0	0	.40	3.50	1.70	0	.40
0	8.50	0	.40	0	2.20	.40	.40
0	0	0	0	0	0	3.50	14.70
4.40	5.30	0	5.30	.80	8.50	0	0
0	0	0	3.50	.40	0	.40	0
0	0	.80	0	0	0	0	0
0	1.30	0	0	0	0	0	0
0	0	0	0	.80	0	0	0
0	0	0	0	.40	0	0	0
ML08185	.10	0	0	0	0	1.00	.10
.30	.30	10.10	0	.10	.10	.10	.10
0	0	0	.30	0	0	1.90	6.00
0	.10	.10	0	.90	.70	0	0
0	5.40	0	.30	0	.10	0	.10
0	0	0	0	0	.10	1.30	7.00
14.00	16.20	0	4.70	.40	4.80	0	0
0	0	0	7.40	0	0	.10	.10
0	0	2.20	0	.10	0	0	0
0	3.60	0	0	0	0	0	0
0	0	0	0	.60	.10	0	0
0	0	0	0	1.30	0	0	0
ML11865	1.10	0	.30	0	0	4.00	1.10
0	0	11.10	0	0	0	0	0
.30	0	0	.70	.30	.30	0	9.20
0	.30	0	.70	5.50	0	2.20	0
0	0	0	0	0	2.20	0	0
0	0	0	0	.70	1.80	5.50	6.60
5.90	8.50	0	5.10	2.50	1.80	0	0

0	0	0	0	0	0	0	1.10
0	.30	0	0	1.10	0	.70	0
.30	0	0	1.10	0	0	0	0
0	0	1.80	0	.70	.70	.70	.30
1.80	0	0	0	1.10	0	0	0
ML11871	3.80	0	0	0	0	.90	2.90
.90	0	5.80	0	0	0	0	0
0	.90	0	0	0	0	0	7.70
0	0	0	3.80	3.80	4.80	0	0
0	0	0	0	0	.90	0	0
0	0	0	.90	0	0	8.70	6.70
.90	2.90	0	2.90	4.80	1.90	0	.90
0	0	0	0	0	0	0	0
0	0	.90	0	0	.90	.90	0
4.80	2.90	0	0	0	.90	0	0
0	0	0	0	0	.90	.90	.90
1.90	0	2.90	0	0	0	0	0
ME12635	.90	0	0	0	0	1.90	0
0	0	.90	0	0	0	0	0
.90	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	13.70
0	.90	0	0	.90	0	0	1.90
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1.90
0	0	0	.90	0	0	0	0
0	0	0	0	0	0	0	1.90
0	0	0	0	.90	4.90	6.80	51.90
ME12638	.90	0	0	0	0	1.90	0
.40	0	1.40	0	0	0	0	0
2.90	0	0	0	0	0	0	.40
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	13.70
0	.90	0	0	.40	.90	1.90	.40
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	2.90
0	0	0	0	0	0	0	0
0	0	0	0	0	.90	.90	.90
0	0	0	0	.40	3.40	14.70	42.10
ME12560	0	0	0	0	0	2.00	0
0	0	16.60	0	0	0	0	0
0	.60	0	0	0	0	0	9.70
0	0	0	0	2.00	1.30	0	0
0	0	1.30	0	0	0	0	0
0	0	0	0	0	0	1.30	11.10
6.20	16.60	0	0	1.30	12.50	0	0
0	0	0	0	0	0	0	.60
0	0	0	0	0	0	.60	0
.60	0	0	0	0	0	0	0
0	0	.60	0	.60	0	0	1.30
.60	0	0	0	.60	0	0	2.00
ME12565	.50	0	.40	0	0	2.40	2.00
.10	0	7.10	0	0	0	0	1.50
.90	0	0	.10	0	0	0	7.40
0	.50	0	.80	1.10	.80	.40	.50
0	0	0	0	0	0	0	0
0	0	0	0	0	.20	1.90	24.00
.90	3.10	0	.10	4.60	1.60	.20	8.10
0	0	0	0	0	0	0	0
0	0	0	0	.60	.10	.20	0
.20	0	0	.40	0	0	0	.20
0	0	0	0	6.40	.50	.90	.80
.10	0	0	0	.20	.50	1.20	6.90
ME12652	2.20	0	0	0	0	3.30	0
0	0	15.50	0	0	0	0	0
0	1.10	0	0	0	0	0	1.10
0	0	0	0	1.10	2.20	0	0
0	0	0	0	0	0	0	0
0	0	0	0	1.10	0	1.10	4.40
3.30	13.30	0	2.20	0	17.70	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	2.20	0	0
0	1.10	0	0	0	0	0	0
0	0	1.10	0	2.20	0	2.20	0
5.50	0	0	0	2.20	0	2.20	0

ME12658	0	0	0	0	0	3.30	2.20
1.10	0	4.40	0	0	0	0	0
0	0	0	0	0	0	0	1.10
0	.50	0	.50	1.10	.50	0	0
0	0	0	0	0	0	0	0
0	0	0	2.20	0	.50	0	14.00
.50	3.30	0	0	.50	2.80	1.60	.50
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	3.90
0	0	0	0	0	0	0	0
0	0	.50	0	0	0	1.10	.50
.50	0	0	0	2.20	.50	0	0
ME12659	.90	0	0	0	0	0	1.40
.40	0	.40	0	0	0	0	0
0	0	0	0	0	0	0	.40
0	0	0	0	.40	0	0	.40
0	0	0	0	0	0	0	0
0	0	0	1.40	0	0	0	9.70
0	0	0	0	.90	0	.40	.40
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	4.30
0	0	0	0	0	0	0	0
0	0	0	0	0	.40	2.90	.40
.90	0	0	0	.90	2.90	11.10	46.10

Appendix 6: Percentages of Radiolaria categories of down-core samples (Cores: V19-29, Y71-6-12, V15-53, RC15-61, RC17-213, V17-92).

FORMAT:

ACCESS LVL.							
	S1	S1A	S3	S4	S5	S6	S7
S8	S9	S10	S11	S12	S13	S13A	S14
S15	S17	S17A	S18	S19	S21	S23	S24
S26	S27	S28	S29	S30	S30A	S30B	S31
S33	S34	S36	S36A	S36B	S36C	S37	S38
S39	S39A	S40	S41	S42	S45	S47	S48
S50	S51	S53	S54	S56	S57	S58	S59
N1	N1A	N1B	N1C	N2	N3	N4	N5
N5	N7	N8	N9	N10	N11	N12	N14
N15	N16	N17	N18	N19	N24	N25	N26
N27	N28	N29	N32	N33	N35	N35A	N36
N39	N39	N40	N42	N43	N48	N49	N50
UNIDENIF							

CORE V19-29

ML08195	.30	0.00	.30	0.00	0.00	0.00	.60
0.00	.80	2.20	.20	2.20	.10	.30	.30
0.00	1.70	.40	.60	1.90	.10	3.20	2.20
.10	2.80	.10	2.20	5.40	2.40	0.00	1.90
0.00	5.80	.40	0.00	0.00	1.10	.60	0.00
.30	0.00	.20	.10	.30	0.00	.90	19.90
.40	0.00	1.40	13.30	.60	.60	0.00	0.00
.80	.60	.20	.70	.90	.30	0.00	.40
.40	3.30	0.00	1.30	0.00	2.70	.70	0.00
0.00	1.10	.40	.40	0.00	.70	.20	0.00
0.00	.90	.20	.10	.10	.40	0.00	.10
.10	0.00	.10	0.00	.10	.10	0.00	0.00
.90	0.00						
ML08196	0.00	0.00	.70	0.00	0.00	0.00	.40
0.00	.30	3.40	.30	3.80	.30	.60	.80
0.30	2.30	.30	.20	1.70	0.00	2.60	1.80
.10	2.40	.20	3.30	3.80	2.20	0.00	.70
.10	5.10	.30	0.00	0.00	.60	1.20	0.00
.40	0.00	0.00	0.00	.30	0.00	1.00	18.90
.10	.40	.90	10.40	0.00	1.50	0.00	0.00
.50	.10	.40	.50	.30	.60	0.00	.80
.50	2.50	0.00	1.20	0.00	1.40	.50	0.00
.30	1.30	.10	.40	0.00	1.40	.90	0.00
.10	.90	.40	0.00	.30	1.20	0.00	0.00
0.00	0.00	0.00	0.00	.20	0.00	0.00	0.00
3.70	0.00						
ML08197	.50	0.00	.40	0.00	.50	.10	.20
.30	1.00	3.00	.30	1.80	.20	.20	.10
0.00	2.10	0.00	.20	1.60	0.00	3.20	1.20
.10	3.30	0.00	2.20	2.90	2.10	0.00	1.50
0.00	4.60	.70	0.00	0.00	.90	1.50	.10
.60	0.00	.10	0.00	.10	.40	1.50	20.10
.20	.30	1.10	12.80	.30	.70	0.00	0.00
1.10	.10	.20	.50	.90	.30	.10	.80
.50	4.10	0.00	.90	0.00	3.30	.50	0.00
0.00	1.70	.40	.70	0.00	.90	.70	0.00
0.00	1.00	.70	.20	.60	.90	0.00	0.00
.10	0.00	.40	.20	.20	.20	0.00	0.00
.60	0.00						
ML08198	.20	0.00	1.00	0.00	.30	.10	.20
0.00	.30	3.70	0.00	1.80	.40	.30	.30
0.00	.40	.10	1.70	2.20	0.00	4.60	2.90
0.00	2.20	0.00	1.50	4.90	1.80	0.00	1.00
0.00	4.70	.50	0.00	0.00	.80	1.80	0.00
.30	0.00	.40	0.00	.50	.20	2.50	21.40
.30	.10	1.20	13.60	.60	1.30	0.00	0.00
.60	.10	0.00	1.00	.40	.30	0.00	.40
.20	3.30	0.00	.70	0.00	1.80	.70	0.00
.20	1.60	.40	.50	.10	.50	.30	0.00
.10	.40	.70	0.00	.60	.90	0.00	0.00
.20	0.00	.10	.10	.10	.10	0.00	0.00
.50	0.00						
ML08199	.20	0.00	.20	0.00	.10	0.00	.50
.30	.20	2.30	.10	1.70	.30	.10	.20
0.00	1.40	.30	.20	2.10	0.00	4.80	1.40
0.00	1.70	0.00	1.90	3.50	2.10	0.00	1.00
0.00	4.10	1.00	0.00	0.00	.80	2.40	0.00
.80	0.00	0.00	0.00	0.00	.20	.60	20.50
.20	0.00	1.40	12.00	.50	1.10	0.00	0.00
.40	.20	0.00	.30	.90	.20	0.00	1.20
.40	3.70	0.00	.80	.10	3.00	.60	0.00
0.00	1.00	.20	.90	0.00	.20	1.00	0.00
0.00	.60	.20	0.00	0.00	.90	0.00	0.00
0.00	0.00	.10	0.00	.10	0.00	0.00	0.00
6.40	0.00						

ML08200	.20	0.00	.20	0.00	.10	.20	.20
0.00	.30	3.40	1.00	2.50	.20	0.00	.40
0.00	3.00	.50	0.00	.80	0.00	6.90	1.60
.40	2.80	.20	1.90	3.80	1.70	0.00	1.10
0.00	4.90	.20	.10	.20	1.30	1.40	.10
.40	0.00	0.00	.10	.50	.10	1.20	20.60
.60	.10	1.00	8.70	.60	2.30	0.00	0.00
.30	0.00	0.00	.10	1.00	.50	0.00	1.00
.20	4.10	0.00	1.30	.10	2.50	.50	0.00
.20	1.30	.10	.10	0.00	1.00	.70	0.00
.10	.70	.20	.20	.10	.50	0.00	0.00
.40	.10	.20	0.00	.40	.10	0.00	0.00
1.30	0.00						
ML08201	.40	0.00	.50	0.00	0.00	.20	.20
.50	.80	2.50	.20	1.40	.10	.10	.40
0.00	1.40	.10	.40	.50	.10	4.90	2.10
.20	2.90	0.00	2.60	3.30	1.70	.10	2.50
0.00	5.50	.60	0.00	0.00	1.40	2.20	0.00
.10	.10	0.00	0.00	.40	.10	1.00	23.00
.80	.10	1.20	9.50	.60	2.20	0.00	0.00
.20	0.00	0.00	.60	.50	.40	.40	1.00
.80	4.50	0.00	.20	0.00	2.80	.40	0.00
.10	1.60	.10	.10	0.00	.90	.60	0.00
0.00	.60	.20	0.00	0.00	.60	0.00	0.00
0.00	0.00	.10	0.00	0.00	.40	0.00	0.00
.80	0.00						
ML08202	.40	0.00	.40	0.00	.10	.20	.10
.20	1.00	2.60	.40	1.80	.20	0.00	.40
0.00	2.80	.50	.30	.30	0.00	5.80	2.00
.10	2.90	.40	2.80	2.90	1.00	0.00	1.10
0.00	7.40	1.00	0.00	0.00	1.00	2.40	0.00
.40	0.00	.10	.20	.40	.50	1.00	19.20
.50	.20	1.10	6.10	.70	2.70	0.00	0.00
.10	.10	0.00	.10	.90	.40	.30	1.30
.70	4.10	0.00	.20	.10	4.80	.20	0.00
.60	2.00	.10	.60	0.00	1.10	.90	0.00
.10	.50	.10	.10	0.00	1.20	0.00	0.00
.40	0.00	.10	0.00	.20	0.00	0.00	0.00
1.30	0.00						
ML08203	.10	0.00	.10	0.00	.20	.20	.20
.20	.50	2.90	.10	2.80	.10	0.00	.10
0.00	1.50	.40	.10	0.00	0.00	2.60	2.20
0.00	1.20	0.00	1.10	.80	.80	0.00	1.50
0.00	6.00	.70	.40	.40	1.80	.90	.10
0.00	0.00	0.00	0.00	.50	.20	1.50	27.60
2.50	.80	.90	7.30	.70	3.30	0.00	0.00
.50	0.00	0.00	.50	.70	.40	.40	.40
.40	3.90	0.00	0.00	0.00	4.90	1.40	0.00
.20	1.60	.40	.40	0.00	.70	.80	0.00
0.00	.70	.10	.10	.20	.40	0.00	0.00
.20	0.00	0.00	0.00	.40	0.00	0.00	0.00
1.90	0.00						
ML08204	.40	0.00	.80	0.00	.30	.30	.40
.70	.50	3.50	.30	2.10	.20	.10	0.00
0.00	1.80	.10	.10	.50	0.00	2.60	2.60
.10	4.60	0.00	2.80	.90	1.40	0.00	1.60
.10	5.40	.80	.10	0.00	1.50	.40	.10
.50	0.00	0.00	.20	.10	.10	1.90	21.00
0.00	.30	.60	7.10	.70	3.70	0.00	0.00
.30	0.00	.10	0.00	.60	.70	0.00	3.50
.70	4.30	0.00	.10	0.00	3.30	.50	0.00
.40	1.60	.20	1.00	0.00	1.20	.80	0.00
0.00	1.40	1.10	0.00	.10	1.20	0.00	0.00
.20	0.00	.30	0.00	.10	0.00	0.00	0.00
.70	0.00						
ML08205	.50	0.00	.20	0.00	.50	.70	.60
1.40	.40	5.40	0.00	1.50	0.00	0.00	0.00
0.00	4.50	.20	.30	.10	0.00	2.80	2.20
0.00	2.30	.10	1.90	.70	.40	0.00	1.50
0.00	4.50	.20	0.00	0.00	.90	.30	0.00
.70	0.00	0.00	0.00	.40	.20	.90	19.70
2.90	.20	1.20	8.20	.10	3.60	0.00	0.00
0.00	0.00	0.00	0.00	.80	.40	0.00	4.20
.70	6.00	0.00	.20	0.00	2.30	.40	0.00
.60	1.50	.10	.20	0.00	1.70	0.00	0.00
0.00	1.00	1.20	0.00	.40	.90	0.00	0.00
.20	0.00	.30	0.00	.40	0.00	0.00	0.00
.60	0.00						
MLJ7268	.20	0.00	.70	0.00	.50	1.40	.10
1.20	.30	6.10	0.00	1.20	0.00	0.00	.10
0.00	2.90	.60	.50	.10	.10	2.30	2.60
.10	3.40	.30	2.90	1.00	1.00	0.00	2.10
0.00	3.50	1.00	0.00	0.00	1.30	.30	.10
.50	0.00	.10	0.00	0.00	.70	2.50	19.90

1.00	.80	.50	9.60	1.00	4.20	0.00	0.00
0.00	0.00	0.00	.10	.40	0.00	0.00	2.40
.60	3.40	0.00	.10	0.00	2.20	.30	0.00
0.00	1.10	.20	.20	0.00	.30	1.60	.10
.10	.60	.90	.10	.20	1.60	0.00	.20
.10	0.00	0.00	0.00	.60	0.00	0.00	0.00
1.40	0.00						
ML08206	.10	0.00	.60	0.00	.10	0.00	.20
1.20	.10	2.20	.20	1.70	.10	0.00	0.00
0.00	2.70	.80	.20	.30	.10	1.30	1.70
.40	4.40	.30	3.20	1.70	.60	0.00	1.40
.20	1.40	.90	0.00	0.00	.60	.10	0.00
.40	.10	0.00	.10	.10	.70	1.20	17.90
0.00	.10	.60	8.10	.70	2.30	0.00	0.00
.20	.10	0.00	.10	1.20	.10	.20	2.10
.60	6.70	0.00	.20	0.00	3.20	0.00	.80
.10	1.10	.20	1.90	0.00	1.80	1.80	0.00
0.00	7.50	1.20	.10	.10	2.40	0.00	0.00
.20	0.00	.60	0.00	.20	.30	0.00	0.00
3.90	0.00						
ML08207	1.10	0.00	.20	0.00	0.00	0.00	.10
.50	0.00	2.30	0.00	1.20	0.00	0.00	0.00
0.00	2.90	1.10	.10	0.00	0.00	2.00	2.40
.20	3.60	.30	3.10	1.10	.80	0.00	1.30
0.00	3.00	1.00	0.00	0.00	.50	.50	0.00
.20	0.00	0.00	0.00	.20	.30	1.70	16.80
.60	0.00	.60	5.60	.10	2.40	0.00	0.00
.20	0.00	0.00	0.00	.40	1.70	0.00	4.20
1.20	5.90	0.00	.10	.10	5.30	2.20	0.00
.30	1.60	.20	2.40	0.00	2.10	1.50	0.00
0.00	2.10	1.00	.30	.30	2.90	0.00	.10
0.00	0.00	0.00	0.00	.30	0.00	0.00	0.00
1.40	0.00						
ML08208	.10	0.00	.50	0.00	.30	.40	.20
.50	0.00	4.10	.30	2.10	0.00	.10	0.00
0.00	2.90	.60	.10	.30	.10	2.20	1.90
.10	4.20	.50	3.60	1.10	.70	0.00	1.00
0.00	5.30	1.20	0.00	0.00	1.20	.80	.20
1.10	.10	0.00	.10	.50	.60	1.80	18.20
.60	.10	.60	7.70	.60	3.60	0.00	0.00
.10	0.00	0.00	.20	.90	.10	0.00	2.70
1.10	3.80	0.00	.20	.10	3.60	.80	0.00
.90	1.70	.30	.30	0.00	1.20	2.20	0.00
0.00	1.60	.70	0.00	.30	2.10	0.00	0.00
.10	0.00	.20	0.00	.40	0.00	0.00	0.00
1.60	0.00						
ML08209	.70	0.00	.70	0.00	.50	.50	.20
.50	.30	3.00	.30	1.80	.20	0.00	.10
0.00	2.30	.20	.10	.60	0.00	1.40	1.80
.10	2.50	.10	4.00	1.50	1.00	0.00	1.40
0.00	4.20	1.10	0.00	0.00	1.10	1.20	.20
.70	.10	.10	0.00	.20	.10	1.70	18.50
.20	.20	.50	7.90	.40	3.20	0.00	0.00
.20	0.00	0.00	.50	.50	.60	.50	3.20
1.00	4.20	0.00	.10	.20	4.40	.60	0.00
.70	.80	.10	2.10	0.00	2.40	1.30	0.00
.10	1.00	.50	.10	.40	3.10	0.00	.10
.20	0.00	.20	0.00	.30	0.00	0.00	0.00
1.00	0.00						
ML08210	1.30	0.00	.90	0.00	.50	.20	.20
1.30	.10	3.00	.20	1.10	.10	.20	.10
0.00	2.20	.60	.40	.70	0.00	1.20	1.60
0.00	2.10	0.00	3.30	1.70	.80	0.00	.80
0.00	4.40	1.60	.20	0.00	1.00	1.50	.10
.70	0.00	0.00	.10	.70	.70	1.60	16.80
.80	.20	.80	7.20	1.00	2.30	0.00	0.00
0.00	0.00	0.00	.20	.30	.60	.30	2.60
.80	3.30	.10	.10	0.00	4.10	1.80	0.00
.60	.70	.40	4.40	.10	2.20	1.30	0.00
0.00	1.30	.80	.40	.20	3.10	0.00	0.00
0.00	0.00	.20	0.00	.40	0.00	0.00	0.00
.90	0.00						
ML08211	.70	0.00	.50	0.00	.20	.30	.80
.80	0.00	3.80	.10	2.80	.20	.10	.10
0.00	3.40	1.00	.30	.60	0.00	.90	1.50
.10	2.50	.10	3.50	1.80	.80	.10	2.00
.10	2.90	.60	0.00	0.00	1.40	1.10	.10
.20	0.00	0.00	0.00	.40	.30	1.60	17.20
1.00	.50	.50	7.90	.60	2.00	0.00	0.00
.30	0.00	0.00	0.00	.30	.20	0.00	2.60
1.40	3.90	.10	.30	0.00	3.30	1.50	0.00
.60	.50	.40	2.10	0.00	2.30	1.40	.20
0.00	1.80	.60	0.00	.20	1.90	0.00	0.00
0.00	0.00	.20	0.00	.30	0.00	0.00	0.00

3.40	0.00						
ML08212	.80	0.00	.50	0.00	.20	.20	.80
1.30	.10	3.20	.10	1.40	0.00	.10	.10
0.00	2.50	.60	0.00	.60	0.00	1.20	1.50
.20	3.20	.60	3.30	.90	.40	0.00	.90
0.00	1.90	.50	0.00	0.00	1.60	.70	.20
.70	0.00	0.00	.10	.50	0.00	1.30	19.60
.80	.20	.90	6.80	1.20	2.70	0.00	0.00
.20	.20	0.00	.10	.40	.80	.10	3.50
.80	2.50	0.00	.20	.20	3.70	1.30	0.00
.20	1.10	.20	3.60	.10	3.20	.40	.10
0.00	.70	.70	.30	.40	4.20	0.00	.10
.40	0.00	.50	0.00	0.00	.10	0.00	0.00
2.20	0.00						
ML08213	3.00	0.00	.40	0.00	.10	.10	.80
.80	.10	2.30	0.00	.40	0.00	0.00	0.00
0.00	2.90	.20	.10	1.10	0.00	.40	1.50
.10	2.10	.70	1.80	.20	.20	0.00	.70
0.00	1.50	1.30	0.00	0.00	.80	.50	.20
.70	0.00	0.00	0.00	.50	0.00	.50	17.80
.50	.20	.20	5.50	1.00	1.10	0.00	0.00
.10	0.00	0.00	.10	.50	.80	0.00	2.40
.20	4.30	.40	0.00	.20	4.70	2.60	0.00
.40	0.00	0.00	13.00	0.00	2.00	.80	0.00
0.00	.20	.50	1.30	.10	5.60	0.00	.10
.50	0.00	.10	0.00	0.00	.10	0.00	0.00
3.00	0.00						
ML08214	.40	0.00	.40	0.00	.30	.10	.20
.60	.20	3.10	.20	2.90	0.00	0.00	0.00
0.00	2.30	.90	0.00	1.40	0.00	1.00	1.30
.30	3.30	0.00	3.70	.50	.20	.10	.40
0.00	3.60	1.10	0.00	0.00	1.20	.90	0.00
.30	0.00	.10	0.00	.20	.50	.60	19.30
.70	.10	.70	7.40	.30	.70	0.00	0.00
0.00	0.00	0.00	.20	.20	.40	0.00	3.60
1.00	6.20	0.00	0.00	.30	3.60	1.40	0.00
.70	.60	.40	4.40	0.00	1.90	.30	0.00
.10	1.50	.40	.40	.20	3.90	0.00	.10
.10	0.00	.10	0.00	.10	.10	0.00	0.00
3.50	0.00						
ML08215	.70	0.00	.70	0.00	.50	0.00	.70
1.10	0.00	2.40	.20	1.30	0.00	.10	.10
0.00	1.60	.20	.40	.80	.10	1.00	1.40
.10	3.00	.20	2.80	1.70	.70	.10	.80
0.00	2.60	1.10	0.00	0.00	1.00	.30	0.00
.40	0.00	.10	.20	.30	.50	1.50	20.20
.50	.20	.90	8.60	.80	2.40	0.00	0.00
.30	0.00	0.00	.10	.20	.70	0.00	2.60
.70	5.20	0.00	0.00	0.00	2.80	1.50	0.00
.70	.40	.10	5.00	0.00	2.30	.70	.10
.10	.90	.80	0.00	.90	4.10	0.00	0.00
.20	0.00	.40	0.00	.20	.10	0.00	0.00
1.80	0.00						
ML08216	.80	0.00	.50	0.00	.40	.10	.60
1.10	0.00	3.10	.30	1.20	.20	.20	.10
0.00	2.10	.30	.20	1.00	.20	2.50	2.10
.20	3.60	.10	2.50	1.10	.30	0.00	.60
.10	3.60	1.30	0.00	0.00	1.50	1.30	.10
.30	0.00	.10	.10	.30	.50	1.90	18.00
.90	.30	.40	7.00	.70	3.10	0.00	0.00
.20	0.00	0.00	.50	.30	.50	.20	2.40
.30	4.90	.40	0.00	0.00	4.20	1.10	0.00
.40	1.00	0.00	3.70	0.00	1.30	.30	.10
.20	.70	1.30	.60	.90	2.60	0.00	.10
.10	0.00	.20	0.00	.30	.10	0.00	0.00
1.40	0.00						
ML08217	.30	0.00	.10	0.00	.10	0.00	.20
.70	.10	3.70	0.00	1.80	.10	.20	0.00
0.00	2.80	0.00	.50	.20	.10	1.00	2.90
.20	3.80	.10	2.70	2.50	.90	0.00	.90
0.00	4.00	1.20	0.00	0.00	1.60	.30	.20
.50	0.00	.10	.10	.50	.50	1.60	24.30
.30	.10	1.00	10.40	.70	2.40	0.00	0.00
.10	0.00	0.00	.10	.10	.30	0.00	2.30
.70	4.60	0.00	.20	.10	1.80	0.00	.60
.20	.90	.10	2.00	0.00	1.20	.30	0.00
.10	1.10	.60	0.00	.30	1.20	0.00	0.00
.10	0.00	.20	0.00	.20	0.00	0.00	0.00
1.80	0.00						
ML08218	.50	0.00	.40	0.00	0.00	0.00	.50
.40	0.00	2.80	0.00	1.60	.10	.20	0.00
0.00	2.90	.50	.10	.60	0.00	1.80	1.90
.10	3.00	.30	2.80	1.70	1.10	0.00	1.00
0.00	4.30	1.40	0.00	0.00	1.50	1.20	0.00

