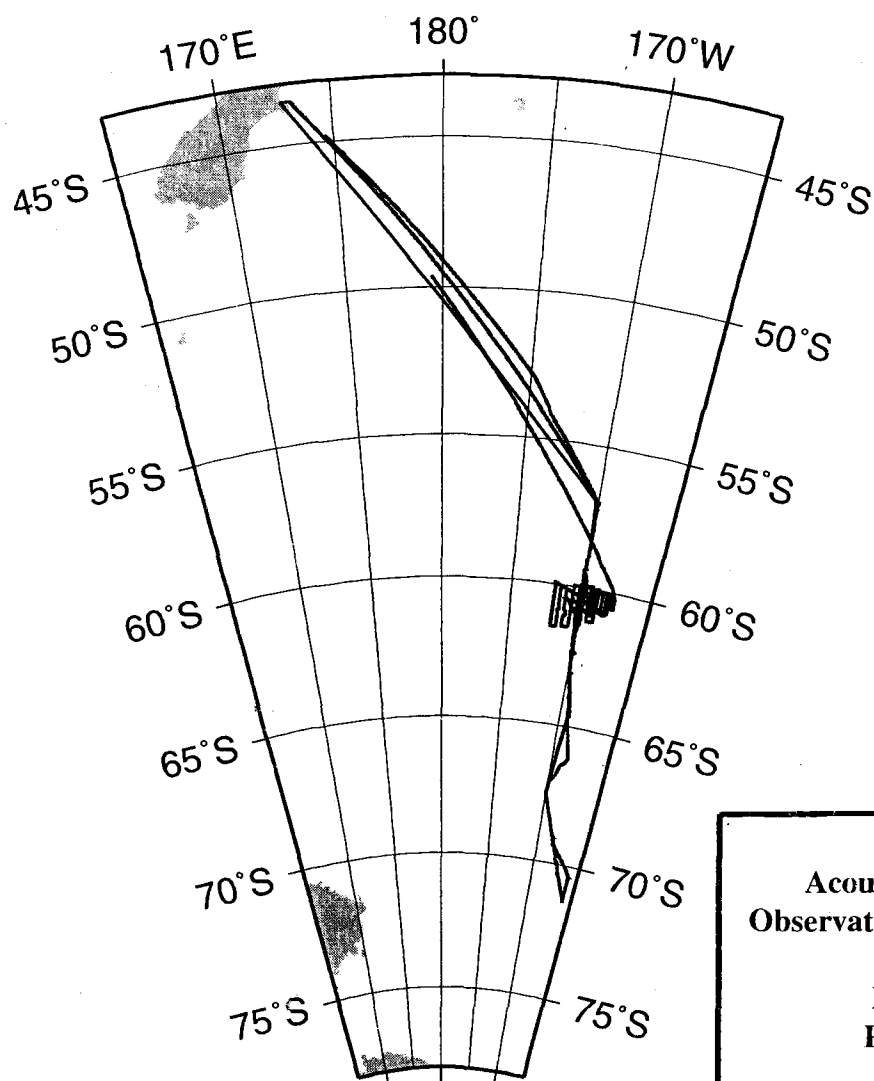


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**Acoustic Doppler Current Profiler
Observations During the JGOFS AESOPS
Antarctic Polar Front
Process Studies I and II:
R/V Revelle Cruises from
30-Nov-97 to 3-Jan-98
and 13-Feb-98 to 19-Mar-98**

by

S. D. Pierce, J. A. Barth, and T. J. Cowles

College of Oceanic & Atmospheric Sciences
Oregon State University
Corvallis, OR 97331-5503

Data Report 176
Reference 99-5
December 1999

Oregon State University

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**Acoustic Doppler Current Profiler observations during the
JGOFS AESOPS Antarctic Polar Front Process Studies I and II:
R/V Revelle Cruises from 30-Nov-97 to 3-Jan-98 and
13-Feb-98 to 19-Mar-98**

*S. D. Pierce
J. A. Barth
T. J. Cowles*

College of Oceanic and Atmospheric Sciences
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Corvallis, Oregon 97331-5503

Data Report 176
Reference 99-5
December 1999

<http://diana.coas.oregonstate.edu/sojgofs>

We present velocity observations from a shipboard acoustic Doppler current profiler (ADCP) on R/V *Revelle* during cruises R9711 (30 November 1997 to 3 January 1998) and R9802 (13 February 1998 to 19 March 1998). The cruises were conducted as part of the Southern Ocean JGOFS (Joint Global Ocean Flux) Antarctic Polar Frontal Zone program. The ADCP was an RD Instruments hull-mounted 153-kHz narrowband unit. Data were collected nearly continuously during these Spring and Summer Process cruises, using an ensemble averaging interval of 2.5 min and a vertical bin length of 8 m. To reference the velocities to earth coordinates, we used GPS navigation in combination with the ship's gyrocompass and a GPS attitude system. An online version of this report is available at <http://diana.coas.oregonstate.edu/sojgofs>. In addition, the complete data sets and all processing details are available from the NODC Joint Archive for Shipboard ADCP: <http://ilikai.soest.hawaii.edu/sadcp>. This work was funded by National Science Foundation grant OPP-9530758.