.80	0.00	0.00	0.00	.30	.30	2.00	16.70
.30	.10	.60	9.70	.20	2.20	0.00	0.00
.30	0.00	0.00	0.00	.10	.20	0.00	2.50
.80	6.60	0.00	0.00	0.00	4.10	1.00	0.00
.70	.90	.20	3.10	0.00	2.60	.60	0.00
0.00	.90	1.00	.10	.10	2.30	0.00	0.00
0.00	0.00	.30	0.00	.10	0.00	0.00	0.00
1.00	0.00						
ML08219	.40	0.00	.30	0.00	.10	0.00	.50
.70	0.00	3.50	0.00	2.50	.10	.10	0.00
0.00	2.80	.80	.40	.20	0.00	1.20	1.50
.10	2.50	0.00	2.90	2.30	1.20	0.00	1.00
0.00	4.40	.80	0.00	0.00	1.10	.50	.20
1.50	0.00	0.00	.10	.40	.20	1.50	19.10
.30	.20	.40	9.10	.70	2.40	0.00	0.00
.40	0.00	0.00	.10	.10	.30	.30	2.50
.50	6.80	.20	.20	.20	3.70	1.10	0.00
.10	1.00	.20	3.60	0.00	2.20	.50	.10
.10	.90	.30	.10	.10	2.40	0.00	0.00
0.00	0.00	.20	0.00	.20	0.00	0.00	0.00
1.00	0.00						
ML08782	2.10	0.00	.60	0.00	.20	.10	.30
.50	0.00	2.70	0.00	1.70	0.00	0.00	.10
0.00	1.30	.60	.80	.10	0.00	1.40	2.00
.20	3.40	.10	3.20	2.60	.90	0.00	.80
0.00	1.40	.90	0.00	0.00	1.20	.40	.20
.80	.10	0.00	0.00	.20	.30	1.90	17.60
.80	.10	1.10	9.30	.50	1.60	0.00	0.00
.20	0.00	0.00	.40	0.00	.40	0.00	1.70
.40	0.00	.10	0.00	.50	2.50	1.70	0.00
.50	.60	.20	7.00	.10	.80	.50	.10
0.00	.90	.20	.20	.60	5.60	0.00	0.00
0.00	0.00	.40	0.00	0.00	0.00	0.00	0.00
8.00	0.00						
ML08783	2.20	0.00	.60	0.00	.10	0.00	.10
.50	0.00	3.70	0.00	1.80	.10	0.00	0.00
0.00	1.30	.20	.20	.20	0.00	1.30	2.00
.20	3.60	.30	3.10	2.30	.70	0.00	.60
0.00	2.00	1.70	0.00	0.00	1.60	.10	.10
.30	0.00	.10	0.00	.20	.70	2.20	20.10
.50	.20	1.20	7.60	.80	2.10	0.00	0.00
0.00	0.00	0.00	.30	.10	.50	.50	1.00
.50	8.10	.50	0.00	.30	2.80	1.30	0.00
.30	1.10	.30	6.00	0.00	1.00	.60	0.00
0.00	.60	.60	.50	.20	2.70	0.00	0.00
0.00	0.00	.10	0.00	.20	.10	0.00	0.00
.80	0.00						
ML08784	1.60	0.00	.50	0.00	.40	.10	.20
.60	.10	3.50	0.00	1.00	.10	.10	.10
0.00	1.90	.20	.90	.20	.10	2.00	3.10
.10	3.00	.30	3.50	1.90	.60	.20	.80
0.00	2.60	.90	0.00	0.00	.70	.40	.20
.40	.10	0.00	.10	.10	.40	1.10	20.30
.60	.10	.90	9.30	.40	2.30	0.00	0.00
.10	0.00	0.00	.10	.20	.50	.60	1.60
.10	6.50	.60	.10	.10	3.30	1.10	0.00
.10	1.00	.20	5.90	0.00	.40	.60	0.00
0.00	1.30	.50	.10	0.00	3.00	0.00	0.00
0.00	0.00	.10	0.00	.20	.10	0.00	0.00
.80	0.00						
ML08785	3.00	0.00	.60	0.00	.30	.20	.20
.20	0.00	3.10	0.00	1.40	.10	0.00	0.00
0.00	1.40	.30	.40	.20	0.00	1.30	2.10
.30	3.50	0.00	3.40	1.90	.70	0.00	.90
0.00	1.60	1.20	0.00	0.00	.90	.60	.10
.80	.10	0.00	.10	.20	.90	2.40	17.90
.80	.20	1.10	9.50	.90	1.60	0.00	0.00
.40	0.00	0.00	.20	.20	.70	.30	1.20
.30	6.50	.40	.10	.10	3.40	1.90	0.00
.50	.50	0.00	7.90	.10	1.50	.30	.10
0.00	.40	.10	.10	.30	2.80	0.00	0.00
0.00	0.00	.30	0.00	.20	0.00	0.00	0.00
.40	0.00						
ML08786	2.20	0.00	.60	0.00	.40	.30	.60
.50	0.00	4.10	0.00	1.20	0.00	0.00	0.00
0.00	1.10	.20	.10	.40	.20	1.20	2.10
.20	3.30	.20	3.10	1.70	.70	0.00	1.00
0.00	2.40	.30	0.00	0.00	.60	.60	.10
.10	.10	0.00	0.00	.20	.30	1.00	18.60
.40	.20	1.20	10.10	.80	3.20	0.00	0.00
.20	0.00	0.00	.10	.20	.50	.50	2.50
.20	6.00	.60	0.00	.10	2.00	1.30	0.00
.20	.70	.20	7.10	0.00	1.60	.30	0.00
0.00	.50	.50	.10	2.30	2.90	0.00	.10

0.00	0.00	.20	0.00	.20	.10	0.00	0.00
.30	0.00						
ML08787	2.30	0.00	.30	0.00	.20	.30	.40
.30	.30	4.30	0.00	1.20	.20	0.00	.20
0.00	1.00	.10	.40	.20	.20	1.50	1.90
.30	2.80	0.00	3.30	2.20	.30	0.00	.70
0.00	1.90	1.10	0.00	0.00	.80	1.00	.20
.70	0.00	.10	.10	.30	.70	1.90	17.40
.50	0.00	.70	9.90	.80	2.10	0.00	0.00
0.00	0.00	0.00	0.00	.20	.80	.70	2.80
.20	7.30	.40	0.00	.10	2.40	1.10	0.00
.30	.50	.20	5.60	0.00	1.40	.30	0.00
0.00	.50	.70	0.00	1.90	3.00	0.00	0.00
0.00	0.00	.30	0.00	.10	.10	0.00	0.00
1.50	0.00						
ML08788	2.30	0.00	.40	0.00	0.00	.10	.40
.50	.20	3.80	0.00	1.50	0.00	0.00	.10
0.00	1.10	.40	.10	.20	.10	.90	2.70
.10	3.10	.20	2.70	2.20	.70	.10	.40
0.00	1.30	1.00	0.00	0.00	1.10	.60	.10
.10	0.00	0.00	0.00	.20	.30	1.90	17.40
.40	.10	.70	8.90	.60	2.20	0.00	0.00
0.00	1.00	0.00	.20	.30	.70	.40	2.30
.20	7.60	.20	0.00	.40	3.50	1.50	0.00
.50	1.10	.10	7.70	.10	1.40	.40	0.00
0.00	.50	.60	.30	1.50	3.40	0.00	.10
.20	0.00	0.00	0.00	0.00	.20	0.00	0.00
.40	0.00						
ML08789	2.70	0.00	.70	0.00	.30	.10	.60
.10	.10	3.30	0.00	2.40	0.00	0.00	0.00
0.00	1.20	.10	.20	.40	0.00	1.40	2.70
.10	3.30	.30	2.90	2.20	.20	0.00	.20
0.00	1.60	1.70	0.00	0.00	1.30	.60	.30
.30	0.00	.10	0.00	.60	.70	2.30	17.70
.80	0.00	.40	9.10	.40	1.80	0.00	0.00
.10	0.00	0.00	.30	.30	.80	.60	2.30
.30	4.80	.20	0.00	.30	2.40	1.30	0.00
.20	.70	0.00	5.30	.10	2.20	.70	0.00
0.00	.80	1.40	.10	1.20	2.80	0.00	0.00
0.00	0.00	.10	0.00	.20	.20	0.00	0.00
2.10	0.00						
ML08790	2.50	0.00	.10	0.00	.40	.10	.10
.10	0.00	3.40	0.00	1.10	0.00	0.00	0.00
0.00	2.00	.40	0.00	.90	0.00	1.20	1.90
.10	3.80	0.00	4.30	1.90	.60	0.00	.60
0.00	.40	1.20	0.00	0.00	1.30	1.20	.10
.30	0.00	0.00	0.00	.60	.30	1.10	16.30
.40	.20	.70	7.30	.30	2.10	0.00	0.00
0.00	0.00	0.00	.10	.40	1.20	.30	2.20
.50	7.50	.20	0.00	.20	2.70	2.10	0.00
.60	.70	.20	6.30	0.00	2.10	.30	0.00
0.00	.60	0.00	.10	.80	4.10	0.00	0.00
0.00	0.00	0.00	0.00	.10	0.00	0.00	0.00
2.30	0.00						
ML08791	3.00	0.00	.30	0.00	.30	.10	.40
.40	0.00	2.10	.20	.60	0.00	0.00	0.00
0.00	.80	.30	.20	.70	.10	.60	2.10
.10	3.20	.30	4.20	1.80	.80	0.00	.40
.10	.40	1.50	0.00	0.00	1.50	1.00	.10
.10	0.00	0.00	.40	.60	.20	2.50	14.40
.40	.20	.60	7.30	.30	1.30	0.00	0.00
0.00	0.00	0.00	0.00	.20	.80	.40	2.80
.40	5.80	.60	0.00	.60	2.80	3.60	0.00
.20	1.00	.30	9.00	.20	1.70	.60	0.00
0.00	.70	.30	.70	.80	5.70	0.00	.10
.20	0.00	.10	0.00	.10	.10	0.00	0.00
.90	0.00						
ML08792	3.30	0.00	.30	0.00	.60	.10	.30
.30	0.00	3.40	0.00	1.30	0.00	.10	0.00
0.00	1.50	.60	.20	.20	0.00	1.10	1.60
.30	3.30	0.00	4.40	1.70	.30	0.00	.50
0.00	.40	1.30	0.00	0.00	1.50	.70	0.00
.40	0.00	0.00	0.00	.50	.50	2.60	17.00
.40	0.00	.50	7.70	.60	1.70	0.00	0.00
0.00	0.00	0.00	.10	.30	.80	.10	2.50
.50	6.30	.40	0.00	.20	2.20	3.10	0.00
.20	.20	0.00	6.80	.10	2.30	.80	.10
0.00	.90	.30	.60	.30	5.70	0.00	0.00
.20	0.00	.30	0.00	0.00	.10	0.00	0.00
.90	0.00						
ML08793	1.50	0.00	1.00	0.00	.10	0.00	.20
.20	.10	3.70	0.00	.60	0.00	0.00	0.00
0.00	2.00	.70	.20	.20	.10	1.00	2.10
.10	2.70	.30	3.20	1.20	.30	0.00	.70

0.00	.50	1.00	0.00	0.00	1.20	.50	.10
.10	0.00	0.00	0.00	.10	.30	1.80	17.00
.20	.10	.30	7.10	.80	1.30	0.00	0.00
.20	.20	0.00	0.00	.20	1.20	.80	3.60
.60	7.30	.10	0.00	.20	4.30	2.30	0.00
.20	1.00	.10	8.60	0.00	2.80	1.10	.10
0.00	.80	.20	.10	.20	4.60	0.00	0.00
0.00	0.00	.80	0.00	0.00	.20	0.00	0.00
1.00	0.00						
ML08794	1.90	0.00	.70	0.00	.70	0.00	.30
.30	0.00	2.90	0.00	2.40	0.00	0.00	.10
0.00	1.20	.70	.80	.40	0.00	1.00	1.80
.10	2.50	.20	3.50	2.40	1.40	0.00	.10
0.00	.80	1.50	0.00	0.00	.80	.80	.20
.20	0.00	0.00	.10	.70	.50	3.20	19.70
.90	.10	.40	6.30	.80	1.70	0.00	0.00
0.00	0.00	0.00	0.00	.30	1.00	.70	2.40
.50	4.30	.20	0.00	.50	4.00	1.80	0.00
.40	.70	.20	5.90	.10	1.40	.40	.20
0.00	1.00	.50	.20	1.20	3.70	0.00	0.00
.10	0.00	.70	0.00	.10	0.00	0.00	0.00
.80	0.00						
ML08795	2.90	0.00	.10	0.00	.20	.10	0.00
.20	0.00	2.70	.10	1.10	0.00	0.00	0.00
0.00	1.50	.20	.10	.20	0.00	.80	1.60
.10	3.30	.40	4.80	2.20	.50	0.00	.20
0.00	.20	1.50	0.00	0.00	1.30	.50	.40
.10	0.00	0.00	0.00	.50	.20	2.20	18.70
.20	.20	.80	6.20	.60	1.60	0.00	0.00
0.00	0.00	0.00	.40	.10	.50	.50	1.60
.50	5.80	.50	0.00	.90	4.40	2.90	0.00
.50	.50	.10	6.60	.10	1.80	.90	.10
0.00	1.50	.40	.20	1.10	4.40	0.00	0.00
0.00	0.00	.40	0.00	.20	.20	0.00	0.00
1.10	0.00						
ML08796	2.30	0.00	.50	0.00	.30	.10	.50
.50	.10	3.90	0.00	1.00	.10	0.00	0.00
0.00	2.20	.60	0.00	0.00	0.00	1.00	2.50
.10	3.00	.30	5.20	1.80	.60	.10	1.00
0.00	.30	1.00	0.00	0.00	.60	.10	.10
.10	0.00	0.00	.10	1.00	.30	1.10	18.00
.50	0.00	.60	6.10	1.10	2.00	0.00	0.00
.30	0.00	0.00	0.00	.50	1.50	.50	3.00
.30	6.10	.50	0.00	0.00	2.30	2.70	0.00
.50	.50	0.00	6.30	.10	1.50	.30	0.00
0.00	.60	.50	.50	.80	5.40	0.00	0.00
0.00	0.00	.50	0.00	0.00	.10	0.00	0.00
1.00	0.00						
ML08797	2.80	0.00	.40	0.00	.10	.40	.10
.70	.10	2.90	0.00	1.10	0.00	0.00	.10
0.00	1.10	.20	0.00	.20	0.00	1.00	1.60
.10	2.30	.40	3.40	1.30	.80	0.00	1.00
0.00	.50	.80	0.00	0.00	.20	.40	.50
0.00	0.00	0.00	0.00	.10	.20	2.60	18.20
.70	.10	.70	6.50	.70	1.70	0.00	0.00
0.00	0.00	0.00	.10	.40	1.40	.80	2.20
.40	5.30	.40	0.00	.10	4.60	2.00	0.00
.50	1.00	0.00	7.10	0.00	2.80	0.00	0.00
0.00	.70	1.30	.20	.80	6.20	0.00	0.00
0.00	0.00	.50	0.00	0.00	0.00	0.00	0.00
1.00	0.00						
ML08798	3.20	0.00	.20	0.00	.40	.30	.40
.40	0.00	2.90	0.00	1.00	0.00	0.00	.10
0.00	2.00	.50	.20	.20	0.00	.70	1.30
.20	2.80	.20	3.40	1.30	.30	0.00	.60
0.00	.40	1.20	0.00	0.00	.90	.90	.20
.40	0.00	0.00	.10	.20	.20	1.90	14.90
.50	.10	.20	6.00	.70	1.70	0.00	0.00
.10	0.00	0.00	.10	.40	1.00	.60	2.60
.50	7.70	.50	0.00	.30	4.30	3.00	0.00
.30	1.00	.10	7.40	.10	3.90	.10	0.00
0.00	1.20	.70	.60	.80	5.30	0.00	0.00
.10	0.00	.20	0.00	.20	.30	0.00	0.00
.60	0.00						
ML08799	2.70	0.00	.30	0.00	.60	.20	.30
0.00	.10	2.50	.20	.70	0.00	0.00	0.00
0.00	2.20	.80	.50	0.00	.10	.70	2.00
.30	3.30	.20	2.50	1.50	.60	0.00	.80
0.00	1.10	1.50	.10	0.00	.20	.20	0.00
.10	0.00	0.00	0.00	.20	.50	2.20	16.60
.70	0.00	.10	5.30	.30	1.60	0.00	0.00
0.00	0.00	0.00	0.00	.20	1.10	.30	3.10
.70	8.10	.10	0.00	.30	3.00	3.10	0.00
.20	1.00	.20	8.30	.10	2.60	.50	.50

0.00	.80	.70	.30	.50	6.20	0.00	0.00
.10	0.00	.10	0.00	.10	.10	0.00	0.00
1.50	0.00						
ML08800	2.10	0.00	.30	0.00	.20	0.00	.20
.10	0.00	4.00	0.00	.80	0.00	0.00	0.00
0.00	2.1[illegible]	.20	.50	.20	0.00	.80	1.80
.10	2.6[illegible]	.20	3.20	.80	.30	.10	.70
0.00	1.00	.50	0.00	0.00	1.30	.50	.20
.10	0.0[illegible]	0.00	.10	.60	0.00	1.70	21.00
.20	0.0[illegible]	.30	6.10	.30	1.60	0.00	0.00
0.00	0.0[illegible]	0.00	0.00	.20	1.20	.20	4.60
.60	6.80	.50	0.00	.50	4.50	2.30	0.00
.10	.60	.10	5.50	.20	2.60	.80	.20
0.00	1.30	.20	.30	.30	6.00	0.00	0.00
.10	0.00	.20	0.00	0.00	0.00	0.00	0.00
.80	0.00						
ML08801	3.00	0.00	.60	0.00	.90	.30	.30
.40	.10	4.20	.10	1.00	0.00	0.00	.10
0.00	2.20	.40	.20	.10	.10	.40	1.70
.40	3.20	0.00	4.10	1.00	.60	0.00	.90
0.00	1.60	1.30	0.00	0.00	1.30	.90	.10
.20	0.00	0.00	.10	0.00	.10	1.60	20.30
.50	.20	.80	6.60	.60	2.20	0.00	0.00
.10	0.00	0.00	0.00	.20	.60	.30	2.90
.90	6.00	.30	0.00	.10	1.70	1.70	0.00
.50	.60	0.00	3.50	0.00	2.20	.10	.20
0.00	.90	.60	.30	.60	6.10	0.00	0.00
.10	0.00	.40	0.00	.20	0.00	0.00	0.00
1.30	0.00						
ML08802	2.40	.10	.20	0.00	.20	.10	.10
.30	.20	3.50	0.00	.80	0.00	0.00	0.00
0.00	1.50	.50	.20	0.00	0.00	1.60	2.10
.20	3.90	.20	3.30	1.20	.50	0.00	.70
0.00	1.20	1.50	0.00	0.00	1.30	.30	0.00
.10	0.00	0.00	.10	.30	.20	1.90	17.10
.50	.10	.50	5.00	.20	1.50	0.00	0.00
.10	0.00	0.00	.10	.20	1.60	.30	3.30
.20	6.30	0.00	0.00	.60	3.00	3.10	0.00
.30	.60	.10	5.40	.20	2.60	1.10	.30
0.00	.80	.20	.30	.30	7.60	0.00	0.00
.10	0.00	.70	0.00	.10	.20	0.00	0.00
1.30	0.00						
ML08803	2.00	0.00	.50	0.00	.60	.10	.10
.20	.50	3.80	0.00	1.20	0.00	0.00	0.00
0.00	.60	.30	.20	.10	0.00	1.50	2.00
.10	1.50	.20	3.30	1.20	.90	.10	1.40
.10	1.00	1.40	0.00	0.00	1.40	.30	0.00
.30	0.00	0.00	.10	.10	1.00	1.90	22.00
.50	.10	.70	5.10	1.10	2.40	0.00	0.00
.10	0.00	0.00	.10	.50	1.60	.50	3.10
.30	5.80	.30	.10	.20	3.40	2.40	0.00
.30	.50	.20	4.50	.20	1.00	.20	0.00
0.00	1.60	.20	.20	.20	6.20	0.00	0.00
.10	0.00	.30	.10	.20	.20	0.00	0.00
.60	0.00						
ML08804	1.20	0.00	.50	0.00	.20	.10	.10
.10	.1[illegible]	3.20	.30	1.00	0.00	0.00	0.00
0.00	1.5[illegible]	.20	0.00	.30	0.00	1.90	1.70
.10	3.6[illegible]	.10	2.90	1.50	1.40	0.00	1.10
0.00	1.4[illegible]	.50	0.00	0.00	.50	.60	.10
.10	0.00	0.00	0.00	.30	.90	1.50	20.30
.60	.60	.50	5.50	.60	2.10	0.00	0.00
.30	0.00	0.00	.10	.20	.90	.50	2.80
.40	5.80	.30	0.00	.30	3.90	2.00	0.00
.20	1.00	.10	7.00	.10	2.90	.60	.10
0.00	.60	.70	0.00	.50	5.60	0.00	0.00
0.00	0.00	.10	0.00	0.00	0.00	0.00	0.00
.70	0.00						
ML08805	1.20	0.00	.30	.10	.40	.10	.10
.40	.10	2.00	0.00	.30	0.00	0.00	0.00
0.00	1.10	.10	.10	.30	0.00	1.20	1.40
0.00	2.40	.60	1.20	.90	.90	0.00	0.00
0.00	.40	.60	0.00	0.00	2.40	.60	.10
.30	0.00	0.00	0.00	.60	.30	2.80	19.40
0.00	.30	0.00	3.70	1.40	.60	0.00	0.00
.10	0.00	0.00	0.00	.10	.80	.30	3.50
.90	7.40	.40	0.00	.80	3.50	1.60	0.00
.30	.90	0.00	7.50	0.00	3.70	0.00	.30
.60	.90	.30	0.00	.10	3.20	0.00	1.90
.90	0.00	0.00	0.00	.10	.10	0.00	.30
7.80	0.00						
ML08806	1.20	0.00	.40	.10	.60	.90	.20
.50	.20	3.00	0.00	0.00	0.00	.10	0.00
0.00	1.80	.10	.10	.30	0.00	1.30	2.70

0.00	2.20	.20	1.20	1.10	.60	0.00	.10
0.00	.40	0.00	.10	0.00	2.00	0.00	0.00
0.00	0.00	0.00	.10	.20	0.00	1.90	18.60
0.00	.20	.10	6.10	0.00	.80	.10	0.00
0.00	0.00	0.00	.10	.20	0.00	.40	2.90
1.30	9.30	.80	0.00	1.50	3.40	2.70	0.00
.20	1.20	.10	3.70	0.00	1.10	0.00	.10
.40	.50	.40	.40	1.50	5.00	.10	1.30
.50	0.00	0.00	0.00	.40	0.00	0.00	0.00
7.30	0.00						
ML08807	1.90	0.00	.90	0.00	.40	0.00	.30
1.10	0.00	2.60	0.00	.10	0.00	0.00	0.00
.30	.70	.10	0.00	.10	0.00	1.90	1.20
0.00	3.30	.10	1.90	1.40	.30	0.00	0.00
0.00	.10	.30	0.00	0.00	1.50	.30	0.00
0.00	0.00	.10	0.00	.30	.10	2.50	20.40
0.00	.10	.30	3.40	1.20	.70	0.00	0.00
0.00	0.00	0.00	.10	.40	.30	.10	2.80
.60	5.00	.40	0.00	.10	4.70	2.30	0.00
.70	.90	0.00	9.10	.10	1.90	0.00	0.00
.10	.30	.10	0.00	2.20	5.20	0.00	1.40
.10	0.00	.60	0.00	.10	.10	0.00	.70
6.80	0.00						
ML08808	1.40	0.00	.70	.50	.10	.10	.40
0.00	0.00	1.90	0.00	.10	0.00	0.00	0.00
.10	1.70	.50	0.00	0.00	0.00	.70	.50
0.00	1.70	.10	1.40	.70	.10	0.00	0.00
0.00	0.00	.10	0.00	0.00	1.30	.80	0.00
0.00	0.00	0.00	.10	.20	.20	1.60	14.40
0.00	.10	0.00	6.20	.50	.20	0.00	0.00
0.00	0.00	0.00	.20	.10	.10	.10	4.10
1.10	7.30	.70	0.00	1.10	2.90	3.40	0.00
.20	.50	0.00	11.30	0.00	3.20	0.00	.20
.40	1.00	0.00	0.00	.50	6.80	.20	2.90
.70	0.00	0.00	0.00	.50	.10	0.00	.70
7.40	0.00						
ML08809	1.70	0.00	.70	0.00	.70	0.00	.30
.60	0.00	3.30	0.00	.40	0.00	0.00	0.00
.30	.90	.30	.10	.30	.30	1.20	1.10
0.00	2.30	.40	2.00	2.00	.30	0.00	0.00
0.00	.30	.40	0.00	0.00	1.70	0.00	0.00
.10	0.00	0.00	0.00	.30	0.00	.70	19.60
0.00	.10	.10	2.50	1.40	.90	0.00	0.00
.10	0.00	0.00	0.00	0.00	.10	.90	2.60
1.10	3.90	.40	0.00	.30	4.50	1.70	0.00
.10	.90	0.00	9.90	.30	1.40	.10	.30
.10	.30	.30	.30	.40	6.10	0.00	2.50
.90	0.00	.10	0.00	.40	0.00	0.00	1.40
8.50	0.00						
ML08810	1.80	0.00	.50	.40	.70	0.00	.20
.70	.20	4.10	0.00	.50	0.00	0.00	0.00
.10	1.90	.70	0.00	.20	0.00	.30	2.10
.10	2.70	.50	1.20	1.10	.90	0.00	0.00
0.00	.40	.40	0.00	0.00	1.50	0.00	0.00
.20	0.00	0.00	0.00	0.00	.10	1.50	15.50
.40	.40	.40	5.90	1.50	.70	0.00	0.00
.10	0.00	.10	.10	.20	.10	.20	2.90
1.20	4.10	.70	.20	.50	2.90	1.80	0.00
.20	1.70	0.00	7.50	0.00	2.10	0.00	0.00
.10	.20	.10	.10	.90	7.80	0.00	1.80
1.10	0.00	0.00	0.00	.10	0.00	0.00	.10
7.50	0.00						
ML08811	1.10	0.00	1.10	0.00	.50	.20	.20
.50	.20	5.60	0.00	0.00	0.00	0.00	0.00
.20	1.40	0.00	0.00	.50	0.00	.80	1.70
0.00	1.10	.20	2.00	.80	.20	0.00	0.00
0.00	.80	.80	0.00	0.00	.80	.20	0.00
0.00	0.00	0.00	0.00	.20	0.00	2.30	19.80
0.00	0.00	.20	2.90	.80	.80	0.00	0.00
.20	0.00	0.00	.50	.50	0.00	.80	3.50
.80	4.40	.50	0.00	1.10	5.30	1.40	0.00
.20	1.40	0.00	6.80	0.00	.80	0.00	0.00
0.00	.50	.80	0.00	1.40	7.90	0.00	2.60
1.70	0.00	0.00	0.00	.80	0.00	0.00	0.00
4.10	0.00						
ML08812	1.70	0.00	.90	.70	0.00	0.00	.20
.70	.20	1.40	.20	.40	.20	0.00	0.00
.20	1.90	0.00	0.00	0.00	0.00	1.20	1.40
0.00	1.70	0.00	.90	.20	0.00	0.00	0.00
0.00	.40	0.00	0.00	0.00	1.40	0.00	0.00
.40	0.00	0.00	0.00	0.00	0.00	2.60	16.50
.20	.20	.40	3.10	.90	.40	0.00	0.00
.40	0.00	0.00	0.00	.20	.40	.40	3.80
.70	7.50	.40	0.00	1.40	3.60	1.70	0.00

0.00	.70	0.00	5.50	.70	4.30	0.00	0.00
0.00	.70	.20	.40	.20	9.20	.20	2.60
.90	0.00	0.00	0.00	0.00	.40	0.00	.90
9.00	0.00						
ML08813	3.10	0.00	.40	0.00	.80	.30	.10
.60	.40	3.10	0.00	.10	0.00	0.00	0.00
.10	.80	0.00	0.00	.10	0.00	1.10	.80
0.00	1.80	.30	2.10	.90	0.00	0.00	0.00
0.00	.30	1.80	0.00	0.00	.90	.30	0.00
0.00	0.00	0.00	0.00	0.00	.30	2.80	20.60
.10	0.00	0.00	2.90	.90	.90	.10	0.00
0.00	0.00	0.00	.10	.30	.40	.80	4.30
.60	4.30	.10	.10	.40	4.30	4.10	0.00
.30	1.30	0.00	6.90	0.00	1.80	0.00	.30
.10	.40	.40	0.00	1.30	5.40	0.00	2.40
.30	0.00	.30	0.00	.30	0.00	0.00	1.30
5.60	0.00						
ML08814	2.50	0.00	.20	0.00	.20	.10	.10
.10	.20	3.50	0.00	2.20	0.00	0.00	0.00
0.00	1.20	.10	0.00	.20	0.00	1.60	1.40
.10	2.80	0.00	2.10	2.10	1.50	.10	.10
0.00	.10	1.60	0.00	0.00	1.60	.70	.10
.20	0.00	0.00	.10	.20	.40	1.50	21.20
.10	.20	.20	4.20	.20	2.10	0.00	0.00
0.00	0.00	0.00	.10	.10	.50	.50	2.20
.40	.50	1.10	0.00	0.00	3.30	4.30	0.00
.50	.70	0.00	7.20	0.00	2.10	.50	.20
0.00	.70	1.40	.20	.70	6.30	0.00	0.00
0.00	0.00	.10	0.00	0.00	.40	0.00	0.00
6.30	0.00						
ML08815	1.10	0.00	.50	0.00	1.30	0.00	0.00
1.10	0.00	4.00	0.00	.10	0.00	0.00	0.00
0.00	2.30	0.00	.10	.50	0.00	2.30	.90
0.00	.50	.30	2.10	.90	.10	0.00	0.00
0.00	.50	2.30	0.00	0.00	1.10	1.10	0.00
.30	0.00	0.00	0.00	.10	.10	1.30	18.70
.10	0.00	0.00	3.40	.50	.30	0.00	0.00
0.00	0.00	0.00	.10	.30	.50	.30	3.40
0.00	8.50	1.10	0.00	1.10	3.20	2.70	0.00
.70	.10	0.00	6.30	0.00	1.90	0.00	.50
.10	.30	0.00	.30	.70	5.00	.10	1.90
.70	0.00	0.00	0.00	.10	.10	0.00	.50
7.50	0.00						
ML08816	1.20	0.00	.60	0.00	.10	.60	.30
.10	.10	4.00	0.00	0.00	.10	0.00	.10
.60	1.40	0.00	0.00	.10	0.00	2.20	1.10
0.00	.40	.30	2.70	1.20	.40	0.00	0.00
0.00	.90	.10	0.00	0.00	1.10	.30	0.00
.40	0.00	0.00	0.00	0.00	0.00	2.10	11.60
.10	.10	0.00	3.40	1.10	0.00	0.00	0.00
0.00	0.00	0.00	0.00	.10	.80	.40	3.50
1.20	7.40	.30	.30	1.60	3.20	3.00	0.00
.10	1.20	0.00	5.50	0.00	3.20	0.00	0.00
.30	1.40	.40	.30	.60	8.40	0.00	2.70
1.90	0.00	.60	0.00	.60	.10	0.00	.60
8.40	0.00						
ML08817	.40	0.00	.40	0.00	.60	.10	.10
.40	.30	3.00	0.00	.40	0.00	0.00	0.00
0.00	1.90	0.00	.30	.30	0.00	4.00	1.10
0.00	1.10	.10	1.70	.80	.30	0.00	0.00
0.00	.30	.60	0.00	0.00	1.10	.80	.10
.40	0.00	0.00	0.00	.10	.10	1.90	15.80
.40	0.00	.10	4.00	1.10	.40	0.00	0.00
.10	0.00	0.00	.10	.90	1.40	.40	2.00
.40	8.30	.40	0.00	.80	4.90	3.60	0.00
.10	.90	0.00	5.20	0.00	2.20	.10	.30
.10	1.10	.40	.10	1.90	6.50	0.00	1.40
.90	0.00	0.00	0.00	.40	.40	0.00	.90
5.90	0.00						
ML08818	1.60	0.00	.80	0.00	1.30	.60	.10
.60	.30	3.90	.30	.30	0.00	0.00	0.00
.30	1.10	.30	0.00	.10	0.00	2.80	1.60
0.00	3.10	.40	1.90	.90	.40	0.00	0.00
0.00	.10	.10	0.00	0.00	.80	0.00	0.00
.40	0.00	0.00	0.00	.10	.30	1.90	19.60
.10	.10	.10	3.70	1.40	.60	0.00	0.00
.10	0.00	0.00	.10	0.00	.80	.10	2.90
.80	4.40	.60	.10	.40	3.20	2.90	0.00
.60	1.30	0.00	4.90	0.00	2.10	0.00	.30
.10	.90	.30	.30	1.30	4.90	0.00	1.40
.40	0.00	.40	0.00	.10	.30	0.00	.90
7.50	0.00						
ML08819	1.70	0.00	.20	0.00	.60	.40	.40
.40	.20	2.10	0.00	.20	0.00	0.00	0.00

0.00	1.50	.20	0.00	.40	0.00	4.00	1.50
0.00	1.90	0.00	1.50	1.20	.20	0.00	0.00
0.00	.60	.40	0.00	0.00	1.00	.40	0.00
.60	0.00	0.00	0.00	.20	0.00	.60	14.60
.20	0.00	.20	1.50	1.00	.40	0.00	0.00
.40	0.00	0.00	.20	.20	1.70	0.00	4.00
.60	10.30	.60	.20	1.20	4.70	2.30	0.00
.40	1.20	0.00	4.90	0.00	2.50	0.00	.60
.40	.80	1.00	.40	1.00	4.70	0.00	2.10
2.10	0.00	0.00	0.00	.40	0.00	0.00	.60
7.70	0.00						
ML08820	1.70	0.00	.30	0.00	0.00	.10	.10
.30	0.00	6.70	.10	.50	.30	0.00	.30
0.00	1.40	.10	0.00	.10	0.00	3.00	1.70
0.00	1.70	0.00	1.70	.80	.70	0.00	0.00
0.00	1.20	.50	0.00	0.00	.80	.10	0.00
.30	0.00	0.00	0.00	0.00	.30	2.10	18.50
0.00	.70	0.00	3.90	.50	.80	0.00	0.00
0.00	0.00	0.00	.30	.30	1.00	.80	2.60
1.60	7.40	.80	0.00	.80	3.00	.80	0.00
.50	1.60	0.00	3.50	0.00	1.40	0.00	.10
1.20	1.60	1.20	.10	1.40	5.10	0.00	1.00
1.00	0.00	.30	0.00	.30	.50	0.00	.10
4.90	0.00						
ML08821	.30	0.00	.30	0.00	.50	1.10	.10
.30	.50	8.60	0.00	.30	.50	.10	0.00
0.00	.70	0.00	0.00	0.00	0.00	9.20	3.70
0.00	.50	0.00	1.30	1.30	1.30	0.00	0.00
0.00	1.90	0.00	0.00	0.00	.70	.90	0.00
.30	0.00	0.00	0.00	0.00	0.00	1.90	15.30
.70	.30	.90	6.40	.70	2.90	0.00	0.00
.30	0.00	0.00	1.50	.10	.50	.50	.90
0.00	3.70	2.30	0.00	.10	2.50	1.30	0.00
.10	1.90	0.00	2.90	0.00	.50	0.00	.10
.70	.50	.70	0.00	.30	3.10	.30	.30
.30	0.00	0.00	0.00	.10	0.00	0.00	.50
5.90	0.00						
ML08822	2.60	0.00	1.50	0.00	0.00	1.50	0.00
0.00	0.00	4.10	0.00	0.00	0.00	0.00	0.00
0.00	.50	0.00	0.00	.50	0.00	6.20	3.60
0.00	1.50	0.00	2.00	2.60	.50	0.00	0.00
0.00	2.60	.50	0.00	0.00	1.50	0.00	0.00
0.00	0.00	0.00	0.00	0.00	1.00	3.10	18.80
0.00	.50	0.00	8.30	1.50	2.60	.50	0.00
.50	0.00	0.00	0.00	0.00	1.00	0.00	2.60
0.00	2.00	.50	0.00	1.00	1.00	2.60	0.00
0.00	2.00	0.00	2.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	1.50	.50	0.00	.50
.50	0.00	0.00	0.00	.50	1.00	0.00	0.00
10.40	0.00						
ML08823	1.10	0.00	.70	0.00	.10	.10	.10
.50	.10	4.50	.50	.70	1.00	0.00	0.00
0.00	.50	0.00	.10	.30	0.00	3.00	1.80
0.00	1.50	0.00	3.20	1.30	.50	0.00	0.00
0.00	1.50	.50	0.00	0.00	1.10	.30	0.00
.10	0.00	0.00	0.00	.30	.10	2.40	23.40
.10	.10	.10	3.70	1.30	1.70	0.00	0.00
.30	0.00	0.00	.30	.50	1.10	.30	2.80
0.00	4.30	.50	0.00	.50	2.20	3.00	0.00
1.10	1.80	0.00	2.00	.10	.70	0.00	0.00
.90	.70	.50	0.00	.90	5.20	.10	.90
.70	0.00	0.00	0.00	.30	.10	0.00	.30
6.90	0.00						
ML08824	1.30	0.00	.60	0.00	0.00	.10	.60
.60	.30	5.00	0.00	1.10	.10	0.00	0.00
0.00	2.30	0.00	0.00	.80	0.00	4.00	2.50
0.00	1.60	0.00	1.00	2.00	1.30	0.00	0.00
0.00	1.10	.50	0.00	0.00	1.00	.30	0.00
0.00	0.00	0.00	0.00	.10	.50	2.50	17.40
0.00	.30	0.00	8.00	.80	.30	0.00	0.00
.30	0.00	0.00	.30	.60	1.50	.80	1.30
.80	5.50	.80	.10	.10	3.00	1.50	0.00
1.00	2.00	0.00	2.50	0.00	1.60	0.00	0.00
.80	1.30	.30	0.00	1.10	3.60	.10	1.00
.50	0.00	0.00	0.00	.50	.10	0.00	.30
6.30	0.00						
ML08825	1.30	0.00	.80	.30	.60	0.00	.50
1.00	1.10	3.40	0.00	.80	.30	0.00	0.00
0.00	1.50	.30	0.00	.30	.10	2.80	1.30
0.00	1.10	0.00	1.30	.60	.80	0.00	0.00
0.00	1.70	2.00	0.00	0.00	1.10	1.10	0.00
0.00	0.00	.10	0.00	.30	.10	3.00	19.70
0.00	.30	.10	6.20	1.30	.80	0.00	0.00
0.00	0.00	0.00	.30	.50	1.80	.80	2.50

.30	4.40	.80	0.00	.60	2.80	2.20	0.00
.80	1.70	.10	2.20	0.00	1.00	.10	.50
.50	.50	.30	.30	1.50	3.50	.30	.80
1.00	0.00	0.00	0.00	.50	0.00	0.00	.60
5.70	0.00						
ML0 8826	1.30	0.00	1.50	0.00	1.10	0.00	0.00
.30	.30	7.30	0.00	.30	.10	0.00	0.00
0.00	1.10	.10	.30	.10	0.00	5.40	2.40
0.00	.70	0.00	1.50	.90	1.10	0.00	0.00
0.00	2.00	.50	0.00	0.00	.90	.10	0.00
0.00	0.00	0.00	.10	.30	.10	2.40	21.90
0.00	0.00	.10	8.20	.50	1.10	0.00	0.00
.10	0.00	0.00	.30	.10	.50	.50	1.60
.10	6.10	1.10	0.00	.70	3.10	2.40	0.00
.30	1.30	0.00	3.10	.50	1.10	0.00	.10
.50	.10	.50	0.00	3.70	1.30	0.00	.50
.50	0.00	0.00	0.00	.70	0.00	0.00	0.00
1.80	0.00						
ML0 8827	1.30	0.00	.90	0.00	.30	.60	.10
.80	.10	6.70	0.00	.60	.30	0.00	0.00
0.00	1.80	.10	0.00	.40	0.00	5.40	.90
0.00	1.30	.10	1.40	1.90	.60	0.00	0.00
0.00	1.30	.30	0.00	0.00	.40	.60	0.00
.10	0.00	0.00	0.00	.10	.10	2.60	18.40
.30	.10	0.00	5.00	1.60	.80	0.00	0.00
.80	0.00	.10	1.60	0.00	.60	.30	2.10
.40	5.20	.90	.30	.30	2.70	2.60	0.00
.10	1.30	0.00	2.60	.10	1.40	0.00	.40
.10	.30	.80	0.00	4.90	1.40	0.00	.40
.80	.10	.10	0.00	.40	.10	0.00	.30
5.70	0.00						
ML0 8828	.60	0.00	.80	0.00	.40	.60	.30
.30	.80	3.70	.10	1.40	.30	0.00	.10
.10	.60	.10	0.00	.30	0.00	3.70	1.60
0.00	.80	.10	1.20	1.10	.60	0.00	0.00
0.00	1.10	.60	0.00	0.00	.90	.30	0.00
.30	0.00	0.00	0.00	.40	.30	2.40	17.40
.10	.40	.40	6.20	1.10	.40	0.00	0.00
.30	0.00	0.00	.80	.30	1.20	1.20	2.50
.30	6.10	1.10	.10	.80	2.00	3.00	0.00
.10	1.20	0.00	5.90	0.00	.90	0.00	0.00
.10	.40	.80	0.00	2.20	2.40	0.00	.40
1.60	0.00	0.00	0.00	.80	0.00	0.00	.30
8.30	0.00						
ML0 8829	.90	0.00	.40	0.00	0.00	0.00	.20
0.00	.40	4.60	.20	1.40	.20	0.00	0.00
0.00	1.70	0.00	.20	.20	0.00	5.80	1.40
0.00	1.40	.20	1.20	.90	.70	0.00	0.00
0.00	1.20	.40	0.00	0.00	.90	.70	0.00
0.00	0.00	0.00	0.00	.70	.70	1.40	21.10
0.00	.70	.40	5.10	.20	.20	0.00	0.00
.20	.20	0.00	.40	.70	.70	.40	1.90
.40	8.50	.40	0.00	0.00	3.40	1.90	0.00
1.90	1.90	0.00	2.60	0.00	1.70	0.00	.70
.40	1.20	.40	0.00	2.10	1.20	.20	.40
.90	0.00	.70	0.00	.20	.20	0.00	.20
5.30	0.00						
ML0 8830	1.30	0.00	.50	0.00	.80	.50	.80
.50	0.00	4.30	0.00	.50	.30	0.00	0.00
.10	.50	.50	0.00	.50	0.00	4.50	2.20
0.00	.60	.30	1.90	1.20	.10	0.00	0.00
0.00	1.90	.30	0.00	0.00	.50	.30	0.00
.10	0.00	0.00	0.00	.10	.30	2.40	22.90
.60	.60	0.00	5.70	1.30	.60	0.00	0.00
.30	0.00	0.00	.50	.30	1.70	.10	1.90
.60	5.20	.50	.10	1.50	2.60	2.40	0.00
1.20	1.20	0.00	3.80	.10	1.20	0.00	.30
.10	.60	.50	0.00	1.90	1.30	0.00	.30
.60	0.00	0.00	0.00	.10	.50	0.00	.30
5.40	0.00						
ML0 8831	1.80	0.00	.30	0.00	.40	0.00	.10
.60	.40	6.80	0.00	.10	.30	0.00	.10
0.00	.60	.30	.30	.40	.10	3.40	1.00
0.00	.30	.10	1.80	1.80	1.20	0.00	0.00
0.00	1.20	1.70	0.00	0.00	.70	.60	.10
0.00	0.00	0.00	0.00	.30	.10	2.00	21.50
.30	.40	0.00	4.00	.60	1.40	0.00	0.00
.10	0.00	0.00	1.40	.40	.70	.30	1.20
.10	4.20	1.40	0.00	.70	2.60	2.80	0.00
.60	2.10	0.00	5.30	0.00	.70	0.00	.90
.10	.70	.90	0.00	2.30	2.50	0.00	.60
.90	0.00	.30	0.00	.40	.10	0.00	.10
5.40	0.00						
ML0 8832	1.60	0.00	.50	0.00	1.60	1.60	0.00

.50	.50	4.90	0.00	1.60	0.00	0.00	0.00
0.00	1.60	0.00	0.00	0.00	0.00	1.10	3.30
0.00	1.10	.50	1.60	2.70	1.10	0.00	0.00
0.00	1.10	1.10	0.00	0.00	1.10	.50	0.00
1.10	0.00	0.00	0.00	0.00	.50	3.30	12.10
.50	.50	.50	4.40	1.10	3.80	0.00	0.00
0.00	0.00	0.00	1.10	0.00	0.00	1.60	2.20
1.10	3.30	1.10	0.00	0.00	3.30	1.60	0.00
1.10	.50	0.00	4.90	0.00	.50	0.00	0.00
0.00	0.00	2.70	0.00	1.10	1.60	.50	0.00
1.60	0.00	0.00	0.00	1.60	0.00	0.00	.50
8.80	0.00						
ML08833	2.10	0.00	0.00	0.00	0.00	.80	.40
0.00	0.00	4.80	0.00	2.10	0.00	0.00	.40
0.00	1.70	0.00	0.00	.40	.40	3.40	1.70
0.00	0.00	0.00	1.30	2.10	1.70	0.00	0.00
0.00	0.00	.80	0.00	0.00	.80	0.00	0.00
0.00	0.00	0.00	0.00	.80	.40	2.10	15.20
0.00	.40	0.00	4.30	.40	1.70	0.00	0.00
0.00	0.00	0.00	0.00	.40	.80	.40	2.10
.40	5.60	2.10	.40	2.10	2.10	3.00	0.00
0.00	5.60	0.00	4.30	0.00	1.30	0.00	0.00
.40	.40	1.70	.40	3.00	2.10	0.00	.40
0.00	0.00	0.00	0.00	.40	.40	0.00	0.00
7.40	0.00						
ML08834	1.90	0.00	.40	0.00	.40	.40	.40
.40	.80	4.70	0.00	1.20	0.00	0.00	0.00
0.00	.80	0.00	0.00	.20	0.00	3.40	2.50
0.00	.60	0.00	.40	4.00	.80	0.00	0.00
0.00	2.10	.80	0.00	0.00	.80	0.00	0.00
0.00	0.00	0.00	0.00	.40	.20	2.30	19.20
.20	0.00	0.00	7.90	.60	3.80	0.00	0.00
0.00	0.00	0.00	.60	0.00	0.00	.40	1.20
0.00	3.60	.60	0.00	.60	1.20	.40	0.00
.20	2.50	0.00	7.40	.40	1.00	0.00	.20
.20	.40	0.00	0.00	.80	2.90	.60	.20
.40	0.00	0.00	0.00	.40	0.00	0.00	.80
9.40	0.00						
ML08835	.70	0.00	.70	0.00	.70	.70	.20
.50	.50	3.20	.20	1.50	0.00	0.00	.50
0.00	1.50	0.00	0.00	0.00	0.00	3.20	1.50
0.00	.20	.20	1.00	3.50	3.50	0.00	0.00
0.00	2.20	1.20	0.00	0.00	1.00	.20	0.00
0.00	0.00	0.00	.20	.70	0.00	2.50	18.10
0.00	.20	0.00	7.50	.20	3.00	0.00	0.00
.20	0.00	0.00	.50	.50	1.20	0.00	2.50
1.50	2.70	.50	.50	1.20	1.50	1.70	0.00
.20	1.20	0.00	3.50	0.00	1.20	0.00	.20
0.00	.70	.20	.20	1.20	3.00	.20	.70
.20	0.00	0.00	0.00	1.20	.20	0.00	.50
7.50	0.00						
ML08836	1.60	0.00	.30	0.00	.80	.10	.10
.10	1.10	3.70	0.00	1.40	0.00	0.00	.30
0.00	1.90	0.00	.10	0.00	0.00	5.30	.80
0.00	.80	.10	1.10	3.40	1.10	0.00	0.00
0.00	2.50	.10	0.00	0.00	.60	.40	0.00
.60	0.00	.10	0.00	.10	.40	3.40	13.40
.40	.10	.30	9.50	.30	1.90	0.00	0.00
.40	0.00	0.00	1.10	.30	2.20	.40	1.20
.40	4.70	.60	.60	.40	3.40	3.50	0.00
0.00	1.10	.10	2.90	.30	.60	0.00	.10
.10	1.20	.10	.10	.60	2.70	.10	.60
.80	0.00	0.00	0.00	.30	.30	0.00	.30
7.10	0.00						
ML08837	1.30	0.00	.10	.10	.10	.50	0.00
.30	.80	2.50	.10	.80	.10	0.00	0.00
0.00	1.50	0.00	0.00	.10	0.00	4.50	2.00
0.00	1.60	0.00	1.80	3.60	1.80	0.00	0.00
0.00	4.60	.50	0.00	0.00	.10	.50	0.00
.50	.10	.10	0.00	0.00	.50	4.00	14.30
0.00	.10	.50	6.60	.10	.50	0.00	0.00
.50	0.00	0.00	2.00	.80	.60	1.30	1.60
.30	6.50	.30	1.30	.60	2.50	2.60	0.00
.60	1.10	.30	2.80	.30	.10	0.00	0.00
1.00	.50	0.00	.30	.60	2.30	.60	1.00
1.60	0.00	0.00	0.00	.60	.80	0.00	.10
5.30	0.00						
ML08838	.90	.10	.30	0.00	.60	.10	.10
.30	.60	3.10	.10	1.10	.10	0.00	0.00
0.00	.60	.10	0.00	.30	0.00	5.70	1.40
0.00	.90	0.00	2.10	6.00	1.90	0.00	0.00
0.00	3.10	1.10	0.00	0.00	.30	.60	0.00
.30	0.00	.10	0.00	.10	.60	2.40	20.40
0.00	.40	.40	8.00	.10	.90	0.00	0.00

0.00	.10	0.00	1.40	.80	1.10	.60	.80
.30	3.70	1.10	.40	.80	2.60	2.60	0.00
.30	.90	0.00	2.70	.10	.30	0.00	.10
.80	.10	.10	0.00	.30	.90	0.00	.40
.60	0.00	0.00	.10	.10	.60	0.00	.10
6.60	0.00						
ML08839	1.20	0.00	0.00	.10	.10	0.00	0.00
0.00	1.40	2.60	0.00	1.40	0.00	0.00	0.00
0.00	.60	0.00	.30	.10	0.00	3.70	1.50
0.00	1.20	.10	.90	4.80	2.00	0.00	0.00
0.00	1.70	2.00	0.00	0.00	1.50	.60	0.00
.30	0.00	.10	0.00	.30	.40	3.60	20.10
.10	.60	.10	6.30	0.00	.60	0.00	0.00
.10	0.00	.10	1.70	.30	.60	1.10	.60
.10	3.30	.90	0.00	.40	2.80	2.90	0.00
0.00	1.10	0.00	4.20	.60	.60	.10	.30
.10	.60	.60	.60	1.10	1.80	.30	.30
.60	0.00	0.00	0.00	.40	.10	0.00	.90
7.70	0.00						
ML03840	1.10	0.00	.30	0.00	.30	0.00	.30
.10	.80	3.20	0.00	1.10	.10	0.00	0.00
0.00	1.60	.40	.10	.30	0.00	2.20	1.40
0.00	1.40	.30	1.10	4.20	1.30	0.00	0.00
0.00	1.60	.40	0.00	0.00	1.60	.90	0.00
0.00	0.00	0.00	0.00	.10	.10	1.40	17.50
.40	.60	.40	6.80	.10	1.30	0.00	0.00
0.00	0.00	0.00	.40	.60	1.40	.80	.80
.30	3.50	.60	.30	.30	5.20	3.70	0.00
.80	1.40	.10	5.50	.10	.90	0.00	.10
.90	.10	.10	.30	.30	3.20	.10	.40
1.30	0.00	.10	0.00	.40	.60	0.00	.90
6.50	0.00						
ML08841	2.00	0.00	.10	.10	.10	.10	.30
0.00	.50	1.80	0.00	.80	0.00	0.00	0.00
0.00	1.10	.10	0.00	.10	0.00	2.90	1.10
0.00	.80	0.00	2.00	3.40	1.80	0.00	0.00
0.00	1.70	.60	0.00	0.00	.80	.10	0.00
.10	0.00	0.00	0.00	.50	0.00	1.10	20.20
.30	.50	0.00	4.20	1.50	1.00	0.00	0.00
.30	0.00	.10	.50	.80	.60	.80	1.50
.30	5.80	.50	.50	1.30	2.70	2.70	0.00
.30	.60	0.00	6.50	.10	1.10	0.00	.10
.50	.60	.60	.50	.30	3.40	.50	1.00
.60	0.00	0.00	0.00	1.10	.10	0.00	1.10
7.30	0.00						
ML03842	1.30	0.00	.40	.10	.40	.20	0.00
.10	.40	1.40	.10	1.10	.40	0.00	.10
0.00	1.30	0.00	.20	.50	0.00	2.60	.80
0.00	1.10	.10	1.90	2.90	2.50	0.00	0.00
0.00	2.60	.50	0.00	0.00	.50	1.00	.10
.50	0.00	0.00	0.00	.70	0.00	2.20	14.70
.10	.20	.20	5.60	.10	1.30	0.00	0.00
.20	0.00	0.00	.40	1.10	.70	.80	2.60
.80	4.50	.40	.50	.70	2.20	4.10	0.00
.40	1.90	.20	6.40	0.00	2.20	0.00	0.00
.50	0.00	.10	.40	.20	3.50	.20	1.10
1.90	0.00	0.00	0.00	.80	1.00	0.00	.70
5.60	0.00						

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M012804	2.60	0	.10	0	0	.20	0
.10	.50	6.20	0	.80	0	0	.20
0	.40	0	0	1.60	0	1.90	5.20
0	.80	.10	.90	1.90	.40	0	0
0	6.10	.10	0	0	.20	.40	0
0	0	0	0	.20	.80	1.10	9.80
.50	1.50	.90	15.00	1.20	10.10	0	0
0	0	0	1.90	.10	0	.10	.10
0	1.90	.80	.20	.50	.20	.50	0
0	.40	0	.90	0	.80	0	0
.10	0	.80	0	1.60	4.70	.10	.90
.90	0	0	0	.10	.10	0	.40
7.50	0						
M012805	2.60	0	.50	0	0	.70	.10
.30	.80	9.50	0	.50	0	0	.20
0	.20	0	.10	1.10	0	2.80	6.90
0	.80	.30	.50	1.20	.30	0	0
0	4.20	.10	0	0	.70	.60	0
0	0	0	0	.10	.70	1.10	8.60
.70	1.40	.50	11.30	1.10	13.10	0	0
0	0	0	1.50	.10	0	.20	.50
.10	2.50	2.50	.10	.60	.10	.30	0
.20	.50	0	.50	0	1.00	0	0

.10	.10	.70	0	1.60	3.30	0	.80
.50	0	0	0	.70	0	0	.20
5.00	0						
M012806	5.00	.10	.30	0	0	0	0
.20	.80	8.60	0	1.20	0	0	.10
.10	.50	0	.70	.50	0	1.60	2.70
0	1.30	.20	.10	1.20	.60	0	0
0	3.20	.20	0	0	.90	.90	0
.10	0	0	0	.20	.70	1.70	9.50
1.00	.70	.50	13.40	.70	13.90	0	0
0	0	0	1.00	.30	.10	.90	.30
0	1.70	1.40	.30	.20	.10	.40	0
.90	.40	0	.70	0	.30	.10	0
0	.40	1.10	0	2.30	3.50	.10	.40
1.00	0	.10	0	1.10	0	0	.20
5.10	0						
M012807	4.10	0	.30	0	0	0	.10
.60	.40	13.00	0	.30	.10	0	.10
.50	.20	0	.50	.10	.20	.30	4.40
0	.40	.60	.50	.50	.40	0	0
0	.90	0	0	0	1.00	.30	0
0	0	0	.20	.30	.60	1.20	8.70
1.10	1.00	.30	7.20	1.00	24.60	0	0
0	0	0	.10	0	.20	.10	.10
0	0	1.30	0	.20	.40	.10	0
.40	.50	.10	.50	0	0	0	.10
0	.10	1.00	0	4.70	3.50	.20	0
1.00	0	0	0	.80	0	0	.10
5.90	0						
M012808	1.70	0	.50	0	0	0	.10
1.10	.10	14.30	0	.10	0	0	.10
.10	.30	0	.30	.10	.10	.30	6.90
0	.70	.50	1.10	1.10	.10	0	0
0	.50	.10	0	0	1.10	0	0
.10	0	0	0	.10	.90	1.30	9.70
1.50	1.10	.10	3.40	2.10	28.10	0	0
0	0	0	.10	0	0	0	.30
0	0	1.10	0	0	.50	0	0
.30	.70	0	.30	0	.10	0	0
0	0	2.50	0	2.50	2.30	0	.10
.30	0	0	0	.50	0	0	0
5.00	0						
M012809	5.80	0	.40	0	0	0	.40
.30	0	12.00	0	.60	.10	0	.10
0	.40	0	.40	.60	.30	.90	5.30
0	.20	.40	.20	.40	.20	0	0
0	1.70	0	0	0	1.30	.20	.10
0	0	0	0	.40	.60	1.80	10.30
1.20	1.00	.30	6.60	1.70	20.20	0	0
0	0	0	.10	0	0	0	.70
.10	.70	2.50	0	.10	.20	.10	0
.20	.90	.10	.80	0	.40	0	.10
0	0	1.70	0	3.40	4.10	.20	.40
.90	0	0	0	1.20	0	0	.30
1.90	0						
M012810	3.30	0	.10	0	0	.50	.90
.50	.70	11.40	0	.60	0	0	.20
.20	.10	0	.30	.10	0	.20	6.80
0	.70	.50	.70	.60	.30	0	0
0	1.10	0	0	0	.70	.10	0
0	0	0	.10	0	.60	1.10	8.70
.90	1.00	.20	5.80	1.60	22.10	0	0
0	.10	0	.10	0	0	.10	.70
0	.20	1.00	.10	0	.60	.10	0
.50	1.00	0	.20	0	.20	0	0
0	.10	2.30	0	3.30	4.60	.10	.20
1.00	0	0	0	.90	0	0	.30
6.80	0						
M012811	3.80	0	.20	0	0	.20	.60
1.10	.30	11.00	0	.90	.10	0	.10
.20	.40	.10	.60	2.30	0	1.40	5.10
0	1.30	.40	.30	.70	.30	0	0
0	2.20	0	0	0	1.30	.30	0
0	0	0	.20	.40	.30	1.80	9.60
.60	2.20	.30	10.50	1.70	13.70	0	0
0	0	0	.40	0	0	.20	.20
0	.70	.80	.10	0	.40	.40	0
.30	.40	0	1.10	0	.30	0	.10
0	0	.90	.30	2.10	3.50	.20	.70
.40	0	0	0	.80	0	0	.20
5.90	0						
M012812	3.80	0	.40	.10	0	.50	.50
.80	.40	12.70	0	.50	0	0	.20
.40	.10	0	.60	.50	.50	.50	7.10

0	.40	.20	1.60	1.60	.40	0	0
0	1.40	0	0	0	1.00	.20	0
0	0	0	0	.20	.80	1.70	7.70
1.20	1.40	.10	4.50	2.10	20.10	0	0
0	0	0	.10	.10	0	0	.80
0	.60	1.60	0	0	.40	0	0
.10	1.00	0	.20	0	.80	0	0
0	.10	.90	0	4.10	3.20	.10	.10
.50	0	0	0	.90	0	0	0
6.10	0						
M012813	3.10	0	1.00	.20	0	.30	.20
1.00	.30	13.30	0	.70	0	0	.10
.30	.70	0	.70	0	.10	0	7.20
0	.60	.70	.20	1.00	.10	0	0
0	1.20	.20	.10	0	.90	0	0
.10	0	0	.10	.60	.70	1.80	8.40
.30	.50	.20	3.60	3.20	22.90	0	0
0	0	0	.10	0	0	0	.60
.10	.30	1.60	0	0	.50	.50	0
.30	.30	0	.10	0	.50	0	0
0	0	.90	0	3.50	2.50	0	0
.30	0	0	0	.60	0	0	.10
7.90	0						
M012814	2.50	0	.40	.10	0	.30	.30
.70	0	17.70	0	.90	0	0	0
0	0	0	.60	0	.10	.10	6.90
0	.70	.90	.30	.30	0	0	0
0	.40	.40	0	0	.70	.10	0
0	0	0	0	0	.30	.40	5.30
1.20	1.10	0	2.30	1.70	28.50	0	0
0	0	0	0	0	0	0	.40
0	.10	1.80	0	0	.60	0	0
.60	1.40	0	0	0	.30	0	0
0	0	1.20	0	3.70	3.90	0	.10
.40	0	0	0	.90	0	0	0
7.40	0						
M012815	2.80	0	.10	0	0	.10	.60
.50	.50	13.20	0	.50	0	0	0
.10	.20	0	.60	.20	.10	.20	7.90
0	.20	.20	.50	.30	.20	0	0
0	.60	.10	0	0	.60	0	0
0	0	0	.20	.10	.50	2.10	6.70
.60	1.20	.10	3.60	2.70	27.40	0	0
0	0	0	.10	0	0	.10	.50
0	.10	1.00	0	.10	.20	.50	0
.30	1.00	0	.10	0	.50	0	.10
0	0	.60	.10	4.30	2.30	0	0
.30	0	.10	0	.90	0	0	.10
9.00	0						
M012816	3.00	0	.60	0	0	.30	.30
.10	.20	12.30	0	.70	0	.10	0
.20	.30	.10	.30	.40	.10	.30	6.80
0	.30	.70	.30	.30	.30	0	0
0	2.90	0	0	0	.70	.20	0
0	0	0	0	.40	1.20	1.30	9.20
1.80	1.10	.20	5.90	2.40	23.00	0	0
0	0	0	.40	0	0	.20	0
0	.40	1.20	0	.10	.90	.10	0
.20	.80	0	.20	0	.30	0	0
0	0	1.10	0	2.40	2.70	0	.20
.20	0	0	0	.90	0	0	0
6.80	0						
M012817	3.60	0.00	.70	.60	0.00	.60	.20
.30	.10	9.80	0.00	.70	0.00	0.00	0.00
.30	.20	0.00	.50	.10	.10	.10	7.00
0.00	.60	.10	1.00	.80	.30	0.00	0.00
0.00	1.00	.30	0.00	0.00	1.10	0.00	0.00
0.00	0.00	0.00	0.00	.10	.30	.80	8.70
1.60	.70	.30	4.50	4.00	20.10	0.00	0.00
0.00	0.00	0.00	.20	0.00	0.00	0.00	.30
0.00	1.60	2.10	0.00	0.00	.50	0.00	0.00
0.00	.50	0.00	.60	0.00	.70	0.00	0.00
.20	0.00	1.80	.10	4.50	5.90	.10	.20
.60	0.00	0.00	0.00	1.20	0.00	0.00	0.00
5.10	0.00						
M012818	3.50	0	.20	.20	0	.30	.20
.60	.50	10.80	0	1.10	0	0	0
.10	.10	.10	.40	.50	.10	.20	8.10
0	.40	.40	.60	.90	.10	0	0
0	1.20	.40	.30	0	1.00	.20	0
0	0	0	0	.20	.60	2.20	10.00
.70	1.70	.40	4.60	2.10	19.50	0	.10
0	0	0	.10	0	0	.10	.40
.10	1.20	1.20	0	.20	.10	.40	0