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r9711.txt

#DATA_DATES: 1997/12/02 03:50:24 to 1997/12/31 23:55:07
#LON_RANGE: 173.734 E to 168.57 W
#LAT_RANGE: 64.744 S to 44.061 S
#DEPTH_RANGE: 57 to 300 m
#SAC_CRUISE_ID:
#PLATFORM_NAME: R/V Revelle
#PRINCIPAL_INVESTIGATOR_NAME: J. A. Barth and T. J. Cowles
#PI_INSTITUTION: Oregon State University
#PI_COUNTRY: USA
#PROJECT: Southern Ocean JGOFS (Joint Global Ocean Flux), AESOPS
#CRUISE_NAME: R9711 or APFZ cruise RR07 (SOJGOFS Process 1)
#PORTS: Lyttelton, New Zealand --- to --- Lyttelton, New Zealand
#GEOGRAPHIC_REGION: Antarctic polar front zone, south of New Zealand along 170W
#PROCESSED_BY: Oregon State University
#NAVIGATION: GPS (Pcode and attitude)
#QUALITY_NAV: <excellent>
#GENERAL_INFORMATION:

CRUISE NOTES

CHIEF SCIENTIST ON SHIP :

INSTITUTE : Oregon State University

COUNTRY : USA

SIGNIFICANT DATA GAPS : none

SPECIAL SHIP TRACK PATTERNS : long transect along 170 W, 64.7-57 S

ADCP INSTRUMENTATION

MANUFACTURER : RD Instruments (RDI)

HARDWARE MODEL : RD-VM150 Narrow band

TRANSDUCER SERIAL NUMBER : 173

FIRMWARE VERSION : 17.10

TRANSMIT FREQUENCY : 153.6 kHz

TRANSDUCER CONFIGURATION : JANUS CONCAVE

TRANSDUCER BEAM ANGLE : 30 deg.

ADCP INSTALLATION

METHOD/DESCRIPTION OF THE

ATTACHMENT TO THE HULL :

LOCATION/DEPTH ON HULL : 5 m

REPEATABLE ATTACHMENT : YES

DATE OF MOST RECENT ATTACH. : Sep-97

ACOUSTIC WINDOW : YES

ADCP INSTRUMENT CONFIGURATION

DEPTH RANGE : 57 - 300 m (bin centers)

BIN LENGTH : 16 m
NUMBER OF BINS : 28
TRANSMIT PULSE LENGTH : 16 m
BLANKING INTERVAL : 36 m
ENSEMBLE AVERAGING INTERVAL : 150 s
SOUND SPEED CALCULATION : function of temp at transducer
BOTTOM TRACKING : NO
DIRECT COMMANDS : "FH00001" "E0004020099" "B005099" "CF63"

ADCP DATA ACQUISITION SYSTEM

SOFTWARE DEVELOPERS : RDI
SOFTWARE VERSIONS : DAS 2.48
DATA LOGGER, MAKE/MODEL : 386
ADCP/LOGGER COMMUNICATION : GPIB
USER BUFFER VERSION : UH user exit "UE4", 1920 buffer version
CLOCK : PC clock; reset if drift > 2 sec from GPS clock

SHIP HEADING

INSTRUMENT MAKE/MODEL : Sperry MK-37 Mod D/E gyrocompass
SYNCHRO OR STEPPER : synchro
SYNCHRO RATIO : 1:1
COMPENSATION APPLIED : latitude: changed daily by bridge officer
: speed: 11 knots constant
GPS ATTITUDE SYSTEM : YES: Ashtech
LOCATION OF ANTENNAS : forward
RIGID ATTACHMENT : YES
LOGGING RATE : 1 per sec

ANCILLARY MEASUREMENTS

SURFACE TEMP AND SALINITY : yes
HYDRO CAST MEASUREMENTS : yes
SEASOAR CTD MEASUREMENTS : no
RAW AGC AND SPECTRAL WIDTH : no
BIOMASS DETERMINATION : no
BEAM-AVERAGED AGC AVAILABLE?: YES
CALIBRATION NET TOWS? : Yes

ADCP DATA PROCESSING/EDITING

PERSONNEL IN CHARGE : Stephen D. Pierce
DATE OF PROCESSING : final Dec. 1999

NAVIGATION

GPS : YES
MAKE/MODEL : Trimble Tasmin P-Code

SELECTIVE AVAILABILITY : YES
P-CODE : YES
DIFFERENTIAL : NO
SAMPLE INTERVAL : 1 per sec
TIME OBTAINED RELATIVE TO
START/END OF ENSEMBLE : end
LOGGED WITH ADCP DATA : YES - user exit program

CALIBRATION

GYROCOMPASS CORRECTION : YES, profile-by-profile-rotation based
on the attitude gps HOFS (heading offsets)
BOTTOM TRACK METHOD : NO
WATER TRACK METHOD : YES
FINAL SELECTION : AMPLITUDE= 1.016 PHASE= -2.200
SOUND SPEED CORRECTIONS : YES, offset of -1.09 degrees applied
(based on underway bow thruster thermistor comparison)
: we used salinity mean from underway system: 32.33