.10	.70	0	.40	.10	.40	0	0
0	0	1.00	0	4.70	3.10	.20	.30
.60	0	0	0	1.30	0	0	.20
5.80	0						
M012819	1.20	0	.30	.10	0	.30	0
0	.10	17.40	0	.10	0	.10	0
.10	0	0	.50	0	0	.30	10.00
0	0	0	0	1.00	0	0	0
0	.90	.10	0	0	.30	0	0
0	0	0	0	0	0	1.40	7.00
1.40	2.70	.10	1.40	1.60	29.80	0	0
0	0	0	0	0	0	0	.30
0	.30	2.10	0	0	.90	0	0
.50	1.20	0	0	0	0	0	0
0	.10	1.40	.10	5.40	2.10	0	0
0	0	0	0	.30	0	0	0
4.90	0						
M012820	1.20	0	.20	0	0	0	0
.20	0	17.20	0	0	0	0	0
0	0	0	.40	.20	0	0	8.90
0	.20	0	.20	.40	0	0	0
0	0	0	0	0	.20	0	0
0	0	0	0	0	.20	1.40	7.60
.30	1.90	0	1.90	1.70	31.10	0	.20
0	0	0	0	0	0	0	0
0	.40	2.30	0	0	1.00	0	0
.80	1.20	0	0	0	.20	0	0
0	0	1.00	0	3.80	2.70	0	0
0	0	0	0	.60	0	0	0
8.70	0						
M012821	1.00	0	1.00	.20	0	.20	.20
.60	0	21.70	0	0	0	0	0
.20	.20	0	.40	.0	0	0	9.90
0	.20	.20	.20	1.00	.20	0	0
0	.20	0	0	0	.60	.20	0
0	0	0	0	0	0	1.60	6.70
1.00	1.80	0	2.00	2.60	31.50	0	0
0	0	0	0	0	0	0	0
0	.20	2.20	0	0	.40	0	0
.40	1.20	0	.20	0	.20	0	0
0	0	1.00	0	3.00	1.40	0	0
0	0	0	0	0	0	0	0
3.60	0						
M012822	2.40	0	.20	.20	0	.10	.10
.40	.20	13.30	0	.40	0	0	0
0	.10	0	.50	.10	.20	.10	10.60
0	.20	.40	.20	1.00	.20	0	0
0	.20	.10	0	0	.70	0	0
0	0	0	0	.20	.20	1.10	6.50
1.30	1.40	.20	3.00	2.10	25.50	0	0
0	0	0	.20	0	0	0	.20
0	1.10	2.70	0	0	.40	.10	0
0	1.30	.10	.10	0	.20	0	0
0	.10	1.10	0	3.60	2.10	0	.20
.40	0	.10	0	.40	0	0	.40
3.40	0						
M012823	3.20	0	.50	.10	0	.50	.20
.70	.20	15.30	0	.80	0	.10	0
.40	.10	0	.80	.10	0	.10	7.50
0	.1[illegible]	.20	.80	.80	0	0	0
0	.70	.10	0	0	1.20	0	0
0	0	0	0	.20	0	1.10	7.80
1.00	.7[illegible]	0	3.10	3.20	23.6[illegible]	0	.10
0	0	0	0	0	0	0	.20
0	.20	1.00	0	.10	.20	0	0
.20	1.00	0	.20	0	0	0	.10
0	0	1.40	.20	3.50	3.10	0	0
.80	0	.20	0	1.70	0	0	0
8.00	0						
M012824	1.60	0	.40	0	0	.50	0
.30	.30	17.60	0	.40	0	0	.10
0	.10	0	.30	0	.30	0	7.50
0	.30	.30	.60	.30	.10	0	0
0	.40	.10	0	0	.60	.10	0
0	0	0	0	0	.10	1.90	7.40
1.90	.90	0	.40	2.50	30.50	0	0
0	0	0	.10	0	0	0	.10
0	0	2.40	0	0	.60	0	0
.30	1.50	0	0	0	.10	0	0
0	0	1.30	.10	4.00	2.40	0	.10
.10	0	0	0	.40	0	0	0
6.90	0						
M012825	2.20	0	.30	.10	0	.30	.30
.50	0	11.60	0	.20	0	0	0

.10	.30	0	.50	.10	.10	.60	8.90
0	.70	.30	.70	.20	.20	0	0
0	.50	.10	0	0	.70	0	0
0	0	0	0	0	.70	1.50	10.30
1.10	.30	.20	2.40	4.40	23.50	0	.10
0	0	0	.10	0	0	.20	.20
0	.70	3.40	0	.20	.30	0	0
.30	1.80	0	.20	0	.10	0	0
.70	0	.50	0	3.60	3.90	0	.20
6.40	0	.10	0	.60	0	0	.10
MO12826	1.90	0	.20	.10	0	.50	.10
.30	.30	10.00	0	.40	0	0	0
.10	.20	.10	.50	.40	0	1.20	7.40
0	.50	.40	.40	1.00	.20	0	0
0	.60	.10	.10	0	.40	.30	0
0	0	0	.10	.30	.70	1.60	10.10
.40	1.40	.30	7.50	2.60	20.10	0	0
0	0	0	.20	0	0	.20	.40
0	1.50	2.80	0	.10	1.10	.10	0
.20	1.20	0	.40	0	.10	0	0
.20	.30	.70	0	4.20	3.70	.10	.30
.60	0	0	0	.30	0	0	.30
5.00	0						
MO12827	2.60	0	0	.50	0	.10	0
.40	1.40	11.60	0	1.00	0	0	.10
0	.10	0	1.60	.70	.10	.70	6.50
0	.50	0	.20	1.10	0	0	0
0	.70	0	0	0	.70	.10	0
0	0	0	0	.40	.10	1.00	9.60
1.30	1.00	0	5.00	2.90	18.00	0	.10
0	0	0	.40	0	0	.70	0
.10	2.60	3.70	0	.20	1.10	.10	0
.40	.50	0	.10	0	.50	0	0
.10	0	.80	.10	4.50	4.00	0	0
.70	0	0	0	.80	0	0	.10
6.10	0						
MO12828	1.80	0	.50	.10	0	.30	0
0	.30	14.20	0	.50	0	0	.10
0	.10	0	0	0	.10	.10	7.10
0	.30	.10	.30	.10	.10	0	0
0	1.40	.10	0	0	.10	0	0
0	0	0	0	.30	.50	1.40	4.90
1.40	2.30	0	3.60	1.80	28.20	0	.10
0	0	0	.30	0	0	.30	.10
0	.30	2.50	0	.10	.50	0	0
.30	1.20	0	.30	0	0	0	.30
0	0	.50	0	4.90	2.30	0	0
.30	0	0	0	1.20	0	0	.10
9.30	0						
MO12829	1.40	.10	0	0	0	.20	.10
.20	0	12.90	0	.50	0	0	0
0	0	0	.20	.10	.50	.20	5.70
0	.10	0	.90	.10	.10	0	0
0	.70	0	0	0	.20	.10	0
0	0	0	.10	.20	.70	1.00	8.20
1.10	.70	0	4.40	2.20	31.10	0	.10
0	0	0	.50	.10	0	.20	.10
0	1.70	2.40	0	.20	.50	.20	0
.10	.30	0	.30	0	0	0	0
0	0	.30	0	4.70	2.00	.20	.10
.60	0	0	0	.50	0	0	.20
8.10	0						
MO12830	1.70	0	.40	0	0	.10	.10
0	.10	12.60	0	.40	0	0	0
0	.20	0	.40	.10	.20	.30	7.40
0	.30	0	.30	.70	.20	0	0
0	.30	0	0	0	.80	.20	0
0	0	0	.20	.20	.40	.80	7.60
1.40	1.00	.30	6.50	2.20	24.50	0	0
0	0	0	.70	0	0	0	.30
0	3.20	3.10	.10	.10	.70	.10	0
1.00	.70	0	.40	0	.30	0	0
0	0	.80	0	3.60	2.40	0	.20
.70	0	.30	0	.20	0	0	.20
7.00	0						
MO12831	2.50	0	.90	0	0	.40	0
.40	0	16.40	0	0	0	0	.20
0	0	0	.20	0	.20	.40	6.30
0	0	.20	0	.20	.40	0	0
0	.90	0	0	0	.20	0	0
0	0	0	0	0	.20	3.40	5.70
.60	1.10	.20	7.00	2.00	27.80	0	0
0	0	0	.60	0	0	0	0

0	.40	3.10	0	0	.20	0	0
1.10	1.10	0	.20	0	0	0	0
0	.20	.60	0	2.70	1.50	0	.20
.20	0	0	0	.90	0	0	.90
6.60	0						
M012832	2.50	0	.70	.10	0	.20	0
.40	.10	12.00	0	.70	0	0	0
.10	0	.10	.40	.10	0	.10	8.80
0	.10	0	.50	.40	.20	0	0
0	.50	0	0	0	.80	.10	0
0	0	0	.10	.10	.10	2.20	7.20
1.60	.80	.20	5.50	3.00	21.70	0	0
0	0	0	1.10	.10	0	1.00	.70
0	.50	1.70	0	0	.70	0	0
1.00	.70	0	.40	0	.20	0	0
0	0	1.40	0	2.90	3.80	0	0
.50	0	0	0	.50	0	0	0
8.60	0						
M012833	1.90	0	.30	.60	0	.10	0
0	.40	10.90	0	.30	.10	0	0
0	.40	0	.30	.30	.10	1.20	6.90
0	.40	0	.60	2.10	.30	0	0
0	1.20	0	0	0	.70	0	.10
0	0	0	0	.10	0	.60	8.30
.70	.90	.10	16.30	1.30	18.70	0	0
0	0	0	1.50	0	0	.60	0
0	.90	1.60	0	0	1.00	.40	0
.30	.30	0	0	0	.40	0	0
0	0	.60	0	2.40	2.40	.10	0
.90	0	0	0	.40	0	0	.60
7.80	0						
M012834	.40	0	0	0	0	.40	0
.40	.40	16.50	0	.40	0	0	.40
0	0	0	.40	0	0	1.80	8.70
0	0	0	.40	.90	0	0	0
0	1.30	0	0	0	.90	0	0
0	0	0	0	0	0	.90	0
2.70	3.20	.40	6.40	1.80	33.00	0	0
0	0	0	.40	0	0	0	0
0	.40	1.30	0	0	.40	0	0
.40	.40	0	0	0	0	0	0
0	0	.40	0	1.80	.40	0	0
.90	0	0	0	.90	0	0	0
9.10	0						

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ML12784	2.90	0	.80	0	0	.60	1=50
1.30	.10	7.40	0	.10	0	0	0
.10	.10	0	.80	0	0	0	6.10
0	.20	1.60	3.20	1.10	.50	0	0
0	0	0	0	0	.20	0	0
0	0	0	.90	.50	1.20	4.40	10.70
0	.90	0	.90	2.00	.50	0	0
0	0	0	0	0	0	0	2.70
0	.80	.40	0	.10	.10	.10	0
.80	.10	0	.60	0	.10	0	.20
0	1.20	0	0	19.50	7.50	.50	.40
1.10	0	.50	0	1.10	0	0	0
9.00	0						
ML12786	1.10	0	1.10	0	0	.70	2.30
1.30	0	6.30	0	.20	0	0	0
0	.20	0	1.30	0	0	0	4.30
0	0	1.30	3.10	1.70	.50	0	0
0	0	0	0	0	.50	0	0
0	0	0	.60	.60	.50	7.20	12.60
.10	.60	0	1.30	4.60	.20	0	0
0	0	0	0	0	0	0	5.40
0	.70	.20	0	.30	.10	0	0
1.40	.10	0	1.30	0	.30	0	.10
0	.50	.30	0	8.80	13.40	.90	.30
1.10	0	.10	0	.20	0	0	.10
8.00	0						
ML12787	2.90	0	1.20	0	0	.70	1.10
.90	0	8.10	0	.70	0	0	0
.10	.40	0	.90	0	0	0	5.90
0	0	1.50	2.50	1.10	.10	0	0
0	0	0	0	0	.30	0	0
0	0	0	.60	.30	.30	4.00	14.30
0	.60	0	.30	2.90	.30	0	0
0	0	0	0	0	0	0	4.20
0	.10	.10	.10	.10	0	0	0
2.60	.10	0	.60	0	.10	0	0
0	.10	.30	0	8.90	16.30	.60	.10

.70	0	0	0	.40	0	0	.10
10.30	0						
ML12790	2.00	0	1.30	0	0	0	3.60
1.60	0	9.20	0	.20	0	0	0
0	.90	0	1.60	0	0	0	6.60
0	.20	1.30	1.60	.90	.20	0	0
0	0	0	0	0	.60	0	0
0	0	0	.20	.40	.60	5.30	12.00
.20	1.10	0	0	3.20	.20	0	0
0	0	0	0	0	0	0	3.20
0	0	0	0	.20	0	0	0
.90	0	0	.40	0	.20	0	.40
0	.90	0	0	16.10	10.80	0	.20
.90	0	0	0	.20	0	0	0
9.00	0						
ML12792	4.00	0	1.10	.30	0	1.10	2.50
1.00	.30	8.70	0	.10	0	0	0
.10	0	0	1.30	0	0	0	9.80
0	.50	.30	1.80	1.10	.10	0	0
0	.10	0	0	0	.30	0	0
0	0	0	.50	.80	1.00	4.50	12.00
.30	.10	0	1.00	1.60	.60	0	.10
0	0	0	0	0	0	0	3.20
0	.10	.30	0	0	0	0	0
1.80	.30	0	0	0	.80	0	.60
0	1.10	.50	0	10.60	8.40	.50	0
.10	0	.30	0	.30	0	0	0
11.80	0						
ML12793	2.80	0	.40	0	0	.60	1.30
.90	0	9.40	0	.30	.10	0	0
0	1.60	0	1.30	0	0	0	7.20
0	.40	.40	2.40	.40	0	0	0
0	0	0	0	0	.70	0	0
0	0	0	0	1.50	1.60	3.90	12.70
.40	.40	0	2.80	1.50	.40	0	0
0	0	0	0	0	0	.10	3.40
0	.10	.40	0	.10	.10	0	0
2.10	.30	0	1.30	0	.70	0	.60
0	.70	.60	0	11.70	5.10	1.00	.10
.10	0	1.20	0	1.30	0	0	0
11.30	0						
ML12451	4.10	0	.40	0	0	1.10	3.40
1.30	0	11.50	0	.10	.10	0	.10
.40	.80	.10	.40	0	0	0	4.30
0	.20	.70	2.30	1.00	1.30	0	0
0	.10	0	0	0	.20	0	0
0	0	0	1.00	.10	1.10	4.10	11.90
1.70	.70	0	1.40	2.00	1.00	0	0
0	0	0	0	0	0	0	1.10
0	.40	.50	0	0	.10	.10	0
1.50	.40	0	1.10	0	.50	0	.10
0	0	.70	0	8.90	10.80	.80	0
.20	0	2.00	0	.50	0	0	0
9.10	0						
ML12794	3.00	0	1.00	0	0	0	4.50
1.50	0	7.60	0	0	0	0	0
0	0	0	0	0	0	0	8.10
0	0	2.00	3.50	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	.50	.50	0	4.50	7.10
0	.50	.50	0	4.00	0	0	0
0	0	0	0	0	0	0	3.00
0	2.00	0	0	.50	0	0	0
1.00	0	0	0	0	0	0	1.00
0	.50	.50	0	8.60	16.20	.50	0
1.00	0	3.50	0	.50	0	0	0
11.60	0						
ML12795	2.90	0	.30	0	0	1.10	4.40
2.50	0	9.90	0	0	0	0	0
0	4.00	0	0	0	0	0	8.40
0	0	.70	2.20	.30	0	0	0
0	0	0	0	0	.30	0	0
0	0	0	1.10	.70	0	4.00	9.90
.70	.70	0	0	4.00	.70	0	0
0	0	0	0	0	0	0	4.00
0	.30	.30	0	.70	0	0	0
2.20	0	.30	.70	0	.30	0	0
0	0	.70	0	4.00	15.40	.30	0
.30	0	2.20	0	1.10	0	0	0
6.90	0						
ML12797	3.10	0	.80	0	0	.80	5.30
1.90	0	5.90	0	0	0	0	0
0	1.70	0	1.40	0	0	0	5.60
0	0	.80	2.80	.50	0	0	0

0	0	0	0	0	0	0	0
0	0	0	1.70	.20	.50	3.40	8.50
.20	.50	0	0	3.90	.50	0	0
0	0	0	0	0	0	0	3.60
0	.50	0	0	.50	0	0	0
3.90	.20	0	.20	0	0	0	.20
0	.80	1.70	0	3.40	14.40	.20	.50
3.10	0	1.90	0	.20	0	0	0
12.50	0						
ML12799	4.20	0	0	0	0	1.10	1.10
1.50	0	6.20	0	.30	0	0	0
.30	1.90	0	.70	0	0	0	6.20
0	.30	1.10	2.70	.30	0	0	0
0	0	0	0	0	.30	0	0
0	0	0	1.10	1.10	0	5.80	8.50
.70	1.10	.30	0	3.50	1.10	0	0
0	0	0	0	0	0	0	1.90
0	.70	0	0	0	0	0	0
3.50	0	0	0	0	0	0	0
0	.30	.70	0	2.70	16.70	1.50	.30
1.50	0	.70	0	.70	0	0	0
14.80	0						
ML12801	2.00	0	1.10	0	0	.60	3.50
1.30	0	7.10	0	.10	0	0	0
.10	1.30	0	1.50	0	0	0	9.20
0	.10	1.00	4.10	.60	.10	0	0
0	0	0	0	0	.30	0	0
0	0	0	.50	0	1.00	9.70	13.60
.50	.30	0	.50	4.70	.50	0	0
0	0	0	0	0	0	0	1.70
0	0	.10	0	0	0	0	0
2.00	0	0	.10	0	.30	0	.10
0	0	1.00	0	4.10	9.70	0	.10
1.30	0	.50	0	.60	0	0	0
11.10	0						
ML12803	3.20	0	.80	0	0	.80	2.40
1.60	0	7.60	0	.40	0	0	0
0	2.00	0	1.20	0	0	0	7.20
0	0	1.20	2.40	.40	0	0	0
0	0	0	0	0	0	0	0
0	0	0	1.20	0	0	6.80	12.00
0	.80	0	.40	5.60	0	0	.40
0	0	0	0	0	0	0	1.20
0	.80	.40	0	.80	0	.40	0
1.20	0	0	.40	0	0	0	0
0	.80	1.20	0	5.20	9.60	0	.40
.80	0	1.20	0	0	0	0	0
16.80	0						

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ML12971	2.10	0.00	0.00	0.00	1.00	1.60	.50
0.00	0.00	7.10	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	.50	0.00	0.00	10.40
0.00	.50	0.00	1.60	.50	.50	0.00	0.00
0.00	.50	0.00	0.00	0.00	1.00	0.00	0.00
0.00	0.00	0.00	0.00	.50	1.60	8.70	19.20
2.10	2.70	0.00	.50	1.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	.50
0.00	0.00	.50	0.00	0.00	0.00	0.00	0.00
2.70	3.80	0.00	.50	0.00	0.00	0.00	1.60
0.00	0.00	1.00	0.00	.50	4.30	0.00	.50
0.00	0.00	0.00	.50	0.00	0.00	0.00	0.00
17.50	0.00						
ML12979	3.20	0.00	.70	.10	.70	.40	1.00
1.00	0.00	5.30	0.00	0.00	.30	0.00	0.00
.10	.90	0.00	0.00	.10	0.00	0.00	8.60
0.00	.30	.30	5.90	.70	1.70	0.00	0.00
0.00	0.00	0.00	0.00	0.00	.30	0.00	0.00
0.00	0.00	0.00	.40	.40	.40	10.30	15.00
1.00	2.60	0.00	.60	.40	0.00	0.00	.10
0.00	0.00	0.00	0.00	0.00	0.00	0.00	.60
0.00	0.00	0.00	0.00	.40	1.00	0.00	0.00
5.40	2.30	0.00	.60	0.00	.30	0.00	.10
0.00	.10	.30	0.00	2.10	2.80	.70	2.10
1.80	0.00	1.40	.90	.70	0.00	0.00	0.00
10.90	0.00						
ML12972	1.70	0.00	.20	1.70	.90	1.90	3.10
1.20	0.00	4.60	0.00	.20	0.00	0.00	.20
0.00	.20	0.00	.40	.20	0.00	0.00	6.10
0.00	0.00	.70	4.90	1.70	.40	0.00	0.00
0.00	0.00	0.00	0.00	0.00	.20	.20	0.00
0.00	0.00	0.00	0.00	.40	.40	8.50	16.40
1.70	3.60	0.00	.90	.20	.40	0.00	.20

0.00	0.00	0.00	0.00	0.00	0.00	.20	.70
0.00	.70	0.00	0.00	0.00	.40	0.00	0.00
3.90	.70	0.00	.20	0.00	.20	0.00	.20
0.00	0.00	1.20	.20	.20	4.60	.90	1.40
1.40	0.00	.70	.20	.40	0.00	0.00	0.00
15.60	0.00						
ML12980	2.10	0.00	.30	0.00	.90	.30	1.90
1.20	0.00	6.90	0.00	.40	0.00	0.00	0.00
0.00	1.20	0.00	.10	.10	0.00	.10	6.00
0.00	.10	.40	6.30	1.60	.90	0.00	0.00
0.00	.10	0.00	0.00	0.00	.30	0.00	0.00
0.00	0.00	0.00	.90	.70	.90	9.00	12.90
.70	1.60	0.00	.30	.60	0.00	0.00	.10
0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30
0.00	.10	1.30	0.00	.40	1.50	.10	0.00
4.60	1.20	0.00	1.50	0.00	.10	0.00	.60
0.00	.30	.40	.30	.10	4.00	.90	1.00
4.20	0.00	1.30	.40	.70	0.00	0.00	0.00
12.80	0.00						
ML12973	3.30	0.00	.10	0.00	1.30	.40	2.60
.90	0.00	5.70	0.00	0.00	0.00	0.00	0.00
.10	1.80	0.00	.60	.10	0.00	0.00	5.40
0.00	0.00	0.00	4.60	1.30	2.10	0.00	0.00
0.00	0.00	0.00	0.00	0.00	1.60	0.00	0.00
0.00	0.00	0.00	.10	.30	.90	8.90	18.30
1.30	1.40	0.00	.30	.10	0.00	0.00	.10
0.00	0.00	0.00	0.00	0.00	0.00	0.00	.90
0.00	0.00	.10	0.00	0.00	2.10	.10	0.00
3.90	.80	0.00	.60	0.00	.30	0.00	.40
0.00	.10	.60	.30	.80	4.20	.40	.10
3.40	0.00	1.40	.10	.10	0.00	0.00	0.00
13.00	0.00						
ML12981	2.70	0.00	.60	0.00	1.00	.10	1.90
1.00	.10	3.80	0.00	.90	.10	0.00	0.00
0.00	.60	.30	.40	.30	0.00	0.00	4.40
0.00	0.00	.60	5.50	.70	.60	0.00	0.00
0.00	.10	0.00	0.00	0.00	.90	0.00	0.00
0.00	0.00	0.00	.30	0.00	.60	9.90	8.40
.70	1.60	0.00	1.30	.10	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	.10	.30	1.20
0.00	.70	.90	0.00	.70	2.40	.30	0.00
3.60	.90	0.00	3.50	0.00	1.80	0.00	.60
0.00	0.00	.30	.10	1.90	3.60	.30	2.20
5.60	0.00	1.90	1.90	1.00	0.00	0.00	0.00
12.40	0.00						
ML12982	2.10	0.00	.30	.30	1.60	.10	2.10
1.80	0.00	6.10	0.00	.60	0.00	0.00	0.00
0.00	.70	.60	.40	.40	0.00	0.00	5.50
0.00	.10	.10	4.80	1.20	1.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	1.00	.30	0.00
0.00	0.00	0.00	.40	.30	1.20	11.60	13.70
1.00	1.90	0.00	1.00	.60	0.00	0.00	.10
0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
0.00	.40	.30	0.00	.40	1.20	0.00	0.00
2.70	.90	0.00	1.80	0.00	.70	0.00	.30
0.00	.30	.90	.40	4.00	2.40	.30	.10
2.20	0.00	.90	.60	.90	0.00	0.00	0.00
12.80	0.00						
ML12983	2.40	0.00	1.20	0.00	.40	.90	3.10
.20	0.00	4.10	0.00	0.00	0.00	0.00	0.00
.20	1.40	0.00	0.00	.20	0.00	0.00	9.40
0.00	0.00	0.00	2.40	2.40	.90	0.00	0.00
0.00	0.00	0.00	0.80	0.00	.20	.20	0.00
0.00	0.00	0.00	.40	1.20	1.90	9.20	9.90
1.40	2.10	0.00	1.60	1.20	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	.70
0.00	0.00	0.00	0.00	.20	.40	.40	0.00
1.40	.40	0.00	1.20	0.00	.20	0.00	.20
0.00	0.00	1.40	0.00	7.90	3.30	.40	2.90
2.10	0.00	.90	.90	1.60	0.00	0.00	0.00
12.80	0.00						
ML12977	2.90	0.00	0.00	0.00	.40	1.40	2.90
.90	0.00	1.90	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.90
0.00	.40	.90	3.40	.90	.40	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	.90	5.40	16.30
1.40	.90	0.00	.90	.40	.40	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.40
0.00	0.00	.40	0.00	0.00	0.00	0.00	0.00
1.40	.40	0.00	0.00	0.00	0.00	0.00	0.00
0.00	.90	1.90	0.00	6.40	7.90	1.40	0.00
1.90	0.00	.90	0.00	.40	0.00	0.00	0.00
19.30	0.00						

ML12452	6.30	0.00	0.00	.40	0.00	2.50	.40
.40	0.00	2.10	0.00	0.00	0.00	0.00	0.00
0.00	.40	0.00	0.00	0.00	0.00	0.00	3.30
0.00	.80	.40	2.10	1.60	2.50	1.20	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	2.10	0.00	.40	10.90	21.00
.40	3.30	0.00	.40	.40	.80	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	.80
0.00	0.00	0.00	0.00	.40	0.00	0.00	0.00
0.00	0.00	0.00	.40	0.00	0.00	0.00	0.00
0.00	0.00	.80	0.00	8.40	9.20	2.10	.40
1.60	0.00	0.00	0.00	0.00	0.00	1.60	0.00
9.20	0.00						
ML12661	6.90	0.00	0.00	0.00	0.00	.50	0.00
2.10	0.00	2.10	0.00	0.00	0.00	0.00	0.00
0.00	.50	0.00	0.00	0.00	0.00	0.00	5.80
0.00	0.00	0.00	1.50	2.60	1.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	4.20	0.00	.50	16.40	17.50
0.00	1.00	0.00	0.00	1.50	0.00	0.00	.50
0.00	0.00	0.00	0.00	0.00	0.00	0.00	.50
0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	.50	.50	0.00	8.50	11.70	0.00	2.60
0.00	0.00	0.00	0.00	2.60	0.00	0.00	0.00
6.30	0.00						
ML12970	3.40	0.00	0.00	0.00	.40	0.00	.40
0.00	0.00	1.30	0.00	0.00	0.00	0.00	0.00
0.00	.80	0.00	0.00	0.00	0.00	0.00	8.60
0.00	0.00	0.00	3.00	1.30	.40	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	3.00	0.00	1.30	15.20	19.50
1.30	3.00	0.00	.80	.80	0.00	0.00	.40
0.00	0.00	0.00	0.00	0.00	0.00	0.00	.40
0.00	0.00	0.00	0.00	0.00	.80	0.00	0.00
0.00	0.00	0.00	0.00	0.00	.40	0.00	0.00
0.00	0.00	0.00	0.00	10.40	11.70	.40	.80
.80	0.00	0.00	0.00	2.10	0.00	0.00	0.00
6.00	0.00						

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ML12908	.60	0	0	0	0	.10	1.00
.30	0	.60	0	0	0	0	.40
1.40	.10	0	.30	0	0	0	.70
0	.30	.10	.90	1.40	.10	0	0
0	0	0	0	0	.30	0	0
0	0	0	.90	0	.10	1.70	22.90
0	.30	0	.70	21.10	0	.30	.30
0	0	0	0	0	0	0	.10
0	.10	0	0	.10	.30	1.80	0
0	0	0	.30	0	.10	0	.10
0	0	.60	0	.10	.40	.60	3.70
2.10	0	1.80	0	.40	2.30	5.40	15.60
5.00	0						
ML12909	.30	0	0	0	0	0	.90
.50	0	.90	0	0	0	0	.10
1.40	0	0	.10	0	0	0	1.00
0	.10	.10	.90	0	.30	0	0
0	0	0	0	0	0	0	0
0	0	0	1.20	0	0	1.00	18.60
0	.30	0	.10	18.30	0	1.00	.10
0	0	0	0	0	0	0	0
0	0	0	0	.10	0	0	3.40
0	0	0	.70	0	0	0	0
0	.10	.50	0	0	.50	0	3.40
1.20	0	.70	0	.30	4.30	11.10	17.70
6.50	0						
ML12910	.60	0	0	0	0	.30	0
0	0	.30	0	0	0	0	0
1.70	0	0	0	0	0	0	.60
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	.60	0	.30	1.20	17.80
0	.10	0	0	19.90	0	1.10	.10
0	0	0	0	0	0	0	0
0	0	0	0	.10	0	0	2.30
0	0	0	0	0	0	0	0
0	0	.40	0	0	.40	.10	7.10
.10	0	.40	0	.60	6.80	8.90	23.10
3.80	0						
ML12911	.60	0	0	0	0	.10	.10
.10	0	.60	0	0	0	0	0
2.30	0	0	0	0	0	0	.10

0	0	0	.10	.30	0	0	0
0	0	0	0	0	0	0	0
0	0	0	.70	0	.10	1.50	23.10
.10	.10	0	0	23.00	0	0	.10
0	0	0	0	0	0	0	0
0	0	.10	0	0	0	0	4.40
0	0	0	.10	0	0	0	0
0	0	.30	0	.30	.30	.40	5.70
.10	0	.10	0	.40	4.90	8.80	14.90
4.60	0						
ML12912	.30	0	0	0	0	0	.30
.10	0	.60	0	0	0	0	0
3.30	0	0	.10	0	0	0	0
0	0	.10	.60	.90	0	0	0
0	0	0	0	0	0	0	0
0	0	0	.90	0	.30	3.00	22.90
0	.30	0	0	12.90	0	.60	.30
0	0	0	0	0	0	0	0
0	0	.10	0	.30	0	0	4.20
0	0	0	.10	0	0	0	.30
0	0	1.00	0	.10	.10	.30	4.60
0	0	.40	0	.60	6.10	7.60	21.80
3.90	0						
ML12913	.90	0.00	0.00	0.00	0.00	0.00	.60
.30	0.00	.60	0.00	0.00	0.00	0.00	0.00
3.70	0.00	0.00	0.00	0.00	0.00	0.00	.30
0.00	0.00	.10	.10	.10	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	.40	0.00	0.00	.70	19.10
0.00	.60	.10	0.00	12.50	0.00	.30	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.10
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	1.50	0.00	.30	.70	0.00	8.80
0.00	0.00	.30	0.00	.30	3.90	9.30	22.70
6.00	0.00						
ML12914	0	0	0	0	0	.10	0
0	0	.60	0	0	0	0	0
2.60	0	0	0	0	0	0	.50
0	0	0	.30	1.00	.10	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	.10	1.00	17.10
0	0	0	0	8.50	0	.80	.10
0	0	0	0	0	0	0	0
0	0	.10	0	.50	0	0	2.80
0	0	0	.10	0	0	0	.10
0	0	.30	0	.10	.60	1.80	9.90
.10	0	2.10	0	.50	4.30	7.30	31.40
3.60	0						
ML12915	.20	0	0	0	0	0	.50
.20	0	.90	0	0	0	0	.20
1.50	.10	0	0	0	0	0	1.10
0	0	.10	.70	2.20	.10	0	0
0	0	0	0	0	0	0	0
0	0	0	.20	0	.40	1.10	27.90
.20	.10	.10	.20	11.40	0	.20	0
0	0	0	0	0	0	0	0
0	.80	.10	0	.10	0	0	3.50
0	0	0	0	0	0	0	.40
0	0	.50	0	.50	.50	.40	3.90
1.60	0	2.60	0	.70	2.20	6.70	18.90
4.90	0						
ML12916	.90	0	.10	0	0	0	0
.10	0	.80	0	0	0	0	.10
.90	.30	0	1.30	0	0	0	.60
0	.10	.30	.40	1.10	.30	0	0
0	0	0	0	0	.10	0	0
0	0	0	.30	.10	0	1.30	21.80
0	.60	0	0	9.50	0	.30	.10
0	0	0	0	0	0	0	.10
0	.80	0	0	.40	0	0	2.90
0	0	0	.90	0	0	0	0
0	.10	.30	0	.60	.80	.60	6.70
1.40	0	4.00	0	.10	2.90	9.00	17.50
7.50	0						
ML12917	1.20	0	0	0	0	0	0
.40	0	1.10	0	0	0	0	0
2.00	0	0	0	0	0	0	.40
0	0	0	.40	1.10	0	0	0
0	0	0	0	0	.10	0	0
0	0	0	.90	0	.30	3.10	21.40
.10	.30	0	0	6.90	0	1.20	.30
0	0	0	0	0	0	0	0
0	.60	0	0	.10	0	0	3.60

0	0	0	.10	0	0	0	0
0	0	.40	0	1.10	.30	.70	2.00
.30	0	2.80	0	0	3.90	9.80	27.40
4.10	0						
ML12918	.90	0	0	0	0	0	.10
.40	0	1.10	0	0	0	0	0
4.20	.40	0	0	0	0	0	.70
0	0	.10	.10	1.40	.70	0	0
0	0	0	0	0	0	0	0
0	0	0	.30	0	0	3.30	23.00
0	.70	.10	0	9.50	0	.90	0
0	0	0	0	0	0	0	0
0	0	0	0	.30	0	0	3.10
0	0	0	0	0	0	0	.10
0	0	.40	0	.40	0	1.10	4.20
.30	0	3.80	0	.30	3.30	6.00	20.80
6.30	0						
ML12919	1.00	0	0	0	0	.10	0
.10	0	.10	0	0	0	0	.10
4.00	0	0	0	0	0	0	.30
0	0	.30	0	1.70	.10	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	2.40	21.40
.10	0	0	0	7.20	0	1.20	.10
0	0	0	0	0	0	0	0
0	0	.10	0	.10	0	0	1.90
0	0	0	.30	0	0	0	0
0	0	0	0	.70	0	.50	5.30
0	0	4.20	0	.70	3.10	7.10	25.20
8.80	0						
ML12920	.90	0	0	0	0	.40	0
0	0	.30	0	0	0	0	0
5.30	0	0	0	0	0	0	.40
0	0	.10	.10	.30	.90	0	0
0	0	0	0	0	0	0	0
0	0	0	.60	0	0	1.40	25.50
.10	.10	0	0	9.20	0	.90	.10
0	0	0	.10	0	0	0	0
0	0	0	0	.30	0	0	2.90
0	0	0	0	0	0	0	.30
0	0	.40	0	0	0	.60	5.00
.10	0	4.30	0	.40	3.00	6.60	19.70
7.80	0						
ML12921	.60	0	0	0	0	.60	0
.30	0	.50	0	0	0	0	0
3.90	0	0	0	0	0	0	.50
0	0	.10	.60	1.50	.50	0	0
0	0	0	0	0	0	0	0
0	0	0	.10	0	0	1.00	24.50
0	.10	0	0	9.20	0	.80	.30
0	0	0	0	0	0	0	0
0	0	.10	0	0	0	0	2.00
0	0	0	0	0	.10	0	0
0	0	.30	0	.30	.30	.30	1.80
7.80	0	4.60	0	.10	2.40	10.10	23.10
ML12922	.70	0	0	0	.30	0	0
.50	0	1.10	0	0	0	0	0
6.40	0	0	0	0	0	0	.90
0	0	0	.30	3.70	0	0	0
0	0	0	0	0	0	0	0
0	0	0	.70	0	0	2.80	32.20
.10	.10	.10	0	7.50	0	1.30	0
0	0	0	0	0	0	0	0
0	0	0	0	.30	0	0	2.40
0	0	0	.10	0	0	0	0
0	.10	0	0	.70	.30	.30	3.00
.10	0	3.20	0	.10	2.80	6.40	13.90
6.00	0						
ML12923	.80	0.00	0.00	0.00	0.00	.20	.10
.20	0.00	.50	0.00	0.00	0.00	0.00	0.00
5.20	0.00	0.00	.20	0.00	0.00	0.00	.50
0.00	0.00	0.00	.10	2.60	.70	0.00	0.00
0.00	0.00	0.00	0.00	0.00	.10	0.00	0.00
0.00	0.00	0.00	.20	0.00	0.00	1.30	26.90
0.00	.20	0.00	.20	9.50	0.00	1.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	.10	0.00	.70	0.00	0.00	3.00
0.00	0.00	0.00	.20	0.00	0.00	0.00	0.00
0.00	.20	.50	0.00	.40	.50	.10	3.90
0.00	0.00	4.60	0.00	.10	2.60	5.90	17.80
7.10	0.00						
ML12924	.10	0	0	0	0	.30	.30
.40	0	.40	0	0	0	0	0

3.90	.10	0	.10	0	0	0	.30
0	0	0	.30	2.90	.10	0	0
0	0	0	0	0	.10	0	0
0	0	0	.10	0	.30	1.50	25.70
0	0	.30	.30	12.50	0	.70	.30
0	0	0	0	0	0	0	0
0	0	0	0	.70	.30	0	2.00
0	.70	.70	.30	0	0	0	.10
0	0	4.70	0	.30	.10	.40	4.30
5.10	0			.90	2.80	6.70	17.10
ML12925	.10	0	0	0	0	.10	.60
.40	0	.30	0	0	0	0	0
3.30	0	0	.10	0	0	0	.80
0	0	0	.30	3.00	0	0	0
0	0	0	0	0	.30	0	0
0	0	0	.40	0	.10	1.40	27.00
.30	.10	0	.10	9.40	0	.80	0
0	0	0	0	0	0	0	0
0	0	0	0	.10	.10	0	1.90
0	0	0	0	0	0	0	.10
0	.30	.80	0	.40	.10	.40	4.60
.10	0	4.60	0	.60	2.70	7.20	20.50
4.90	0						
ML12926	.50	0	0	0	0	0	0
.50	0	.50	0	0	0	0	0
4.80	0	0	.10	0	0	0	.30
0	.10	0	.60	2.10	.50	0	0
0	0	0	0	0	.10	0	0
0	0	0	.50	0	0	1.00	27.90
0	.10	0	.10	8.30	0	1.50	.10
0	0	0	0	0	0	0	0
0	0	.10	0	.10	0	0	2.50
0	0	0	0	0	0	0	.10
0	.10	.80	0	.30	.50	.30	3.00
8.00	0	1.50	0	0	3.00	9.50	19.20
ML12927	.10	0	0	0	0	0	0
.30	0	.10	0	0	0	0	0
7.20	0	0	0	0	0	0	.10
0	0	0	.60	1.00	.40	0	0
0	0	0	0	0	0	0	0
0	0	0	.70	0	0	.70	29.90
0	.10	0	0	9.70	0	.40	0
0	0	0	0	0	0	0	0
0	0	0	0	0	.10	0	2.00
0	0	0	0	0	0	0	.10
0	0	0	0	.30	.40	.40	3.20
6.40	0	1.50	0	.30	3.30	8.10	21.20
ML12928	.80	0	0	0	0	0	.10
.60	0	.10	0	0	0	0	0
0	0	0	0	0	0	0	.30
0	0	.10	.10	1.30	0	0	0
0	0	0	0	0	0	0	0
0	0	0	.10	0	.30	1.90	27.00
.10	0	0	0	3.70	0	.80	.30
0	0	0	0	0	0	0	0
0	.60	0	0	0	.10	0	2.80
0	0	0	.40	0	0	0	0
0	.10	0	0	.60	.10	.40	1.90
.60	0	.30	0	.30	2.90	12.30	29.50
7.70	0						
ML12929	.40	0	0	0	0	0	0
.90	0	.30	0	0	0	0	0
4.60	0	0	0	0	0	0	.30
0	0	0	.10	1.60	0	0	0
0	0	0	0	0	0	0	0
0	0	0	.70	0	.10	1.00	27.60
.30	.10	0	0	5.90	0	1.80	.10
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1.50
0	0	0	0	0	0	0	.10
0	0	.30	0	.10	.40	.40	3.20
.10	0	1.20	0	.40	4.90	11.50	24.50
4.30	0						
ML12930	.30	0.00	0.00	0.00	0.00	0.00	0.00
.90	0.00	1.10	0.00	0.00	0.00	0.00	.10
5.00	0.00	0.00	.10	0.00	0.00	0.00	.40
0.00	0.00	0.00	.10	1.40	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	.40	0.00	.10	1.20	27.30
0.00	.30	0.00	0.00	7.80	0.00	2.20	.10
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	.40	0.00	0.00	.10	.30	4.10
.10	0.00	.70	0.00	.40	3.90	6.00	27.10
4.70	0.00						
ML12931	0	0	0	0	0	.10	.10
.40	0	1.20	0	0	0	0	0
5.30	0	0	0	0	0	0	.10
0	.10	.40	.10	.90	.10	0	0
0	0	0	0	0	0	0	0
0	0	0	.70	0	0	.60	30.50
0	.30	0	0	7.40	0	2.40	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1.00
0	0	0	.10	0	0	0	.10
0	0	0	0	.40	.30	.40	2.20
0	0	.60	0	.70	3.60	7.40	27.30
4.00	0						
ML12932	.70	0	0	0	0	.10	.20
1.10	0	.50	0	0	0	0	.40
2.60	0	0	0	0	0	0	.20
0	0	.10	.40	.70	.10	0	0
0	0	0	0	0	.10	0	0
0	0	0	.20	0	.20	3.10	28.50
0	.20	.10	.50	10.10	.10	.90	.10
0	0	0	0	0	0	0	.10
0	0	0	0	.20	.20	0	1.60
.10	.10	0	.10	0	0	0	.10
0	.50	.10	0	0	.80	.50	3.80
0	0	3.60	0	.50	2.80	6.40	17.60
7.40	0						
ML12933	1.10	0	0	0	0	0	.20
.50	0	.40	0	0	0	0	0
0	0	0	0	0	0	0	.80
0	0	.10	1.10	1.90	0	0	0
0	.10	0	0	0	0	0	0
0	0	0	.80	0	.20	1.90	29.00
0	.20	0	0	6.50	.10	1.80	.40
0	0	0	0	0	0	0	0
0	.50	0	0	.10	.20	0	1.40
0	0	0	0	0	0	0	.10
0	.40	.10	0	0	.10	.70	4.40
1.10	0	2.20	.10	.50	1.90	7.20	21.00
9.10	0						

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ML12935	2.00	0	0	0	0	.20	.50
1.00	0	1.20	0	0	0	0	0
1.20	0	0	0	0	0	0	1.20
0	.20	0	.20	.20	.50	0	0
0	0	0	0	0	0	0	0
0	0	0	.70	0	0	1.20	15.00
.20	0	.20	0	1.70	0	2.00	.20
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1.50
0	0	0	0	0	0	0	0
0	0	0	0	0	9.50	1.00	2.70
.70	0	0	0	.70	3.50	7.00	36.30
6.50	0						
ML12936	2.10	0.00	0.00	0.00	0.00	.10	.30
.90	0.00	1.90	0.00	0.00	0.00	0.00	0.00
1.30	0.00	0.00	0.00	0.00	0.00	0.00	1.10
0.00	.10	0.00	.10	.70	.10	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	.90	0.00	.50	1.70	16.10
.10	.50	0.00	0.00	3.10	.10	2.30	.30
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	.10	0.00	0.00	0.00	0.00	.90
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	4.10	.10	2.10
1.10	0.00	0.00	0.00	.30	3.70	8.20	33.90
8.80	0.00						
ML12937	1.30	0	0	0	0	0	.20
1.10	0	1.30	0	0	0	0	0
2.50	0	0	0	0	0	0	.40
0	0	0	.40	.40	0	0	0
0	0	0	0	0	0	0	0
0	0	0	.60	0	.20	1.30	11.30

.40	0	0	0	1.10	0	2.70	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1.80
0	0	0	0	0	0	0	.20
0	0	0	0	.40	4.70	.60	.90
.90	0	.20	0	.90	5.60	14.30	33.40
9.50	0						
ML12938	1.60	0.00	0.00	0.00	0.00	0.00	0.00
1.50	0.00	2.70	0.00	0.00	0.00	0.00	0.00
5.30	0.00	0.00	0.00	0.00	0.00	0.00	.90
0.00	.10	0.00	.40	.40	.10	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	1.60	0.00	0.00	1.50	11.80
0.00	.10	0.00	0.00	1.60	.10	2.80	.10
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	.60
0.00	0.00	0.00	.10	0.00	0.00	0.00	0.00
0.00	0.00	.10	0.00	.30	4.10	.70	.60
1.00	0.00	.10	0.00	.30	4.70	10.50	36.00
7.00	0.00						
ML12939	.90	0	0	0	0	.20	0
.60	0	1.10	0	0	0	0	0
4.10	0	0	0	0	0	0	.20
0	0	0	.40	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	.40	0	0	1.80	13.70
0	0	0	0	2.50	0	2.20	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1.10
0	0	0	.20	0	0	0	.20
0	0	.40	0	.40	3.90	.20	.60
.90	0	.40	0	.20	3.40	11.70	37.70
9.40	0						
ML12940	.50	0	0	0	0	.20	0
.50	0	1.30	0	0	0	0	0
6.30	0	0	0	0	0	0	1.30
0	0	0	.20	.80	0	0	0
0	0	0	0	0	0	0	0
0	0	0	1.10	0	.20	0	15.50
0	.20	0	0	3.30	.20	1.60	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	.50
0	0	0	0	0	0	0	.20
0	0	0	0	.80	3.30	.20	.50
.20	0	.20	0	.20	4.10	10.80	34.10
10.00	0						
ML12941	.30	0.00	0.00	0.00	0.00	0.00	0.00
1.00	0.00	1.80	0.00	0.00	0.00	0.00	0.00
3.30	0.00	0.00	0.00	0.00	0.00	0.00	.50
0.00	0.00	0.00	.30	.10	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	.80	0.00	.10	1.80	13.80
.10	.50	.10	0.00	2.50	0.00	2.80	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	.10	0.00	0.00	0.00	0.00	1.30
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	.50	0.00	.10	1.60	.10	1.00
.50	0.00	.60	0.00	.30	5.00	14.80	38.20
5.00	0.00						
ML12942	.90	0.00	0.00	0.00	0.00	0.00	.10
1.50	0.00	1.70	0.00	.10	0.00	0.00	0.00
2.80	0.00	0.00	0.00	0.00	0.00	0.00	.10
0.00	.40	0.00	.10	.60	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	1.50	0.00	.10	4.00	15.00
.10	.10	0.00	0.00	2.10	.10	2.50	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	.10	0.00	0.00	1.20
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	.60	0.00	.30	3.40	.40	.90
.40	0.00	.40	0.00	.60	3.90	13.40	33.10
6.00	0.00						
ML12943	.80	0.00	0.00	0.00	0.00	0.00	0.00
.80	0.00	.80	0.00	0.00	0.00	0.00	0.00

5.00	0.00	0.00	0.00	0.00	0.00	0.00	.80
0.00	0.00	0.00	0.00	.80	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	1.00	0.00	0.00	2.20	14.20
.20	.40	0.00	0.00	1.30	0.00	3.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	.40
0.00	0.00	0.00	.20	0.00	0.00	0.00	0.00
.40	0.00	.40	0.00	.20	3.20	0.00	1.00
8.40	0.00	.80	0.00	.20	3.00	11.80	37.90
ML12944	.90						
.90		1.10					
6.60							.50
				.90			
						3.90	19.10
	.10		.10	3.30	.50	1.30	
							1.50
		.30		.10	1.30	.30	.10
.30		.10		.30	1.90	8.80	37.70
5.30							
ML12945	.90						.20
.90		.90					
7.90			.20	.40			
			2.50		.40	2.50	18.80
.20				3.20	.40	2.30	
							1.80
.20		.90		.40	1.30		.20
		.90		.40	2.30	5.30	37.00
6.20							
ML12946	1.30						
1.50		.90					.20
5.80	.20			.40			
			.20	1.10	.40	2.40	14.20
.20	.40						
				.20			1.50
		.20		.40	1.30		.40
		.20		.20	2.40	8.30	46.70
6.10							
ML12947	1.30						
1.50		1.70					.60
			.40		.40		
			1.10		.20	4.60	12.50
	.40			1.50		2.00	
			.20				2.00
.20		.20		.20	2.60	6.90	46.20
9.80							
ML12948	.90						.30
.30		1.40					
4.90			.50	.10			.50
						3.80	11.70
		.10		1.40		1.10	
				.10			2.00
.10		.10		.10	2.70	.30	.10
6.20				.30	3.80	7.90	47.70
ML12949	.90						
.50		.70					1.10
8.10	.30		1.20	.10			
			.90		.30	2.00	15.90
.50				.70		2.00	

0	0	0	0	0	0	0	1.40
0	0	0	0	0	0	0	.50
0	0	.30	0	.30	2.40	0	.10
.10	0	0	0	.70	4.00	8.10	39.00
6.40	0						
ML12950	.60	0	0	0	0	0	.40
.60	0	1.70	0	0	0	0	0
1.90	0	0	0	0	0	0	1.10
0	.10	0	.60	.60	.10	0	0
0	0	0	0	0	0	0	0
0	0	0	.80	0	.10	4.80	12.60
.10	.10	.10	0	1.40	0	1.70	0
0	0	0	0	.10	0	0	1.10
0	0	0	0	0	.10	0	.10
0	0	.40	0	.10	2.10	0	.10
.30	0	0	0	.30	5.10	4.80	43.60
5.80	0						
ML12951	.30	0	0	0	0	0	.40
.40	0	1.20	0	0	0	0	0
3.80	0	0	0	0	0	0	.60
0	.30	0	.30	0	.10	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	.10	4.10	10.80
0	.10	.10	0	1.70	.10	2.50	0
0	0	0	0	0	0	0	0
0	0	0	0	.10	0	0	1.90
0	0	0	0	0	0	0	0
0	0	.30	0	0	1.70	0	.10
.90	0	.10	0	1.20	6.00	7.60	44.70
7.10	0						
ML12952	.90	0	0	0	0	0	.30
.40	0	3.00	0	0	0	0	0
2.80	0	0	0	0	0	0	.40
0	.30	0	.10	.60	0	0	0
0	0	0	0	0	0	0	0
0	0	0	1.80	0	.40	5.10	12.40
0	.30	.10	0	1.50	.30	1.80	.10
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1.20
0	0	0	0	0	0	0	0
0	0	.30	0	.40	1.50	0	.10
.40	0	0	0	.30	6.00	6.50	43.20
5.50	0						
ML12953	.80	0	0	0	0	0	.80
.50	0	2.60	0	0	0	0	0
3.60	0	0	0	0	0	0	.80
0	0	.10	.10	.50	.30	0	0
0	0	0	0	0	0	0	0
0	0	0	1.30	0	.10	3.50	13.90
0	.30	.10	0	3.50	0	1.60	0
0	0	0	0	0	0	0	0
0	.10	0	0	0	0	0	2.00
0	0	0	0	0	0	0	0
0	0	0	0	.50	2.30	0	.50
.60	0	.30	0	1.00	2.60	5.80	43.10
5.30	0						
ML12954	.80	0	0	0	0	0	.10
.60	0	3.40	0	0	0	0	0
2.90	0	0	0	0	0	0	.80
0	.10	.30	.30	.10	.10	0	0
0	0	0	0	0	0	0	0
0	0	0	1.50	0	.10	4.60	15.90
0	.60	0	0	2.70	0	2.90	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	2.40
0	0	0	0	0	0	0	0
0	.10	.30	0	1.00	1.30	0	0
.30	0	0	0	.60	6.20	3.20	38.30
5.50	0						
ML12954	1.00	0	0	0	0	0	.60
.40	0	2.00	0	0	0	0	.20
3.90	0	0	0	0	0	0	.80
0	.20	.60	.40	.20	.20	0	0
0	0	0	0	0	0	0	0
0	0	0	1.80	0	.20	3.30	11.10
0	.20	0	0	2.80	0	2.20	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1.00
0	.20	0	.20	0	0	0	0
0	0	.20	0	.40	1.20	0	0
.20	0	0	0	1.00	3.70	7.60	42.60
8.60	0						
ML12956	1.40	0	0	0	0	0	.10

.30	0	3.40	0	0	0	0	0
2.90	0	0	0	0	0	0	.30
0	0	.30	.10	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	1.90	0	.10	3.90	10.50
0	.50	.10	0	2.70	0	1.80	0
0	0	0	0	0	0	0	0
0	0	.10	0	0	0	0	1.80
0	0	0	0	0	0	0	0
0	0	.50	0	.90	.70	.10	0
.90	0	0	0	.10	6.30	7.40	40.20
9.20	0						
ML12957	1.70	0	0	0	0	0	0
.50	0	1.40	0	0	0	0	0
3.90	0	0	0	0	0	0	0
0	0	0	.20	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	1.90	0	0	5.60	14.20
0	1.10	0	0	2.80	0	1.40	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	3.40
0	0	0	0	0	0	0	.20
0	0	0	0	1.40	0	0	.20
.20	0	0	0	0	4.50	9.10	37.00
8.20	0						
ML12958	3.10	0	0	0	0	0	.20
.20	0	4.00	0	0	0	0	0
3.70	0	0	0	0	0	0	.20
0	0	.20	.50	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	2.00	0	.50	2.20	10.60
0	1.10	0	0	2.80	0	1.10	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	.80
0	0	0	0	0	0	0	0
0	0	0	0	.80	.80	0	0
.20	0	0	0	0	4.20	13.10	36.30
10.00	0						
ML12959	2.00	0	0	0	0	0	.40
.40	0	1.60	0	0	0	0	0
2.70	0	0	0	0	0	0	.90
0	0	.20	.20	.60	0	0	0
0	0	0	0	0	0	0	0
0	0	0	2.00	0	.20	7.90	9.40
0	.40	0	0	4.30	0	1.30	0
0	0	0	0	0	0	0	0
0	0	.20	0	0	0	0	2.00
0	0	0	0	0	0	0	0
0	.40	.60	0	.60	1.10	0	0
.90	0	.20	0	0	5.20	11.70	37.30
7.30	0						

Appendix 7: Percentages of Radiolaria categories of 18 K level samples.

FORMAT: see Appendix 6.

ML07250	1.90	0.00	.70	.10	.70	.50	.40
.30	.30	4.00	.10	2.20	0.00	0.00	.30
0.00	2.30	.80	.20	.30	0.00	3.00	1.60
.20	3.40	0.00	5.10	2.40	.70	0.00	.70
0.00	.30	.30	.10	0.00	.60	.60	0.00
1.10	.30	.10	.10	.30	.40	1.70	12.40
.40	.20	.70	14.00	.30	.40	0.00	0.00
.20	0.00	0.00	1.20	.50	1.40	.20	1.80
0.00	3.80	.80	1.20	.50	3.20	1.90	0.00
.30	.60	.10	5.60	.50	1.60	.70	0.00
.10	1.40	.30	.20	.50	2.40	0.00	0.00
.10	0.00	.30	0.00	.40	.50	0.00	0.00
.60	0.00						
MO07287	1.00	0.00	1.00	0.00	.30	.60	.10
.70	.10	3.70	.10	1.90	0.00	.10	.30
0.00	1.50	.90	.20	.50	0.00	4.20	2.10
.10	4.50	0.00	3.70	2.20	.30	0.00	.90
0.00	.70	.50	0.00	0.00	.20	.50	.10
.30	0.00	.30	0.00	.20	.10	.60	11.10
.60	.20	.50	16.90	.20	.20	0.00	0.00
.20	.20	0.80	1.10	.50	.20	.90	3.10
.10	3.30	.50	2.30	.10	2.90	2.30	0.00
.30	.90	.50	3.40	.10	1.80	1.00	0.00
.10	1.10	.20	.20	.20	3.00	0.00	0.00
0.00	0.00	.10	0.00	.20	.10	0.00	0.00
.90	0.00						
MO07256	.60	0.00	1.00	0.00	.60	.90	0.00
0.00	.10	3.60	0.00	1.60	0.00	.10	.90
0.00	2.80	0.00	.20	.60	0.00	5.40	2.00
0.00	4.40	0.00	4.90	3.10	1.30	0.00	1.50
0.00	.90	.10	0.00	0.00	0.00	.10	0.00
.50	.10	.10	.10	0.00	0.00	.60	6.50
0.00	0.00	.70	22.80	.50	.50	0.00	0.00
.90	.20	.10	1.50	.70	.50	.70	2.20
.30	5.90	0.00	1.00	.20	3.60	1.50	0.00
.20	.50	.10	2.40	0.00	1.40	.30	0.00
.10	1.90	0.00	.10	0.00	.60	0.00	0.00
.10	0.00	.10	0.00	.50	.30	0.00	0.00
.30	0.00						
MO12807	4.10	0	.30	0	0	0	.10
.60	.40	13.00	0	.30	.10	0	.10
.50	.20	0	.50	.10	.20	.30	4.40
0	.40	.60	.50	.50	.40	0	0
0	.90	0	0	0	1.00	.30	0
0	0	0	.20	.30	.60	1.20	8.70
1.10	1.00	.30	7.20	1.00	24.60	0	0
0	0	0	.10	0	.20	.10	.10
0	0	1.30	0	.20	.40	.10	0
.40	.50	.10	.50	0	0	0	.10
0	.10	1.00	0	4.70	3.50	.20	0
1.00	0	0	0	.80	0	0	.10
5.90	0						
ML07268	.20	0.00	.70	0.00	.50	1.40	.10
1.20	.30	6.10	0.00	1.20	0.00	0.00	.10
0.00	2.90	.60	.50	.10	.10	2.30	2.60
.10	3.40	.30	2.90	1.00	1.00	0.00	2.10
0.00	3.50	1.00	0.00	0.00	1.30	.30	.10
.50	0.00	.10	0.00	0.00	.70	2.50	19.90
1.00	.80	.50	9.60	1.00	4.20	0.00	0.00
0.00	0.00	0.00	.10	.40	0.00	0.00	2.40
.60	3.40	0.00	.10	0.00	2.20	.30	0.00
0.00	1.10	.20	.20	0.00	.30	1.60	.10
.10	.60	.90	.10	.20	1.60	0.00	.20

.10	0.00	0.00	0.00	.60	0.00	0.00	0.00
1.40	0.00						
ML13183	1.00	0.00	.10	0.00	0.00	.60	.90
.40	.50	6.00	.60	1.70	.20	0.00	.20
0.00	.20	0.00	0.00	.40	.10	10.70	3.10
0.00	0.00	.10	.10	2.30	.90	0.00	0.00
0.00	.20	.10	.10	0.00	3.10	.20	.10
0.00	0.00	.20	0.00	.10	.20	4.40	13.00
1.80	1.70	.10	15.10	.40	.90	0.00	.60
0.00	.10	.10	1.30	.10	.50	.90	1.60
0.00	.50	1.60	.50	0.00	1.20	.10	0.00
.60	1.30	0.00	.40	0.00	.10	0.00	.10
0.00	.20	.60	0.00	2.00	1.70	0.00	.50
1.20	0.00	0.00	0.00	.90	0.00	0.00	.10
6.50	0.00						
ML09201	.30	0.00	.60	0.00	.50	.10	.20
.30	.10	6.30	.80	1.90	0.00	.10	.20
0.00	1.30	.60	0.00	1.00	.10	3.90	2.10
0.00	2.50	0.00	2.50	1.70	.50	0.00	.50
0.00	1.80	.60	.20	0.00	.70	.50	.10
1.30	.40	.20	0.00	.20	.30	1.00	15.40
.30	.30	.50	14.60	0.00	1.10	0.00	0.00
.30	0.00	.10	.60	.60	.10	.20	1.00
.20	9.30	0.00	.10	.10	2.90	.70	0.00
.60	1.00	.10	2.60	0.00	1.70	1.20	0.00
0.00	1.30	.90	.40	.50	2.30	0.00	0.00
0.00	.10	.10	0.00	.10	0.00	0.00	0.00
.70	0.00						
ML09176	.10	0.00	.10	0.00	0.00	.10	0.00
0.00	.10	4.20	2.70	1.70	.40	.40	1.40
0.00	.20	0.00	.10	.10	0.00	4.40	3.10
.10	.40	0.00	.10	.60	.40	0.00	.10
.10	.50	.80	0.00	0.00	.20	1.30	.40
5.70	1.40	.20	.10	0.00	0.00	.10	4.60
.40	.60	.50	27.20	0.00	1.70	0.00	0.00
1.00	.90	.10	18.90	.10	0.00	.40	0.00
0.00	.20	0.00	3.80	0.00	.10	0.00	.10
0.00	.10	0.00	0.00	.40	0.00	.10	0.00
.20	.20	.10	0.00	.40	.40	0.00	0.00
0.00	0.00	0.00	.10	.20	0.00	0.00	0.00
3.10	0.00						
ML09181	.40	0.00	.30	0.00	.30	.80	.40
.20	0.00	5.00	1.70	1.80	.20	.20	.50
0.00	1.60	.40	0.00	.50	.10	3.40	1.00
.10	3.50	0.00	4.20	3.20	.80	0.00	0.00
0.00	1.90	.10	0.00	0.00	.40	1.10	.10
2.90	.30	.10	0.00	.10	.20	.30	11.70
.40	.20	.50	18.90	.10	.60	0.00	0.00
.30	0.00	0.00	.60	1.80	.10	1.30	.40
0.00	6.40	.20	1.20	0.00	4.30	.20	0.00
.10	.50	0.00	2.70	.20	.20	0.00	0.00
.40	1.40	.50	.10	.40	.60	0.00	0.00
0.00	.80	.30	0.00	.20	.90	0.00	0.00
.50	0.00						

Appendix 8: Opal and quartz data for surface samples (weight perc.).