NAVIGATION CALCULATION

NAVIGATION USED : gps
REFERENCE LAYER DEPTH RANGE : bins 10 - 15
FILTERING METHOD FOR
SMOOTHING REFERENCE LAYER
VELOCITY (FORM/WIDTH) : Blackman window function of width T= 30 min:
 $w(t) = 0.42 - 0.5 * \cos(2 * \pi * t / T) + 0.08 * \cos(4 * \pi * t / T).$
FINALIZED SHIP VEL/POSITIONS
STORED IN DATABASE : YES

GENERAL_ASSESSMENT :

ON-STATION VS. UNDERWAY : good
VECTOR, CONTOUR, STICK PLOTS: good
COMMENTS : Data quality good in general;
relatively large blanking interval was necessary to reduce a
ringing problem.

r9802.txt

#DATA_DATES: 1998/2/19 14:36:38 to 1998/3/18 05:59:00
#LON_RANGE: 174.601 E to 165.91 W
#LAT_RANGE: 71.316 S to 44.791 S
#DEPTH_RANGE: 57 to 300 m
#SAC_CRUISE_ID:
#PLATFORM_NAME: R/V Revelle
#PRINCIPAL_INVESTIGATOR_NAME: J. A. Barth and T. J. Cowles
#PI_INSTITUTION: Oregon State University
#PI_COUNTRY: USA
#PROJECT: Southern Ocean JGOFS (Joint Global Ocean Flux), AESOPS
#CRUISE_NAME: R9802 or APFZ cruise RR09 (SOJGOFS Process 2)
#PORTS: Lyttelton, New Zealand --- to --- Lyttelton, New Zealand
#GEOGRAPHIC_REGION: Antarctic polar front zone, south of New Zealand along 170W
#PROCESSED_BY: Oregon State University
#NAVIGATION: GPS (Pcode and attitude)
#QUALITY_NAV: <excellent>
#GENERAL_INFORMATION:

CRUISE NOTES

CHIEF SCIENTIST ON SHIP :

INSTITUTE : Oregon State University

COUNTRY : USA

SIGNIFICANT DATA GAPS : none

SPECIAL SHIP TRACK PATTERNS : long transect along 170 W, 67.7-57 S

ADCP INSTRUMENTATION

MANUFACTURER : RD Instruments (RDI)
HARDWARE MODEL : RD-VM150 Narrow band
TRANSDUCER SERIAL NUMBER : 173
FIRMWARE VERSION : 17.10
TRANSMIT FREQUENCY : 153.6 kHz
TRANSDUCER CONFIGURATION : JANUS CONCAVE
TRANSDUCER BEAM ANGLE : 30 deg.

ADCP INSTALLATION

METHOD/DESCRIPTION OF THE

ATTACHMENT TO THE HULL :

LOCATION/DEPTH ON HULL : 5 m

REPEATABLE ATTACHMENT : YES

DATE OF MOST RECENT ATTACH. : Sep-97

ACOUSTIC WINDOW : YES

ADCP INSTRUMENT CONFIGURATION

DEPTH RANGE : 57 - 300 m (bin centers)

BIN LENGTH : 16 m
NUMBER OF BINS : 28
TRANSMIT PULSE LENGTH : 16 m
BLANKING INTERVAL : 36 m
ENSEMBLE AVERAGING INTERVAL : 150 s
SOUND SPEED CALCULATION : function of temp at transducer
BOTTOM TRACKING : Yes, 20 hours at end of cruise
DIRECT COMMANDS : "FH00001" "E0004020099" "B005099" "CF63"

ADCP DATA ACQUISITION SYSTEM

SOFTWARE DEVELOPERS : RDI
SOFTWARE VERSIONS : DAS 2.48
DATA LOGGER, MAKE/MODEL : 386
ADCP/LOGGER COMMUNICATION : GPIB
USER BUFFER VERSION : UH user exit "UE4", 1920 buffer version
CLOCK : PC clock; reset if drift > 2 sec from GPS clock

SHIP HEADING

INSTRUMENT MAKE/MODEL : Sperry MK-37 Mod D/E gyrocompass
SYNCHRO OR STEPPER : synchro
SYNCHRO RATIO : 1:1
COMPENSATION APPLIED : latitude: changed daily by bridge officer
: speed: 11 knots constant
GPS ATTITUDE SYSTEM : YES: Ashtech
LOCATION OF ANTENNAS : forward
RIGID ATTACHMENT : YES
LOGGING RATE : 1 per sec

ANCILLARY MEASUREMENTS

SURFACE TEMP AND SALINITY : yes
HYDRO CAST MEASUREMENTS : yes
SEASOAR CTD MEASUREMENTS : no
RAW AGC AND SPECTRAL WIDTH : no
BIOMASS DETERMINATION : no
BEAM-AVERAGED AGC AVAILABLE?: YES
CALIBRATION NET TOWS? : Yes

ADCP DATA PROCESSING/EDITING

PERSONNEL IN CHARGE : Stephen D. Pierce
DATE OF PROCESSING : final Dec. 1999

NAVIGATION

GPS : YES
MAKE/MODEL : Trimble Tasmin P-Code

SELECTIVE AVAILABILITY : YES
P-CODE : YES
DIFFERENTIAL : NO
SAMPLE INTERVAL : 1 per sec
TIME OBTAINED RELATIVE TO
START/END OF ENSEMBLE : end
LOGGED WITH ADCP DATA : YES - user exit program