ACC. NO.	LOCA-TION	OPAL CF.	QUARTZ C-O-F.
08194	1	60.70	06.40
08193	2	65.90	04.70
08014	3	22.60	04.80
08015	4	13.90	12.60
08035	5	09.30	14.80
08036	6	07.90	13.00
08037	7	08.80	09.80
09619	8	04.40	26.00
09620	9		
08034	10	06.70	18.60
08033	11	08.10	13.10
08032	12	16.60	12.30
08030	13	19.30	08.70
08031	14	23.50	10.80
08029	15	27.30	05.00
08028	16	27.10	02.70
08027	17	25.60	03.70
08023	18	04.60	16.90
08024	19	06.90	21.70
08022	20	25.70	12.80
08021	21	49.70	12.00
08020	22	38.90	06.20
08019	23	53.50	10.20
08018	24	55.50	03.40
08017	25	46.00	03.40
08016	26	47.50	02.80
08178	27	07.80	16.20
08183	28	07.20	10.30
12784	29	02.80	07.96
08047	30	09.40	08.10
11873	31	02.90	10.83
11874	32	00.77	06.68
11875	33	01.60	15.93
11876	34	74.10	07.34
11877	35	03.94	19.23
11878	36	02.48	21.63
11880	37	02.82	11.38
11881	38	03.46	04.19
11882	39	02.57	15.18
11883	40	02.86	20.78
11905	41	04.80	17.02
11884	42	03.04	18.90
11906	43	00.84	19.70
11907	44	00.69	20.24
08176	45	23.60	12.40
08184	46	04.60	15.00
08182	47	12.90	10.80
08181	48	10.90	08.30
04907	49	62.50	04.00
03978	50	53.50	05.10
03979	51	74.90	05.90
11885	52	00.42	02.13
11886	53	00.19	02.71
11887	54	00.50	04.44
11888	55	00.94	01.26
11889	56	00.00	00.00
08180	57	14.60	08.60
09621	58		
09622	59	04.40	26.00
09121	60	02.10	07.15
08042	61	10.60	11.50
08041	62	05.60	08.40
08040	63	10.10	08.10
08186	64	06.90	07.30
08049	65	08.40	07.20
11891	66	00.06	03.36
11892	67	00.00	02.52
11893	68		
11894	69	87.41	00.00
09104	70	17.00	03.00
08179	71	15.60	04.20
11847	72	18.12	12.68
11848	73	56.52	12.85
11849	74	35.36	09.83
11850	75	11.61	07.60
11851	76	04.42	08.04
11852	77	02.06	15.94
11896	78		
08187	79	05.50	07.50
08038	80	07.20	10.50
08185	81	06.90	11.80
08039	82	07.80	13.30
08177	83	13.20	13.40
08175	84	60.50	04.50
08174	85	50.70	06.60
11897	86	00.00	00.10
11853	87	01.62	00.50
08043	88	05.30	03.80
08044	89	06.50	05.80
08045	90	02.60	00.90
08046	91	09.80	08.90
08048	92	03.70	15.30
12971	93		
11856	94	02.03	05.07
11857	95	02.85	13.98
11858	96	03.22	41.22
11859	97	02.80	16.10
11860	98	02.67	17.38
11861	99	00.44	22.06
11862	100	00.82	16.55
11863	101	03.85	00.00
11864	102	02.02	00.00
11865	103		
11902	104	18.70	05.16
11866	105	06.90	17.72
11867	106	02.04	34.43
11868	107	02.87	25.79
11869	108	05.44	17.58
11870	109	02.86	22.49
11871	110	02.60	14.68
11903	111	03.03	04.58
12634	112	01.00	16.28

ACC. NO.	LOCA-TION	OPAL CF.	QUARTZ C-O-F.
12635	113	02.50	20.82
12636	114	02.00	19.90
12551	115	47.10	10.87
12552	116	21.20	00.00
12553	117	23.20	02.94
12554	118	19.00	09.13
12637	119	02.40	05.48
12555	120	03.15	18.58
12638	121	03.25	19.58
12639	122	02.60	20.02
12640	123	18.00	09.14
11901	124		
12306	125	04.85	51.10
12556	126		
12642	127	02.15	05.57
12557	128		
12312	129	36.70	03.95
12644	130	54.85	11.96
12645	131	38.00	11.12
12646	132	04.00	02.65
12647	133	06.00	03.30
12558	134		
12319	135	05.90	01.48
12560	136	10.60	02.12
12561	137	09.40	02.04
12562	138	04.10	00.10
12563	139	03.70	01.03
12322	140	02.60	02.77
12648	141	02.00	04.38
12564	142	49.30	12.13
12565	143	49.30	13.31
12324	144		
12325	145	41.65	01.19
12326	146	21.75	01.53
12327	147		
12649	148	25.60	06.45
12331	149	37.65	02.16
12333	150	29.40	00.00
12650	151	01.14	02.17
12651	152	03.80	06.28
12652	153	01.05	04.14
12653	154	04.60	06.60
12654	155	03.60	07.78
12566	156	14.10	06.69
12567	157	41.65	06.68
12568	158	05.20	06.32
12569	159	49.25	09.26
12655	160	36.40	00.00
12656	161	01.70	10.63
12657	162	02.80	17.64
12658	163	03.35	15.20
12659	164	02.65	06.78

CF= CARBONATE FREE PORTION

C-O-F.= CARB. AND OPAL FREE PORTION

Appendix 9: Opal and quartz data for down-core samples (weight perc.).

CORE V15-53

LVL. CM.	OPAL CF.	QTZ. COF.	QTZ. CF.
00	02.77	07.96	07.74
04	01.73	06.16	06.05
08	03.15	06.85	06.63
12	03.12	05.85	05.67
16	04.37	05.77	05.52
20	02.79	08.70	08.46
24	03.58	08.00	07.71
28	03.27	07.24	07.00
32	02.72	08.06	07.84
36	03.05	05.95	05.77
40	02.85	09.39	09.12
44	03.24	10.10	09.77
48	03.37	10.61	10.25
52	03.31	08.69	08.40
56	02.93	08.47	08.22
60	02.96	07.09	06.88
64	03.08	07.29	07.07
68	02.35	07.28	07.11
72	02.76	08.44	08.21
76	03.30	09.77	09.45
80	03.67	08.73	08.41

CORE RC17-213

LVL. CM.	OPAL CF.	QTZ. COF.	QTZ. CF.
000	06.88	17.70	16.48
005	06.10	16.60	15.59
010	06.40	14.38	13.46
015	06.38	14.23	13.32
020	02.84	12.36	12.01
025	05.69	14.54	13.71
030	05.98	12.78	12.13
035	04.91	12.36	11.75
040	05.52	12.18	11.51
045	05.17	12.18	11.55
050	06.23	14.32	13.43
055	05.33	13.65	12.92
060	05.48	13.25	12.52
065	05.77	14.03	13.22
070	05.77	14.63	13.79
075	05.43	10.73	10.15
080	05.55	14.44	13.64
085	05.84	13.90	13.09
090	04.95	11.74	11.16
095	06.04	13.13	12.34
100	05.94	13.97	13.14
105	06.43	14.63	13.69
110	05.83	14.03	13.21
115	05.55	11.35	10.72
120	05.46	14.34	13.56
125	06.35	15.39	14.41

CORE RC15-61

LVL. CM.	OPAL CF.	QTZ. COF.	QTZ. CF.
00	11.91	03.41	03.00
08	12.61	06.65	05.81
16	11.81	07.31	06.45
24	07.99	07.99	07.35
32	04.10	07.65	07.34
40	04.02	07.48	07.18
48	04.34	07.38	07.06
64	03.55	07.47	07.20
68	03.21	07.96	07.70
72	03.14	07.31	07.08
80	01.22	06.61	06.53

CORE V17-92

LVL. CM.	OPAL CF.	QTZ. COF.	QTZ. CF.
000	04.81	17.03	16.21
005	05.20	17.57	16.66
010	06.94	21.17	19.70
015	05.99	19.06	17.92
020	06.31	19.40	18.18
025	05.87	21.42	20.16
030	06.13	19.97	18.75
035	06.04	18.76	17.63
040	05.19	20.63	19.56
045	05.42	18.78	17.76
050	05.98	15.98	15.02
055	05.99	21.00	19.74
060	05.22	18.39	17.43
065	04.79	18.15	17.28
070	04.99	19.64	18.66
075	05.19	19.99	18.95
080	05.66	21.12	19.92
086	04.92	16.50	15.69
090	04.91	17.10	16.26
095	05.68	20.59	19.42
100	06.09	19.19	18.02
105	05.29	20.58	19.49
110	07.30	23.00	23.17
115	06.29	21.83	20.46
120	04.71	20.38	19.42
125	05.95	20.41	19.20

CF.= CARBONATE FREE PORTION

COF.= CARBONATE AND OPAL FREE PORTION

Appendix 10. Opal and quartz data for 18K samples (weight perc.).

Core	O.S.U. Access No.	Opal (c.f.)	Quartz (c and o.f.)	Quartz (c.f.)
Y69-71	M007250	49.94	02.00	00.60
Y69-73	M007287	33.32	02.93	01.96
Y69-106	M007256	59.40	10.29	04.18
Y71-6-12	M012807	04.49	12.00	11.32
V19-29	ML07268	20.20	15.00	11.28
V19-41	ML13183	19.98	08.00	06.29
V21-33	ML09201	78.71	26.00	05.48
RC11-230	ML09176	30.20	04.00	02.73
RC13-113	ML09181	92.42	28.00	02.10

c.f. = carbonate free

c and o.f. = carbonate and opal-free

The values of core Y69-73 were considered noise

Appendix 11: Mineralogical data for core V19-29 (weight perc.).

LVL.	OPAL	QTZ.	DET.	CARB.	DEN A	DEN B	S.R.
000	16.89	06.79	48.01	28.3	.5312	.3783	6.36
010	17.70	06.22	44.97	31.1	.5451	.3882	6.36
020	17.89	06.07	43.44	32.6	.5546	.3950	6.36
030	18.33	06.29	39.17	36.2	.5758	.4101	6.36
040	12.38	03.75	34.17	49.7	.6728	.4792	6.36
050	10.23	04.75	31.40	53.6	.7071	.5036	6.36
060	18.23	04.66	32.11	45.0	.6355	.4526	6.36
070	12.30	04.96	36.33	46.4	.6462	.4602	6.75
080	16.40	05.39	32.60	45.6	.6401	.4559	7.14
090	16.51	04.99	34.20	44.3	.6303	.4489	7.14
100	09.22	05.70	43.26	41.8	.6125	.4362	7.14
110	08.22	06.56	38.85	49.5	.6712	.4780	7.14
120	08.35	04.89	29.95	56.3	.7331	.5221	7.90
130	13.86	06.44	34.36	50.3	.6779	.4828	8.66
140	10.83	06.07	40.58	42.5	.6174	.4397	8.66
150	11.56	05.88	33.96	48.6	.5435	.4727	8.66
160	11.59	07.16	39.43	41.8	.6125	.4362	8.66
170	15.88	06.12	35.00	43.0	.6209	.4422	8.66
180	11.15	04.81	38.53	45.5	.6393	.4553	8.66
190	14.13	05.75	34.52	45.6	.6401	.4559	8.66
200	07.76	05.76	37.67	48.8	.6653	.4738	8.66
210	11.62	05.63	37.05	45.7	.6408	.4564	8.66
220	12.92	06.55	36.41	44.1	.6289	.4479	8.66
230	16.83	06.57	36.98	39.6	.5976	.4256	8.66
240	16.71	06.78	39.71	36.8	.5796	.4128	8.66
250	13.10	06.38	41.11	39.4	.5963	.4247	8.42
270	23.30	04.39	30.70	41.6	.6111	.4352	8.17
280	18.51	06.75	31.32	43.4	.6238	.4443	8.17
290	14.77	05.58	33.53	46.1	.6439	.4586	8.17
300	11.29	06.37	36.83	45.5	.6393	.4553	8.17
310	20.34	05.93	30.23	43.5	.6445	.4448	8.17
320	14.77	06.78	39.04	39.4	.5963	.4247	8.17
330	13.77	08.72	48.00	29.5	.5375	.3828	8.17
340	24.21	07.39	37.40	31.0	.5456	.3886	8.17
350	24.00	06.83	41.07	28.1	.5300	.3775	8.17
360	31.99	06.49	36.30	25.2	.5154	.3671	8.17
370	27.53	06.20	42.37	23.9	.5091	.3626	8.17
380	28.19	05.43	40.07	26.3	.5209	.3710	8.17
390	41.11	05.69	27.00	26.2	.5204	.3706	8.17
400	30.77	04.90	38.91	25.4	.5164	.3678	8.17
410	27.87	03.71	43.91	24.5	.5119	.3646	8.17
420	37.97	03.19	32.34	26.5	.5219	.3717	8.17
430	38.39	04.20	29.71	27.7	.5154	.3761	8.17
440	26.72	04.82	39.05	29.4	.5369	.3824	8.17
450	15.05	05.63	46.82	32.5	.5541	.3946	8.17
460	22.48	04.96	38.96	33.6	.5604	.3991	8.17
470	32.93	04.06	67.61	35.4	.5710	.4067	8.17
480	26.81	06.40	33.23	33.5	.5598	.3987	8.17
490	19.27	06.58	50.05	24.1	.5101	.3633	8.17
500	29.47	06.56	38.79	25.9	.5190	.3696	8.37
510	20.83	07.15	37.82	34.2	.5639	.4016	9.58
520	13.74	07.53	46.81	31.9	.5502	.3922	9.58
530	19.21	07.37	42.02	31.4	.5479	.3902	9.58
540	22.31	07.34	39.74	30.6	.5434	.3870	9.58
550	14.56	06.57	44.97	33.9	.5621	.4003	9.58
560	18.61	07.38	44.20	29.8	.5390	.3839	9.58
570	18.24	07.15	46.41	28.2	.5306	.3779	9.58
580	21.97	07.16	46.15	24.7	.5129	.3653	9.58

590	26.66	07.55	47.89	17.9	.4819	.3432	9.58
600	23.54	07.84	47.80	20.8	.4947	.3523	9.58
610	29.56	06.48	36.05	27.9	.5291	.3768	7.29
620	27.46	07.26	44.37	20.9	.4951	.3526	5.00
630	25.16	04.70	28.13	42.0	.6139	.4372	5.00
640	11.45	06.40	44.55	37.6	.5847	.4164	5.00
650	12.05	06.36	41.99	36.9	.5802	.4132	5.00
660	11.72	07.10	54.48	26.7	.5229	.3724	5.00
670	06.14	05.50	68.36	20.0	.4910	.3497	5.00
680	13.01	08.19	49.90	28.9	.5343	.3805	5.00
690	14.00	09.23	54.67	22.1	.5006	.3565	5.00
700	09.86	06.99	60.25	22.9	.5044	.3592	5.00
710	17.63	09.36	53.81	19.2	.4875	.3472	5.00
720	16.94	07.98	56.88	18.2	.4832	.3441	5.00
730	18.00	07.82	50.78	23.4	.5067	.3609	5.00
740	17.51	06.81	49.28	26.4	.5213	.3713	5.00
750	09.50	06.29	53.71	30.5	.5428	.3866	5.00
760	13.17	09.19	50.24	27.4	.5265	.3750	5.00
770	11.97	09.53	58.90	19.6	.4893	.3485	5.00
780	09.49	09.65	60.26	20.6	.4937	.3516	5.00
790	18.08	08.81	54.41	18.7	.4854	.3457	5.00
800	18.29	08.35	51.56	21.8	.4992	.3555	5.00
810	19.67	07.02	48.31	25.0	.5145	.3664	5.00
820	17.63	05.65	37.12	39.6	.5976	.4256	5.00
830	18.44	07.06	40.10	34.4	.5650	.4024	5.00
840	21.44	07.05	40.01	31.5	.5484	.3906	5.00
850	14.72	06.91	50.67	27.7	.5281	.3761	5.00
860	16.78	06.49	38.43	38.3	.5892	.4196	5.00
870	16.75	06.85	46.40	30.0	.5402	.3847	5.00
880	08.21	07.75	47.94	36.1	.5752	.4097	5.07
890	10.26	07.92	48.32	33.5	.5598	.3987	5.07
900	09.19	07.27	47.54	36.0	.5746	.4093	5.07
910	21.43	05.83	36.34	36.4	.5770	.4110	5.07
920	22.74	06.84	34.92	35.5	.5716	.4071	5.07
930	19.07	05.23	35.30	40.4	.6029	.4294	5.07
940	19.67	06.14	43.19	31.0	.5456	.3886	5.07
950	19.31	05.93	40.76	34.0	.5627	.4008	5.07

DEN B = Bulk density estimated through the regressive equation defined by Luz and Shackleton (1975):

$$D = \frac{1}{3.379 - 0.026\ (\%\ \text{carbonate})}$$

DEN A = Bulk density B corrected by the coefficient 1.4041.

Appendix 12: Mineralogical data for core Y71-6-12 (weight perc.).

LVL.	OPAL	QTZ.	DET.	CARB.	DEN A	DEN B	S.R.
000	07.22	10.98	73.40	08.4	.5858	.3163	0.84
006	05.30	11.72	72.73	10.2	.5949	.3212	0.84
012	05.36	09.01	62.25	21.4	.6334	.3542	2.14
018	03.41	08.60	64.06	23.9	.6718	.3627	2.14
024	05.04	09.02	60.19	25.7	.6599	.3690	2.07
030	03.13	07.84	62.73	26.3	.6869	.3709	2.00
036	04.03	08.55	64.12	23.3	.6677	.3605	2.00
042	04.00	08.48	60.67	26.8	.7189	.3730	2.00
048	05.96	08.65	53.97	31.4	.7229	.3903	2.00
054	03.37	07.62	58.32	30.7	.7175	.3874	1.75
060	04.79	08.52	53.39	33.3	.7753	.3979	1.50
066	03.63	08.72	56.02	31.6	.7244	.3911	1.50
072	03.94	06.81	55.57	33.7	.7397	.3994	1.50
078	04.27	08.24	57.79	29.7	.7105	.3836	1.50
084	06.72	07.62	64.55	21.1	.6408	.3533	1.50
090	05.66	07.87	63.55	22.9	.6435	.3593	1.50
096	04.54	11.27	69.22	15.0	.6193	.3344	1.50
102	03.58	10.39	72.94	13.1	.6093	.3290	1.75
108	04.29	11.03	70.10	14.6	.6299	.3333	2.00
114	04.00	09.82	73.46	12.7	.6075	.3280	2.00
120	03.76	09.16	70.75	16.3	.6268	.3384	2.00
126	03.89	11.76	70.89	13.4	.6386	.3301	1.10
132	04.50	10.01	68.08	17.4	.6487	.3417	1.10
138	03.95	10.74	67.91	17.4	.6231	.3416	1.10
144	05.33	10.58	77.60	06.5	.5991	.3114	1.10
150	08.58	14.92	73.88	02.6	.5784	.3020	1.10
156	05.03	12.03	65.02	17.9	.6356	.3432	1.10
162	03.55	10.94	71.93	13.6	.6119	.3304	1.10
168	05.07	11.17	71.18	12.6	.6067	.3276	1.10
174	05.24	10.85	67.72	16.2	.6260	.3380	1.10
180	05.01	09.86	61.10	24.0	.6367	.3630	1.10

DEN A = Measured bulk density.

DEN B = Bulk density estimated through the regressive equation defined by Luz and Shackleton (1975); see Appendix 11.

Appendix 13: Mineralogical accumulation rates for cores V19-29 and Y71-6-12 (gm/cm^2/1000 yrs).

CORE V19-29

LVL.	OPAL	QTZ.	DETRIT.	CARB.
000	56.20	22.41	160.57	93.67
010	60.77	21.29	154.16	106.44
020	62.13	20.94	151.47	111.69
030	66.29	22.46	141.64	130.41
040	52.07	15.66	144.37	207.45
050	45.43	20.93	139.86	236.07
060	72.81	18.40	128.42	180.02
070	53.24	21.21	157.11	199.10
080	74.52	24.08	148.13	204.48
090	73.80	21.92	152.98	196.81
100	39.98	24.77	187.71	178.15
110	39.07	30.97	184.85	233.44
120	50.96	27.80	173.14	324.28
130	80.35	37.26	199.70	291.11
140	57.31	31.84	214.90	222.86
150	53.70	27.08	158.31	224.15
160	60.53	37.37	207.37	215.79
170	84.25	32.53	186.62	229.28
180	61.00	26.38	211.57	247.29
190	77.61	31.37	189.89	247.68
200	44.04	32.60	215.03	274.51
210	63.85	30.82	203.65	247.68
220	69.67	35.11	196.59	237.64
230	86.25	33.37	189.45	200.23
240	83.16	33.36	197.68	179.26
250	65.58	31.54	205.76	195.25
260	90.45	26.41	178.85	199.08
270	115.31	21.28	151.94	202.91
280	93.36	33.81	157.95	216.99
290	76.56	28.65	174.48	239.58
300	57.97	32.61	190.47	232.92
310	105.89	30.78	157.54	224.31
320	70.97	32.34	188.28	188.28
330	59.59	37.84	208.79	126.14
340	106.83	32.23	165.10	136.85
350	103.03	29.19	176.01	120.20
360	133.07	26.70	151.43	104.29
370	113.38	25.56	174.40	94.83
380	118.36	22.74	168.48	109.51
390	173.11	23.59	113.72	109.51
400	128.31	20.48	162.59	104.49
410	115.07	15.31	181.71	99.34
420	159.94	13.08	136.31	109.72
430	159.77	17.52	123.89	112.63
440	115.92	20.84	169.32	125.91
450	67.31	25.13	210.01	143.60
460	101.61	22.23	176.45	149.69
470	152.17	18.50	312.66	161.88
480	121.35	28.98	150.33	149.42
490	79.32	26.85	206.55	99.14
500	126.65	28.00	166.71	107.69
510	111.25	37.97	202.17	181.85
520	71.58	39.19	244.53	161.98
530	99.77	37.93	218.25	161.09
540	115.03	37.66	204.79	154.76

550	77.42	34.70	239.72	176.19
560	95.24	37.38	226.33	148.49
570	91.64	35.75	233.62	140.98
580	106.52	34.53	224.23	116.74
590	121.55	34.27	218.42	77.68
600	110.29	36.61	224.33	93.86
610	112.36	24.38	137.12	102.84
620	67.82	17.82	109.64	49.50
630	76.93	14.41	86.13	128.73
640	33.29	18.69	129.94	108.04
650	34.80	18.27	121.51	104.40
660	30.54	18.53	141.98	67.86
670	14.98	13.50	167.68	49.10
680	34.71	21.63	133.23	74.76
690	35.00	23.00	136.50	55.00
700	24.70	17.39	151.70	55.44
710	42.86	22.65	131.00	46.27
720	40.81	19.08	137.17	43.47
730	45.54	19.73	128.27	58.19
740	45.59	17.71	128.17	67.73
750	25.75	16.80	145.53	81.30
760	34.45	23.93	132.03	71.01
770	29.10	23.23	144.01	46.46
780	23.17	23.66	148.39	49.30
790	43.65	21.34	131.92	43.65
800	45.41	20.71	128.49	52.39
810	50.37	17.99	124.13	64.25
820	52.54	16.72	110.74	116.41
830	51.98	19.78	113.28	96.05
840	58.64	19.18	109.60	84.94
850	38.81	18.22	133.58	71.28
860	49.18	18.85	113.09	111.91
870	45.09	18.36	125.28	81.00
880	23.57	22.14	137.71	103.50
890	28.51	22.08	135.00	92.23
900	26.12	20.66	136.32	103.32
910	61.74	16.73	104.73	103.86
920	64.81	19.41	99.64	99.93
930	57.19	15.65	106.25	120.40
940	53.41	16.62	117.45	84.48
950	54.23	16.58	114.37	95.54

CORE Y71-6-12

LVL.	OPAL	QTZ.	DETRIT.	CARB.
000	3.37	5.10	34.35	3.74
006	2.52	5.56	34.55	4.75
012	7.05	11.96	82.68	27.92
018	4.79	12.12	90.18	32.41
024	6.59	11.86	79.21	32.95
030	4.25	10.70	86.02	35.67
036	5.34	11.34	85.51	30.68
042	5.74	12.06	87.02	37.34
048	8.52	12.42	77.83	44.76
054	4.02	9.26	71.06	36.57
060	5.46	9.88	61.96	38.36
066	3.91	9.45	60.82	33.67
072	4.32	7.54	61.52	36.58
078	4.47	8.73	61.45	30.89
084	6.43	7.30	61.92	20.16
090	5.40	7.52	61.25	21.22
096	4.18	10.40	64.25	13.93
102	3.62	10.66	75.47	13.46
108	5.28	13.84	88.19	17.61
114	4.86	11.90	89.11	14.57
120	4.63	11.39	88.52	20.03
126	2.67	8.21	49.69	9.12
132	3.21	7.13	48.47	12.12
138	2.67	7.33	46.53	11.65
144	3.49	6.92	51.13	3.95
150	5.40	9.47	46.92	1.27
156	3.49	8.38	45.40	11.87
162	2.35	7.33	48.32	8.74
168	3.33	7.40	47.40	8.00
174	3.58	7.44	46.62	11.02
180	3.50	6.86	42.75	16.79

Appendix 14: Sedimentation rates of cores used in this study (cm/1000 yrs).

$\delta^{18}O$ Stage	Core V19-29	Core Y71-6-12	Core V15-53	Core RC15-61	
1	6.36	0.84	2.18	3.63	
					— 11,000 yrs.
	7.14	2.14	2.28	4.00	
- - - 2 - - -	- - - - - - -	- - - - - - - -	- - - - - -	- - - - - - -	- 18,000 yrs.
	8.66	2.00			
					— 33,000 yrs.
3	8.17	1.50			
					— 63,000 yrs.
4	9.58	2.00			
					— 75,000 yrs.
5	5.00	1.10			
					—127,000 yrs.
6	5.07				
					—194,000 yrs.

Appendix 15: Varimax Factor Score Matrix (F).

	CATEGORY	ANTARCT.	SUBTROP.	CHILE	PERU	SUBANT.	EQUAT.
1	S1	.0249	.0339	.0966	.1010	.0151	.1536
2	S8	.0089	.0003	.0169	.0115	-.0093	.0048
3	S10	.0136	.0806	.5877	.0881	-.1689	-.3111
4	S11	.0012	.0286	-.0104	-.0313	.0004	-.0042
5	S12	.0022	.0829	-.0151	-.0178	.0077	.0220
6	S13	.0009	.0219	-.0039	-.0253	.0016	-.0037
7	S13A	.0002	.0076	-.0032	-.0020	.0001	.0048
8	S14	-.0062	.0197	-.0371	-.0108	-.1302	-.0503
9	S15	.0349	-.0018	-.0115	.0033	-.0405	-.0045
10	S17	-.0009	.0308	.0073	.0074	-.0101	.0699
11	S17A	.0002	.0041	-.0029	.0031	.0005	.0177
12	S19	.0002	.0285	-.0080	.0144	.0011	.0157
13	S23	.0070	.2231	-.0402	-.0952	.0186	-.1412
14	S24	-.0012	.0914	.5257	-.0404	-.1007	.0480
15	S30	.0003	.1118	-.0035	-.0469	-.1801	.2456
16	S33	.0001	.0037	-.0016	-.0025	-.0006	-.0007
17	S34	-.0131	.0438	-.0783	.8927	-.0211	-.1789
18	S36C	-.0018	.0321	.0146	.0622	-.0071	.0051
19	S37	.0015	.0409	-.0120	-.0370	.0041	.0406
20	S39	.0025	.0581	-.0225	-.0675	.0024	.0322
21	S40	.0010	.0232	-.0065	-.0312	.0000	-.0102
22	S41	.0143	.0076	-.0005	-.0049	-.0234	.0345
23	S47	.0211	.0150	.3614	-.0684	-.1148	.2837
24	S50	-.0052	.0275	.1147	.0299	-.0560	-.0958
25	S51	-.0010	.0236	.2276	.0188	-.0567	-.1348
26	S53	.0002	.0231	-.0092	.0148	.0012	.0375
27	S54	.0184	.9206	-.1097	-.0344	.0407	-.1172
28	S56	.0533	-.0044	-.2162	.0009	-.9186	.0122
29	S58	.0280	-.0009	-.0012	.0017	-.0025	-.0064
30	N1	.0023	.0566	-.0113	-.0518	.0066	.0010
31	N1A	.0006	.0165	-.0073	-.0159	-.0007	.0034
32	N13	.0001	.0064	-.0028	-.0020	-.0002	.0091
33	N2	.0004	.0184	-.0087	-.0059	.0009	.0414
34	N3	.0002	.0129	-.0048	-.0075	.0025	.0629
35	N4	.0006	.0343	-.0085	-.0192	-.0017	.0376
36	N5	-.0009	.0080	.0225	.0615	.0104	.0611
37	N6	-.0001	.0048	.0010	.0126	.0028	.0189
38	N7	-.0011	.1577	-.0355	.1372	.0160	.3706
39	N8	.0002	.0231	.0302	.0358	-.0126	.0116
40	N9	.0033	.0855	-.0329	-.0765	.0016	.0181
41	N11	.0001	.0634	.0005	-.0201	.0029	.2441
42	N12	.0012	.0236	-.0127	.0624	-.0010	.1751
43	N14	.0530	-.0008	-.0254	.0037	-.0390	-.0161
44	N15	-.0034	-.0033	.1226	-.0070	.0001	.0744
45	N16	-.0038	.0368	.1360	.0035	.0630	-.0032
46	N18	.0066	.0689	.0196	.0123	-.0010	.4487
47	N19	.0008	.0242	-.0116	-.0245	.0018	.0731
48	N24	-.0014	.0032	-.0052	.1459	.0076	.1056
49	N25	-.0000	.0047	-.0034	.0041	-.0005	.0140
50	N27	.0019	.0416	-.0208	-.0499	-.0013	.0084
51	N28	.0006	.0201	-.0068	-.0077	.0027	.0753
52	N33	.0003	.0212	.1761	-.0116	-.0610	.0187
53	N35	.0346	.0249	.1214	.2958	.0644	.3927
54	N35A	.0119	-.0028	.0235	.0068	-.0384	.0475
55	N36	.0364	-.0030	-.0018	.0164	-.0985	.0261
56	N38	.0214	.0047	.0067	.0353	-.0666	.0366
57	N42	.0002	.0080	.0096	-.0143	.0042	.0109
58	N43	.0854	.0026	-.0163	.0020	-.0092	.0260
59	N49	.2511	-.0047	.0326	-.0017	.1125	-.0141
60	N50	.9574	-.0214	-.0130	.0002	.0323	-.0240

Appendix 16: Varimax Factor Matrix (B)

LOC.	ACCESS	COMM.	ANTARC. (F1)	SUBTROP. (F2)	CHILE (F3)	PERU (F4)	SUBANT. (F5)	EQUAT. (F6)
001	MO08194	.9587	.0264	.9498	.0351	.0369	-0.0421	.2271
002	MO08193	.8508	.0261	.6984	.1033	.0948	-0.0771	.5803
003	MO08014	.9600	.0237	.9740	.0719	.0144	-0.0470	.0557
004	MO08015	.8658	.0393	.7770	.1659	.2259	-0.0233	.4260
005	MO08035	.9566	.0331	.8060	.0131	.5490	-0.0445	-0.0482
006	MO08036	.9135	.0325	.8305	.1810	.4337	-0.0155	.0386
007	MO08037	.8589	.0371	.8436	.1782	.3107	.0007	.1325
010	MO08034	.9683	.0483	.6580	.0461	.7280	-0.0307	-0.0041
011	MO08033	.9203	.0194	.8668	.2385	.3252	-0.0672	.0373
012	MO08032	.9556	.0217	.9470	.1679	.1672	-0.0459	.0025
013	MO08030	.9855	.0234	.9908	-0.0365	-0.0247	-0.0170	-0.0333
014	MO08031	.9858	.0229	.9899	-0.0708	-0.0135	.0107	-0.0053
015	MO08029	.9833	.0247	.9910	-0.0105	-0.0108	.0175	.0059
016	MO08028	.9707	.0230	.9795	-0.0379	-0.0624	-0.0086	-0.0729
017	MO08027	.9545	.0219	.9649	-0.0303	-0.0850	-0.0069	-0.1217
018	MO08023	.9333	.0081	.5425	.0120	.7949	-0.0352	-0.0754
019	MO08024	.9316	.0276	.5152	.0769	.7503	-0.0078	.3107
020	MO08022	.9642	.0239	.9543	.0640	.2113	-0.0371	.0533
021	MO08021	.8166	.0264	.7907	.1241	.1115	-0.0389	.4016
022	MO08020	.9603	.0241	.9754	.0723	.0340	-0.0128	.0423
023	MO08019	.9236	.0228	.9464	.0759	.0821	-0.0026	.1218
024	MO08018	.9790	.0235	.9866	.0632	.0250	-0.0077	.0186
025	MO08017	.9745	.0226	.9862	.0318	-0.0214	-0.0010	-0.0008
026	MO08016	.9329	.0239	.9608	-0.0278	-0.0331	.0047	.0855
027	ML08178	.8681	.0255	.7240	.0748	.6233	-0.0306	.2197
028	ML08183	.9494	.0415	.9606	-0.0259	.1361	-0.0626	-0.0417
030	ML08047	.9053	.0140	.1602	.8908	.0455	-0.2336	-0.1712
034	ML11876	.9423	.9619	-0.0063	.0788	.0613	.0549	.0631
036	ML11878	.9950	.9950	-0.0079	.0606	.0148	-0.0261	-0.0206
039	ML11882	.8986	.4648	.2765	.5340	.0216	-0.4945	.2757
040	ML11883	.9833	.8898	-0.0020	-0.0496	.0175	-0.4343	.0160
041	ML11905	.9937	.9960	-0.0115	.0130	.0122	-0.0348	-0.0067
042	ML11884	.9977	.9982	-0.0157	.0195	.0099	.0199	-0.0089
045	ML08176	.9556	.0294	.8432	.1340	.3702	-0.0455	.2943
046	ML08134	.9615	.0114	.6500	.1317	.6825	-0.0631	-0.2274
047	ML08132	.9590	.0191	.8887	.2776	.2386	-0.0761	-0.1704
048	ML08131	.9584	.0215	.9655	.0317	.1275	-0.0155	-0.0913
049	ML04907	.9721	.0211	.9847	.0072	.0116	-0.0306	-0.0286
050	ML03978	.9877	.0228	.9932	.0077	-0.0191	-0.0154	-0.0111
051	ML03979	.9606	.0221	.9692	.0802	-0.0195	-0.0593	.1022
057	ML08180	.9680	.0208	.9622	.0989	.0059	-0.0320	-0.1756
061	ML08042	.8543	.0304	.7108	.5302	.2303	-0.1032	.0574
069	ML11894	.9483	.0233	.9690	-0.0559	-0.0507	-0.0219	.0514
070	ML09104	.9460	.0219	.9574	-0.0350	-0.0829	.0119	-0.1441
071	ML08179	.9748	.0213	.9743	.0083	-0.0720	-0.0029	-0.1404
072	ML11847	.9799	.9421	.0094	.0505	.0310	-0.2976	.0134
073	ML11848	.9747	.9023	.0320	.1279	.0274	-0.3764	.0282
074	ML11849	.9848	.9744	.0125	.0682	.0341	-0.1688	.0288
075	ML11850	.9945	.9832	-0.0055	.0694	.0238	-0.1497	.0326
076	ML11851	.9803	.9470	-0.0006	.0284	.0137	-0.2849	.0370
077	ML11852	.9878	.9679	.0028	.0548	.0136	-0.2143	.0428
082	ML08039	.9229	.0287	.8670	.3283	.2042	-0.0908	-0.1128
083	ML08177	.9691	.0184	.9172	.1014	.3335	-0.0391	-0.0670
084	ML08175	.9299	.0225	.9505	.0017	-0.0085	-0.0448	.1542
085	ML08174	.9477	.0199	.9666	.0193	-0.0142	-0.0505	.0992
091	ML08046	.9524	.0253	.2021	.9199	.0852	-0.2397	.0067
093	ML12979	.8299	.0353	.1503	.8326	.0428	-0.2210	.2484
095	ML11857	.9065	.2148	.2344	.4777	.0319	-0.7292	.2108
096	ML11858	.7260	.4293	.2381	.4434	-0.0146	-0.4968	.2033
097	ML11859	.9944	.9934	-0.0080	.0490	.0151	-0.0689	.0039

(continued on next page)

098	ML11860	.9794	.9878	-0.0161	.0199	.0070	.0531	-0.0142
099	ML11861	.8982	.9451	-0.0127	.0504	.0092	.0381	-0.0269
100	ML11862	.9946	.9962	-0.0169	.0126	.0102	.0393	-0.0115
104	ML11902	.8520	.1164	.1359	.3148	.0410	-0.8352	-0.1470
105	ML11866	.9810	.8840	.0323	.0522	.0043	-0.4421	.0173
106	ML11867	.9922	.9665	-0.0082	.0090	.0152	-0.2404	.0015
107	ML11868	.9885	.9930	-0.0138	.0293	.0102	.0353	-0.0020
108	ML11869	.9836	.9885	-0.0042	.0236	.0318	-0.0665	.0209
109	ML11870	.9635	.9087	.0642	.1613	.0144	-0.3078	.1128
111	ML11903	.9643	.3088	.0641	.0417	.0173	-0.9231	.0390
112	ME12634	.9816	.9837	-0.0118	.0171	.0077	-0.1140	-0.0181
115	ME12551	.9885	.9620	-0.0030	.0591	.0143	-0.2435	-0.0021
116	ME12552	.9707	.9848	-0.0198	-0.0074	.0048	.0020	-0.0174
117	ME12553	.9919	.9954	-0.0178	.0109	.0068	.0088	-0.0222
118	ME12554	.9955	.9972	-0.0169	.0166	.0056	.0187	-0.0111
122	ME12639	.9953	.9966	-0.0160	.0194	.0076	-0.0202	-0.0314
123	ME12640	.9306	.9634	-0.0140	.0285	.0318	-0.0158	.0114
124	ME11901	.9653	.9791	-0.0062	.0757	.0174	.0053	-0.0226
127	ME12642	.9961	.9969	-0.0149	.0300	.0172	.0239	-0.0189
128	ME12557	.9827	.9865	-0.0133	.0277	.0543	.0459	.0586
129	ME12643	.9915	.9953	-0.0190	.0012	.0105	-0.0060	-0.0170
130	ME12644	.9847	.9661	.0246	.1459	.0211	-0.1668	.0330
131	ME12645	.9912	.9724	-0.0050	.0543	.0100	-0.2040	-0.0301
141	ME12648	.8909	.0636	.1816	.6273	-0.0029	-0.6740	.0790
142	ME12564	.8729	.0928	.1474	.7284	.0353	-0.5381	-0.1456
144	ME12324	.9828	.9836	-0.0048	.0561	.0612	-0.0718	.0560
145	ME12325	.9939	.9964	-0.0162	.0048	.0125	.0248	-0.0028
147	ME12327	.9929	.9936	-0.0086	.0528	.0133	-0.0345	-0.0384
148	ME12649	.9619	.9798	-0.0172	.0249	.0037	.0186	-0.0248
149	ME12331	.9726	.9848	-0.0158	.0210	.0093	.0398	-0.0181
150	ME12333	.9969	.9965	-0.0143	.0187	.0143	-0.0540	-0.0150
156	ME12556	.9444	.9554	.0109	.1650	.0107	-0.0595	-0.0247
157	ME12567	.9465	.8183	.0286	.1785	.0248	-0.4936	-0.0038
158	ME12568	.9558	.3750	.0862	.3860	.0148	-0.8113	-0.0172
159	ME12569	.9771	.5308	.0851	.2288	.0250	-0.7968	-0.0186
160	ME12655	.9905	.9944	-0.0190	.0050	.0060	.0308	-0.0185
		VARIANCE	42.215	35.383	5.459	4.092	6.485	1.684
		CUM. VAR	42.215	77.598	83.057	87.149	93.634	95.318

Appendix 17: Classification Analysis results (THREAD) for surface samples.

DUPLICATED SAMPLES

LOC.	ACCESS	COMM.	ANTARC. (F1)	SUBTROP. (F2)	CHILE (F3)	PERU (F4)	SUBANT. (F5)	EQUAT. (F6)
005	MO08035	.9290	.0234	.7250	.0566	.6278	-0.0659	.0330
010	MO08034	.9641	.0143	.7174	.0828	.6640	-0.0385	-0.0058
018	MO08023	.9435	.0099	.6045	.0734	.7538	-0.0555	-0.0349
019	MO08024	.9413	.0231	.3869	.1013	.8526	-0.0219	.2310
028	ML08183	.9609	.0238	.9562	.0672	.1853	-0.0338	-0.0778
046	ML08184	.9530	.0089	.6961	.0860	.6563	-0.0436	-0.1683
104	ML11902	.6946	.1374	.2440	.4365	.0199	-0.6387	-0.1316
105	ML12908	.9496	.6536	.0238	-0.1164	.0117	-0.7109	.0531
108	ML11869	.9907	.9918	-0.0079	.0357	.0259	-0.0671	.0234
129	ME12312	.9760	.9872	-0.0155	.0218	.0091	.0093	-0.0223

SAMPLES CONTAINING SCARCE RADIOLARIA

LOC.	ACCESS	COMM.	ANTARC. (F1)	SUBTROP. (F2)	CHILE (F3)	PERU (F4)	SUBANT. (F5)	EQUAT. (F6)
008	MO09619	.7320	.0597	.5280	.1631	.5569	-0.0143	.3357
029	ML12784	.4291	.0298	.1307	.5676	.1123	-0.2166	.1714
035	ML11877	.9296	.9584	-0.0002	.0976	.0186	.0235	-0.0240
043	ML11906	.9390	.9534	.0003	.0951	.0125	-0.1339	-0.0542
044	ML11907	.9926	.9950	-0.0174	.0174	.0053	.0376	-0.0216
062	ML08041	.3750	.0033	.1759	.5274	.0379	-0.1299	-0.2182
080	ML08038	.7389	.0116	.5050	.4575	.4100	-0.2260	-0.2352
081	ML08185	.5636	.0044	.2876	.5636	.2256	-0.1706	-0.2885
103	ML11865	.8343	.0276	.3789	.7436	.0401	-0.3649	-0.0479
110	ML11871	.8305	.0451	.2905	.6952	.0237	-0.4729	.1914
113	ME12635	.9792	.9889	-0.0182	.0009	.0047	.0205	-0.0199
121	ME12638	.9910	.9936	-0.0167	.0253	.0116	.0443	-0.0261
136	ME12560	.7054	.0846	.1146	.7449	.0566	-0.2615	-0.2424
143	ME12565	.8627	.4819	.1068	.6306	.0247	-0.4649	-0.0675
153	ME12652	.5470	.0446	.1920	.6402	.0827	-0.1865	-0.2381
163	ME12658	.3665	.0595	.0885	.4946	.0550	-0.2701	-0.1860
164	ME12659	.9908	.9947	-0.0184	.0015	.0058	.0278	-0.0152

Appendix 18: Classifiaction Analysis results (THREAD) for down-core samples (Cores: V19-29, Y71-6-12, V15-53, RC15-53, RC15-61, RC17-213, V17-92).

CORE V19-29

LVL.	ACCESS	COMM.	ANTARC. (F1)	SUBTROP. (F2)	CHILE (F3)	PERU (F4)	SUBANT. (F5)	EQUAT. (F6)
010	ML08195	.9014	.0179	.9007	.0392	.2773	-0.0949	.0496
020	ML08196	.8652	.0158	.8405	.1256	.3701	-0.0742	.0155
030	ML08197	.9215	.0215	.9161	.0848	.2562	-0.0565	.0763
040	ML08198	.9179	.0227	.9128	.1569	.2151	-0.1102	.0335
050	ML08199	.8928	.0199	.9138	.0291	.2181	-0.0638	.0701
060	ML08200	.7477	.0186	.8037	.1122	.2750	-0.1085	.0385
070	ML08201	.8407	.0189	.8374	.0980	.3420	-0.0950	.0595
080	ML08202	.6789	.0137	.6521	.1240	.4632	-0.1041	.1128
090	ML08203	.7586	.0138	.7225	.1904	.4285	-0.1082	.0695
100	ML08204	.8000	.0197	.7232	.2391	.4332	-0.1053	.1434
110	ML08205	.7129	.0154	.7100	.2672	.3591	-0.0717	.0553
120	ML07268	.8646	.0277	.8036	.3402	.2794	-0.1558	.0065
130	ML08206	.8078	.0261	.8203	.1422	.1852	-0.0821	.2701
140	ML08207	.7172	.0204	.6045	.2204	.3359	-0.0373	.4342
150	ML08208	.7888	.0206	.7275	.2371	.4220	-0.0961	.1250
160	ML08209	.8413	.0247	.7423	.1965	.3945	-0.0705	.3006
170	ML08210	.8491	.0281	.6973	.1929	.4167	-0.1174	.3707
180	ML08211	.7841	.0242	.7512	.2210	.3047	-0.1065	.2574
190	ML08212	.7709	.0353	.6832	.2322	.3057	-0.1211	.3753
200	ML08213	.6666	.0308	.4499	.1464	.2503	-0.0537	.6135
210	ML08214	.7947	.0239	.6817	.1541	.3909	-0.0323	.3896
220	ML08215	.9016	.0313	.7586	.1575	.3205	-0.0818	.4370
230	ML08216	.8456	.0271	.7271	.2390	.3568	-0.1015	.3484
240	ML08217	.8925	.0245	.8478	.2052	.3071	-0.1155	.1532
250	ML08218	.8668	.0208	.7863	.1491	.3511	-0.0461	.3170
260	ML08219	.8512	.0226	.7636	.1466	.3652	-0.0866	.3245
270	ML08782	.8028	.0374	.7376	.2291	.1981	-0.0725	.4005
280	ML08783	.8461	.0294	.6998	.2336	.2590	-0.1042	.4722
290	ML08784	.8843	.0275	.7834	.2190	.2607	-0.0678	.3863
300	ML08785	.8794	.0316	.7459	.1968	.2048	-0.0914	.4825
310	ML08786	.8620	.0302	.7749	.2170	.2622	-0.0912	.3693
320	ML08787	.8788	.0313	.7797	.2282	.2356	-0.1012	.3899
330	ML08788	.8664	.0307	.7082	.2518	.2120	-0.0845	.4984
340	ML08789	.9120	.0324	.7875	.2654	.2206	-0.0839	.4059
350	ML08790	.8386	.0299	.6704	.2287	.2099	-0.0521	.5377
360	ML08791	.8664	.0349	.6022	.2253	.2107	-0.0413	.6366
370	ML08792	.8658	.0383	.6511	.2399	.2296	-0.0672	.5706
380	ML08793	.7885	.0306	.5967	.2274	.2094	-0.0706	.5753
390	ML08794	.8795	.0349	.6523	.2899	.1906	-0.1238	.5631
400	ML08795	.8709	.0351	.6104	.2412	.1928	-0.0812	.6286
410	ML08796	.9230	.0367	.6027	.2869	.2286	-0.1137	.5575
420	ML08797	.8578	.0373	.5898	.2602	.2341	-0.0671	.6177
430	ML08798	.8201	.0338	.5486	.2110	.2427	-0.0585	.6412
440	ML08799	.8378	.0310	.5045	.2311	.2836	-0.0377	.6686
450	ML08800	.7828	.0316	.5642	.2642	.2885	-0.0417	.5557
460	ML08801	.8348	.0373	.6311	.3017	.3500	-0.0749	.4647
470	ML08802	.8211	.0363	.5195	.2912	.3284	-0.0375	.5965
480	ML08803	.8196	.0399	.5703	.2998	.2906	-0.1120	.5531
490	ML08804	.8133	.0313	.5760	.2480	.2893	-0.0679	.5752
500	ML08805	.7284	.0543	.4488	.1969	.2146	-0.1310	.6497
510	ML08806	.7773	.0308	.5940	.2768	.2334	-0.0418	.5391
520	ML08807	.7549	.0835	.4182	.2584	.1919	-0.1193	.6748
530	ML08808	.7353	.0727	.4783	.1268	.2185	-0.0321	.6605
540	ML08809	.6702	.1296	.3472	.2240	.2225	-0.1342	.6443
550	ML08810	.7755	.0524	.5338	.3114	.2620	-0.1314	.5522
560	ML08811	.7020	.0443	.3639	.3916	.2813	-0.1221	.5659
570	ML08812	.7577	.0976	.3624	.2022	.3096	-0.0560	.6906

580	ML08813	.7317	.1292	.3749	.2895	.2389	-0.1044	.6501
590	ML08814	.6719	.0390	.4688	.3062	.2041	-0.0589	.5583
600	ML08815	.6771	.0661	.4464	.2358	.2560	-0.0770	.5886
610	ML08816	.7297	.0808	.4097	.2643	.3213	-0.1084	.6087
620	ML08817	.7049	.0923	.4835	.2101	.2269	-0.0905	.5990
630	ML08818	.7474	.1145	.5054	.3333	.2168	-0.1590	.5405
640	ML08819	.5981	.0665	.3525	.1649	.2457	-0.0859	.6119
650	ML08820	.6932	.0453	.5048	.4252	.2816	-0.1160	.4034
660	ML08821	.6515	.0584	.6405	.4342	.1633	-0.1368	.0627
670	ML08822	.7916	.0400	.7747	.3352	.1718	-0.1981	.0938
680	ML08823	.7573	.0678	.5380	.4038	.3104	-0.1771	.4153
690	ML08824	.8533	.0568	.7601	.3434	.1888	-0.1261	.3207
700	ML08825	.8196	.0880	.6945	.3066	.2660	-0.1543	.3756
710	ML08826	.7577	.0285	.7263	.3826	.1934	-0.1255	.1727
720	ML08827	.6274	.0535	.5927	.3815	.1703	-0.2210	.2233
730	ML08828	.7606	.0543	.6685	.2661	.1377	-0.1388	.4306
740	ML08829	.5945	.0360	.6170	.2806	.1790	-0.0704	.3111
750	ML08830	.7659	.0574	.6822	.3413	.2202	-0.1808	.3156
760	ML08831	.6864	.0420	.5392	.4488	.2206	-0.1588	.3446
770	ML08832	.8226	.0732	.5690	.4759	.1710	-0.2316	.4291
780	ML08833	.6500	.0291	.5499	.4102	.1275	-0.1009	.3900
790	ML08834	.8231	.0840	.7233	.3229	.2112	-0.1273	.3575
800	ML08835	.8610	.0720	.7819	.2615	.2442	-0.1075	.3238
810	ML08836	.8407	.0524	.8112	.1890	.2035	-0.0897	.3077
820	ML08837	.8099	.0404	.6982	.2197	.3377	-0.1018	.3848
830	ML08838	.7637	.0345	.7888	.1700	.1930	-0.1171	.2457
840	ML08839	.8183	.0973	.7178	.2681	.1635	-0.1157	.4261
850	ML08840	.7994	.0935	.6813	.2213	.2050	-0.0863	.4775
860	ML08841	.8124	.1179	.5652	.1412	.2654	-0.1656	.6010
870	ML08842	.8142	.0865	.6132	.1468	.3070	-0.0554	.5585

CORE Y71-6-12

LVL.	ACCESS	COMM.	ANTARC. (F1)	SUBTROP. (F2)	CHILE (F3)	PERU (F4)	SUBANT. (F5)	EQUAT. (F6)
000	MO08036	.9135	.0325	.8305	.1810	.4337	-0.0155	.0386
006	MO12804	.9578	.0535	.8472	.2962	.3622	-0.1329	-0.0233
012	MO12805	.9352	.0426	.7475	.4970	.2988	-0.1787	-0.0797
018	MO12806	.8908	.0480	.8160	.3753	.2545	-0.1248	-0.0382
024	MO12807	.7862	.0423	.5083	.6611	.1714	-0.2141	-0.1175
030	MO12808	.8353	.0301	.3232	.7677	.1276	-0.3154	-0.1572
036	MO12809	.8096	.0572	.5004	.6624	.2380	-0.2415	-0.0464
042	MO12810	.8439	.0559	.4693	.7158	.2019	-0.2527	-0.0595
048	MO12811	.8868	.0508	.6896	.5533	.2158	-0.2217	-0.0832
054	MO12812	.8602	.0354	.3987	.7491	.1984	-0.3060	-0.0758
060	MO12813	.8290	.0417	.3362	.7352	.1746	-0.3665	-0.0946
066	MO12814	.7642	.0281	.2364	.7690	.1527	-0.2596	-0.1596
072	MO12815	.8666	.0389	.3297	.7830	.1310	-0.3357	-0.1156
078	MO12816	.8832	.0337	.4720	.6909	.2626	-0.3034	-0.1447
084	MO12817	.7925	.0458	.4089	.6509	.2354	-0.3755	.0568
090	MO12818	.8825	.0476	.4184	.7604	.1324	-0.3050	-0.0251
096	MO12819	.8524	.0208	.2031	.8296	.1219	-0.2820	-0.1676
102	MO12820	.8258	.0240	.2195	.8167	.1013	-0.2761	-0.1536
108	MO12821	.8057	.0229	.2041	.7876	.0886	-0.3060	-0.2043
114	MO12822	.8491	.0474	.3029	.8021	.1043	-0.3022	-0.0984
120	MO12823	.8104	.0350	.2909	.7504	.1526	-0.3477	-0.1311
126	MO12824	.8101	.0256	.1486	.8021	.1219	-0.3183	-0.1669
132	MO12825	.8260	.0443	.2790	.7445	.1493	-0.4096	-0.0433
138	MO12826	.8807	.0560	.5817	.6564	.1349	-0.2993	-0.0220
144	MO12827	.7977	.0427	.4472	.6750	.1820	-0.3272	-0.0123
150	MO12828	.8568	.0321	.3234	.7823	.1679	-0.2868	-0.1696
156	MO12829	.7904	.0426	.3937	.7069	.1457	-0.3082	-0.1328
162	MO12830	.8284	.0422	.5030	.6858	.1311	-0.2854	-0.0681
168	MO12831	.8446	.0742	.4449	.7215	.1175	-0.2742	-0.1776
174	MO12832	.8775	.0374	.4340	.7459	.1380	-0.3318	-0.0480
180	MO12833	.9127	.0572	.8177	.4320	.1001	-0.1671	-0.1270
186	MO12834	.8808	.0226	.4373	.7242	.1081	-0.2829	-0.2599

CORE V15-53

LVL.	ACCESS	COMM.	ANTARC. (F1)	SUBTROP. (F2)	CHILE (F3)	PERU (F4)	SUBANT. (F5)	EQUAT. (F6)
000	ML12734	.4291	.0298	.1307	.5676	.1123	-0.2166	.1714
008	ML12736	.5967	.0554	.1566	.5395	.2080	-0.3168	.3666
012	ML12787	.5533	.0497	.1122	.5804	.2434	-0.2134	.3108
024	ML12790	.5377	.0364	.0992	.6283	.1552	-0.2664	.1916
031	ML12792	.6965	.0351	.1666	.7444	.1572	-0.2295	.1896
036	ML12793	.6660	.0316	.2553	.7185	.1176	-0.2375	.1157
040	ML12451	.6567	.0444	.1833	.6934	.2191	-0.2402	.1359
044	ML12794	.5912	.0472	.1078	.5911	.2426	-0.2535	.3237
048	ML12795	.6282	.0470	.1115	.6369	.2441	-0.2692	.2755
056	ML12797	.5602	.0540	.0956	.5312	.2595	-0.2688	.3556

064	ML12799	.5947	.0538	.0965	.5616	.2602	-0.2320	.3817
072	ML12801	.7875	.0502	.1318	.7180	.1447	-0.3801	.2943
080	ML12803	.7748	.0559	.1395	.6715	.1798	-0.4295	.2908

CORE RC15-61

LVL.	ACCESS	COMM.	ANTARC. (F1)	SUBTROP. (F2)	CHILE (F3)	PERU (F4)	SUBANT. (F5)	EQUAT. (F6)
000	ML12971	.9022	.0295	.1538	.8865	.1006	-0.2359	.1561
004	ML12979	.8294	.0353	.1503	.8326	.0428	-0.2210	.2484
008	ML12972	.8117	.0382	.1853	.7999	.0955	-0.2167	.2828
012	ML12980	.8044	.0414	.1499	.7910	.0961	-0.2460	.2911
016	ML12973	.7902	.0386	.1459	.7853	.1044	-0.2011	.3152
028	ML12982	.8054	.0355	.1835	.7903	.0450	-0.2465	.2883
036	ML12983	.7761	.0383	.2111	.7558	.0355	-0.2879	.2732
048	ML12977	.6624	.0351	.1624	.6941	.1313	-0.1585	.3327
068	ML12452	.5531	.0669	.1028	.5770	.1415	-0.1431	.4058
072	ML12661	.5725	.0488	.0828	.5597	.1179	-0.1940	.4455
080	ML12970	.5974	.0396	.1168	.6160	.1039	-0.1671	.4050