CALIBRATION

GYROCOMPASS CORRECTION : YES, profile-by-profile-rotation based
on the attitude gps HOFS (heading offsets)
BOTTOM TRACK METHOD : YES
WATER TRACK METHOD : YES
FINAL SELECTION : AMPLITUDE= 1.002 PHASE= -1.973
SOUND SPEED CORRECTIONS : YES, offset of -1.09 degrees applied
(based on underway bow thruster thermistor comparison)
: we used salinity mean from underway system: 32.33

NAVIGATION CALCULATION

NAVIGATION USED : gps
REFERENCE LAYER DEPTH RANGE : bins 10 - 15
FILTERING METHOD FOR
SMOOTHING REFERENCE LAYER
VELOCITY (FORM/WIDTH) : Blackman window function of width T= 30 min:
 $w(t) = 0.42 - 0.5 * \cos(2 * \pi * t / T) + 0.08 * \cos(4 * \pi * t / T).$
FINALIZED SHIP VEL/POSITIONS
STORED IN DATABASE : YES

GENERAL_ASSESSMENT :

ON-STATION VS. UNDERWAY : good
VECTOR, CONTOUR, STICK PLOTS: good
COMMENTS : Data quality good in general;
relatively large blanking interval was necessary to reduce a
ringing problem. A small quantity of data at the beginning,
prior to 1998/02/19 14:36:38, actually belongs to the end of
the previous cruise and should be ignored.

start.cnf, primary configuration file (R9711 and R9802)

AD,SI,HUNDREDTHS	150.00 Sampling interval
AD,NB,WHOLE	28 Number of Depth Bins
AD,BL,WHOLE	4 Bin Length
AD,PL,WHOLE	16 Pulse Length
AD,BK,TENTHS	36.0 Blank Beyond Transmit
AD,PE,WHOLE	1 Pings Per Ensemble
AD,PC,HUNDREDTHS	1.00 Pulse Cycle Time
AD,PG,WHOLE	25 Percent Pings Good Threshold
XX,OD2,WHOLE	5 [SYSTEM DEFAULT, OD2]
XX,TE,HUNDREDTHS	0.00 [SYSTEM DEFAULT, TE]
AD,US,BOOLE	YES Use Direct Commands on StartUp
DP,TR,BOOLE	NO Toggle roll compensation
DP,TP,BOOLE	NO Toggle Pitch compensation
DP,TH,BOOLE	YES Toggle Heading compensation
DP,VS,BOOLE	YES Calculate Sound Velocity from TEMP/Salinity
DP,UR,BOOLE	YES Use Reference Layer
DP,FR,WHOLE	10 First Bin for reference Layer
DP,LR,WHOLE	20 Last Bin for reference Layer
DP,BT,BOOLE	YES Use Bottom Track
DP,B3,BOOLE	NO Use 3 Beam Solutions
DP,EV,BOOLE	YES Use Error Velocity as Percent Good Criterion
DP,ME,TENTHS	100.0 Max. Error Velocity for Valid Data (cm/sec)
DR,RD,BOOLE	YES Recording on disk
DR,RX,BOOLE	YES Record N/S (FORE/AFT) Vel.
DR,RY,BOOLE	YES Record E/W (FORT/STBD) Vel.
DR,RZ,BOOLE	YES Record vertical vel.
DR,RE,BOOLE	YES Record error Good
DR,RB,BOOLE	YES Bytes of user prog. buffer
DR,RP,BOOLE	YES Record Percent good
DR,RA,BOOLE	YES Record average AGC/Bin
DR,RN,BOOLE	YES Record Ancillary data
DR,AP,BOOLE	YES Auto-ping on start-up
XX,LDR,TRI	4 [SYSTEM DEFAULT, LDR]
XX,RB2,WHOLE	192 [SYSTEM DEFAULT, RB2]
DR,RC,BOOLE	NO Record CTD data
XX,FB,WHOLE	1 [SYSTEM DEFAULT, FB]
XX,PU,BOOLE	NO [SYSTEM DEFAULT, PU]
GC,TG,TRI	1 DISPLAY (NO/GRAPH/TAB)
GC,ZV,WHOLE	1 ZERO VELOCITY REFERENCE (S/B/M/L)
GC,VL,WHOLE	-50 LOWEST VELOCITY ON GRAPH
GC,VH,WHOLE	50 HIGHEST VELOCITY ON GRAPH
GC,DL,WHOLE	0 LOWEST DEPTHS ON GRAPH
GC,DH,WHOLE	400 HIGHEST DEPTHS ON GRAPH