CORE RC17-213

LVL.	ACCESS	COMM.	ANTARC. (F1)	SUBTROP. (F2)	CHILE (F3)	PERU (F4)	SUBANT. (F5)	EQUAT. (F6)
000	ML12908	.9496	.6536	.0238	-0.1164	.0117	-0.7109	.0531
005	ML12909	.8848	.7518	-0.0052	-0.0842	.0099	-0.5587	.0147
010	ML12910	.9213	.7936	-0.0149	-0.1034	.0076	-0.5294	.0124
015	ML12911	.8800	.6195	-0.0101	-0.1311	.0075	-0.6917	.0198
020	ML12912	.9358	.8712	-0.0119	-0.0532	-0.0003	-0.4161	.0263
025	ML12913	.8936	.8656	-0.0147	-0.0608	.0161	-0.3744	.0038
030	ML12914	.9421	.9452	-0.0149	-0.0307	.0087	-0.2177	.0083
035	ML12915	.9651	.8753	.0127	-0.0400	.0118	-0.4424	.0364
040	ML12916	.8927	.8671	.0033	-0.0187	.0235	-0.3693	.0592
045	ML12917	.9784	.9710	-0.0058	.0225	.0060	-0.1851	.0263
050	ML12918	.9559	.9073	-0.0040	.0094	.0003	-0.3629	.0311
055	ML12919	.9647	.9545	-0.0100	-0.0169	-0.0009	-0.2284	.0331
060	ML12920	.9280	.8998	-0.0147	-0.0492	.0049	-0.3400	.0100
065	ML12921	.9559	.9376	-0.0103	-0.0365	.0039	-0.2746	.0081
070	ML12922	.8496	.8283	.0162	.0315	-0.0027	-0.3957	.0749
075	ML12923	.9319	.8777	.0084	-0.0450	.0065	-0.3969	.0428
080	ML12924	.9406	.8275	.0125	-0.0797	-0.0033	-0.4970	.0483
085	ML12925	.9571	.9112	.0027	-0.0384	-0.0031	-0.3525	.0336
090	ML12926	.9177	.9098	-0.0019	-0.0377	.0062	-0.2967	.0226
095	ML12927	.9192	.9017	-0.0144	-0.0683	.0049	-0.3181	.0095
100	ML12928	.9735	.9845	-0.0098	.0064	.0020	-0.0602	.0222
105	ML12929	.9352	.9543	-0.0113	-0.0181	.0045	-0.1549	.0105
110	ML12930	.9709	.9571	-0.0111	-0.0203	.0039	-0.2333	-0.0021
115	ML12931	.9736	.9653	-0.0136	-0.0232	.0060	-0.2019	-0.0125
120	ML12932	.9506	.8827	.0124	-0.0272	.0084	-0.4097	.0513
125	ML12933	.9660	.9515	-0.0007	-0.0007	.0085	-0.2420	.0440

CORE V17-92

LVL.	ACCESS	COMM.	ANTARC. (F1)	SUBTROP. (F2)	CHILE (F3)	PERU (F4)	SUBANT. (F5)	EQUAT. (F6)
000	ML11905	.9937	.9960	-0.0115	.0130	.0122	-0.0348	-0.0067
005	ML12935	.9635	.9724	-0.0066	.0634	.0798	.0003	.0871
010	ML12936	.9921	.9913	-0.0061	.0617	.0421	-0.0492	.0356
015	ML12937	.9670	.9800	-0.0104	.0512	.0426	.0279	.0349
020	ML12938	.9786	.9856	-0.0071	.0709	.0397	-0.0037	.0218
025	ML12939	.9890	.9930	-0.0145	.0316	.0316	-0.0080	.0263
030	ML12940	.9708	.9834	-0.0096	.0307	.0294	-0.0397	.0112
035	ML12941	.9811	.9895	-0.0141	.0395	.0141	-0.0075	-0.0080
040	ML12942	.9720	.9822	-0.0098	.0692	.0271	-0.0108	.0389
045	ML12943	.9836	.9902	-0.0116	.0419	.0233	.0012	.0263
050	ML12944	.9754	.9853	-0.0106	.0390	.0076	-0.0507	.0170
055	ML12945	.9523	.9740	-0.0153	.0163	.0105	-0.0537	.0084
060	ML12946	.9809	.9898	-0.0124	.0260	.0095	.0124	-0.0015
065	ML12947	.9804	.9882	-0.0134	.0570	.0136	-0.0010	.0170
070	ML12948	.9826	.9900	-0.0150	.0421	.0157	.0049	.0146
075	ML12949	.9664	.9818	-0.0138	.0394	.0178	.0172	.0121
080	ML12950	.9683	.9821	-0.0120	.0560	.0099	-0.0067	.0175
085	ML12951	.9818	.9898	-0.0156	.0406	.0088	-0.0054	.0107
090	ML12952	.9761	.9848	-0.0096	.0758	.0100	-0.0162	.0103
095	ML12953	.9802	.9867	-0.0101	.0557	.0174	-0.0552	.0090
100	ML12954	.9560	.9719	-0.0076	.0870	.0116	-0.0608	.0029
105	ML12954	.9853	.9908	-0.0122	.0487	.0089	-0.0324	.0025
110	ML12956	.9821	.9874	-0.0100	.0719	.0102	-0.0424	-0.0075
115	ML12957	.9774	.9854	-0.0132	.0640	-0.0012	-0.0450	.0108
120	ML12958	.9786	.9849	-0.0073	.0823	.0194	-0.0296	-0.0209
125	ML12959	.9876	.9892	-0.0095	.0509	.0097	-0.0773	.0177

Appendix 19: Classification Analysis results (THREAD) for 18 K level samples.

ACCESS NO.	COMM.	ANTARC. (F1)	SUBTROP. (F2)	CHILE (F3)	PERU (F4)	SUBANT. (F5)	EQUAT. (F6)
MO07250	.9187	.0331	.9020	.1505	.0707	-0.0514	.2714
MO07287	.9354	.0282	.9472	.1009	.0765	-0.0233	.1443
MO07256	.9575	.0236	.9744	.0174	.0310	-0.0312	.0725
MO12807	.7862	.0423	.5083	.6611	.1714	-0.2141	-0.1175
ML07268	.8646	.0277	.8036	.3402	.2794	-0.1558	.0065
ML13183	.8386	.0355	.8586	.2900	-0.0164	-0.0974	-0.0797
ML09201	.8617	.0234	.8803	.1810	.1611	-0.0376	.1618
ML09176	.9422	.0216	.9571	.0288	-0.0504	-0.0052	-0.1492
ML09181	.9236	.0249	.9523	.0516	.0721	-0.0348	.0837

Appendix 20: Correlation matrix (R) for sea surface temperatures and Radiolaria Factors.

	Aug. surface temp.	Feb. surface temp.	"Antarctic" factor	"Subtropical" factor	"Chile" factor	"Peru" factor	"Subantarctic" factor	"Equatorial" factor
Aug. surface temp.	1.00	.989	-.922	.960	.027	.364	-.261	.384
Feb. surface temp.		1.00	-.940	.954	.061	.456	-.268	.404
"Antarctic" factor			1.00	-.875	-.308	-.429	.053	-.462
"Subtropical" factor				1.00	-.094	-.332	-.391	.302
"Chile" factor					1.00	-.007	.478	.286
"Peru" factor						1.00	-.212	.276
"Subantarctic" factor							1.00	.043
"Equatorial" factor								1.00

Appendix 21: Regression Analysis data: August sea surface temperature on (transformed) factor loadings.

For 10 variables entered

Multiple Correlation Coefficient . . .	.993
(Adjusted for D.F.)	.992
F-Value for Analysis of Variance . . .	561.250
Standard Error of Estimate	1.153
(Adjusted for D.F.)	1.215

VARIABLE NUMBER	VARIABLE NAME	REGRESSION COEFFICIENT	STD. ERROR OF REG. COEFF.	COMPUTED T-VALUE
25	F2	8.57803	1.24825	6.872
24	F1	-54.83897	5.46706	-10.031
12	F1*F5	18.35624	2.06741	8.879
3	F1SQ	37.61410	4.98820	7.541
11	F1*F4	57.14128	13.38331	4.270
15	F2*F4	- 7.25778	1.40285	- 5.174
19	F3*F5	-15.10172	3.55311	- 4.250
10	F1*F3	23.35778	5.78546	4.037
14	F2*F3	- 8.45469	2.28392	- 3.702
8	F6SQ	6.80534	3.20536	2.123
INTERCEPT		15.80156		

F1 = "Antarctic" factor

F2 = "Subtropical" factor

F3 = "Chile" factor

F4 = "Peru" factor

F5 = "Subantarctic" factor

F6 = "Equatorial" factor

Appendix 21: continuation

TABLE OF RESIDUALS

LOC.	Y VALUE	Y EST.	RESID.	80 PERCENT C.I. HIGH	LOW	S.ERROR
1	23.500	22.418	1.082	24.026	20.809	1.237
2	21.900	21.709	.191	23.763	19.655	1.580
3	23.800	22.234	1.566	23.841	20.627	1.236
5	17.700	18.723	-1.023	20.414	17.032	1.301
6	17.500	18.218	-.718	19.860	16.576	1.263
7	17.200	18.813	-1.613	20.431	17.196	1.244
10	18.300	17.219	1.081	18.948	15.490	1.330
11	19.100	18.654	.446	20.304	17.003	1.270
12	20.400	20.454	-.054	22.071	18.837	1.244
13	21.000	22.613	-1.613	24.222	21.005	1.237
14	21.200	22.421	-1.221	24.030	20.812	1.238
15	22.400	22.832	-.432	24.448	21.215	1.244
16	22.900	22.342	.558	23.945	20.740	1.233
17	23.200	22.275	.925	23.876	20.674	1.231
18	18.000	17.236	.764	18.987	15.485	1.347
19	17.900	17.480	.420	19.180	15.781	1.307
20	20.100	21.043	-.943	22.646	19.439	1.234
21	20.400	20.981	-.581	22.671	19.292	1.300
22	21.300	22.123	-.823	23.727	20.519	1.234
23	21.800	21.764	.036	23.360	20.169	1.227
24	22.500	22.357	.143	23.963	20.751	1.236
25	23.100	22.667	.433	24.277	21.057	1.238
26	23.300	22.408	.892	24.015	20.801	1.236
27	18.100	18.166	-.066	19.838	16.494	1.286
28	18.900	21.054	-2.154	22.662	19.446	1.237
30	13.000	12.601	.399	14.350	10.852	1.345
34	3.300	3.972	-.672	5.738	2.206	1.359
36	.800	1.244	-.444	2.868	-.380	1.249
39	7.000	6.638	.362	8.496	4.781	1.429
40	4.500	5.493	-.993	7.186	3.800	1.302
41	-.600	.219	-.819	1.825	-1.388	1.236
42	-1.000	.050	-1.050	1.659	-1.560	1.238
45	20.000	19.470	.530	21.111	17.828	1.263
46	18.100	17.533	.567	19.211	15.855	1.291
47	19.200	19.056	.144	20.729	17.383	1.287
48	20.000	21.998	-1.998	23.599	20.397	1.232
49	23.400	22.997	.403	24.614	21.379	1.244
50	24.900	22.923	1.977	24.539	21.306	1.243
51	23.900	22.217	1.683	23.822	20.612	1.235
57	20.600	22.315	-1.715	23.924	20.705	1.238
61	15.700	15.922	-.222	17.752	14.092	1.408
69	23.400	22.149	1.251	23.750	20.547	1.232
70	23.900	22.233	1.667	23.833	20.634	1.230
71	22.200	22.657	-.457	24.266	21.049	1.237
72	4.700	5.298	-.598	6.949	3.646	1.271
73	4.800	6.798	-1.998	8.465	5.131	1.282
74	4.600	4.478	.122	6.105	2.851	1.252
75	4.800	3.764	1.036	5.378	2.149	1.242
76	4.800	3.816	.984	5.458	2.174	1.253
77	4.800	3.617	1.183	5.230	2.004	1.241
82	18.100	18.244	-.144	19.954	16.533	1.316
83	20.200	20.045	.155	21.668	18.421	1.249
84	22.000	22.859	-.859	24.476	21.242	1.244
85	22.900	22.855	.045	24.467	21.243	1.240

91	14.000	11.924	2.076	13.657	10.190	1.334
93	10.900	12.654	-1.754	14.406	10.903	1.347
95	7.900	7.473	.427	9.196	5.750	1.326
96	6.600	5.990	.610	7.762	4.218	1.363
97	2.100	1.708	.392	3.310	.105	1.233
98	-1.000	.271	-1.271	1.880	-1.338	1.238
99	0.000	-.080	.080	1.557	-1.718	1.259
100	-1.000	.228	-1.228	1.835	-1.380	1.237
104	7.800	9.781	-1.981	11.453	8.109	1.286
105	6.100	5.102	.998	6.805	3.398	1.310
106	2.900	3.280	-.380	4.927	1.632	1.268
107	-1.100	.436	-1.536	2.042	-1.170	1.235
108	2.700	1.908	.792	3.528	.289	1.246
109	6.200	6.128	.072	7.828	4.427	1.308
111	8.200	8.266	-.066	10.241	6.291	1.519
112	1.100	1.210	-.110	2.817	-.397	1.236
115	3.800	4.077	-.277	5.698	2.455	1.247
117	.300	-.563	.863	1.058	-2.184	1.247
118	-1.100	-.294	-.806	1.324	-1.912	1.245
122	-.600	-.104	-.496	1.510	-1.717	1.241
123	2.600	.660	1.940	2.304	-.984	1.265
127	-1.100	.743	-1.843	2.346	-.859	1.233
128	4.100	2.949	1.151	4.683	1.214	1.334
129	-1.300	-.620	-.680	1.003	-2.244	1.249
130	4.800	5.161	-.361	6.901	3.421	1.338
131	5.600	3.352	2.248	4.970	1.734	1.245
141	9.600	8.444	1.156	10.283	6.604	1.415
142	6.600	8.263	-1.663	10.012	6.515	1.345
144	3.900	4.275	-.375	6.039	2.510	1.357
145	1.100	-.084	1.184	1.529	-1.698	1.241
147	.900	1.109	-.209	2.723	-.505	1.242
148	1.800	-.568	2.368	1.061	-2.196	1.253
149	-.600	.123	-.723	1.731	-1.486	1.237
150	3.100	.848	2.252	2.448	-.752	1.231
157	6.600	6.966	-.366	8.647	5.286	1.293
158	6.300	5.531	.769	7.241	3.820	1.316
159	6.100	6.448	-.348	8.175	4.722	1.328
160	-1.100	-.356	-.744	1.265	-1.976	1.247

Appendix 22: Regression Analysis data: February sea surface temperature on (transformed) factor loadings.

For 11 variables entered

Multiple Correlation Coefficient . . .	.995
(Adjusted for D.F.)	.994
F-Value for Analysis of Variance . . .	677.589
Standard Error of Estimate	1.124
(Adjusted for D.F.)	1.192

VARIABLE NUMBER	VARIABLE NAME	REGRESSION COEFFICIENT	STD. ERROR OF REG. COEFF.	COMPUTED T-VALUE
25	F2	3.97163	1.36527	2.909
24	F1	-21.16817	1.28915	-16.420
19	F3*F5	-20.70622	3.60997	- 5.736
12	F1*F5	14.02370	2.06338	6.796
7	F5SQ	-12.10701	1.73378	- 6.983
20	F3*F6	-20.00295	6.29870	- 3.176
8	F6SQ	8.63263	3.48099	2.480
9	F1*F2	-59.92970	13.12820	- 4.565
10	F1*F3	23.30829	6.38986	3.648
16	F2*F5	28.24159	8.87355	3.183
14	F2*F3	- 5.70048	2.64057	- 2.159
INTERCEPT		23.48835		

F1 = "Antarctic" factor
F2 = "Subtropical" factor
F3 = "Chile" factor
F4 = "Peru" factor
F5 = "Subantarctic" factor
F6 = "Equatorial" factor

Appendix 22: continuation

TABLE OF RESIDUALS

LOC.	Y VALUE	Y EST.	RESID.	80 PERCENT C.I. HIGH	LOW	S.ERROR
1	26.700	26.409	.291	27.990	24.828	1.216
2	26.800	27.289	-.489	29.321	25.257	1.563
3	26.200	26.271	-.071	27.852	24.689	1.217
5	24.100	25.345	-1.245	26.960	23.730	1.242
6	23.600	23.944	-.344	25.559	22.329	1.242
7	23.200	23.169	.031	24.828	21.510	1.276
10	24.700	23.601	1.099	25.262	21.939	1.278
11	26.600	25.553	1.047	27.178	23.928	1.250
12	26.500	25.783	.717	27.374	24.192	1.224
13	25.200	25.803	-.603	27.378	24.228	1.212
14	25.400	25.501	-.101	27.084	23.918	1.218
15	25.200	25.869	-.669	27.450	24.288	1.216
16	25.200	25.574	-.374	27.155	23.993	1.216
17	25.300	25.679	-.379	27.260	24.098	1.216
18	25.500	25.724	-.224	27.447	24.001	1.325
19	24.700	24.381	.319	26.062	22.699	1.294
20	26.300	25.996	.304	27.566	24.426	1.208
21	26.400	25.496	.904	27.158	23.834	1.279
22	26.100	25.372	.728	26.951	23.793	1.214
23	26.000	25.111	.889	26.705	23.518	1.226
24	25.800	25.385	.415	26.971	23.798	1.220
25	25.900	25.456	.444	27.050	23.862	1.226
26	26.000	25.427	.573	27.011	23.843	1.219
27	24.600	25.119	-.519	26.701	23.538	1.216
28	26.000	25.566	.434	27.207	23.925	1.262
30	18.200	16.507	1.693	18.275	14.738	1.360
34	3.600	5.112	-1.512	6.748	3.475	1.259
36	4.000	3.697	.303	5.309	2.084	1.240
39	9.700	8.357	1.343	10.252	6.461	1.458
40	6.600	8.283	-1.683	9.958	6.608	1.288
41	2.700	2.537	.163	4.112	.962	1.211
42	2.000	2.205	-.205	3.783	.627	1.214
45	26.100	25.087	1.013	26.671	23.502	1.219
46	25.700	25.727	-.027	27.346	24.108	1.245
47	26.100	25.041	1.059	26.711	23.371	1.284
48	25.400	25.894	-.494	27.466	24.321	1.210
49	27.000	26.518	.482	28.107	24.928	1.223
50	27.700	25.985	1.715	27.567	24.402	1.217
51	26.500	26.611	-.111	28.215	25.007	1.234
57	24.100	25.895	-1.795	27.468	24.323	1.209
61	21.000	22.874	-1.874	24.674	21.073	1.385
69	25.500	25.753	-.253	27.321	24.185	1.206
70	25.900	25.791	.109	27.366	24.216	1.211
71	24.000	25.848	-1.848	27.439	24.258	1.223
72	6.600	6.774	-.174	8.381	5.167	1.236
73	6.100	7.777	-1.677	9.394	6.160	1.244
74	6.300	5.477	.823	7.049	3.904	1.210
75	7.000	5.559	1.441	7.150	3.969	1.223
76	7.000	6.666	.334	8.290	5.042	1.249
77	6.700	6.179	.521	7.767	4.592	1.221
82	24.000	24.342	-.342	26.034	22.650	1.301
83	26.000	26.069	-.069	27.639	24.499	1.208
84	26.600	26.888	-.288	28.494	25.282	1.235
85	26.300	27.044	-.744	28.661	25.427	1.244

91	19.200	19.001	.199	20.867	17.135	1.435
93	15.200	16.034	-.834	17.961	14.106	1.482
95	10.700	10.351	.349	12.113	8.588	1.356
96	8.300	10.392	-2.092	12.152	8.631	1.354
97	5.000	3.992	1.008	5.569	2.415	1.213
98	.800	2.845	-2.045	4.418	1.272	1.210
99	3.600	4.360	-.760	5.941	2.780	1.215
100	2.300	2.287	.013	3.869	.705	1.217
104	9.800	11.167	-1.367	12.907	9.426	1.339
105	8.500	7.283	1.217	8.994	5.572	1.316
106	4.800	5.359	-.559	6.994	3.723	1.258
107	1.700	2.845	-1.145	4.416	1.275	1.208
108	5.300	3.712	1.588	5.281	2.144	1.207
109	7.600	6.420	1.180	8.062	4.778	1.263
111	11.400	10.755	.645	12.741	8.768	1.528
112	4.700	3.817	.883	5.392	2.242	1.212
115	4.800	6.575	-1.775	8.170	4.981	1.227
117	1.800	1.802	-.002	3.391	.213	1.222
118	.600	2.078	-1.478	3.659	.497	1.216
122	2.400	2.224	.176	3.802	.646	1.214
123	5.200	3.182	2.018	4.756	1.608	1.211
127	1.500	2.563	-1.063	4.137	.990	1.211
128	5.300	3.105	2.195	4.673	1.537	1.206
129	0.000	1.478	-1.478	3.081	-.125	1.233
130	6.700	6.424	.276	8.117	4.731	1.302
131	8.000	5.915	2.085	7.496	4.333	1.217
141	13.300	11.318	1.982	13.120	9.515	1.386
142	9.700	11.634	-1.934	13.378	9.889	1.342
144	4.700	4.507	.193	6.098	2.915	1.224
145	2.100	1.952	.148	3.542	.362	1.223
147	3.100	3.607	-.507	5.200	2.014	1.225
148	4.400	2.616	1.784	4.193	1.040	1.213
149	1.300	2.778	-1.478	4.351	1.206	1.210
150	3.600	2.746	.854	4.319	1.174	1.209
157	9.100	9.528	-.428	11.206	7.851	1.291
158	9.000	8.798	.202	10.568	7.028	1.362
159	9.100	8.905	.195	10.589	7.221	1.295
160	.600	1.930	-1.330	3.526	.334	1.228

Appendix 23: Estimated sea surface temperatures for surface samples. (°C)

DUPLICATED SAMPLES

LOC.	AUGUST	FEBRUARY
5	17.95740	25.86586
10	17.75187	25.80355
18	17.16571	25.87782
19	16.66718	24.01871
28	21.20179	25.90020
46	17.96069	26.08682
104	9.20975	14.25128
105	5.71867	9.63512
108	1.95994	3.71140
129	-.36419	2.35751

SAMPLES CONTAINING SCARCE RADIOLARIA

LOC.	AUGUST	FEBRUARY
8	17.20332	22.22067
29	13.63625	19.19851
35	1.38132	5.59015
43	2.68038	6.63675
44	.00748	2.36835
62	15.64222	20.73160
80	15.30519	22.52991
81	15.42952	20.11439
103	11.71990	18.77727
110	10.60869	14.80036
113	-.82872	1.86189
121	.62747	2.69495
136	11.25548	15.74459
143	5.93167	12.37119
153	13.53615	18.43330
163	12.41292	18.41067
164	-.50043	1.83676

Appendix 24: Estimated sea surface temperatures for down-core samples (°C) (Cores: V19-29, Y71-6-12, V15-53, RC15-61, RC17-213, V17-92).

CORE V19-29

LVL.	AUGUST	FEBRUARY
000	19.46983	25.08677
010	20.73874	27.76965
020	19.26703	26.62189
030	20.48490	26.35270
040	19.92488	26.93338
050	21.18271	27.04669
060	19.52654	26.94814
070	19.51845	26.92474
080	18.09530	26.20021
090	17.98800	26.18267
100	17.59918	25.22976
110	17.76583	25.06648
120	17.20516	25.58195
130	20.06603	25.80246
140	18.95318	24.23730
150	17.65123	25.13472
160	18.58674	24.85034
170	18.47508	25.32657
180	18.56448	25.15335
190	18.33649	24.40543
200	19.65217	25.48278
210	19.12969	24.82687
220	19.69490	25.56192
230	18.44202	24.65998
240	18.79366	25.94420
250	19.51462	25.38593
260	19.27100	25.94632
270	19.15515	23.89935
280	19.32871	24.82580
290	19.48503	24.64794
300	20.03619	25.28052
310	19.21589	24.81675
320	19.30485	24.81536
330	19.60029	24.34534
340	19.23568	24.03529
350	19.96321	24.36685
360	20.27401	24.41421
370	19.67256	24.04861
380	19.80140	24.57246
390	19.33938	24.01826
400	20.09021	24.57634
410	18.97216	23.68485
420	19.67264	23.88978
430	20.03502	24.82682
440	20.04291	24.52513
450	19.17956	23.49940
460	18.19751	22.86952
470	19.00912	22.96029
480	18.51584	23.19267
490	19.38077	24.13220
500	18.86762	24.50969
510	19.28386	23.34307
520	17.81175	22.35703
530	18.91845	24.09467
540	16.10242	21.07657
550	17.93900	22.46952
560	17.29364	21.11367
570	17.84499	22.48551
580	16.29718	20.01320
590	18.45814	22.55688
600	17.95885	22.66588
610	17.49152	21.92377
620	17.51038	22.09331
630	15.94337	19.50131
640	17.85361	23.76660
650	16.51617	20.90627
660	15.52468	22.17943
670	17.06050	24.73581
680	15.97883	20.53679
690	17.32567	22.08732
700	16.54694	20.99634
710	17.24369	23.57448
720	15.69570	22.25067
730	18.01673	23.17806
740	17.91443	22.97673
750	16.68713	22.42601
760	16.10465	21.10569
770	15.30289	19.50347
780	17.49345	21.83061
790	16.67256	20.74573
800	17.51633	21.94085
810	18.81065	23.73686
820	18.36080	24.11176
830	19.18391	25.40497
840	16.99247	20.58615
850	17.54869	21.16280
860	17.58397	22.69853
870	18.37401	22.57052

continued on next page

CORE RC17-213

LVL.	AUGUST	FEBRUARY
000	5.71867	9.63512
005	4.77887	10.02976
010	5.23247	9.50731
015	5.00080	10.41304
020	4.09343	8.19622
025	4.26348	8.20988
030	2.51970	5.62968
035	4.98052	7.99272
040	3.89924	8.09166
045	2.14966	5.17198
050	3.25761	7.27528
055	2.18798	5.53458
060	3.68061	7.41119
065	3.11922	6.46342
070	2.92267	8.44504
075	4.10001	8.09870
080	4.94084	9.00833
085	3.76291	7.60871
090	2.97229	7.42396
095	3.67921	7.57455
100	-.30178	3.05287
105	1.13898	4.85865
110	2.55863	5.53393
115	2.38977	5.05787
120	4.27784	7.70108
125	2.39733	5.86270

CORE V17-92

LVL.	AUGUST	FEBRUARY
000	.21859	2.53703
005	4.02258	3.93937
010	3.12084	4.15692
015	2.31159	3.66793
020	2.27976	3.87919
025	1.22531	2.49003
030	1.38274	3.35408
035	.32391	2.76462
040	1.60437	3.83348
045	.78713	2.84953
050	.58648	3.57374
055	.10255	3.10839
060	-.16572	2.61496
065	.55138	3.13430
070	.44724	2.72443
075	.53296	3.06444
080	.27757	3.38781
085	.03205	2.67048
090	.93233	4.03407
095	1.61144	3.99206
100	1.71653	5.15207
105	.68756	3.37384
110	1.36132	4.18942
115	.70491	3.90893
120	1.82034	4.44706
125	1.50829	4.11810

CORE Y71-6-12

LVL.	AUGUST	FEBRUARY
000	18.21784	23.94418
006	16.91107	24.06038
012	15.24733	22.93882
018	16.69056	23.56742
024	13.62613	20.33946
030	12.00534	17.26931
036	12.92880	20.53513
042	12.48272	19.82190
048	14.40653	22.01203
054	12.02521	19.02341
060	11.35270	17.58096
066	12.56153	17.55248
072	11.42108	17.25070
078	12.60243	19.29389
084	11.88652	19.29596
090	11.73165	19.48169
096	12.12891	16.39731
102	12.18660	16.87822
108	12.13621	15.91797
114	11.44038	17.49484
120	11.57461	17.00193
126	11.69931	15.60745
132	10.66970	17.01033
138	12.67494	21.05598
144	12.26119	20.46148
150	12.19202	17.31558
156	12.27046	18.48467
162	12.76292	20.31888
168	12.01176	17.55727
174	11.80689	19.33957
180	16.32086	22.48628
186	13.35297	17.82201

CORE V15-53

LVL.	AUGUST	FEBRUARY
00	13.63625	19.19851
08	13.28380	16.72984
12	13.72926	17.78340
24	12.82462	17.53940
32	12.85167	17.46342
36	12.92193	18.88751
39	12.83782	17.74745
43	13.46893	17.03552
47	12.98003	16.65810
56	13.60199	17.20579
64	13.90608	17.24460
72	11.41073	13.65651
80	11.18803	13.38023

CORE RC15-61

LVL.	AUGUST	FEBRUARY
00	12.18841	16.61480
04	12.65434	16.03359
08	12.97020	16.11664
12	12.59180	15.47087
16	13.28510	16.05086
28	12.72114	15.69325
36	12.34202	15.67267
48	14.23473	17.53315
68	14.06795	17.95997
72	14.31400	17.52258
80	14.48258	17.59542

Appendix 25: Estimated sea surface temperatures for 18K level samples (°C)

Access No.	August	February
M007250	20.8	24.9
M007287	21.4	25.0
M007256	22.6	26.3
M012807	13.6	20.4
ML07268	17.2	25.6
ML13183	19.0	24.5
ML09201	20.1	24.9
ML09176	22.5	25.7
ML09181	21.9	25.9

Data provided by members of the CLIMAP Project (unpublished):

Core	Lat.	Long.	August	February
Y71-7-45	11 04 S	110 05 W	21.6	25.7
RC13-113	01 39 S	103 38 W	22.1	25.5
V18-312	02 51 S	126 12 W	23.2	26.8
V18-318	03 10 N	118 27 W	24.6	27.4
V19-53	17 01 S	113 31 W	23.0	26.5