GC,SW,BOOLE	NO SET DEPTHS WINDOW TO INCLUDE ALL BINS
GC,MP,WHOLE	10 MINIMUM PERCENT GOOD TO PLOT
SG,PNS,BOOLE	YES PLOT NORTH/SOUTH VEL.
SG,PEW,BOOLE	YES PLOT EAST/WEST VEL.
SG,PVT,BOOLE	NO PLOT VERTICAL VEL.
SG,PEV,BOOLE	YES PLOT ERROR VEL.
SG,PPE,BOOLE	YES PLOT PERCENT ERROR
SG,PMD,BOOLE	NO PLOT MAG AND DIR
SG,PSW,BOOLE	NO PLOT AVERAGE SP. W.
SG,PAV,BOOLE	YES PLOT AVERAGE AGC.
SG,PPG,BOOLE	YES PLOT PERCENT GOOD
SG,PD1,BOOLE	NO PLOT DOPPLER 1
SG,PD2,BOOLE	NO PLOT DOPPLER 2
SG,PD3,BOOLE	NO PLOT DOPPLER 3
SG,PD4,BOOLE	NO PLOT DOPPLER 4
SG,PW1,BOOLE	NO PLOT SP. W. 1
SG,PW2,BOOLE	NO PLOT SP. W. 2
SG,PW3,BOOLE	NO PLOT SP. W. 3
SG,PW4,BOOLE	NO PLOT SP. W. 4
SG,PA1,BOOLE	NO PLOT AGC 1
SG,PA2,BOOLE	NO PLOT AGC 2
SG,PA3,BOOLE	NO PLOT AGC 3
SG,PA4,BOOLE	NO PLOT AGC 4
SG,PP3,BOOLE	NO PLOT 3-BEAM SOLUTION
SS,OD,WHOLE	5 OffSet for Depth
SS,OH,TENTHS	0.0 OffSet for Heading
SS,OP,TENTHS	0.0 OffSet for Pitch
SS,ZR,TENTHS	0.0 OffSet for Roll
SS,OT,HUNDREDTHS	45.00 OffSet FOR temp
SS,ST,HUNDREDTHS	50.00 Scale for Temp
SS,SL,HUNDREDTHS	35.00 Salinity (PPT)
SS,UD,BOOLE	YES Toggle UP/DOWN
SS,CV,BOOLE	NO Toggle concave/Convex transducerhead
SS,MA,TENTHS	30.0 Mounting angle for transducers.
SS,SS,HUNDREDTHS	1500.00 Speed of Sound (m/sec)
XX,GP,BOOLE	YES [SYSTEM DEFAULT, GP]
XX,DD,TENTHS	1.0 [SYSTEM DEFAULT, DD]
XX,PT,BOOLE	NO [SYSTEM DEFAULT, PT]
XX,TU,TRI	2 [SYSTEM DEFAULT, TU]
TB,FP,WHOLE	1 FIRST BINS TO PRINT
TB,LP,WHOLE	64 LAST BIN TO PRINT
TB,SK,WHOLE	6 SKIP INTERVAL BETWEEN BINS
TB,DT,BOOLE	YES DIAGNOSTIC TAB MODE
DU,TD,BOOLE	NO TOGGLE USE OF DUMMY DATA

XX,PN,WHOLE	0 [SYSTEM DEFAULT, PN]
DR,SD,WHOLE	3 Second recording drive
DR,PD,WHOLE	4 First recording drive (1=A:,2=B: ...)
DP,PX,BOOLE	NO Profiler does XYZE transform
SS,LC,TENTHS	5.0 Limit of Knots change
SS,NW,TENTHS	0.5 Weight of new knots of value
GC,GM,TRI	2 GRAPHICS CONTROL 0=LO RES, 1=HI RES, 2=ENHANCED
AD,PS,BOOLE	NO YES=SERIAL/NO=PARALLEL Profiler Link
XX,LNN,BOOLE	YES [SYSTEM DEFAULT, LNN]
XX,BM,BOOLE	YES [SYSTEM DEFAULT, BM]
XX,RSD,BOOLE	NO RECORD STANDARD DEVIATION OF VELOCITIES PER BIN
XX,DRV,WHOLE	0 [SYSTEM DEFAULT, DRV]
XX,PBD,WHOLE	3 [SYSTEM DEFAULT, PBD]
TB,RS,BOOLE	NO SHOW RHPT STATISTIC
UX,EE,BOOLE	YES ENABLE EXIT TO EXTERNAL PROGRAM
SS,VSC,TRI	0 Velocity scale adjustment
AD,DM,BOOLE	NO USE DMA
TB,SC,BOOLE	NO SHOW CTD DATA
AD,CW,BOOLE	YES Collect spectral width
DR,RW,BOOLE	YES Record average SP.W./Bin
DR,RRD,BOOLE	NO Record last raw dopplers
DR,RRR,BOOLE	YES Record last raw AGC
DR,RRW,BOOLE	YES Record last SP.W.
DR,R3,BOOLE	NO Record average 3-Beam solutions
DR,RBS,BOOLE	YES Record beam statistic
XX,STD,BOOLE	NO [SYSTEM DEFAULT, STD]
LR,HB,HUNDREDTHS	0.00 Heading Bias
SL,1,ARRAY5	0 1 8 NONE 19200 PROFILER
SL,2,ARRAY5	0 1 8 NONE 1200 LORAN RECEIVER
SL,3,ARRAY5	0 1 8 NONE 1200 REMOTE DISPLAY
SL,4,ARRAY5	0 1 8 NONE 1200 ENSEMBLE OUTPUT
SL,5,ARRAY5	0 1 8 NONE 1200 AUX 1
SL,6,ARRAY5	0 1 8 NONE 1200 AUX 2
DU,1,ARRAY6	100.00 100.00 60.00 0.00 0.00 YES D1
DU,2,ARRAY6	-100.00 -100.00 60.00 0.00 0.00 YES D2
DU,3,ARRAY6	200.00 200.00 60.00 0.00 0.00 YES D3
DU,4,ARRAY6	-200.00 -200.00 60.00 0.00 0.00 YES D4
DU,5,ARRAY6	200.00 19.00 60.00 0.00 0.00 YES AGC
DU,6,ARRAY6	0.00 0.00 60.00 0.00 0.00 NO SP. W.
DU,7,ARRAY6	0.00 0.00 0.00 0.00 0.00 NO ROLL
DU,8,ARRAY6	0.00 0.00 0.00 0.00 0.00 NO PITCH
DU,9,ARRAY6	0.00 0.00 0.00 0.00 0.00 NO HEADING
DU,10,ARRAY6	0.00 0.00 60.00 0.00 0.00 NO TEMPERATURE
DC,1,SPECIAL	"FH00001" MACRO 1

DC,2,SPECIAL "E0004020099" MACRO 2
DC,3,SPECIAL "B005099" MACRO 3
DC,4,SPECIAL "CF63" MACRO 4
CI,1,SPECIAL "R9801" CRUISE ID GOES HERE
LR,1,SPECIAL " " LORAN FILE NAME GOES HERE

ue4.cnf, user exit configuration file (R9711 and R9802)

configuration:

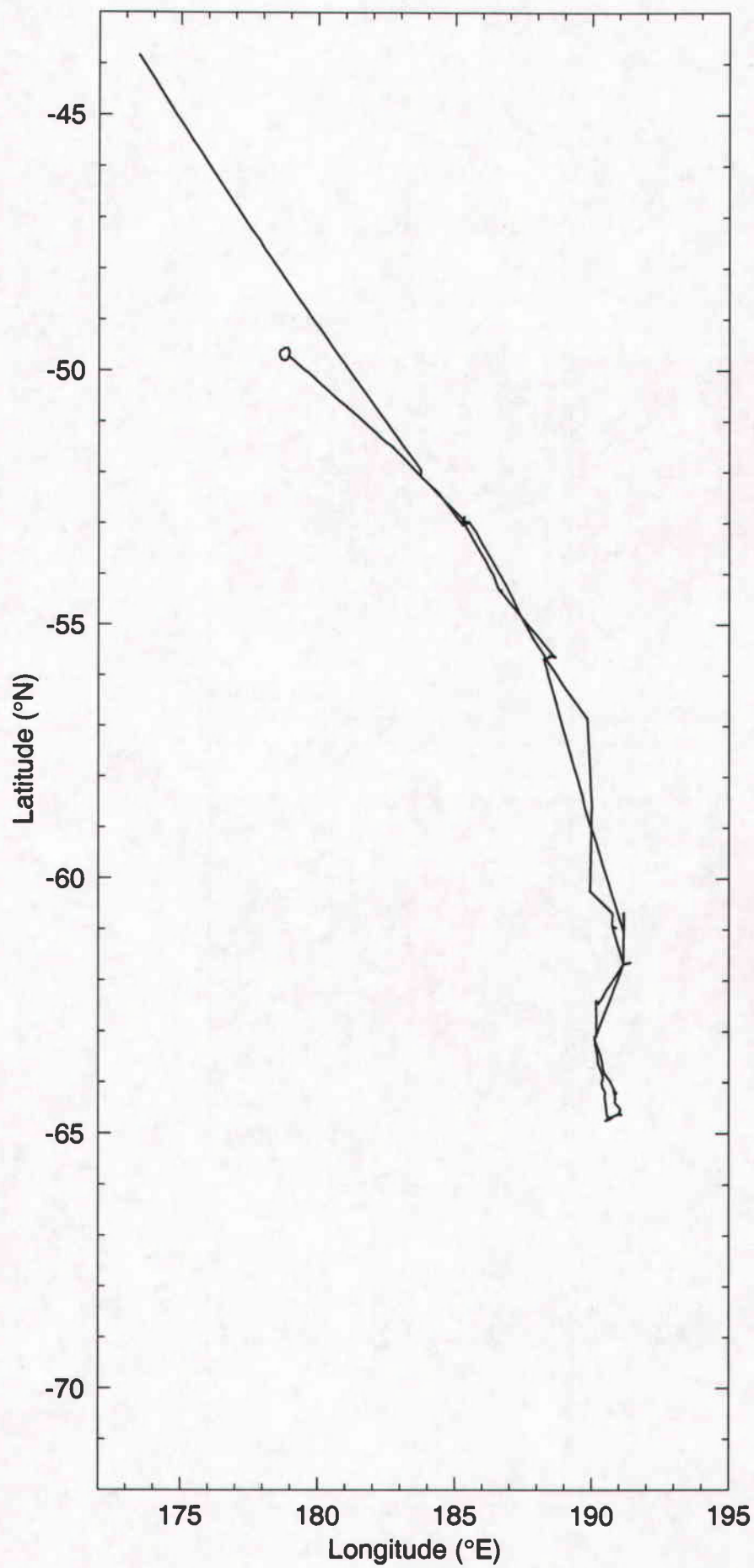
```
set_com2:
  baud= 4800
  parity: N
  receive: nmea_1
  transmit: none
end
set_com1:
  baud= 9600 /* 300 ... 19200 */
  parity: N /* N, O, E */
  receive: ashtech_2 /* none, nmea, raw */
  transmit: none /* none, ensemble, speed */
end
watchdog
correct_clock
init_time
min_correction= 2
max_correction= 32760
max_dt_difference= 2

warn_bad_heading
head_stddev_thresh= 0.01 /* Degrees */

max_brms= 0.03
max_mrms= 0.004
max_dh_dev= 1

max_p_std_dev= 2.5 /* Reject attitudes if pitch exceeds local mean by
this number of standard deviations */
max_r_std_dev= 2.5 /* Reject attitudes if roll exceeds local mean by
this number of standard deviations */
/* WRITING raw amp, spectral width, and auxiliary files: */
amp_sw_nbins= 56 /* number of bins of raw amplitude written */
amp_subsample= 1 /* raw amplitude ping sampling rate */
sw_subsample= 1 /* spectral width ping sampling rate */
minutes_per_file= 60 /* file length in minutes */
amp_sw_drive_path: d:
min_kbytes_free= 2000 /* if space on disk < than this, raw recording
will stop */
end /* This "end" is necessary. */
```

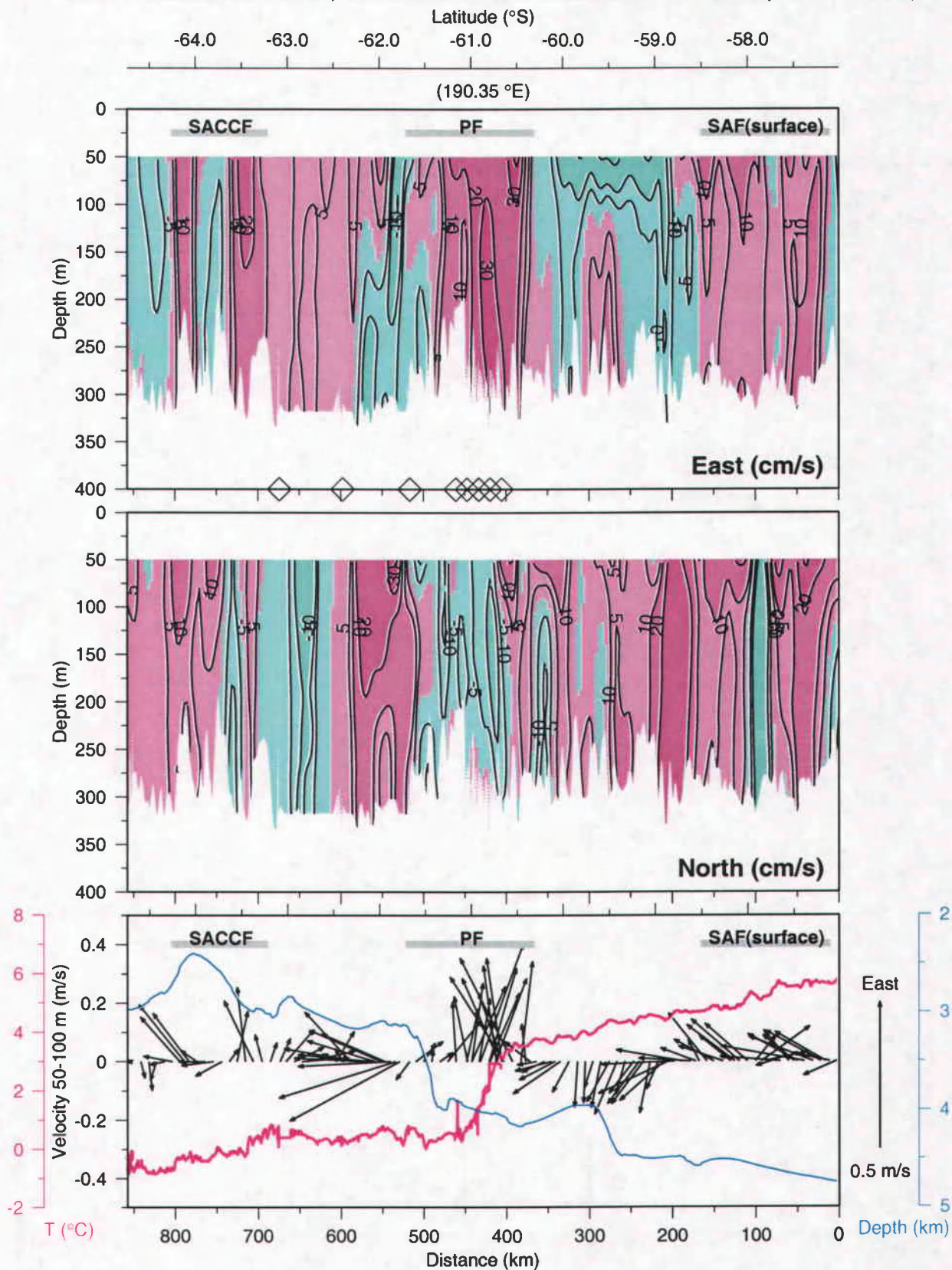
R9711



Latitude (°S)

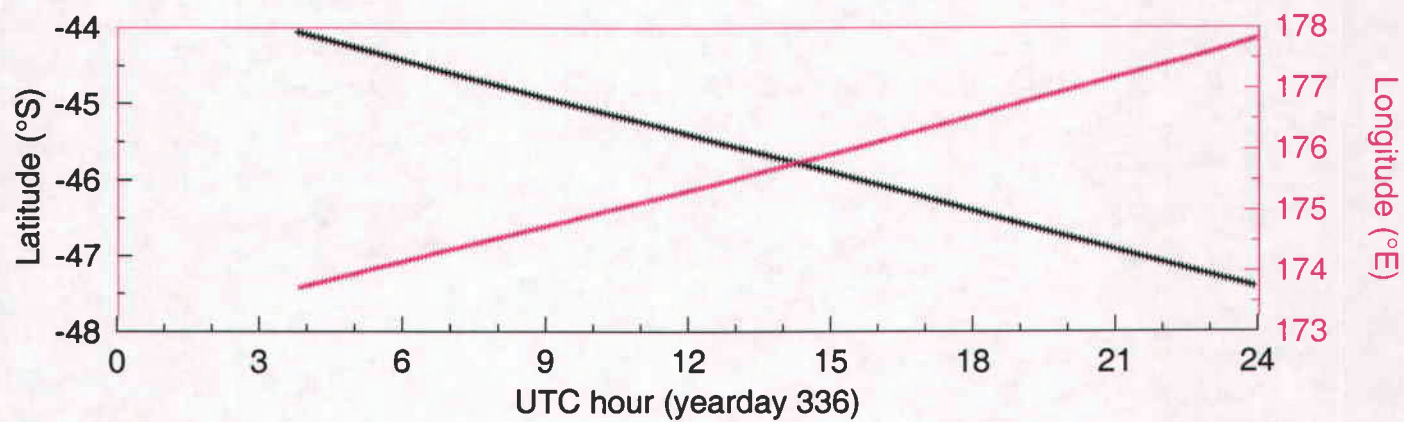
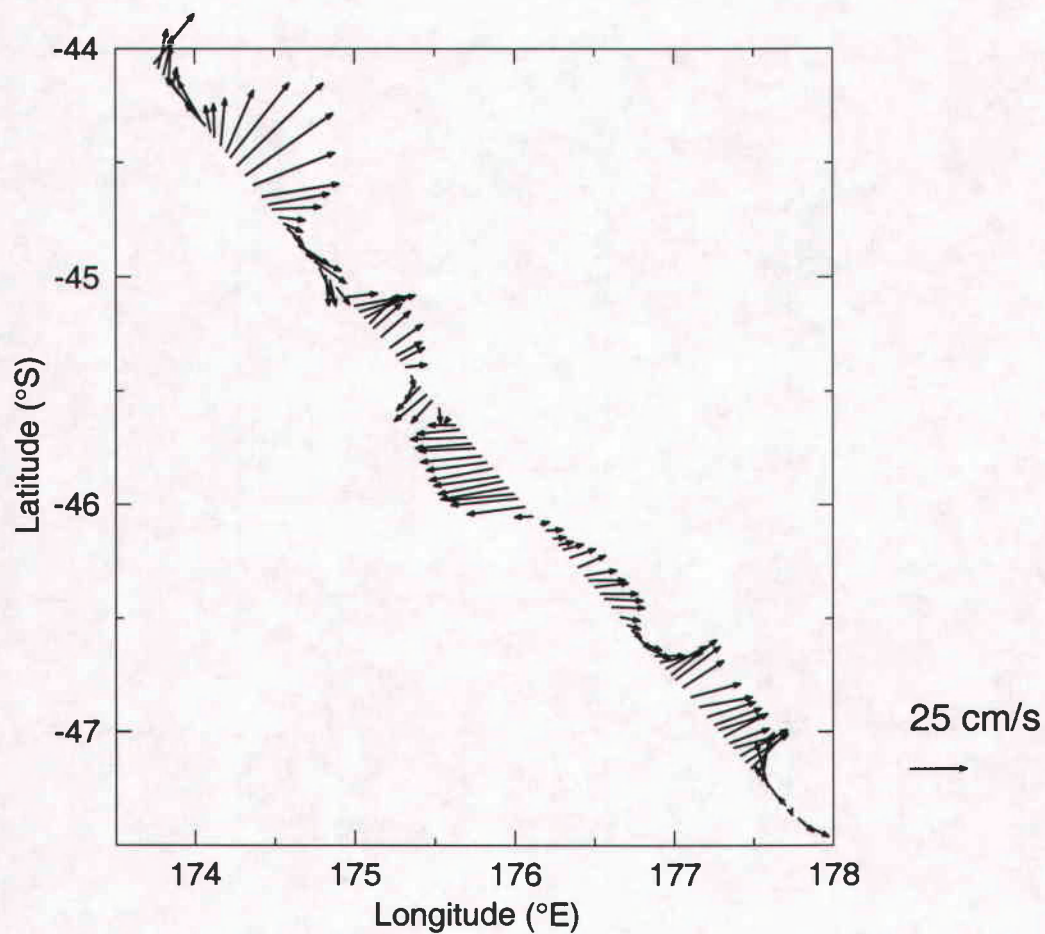


Process 1: Transect north ADCP, 17-Dec-1997 20:19:41 to 25-Dec-1997 08:48:29 (351.847-359.367)



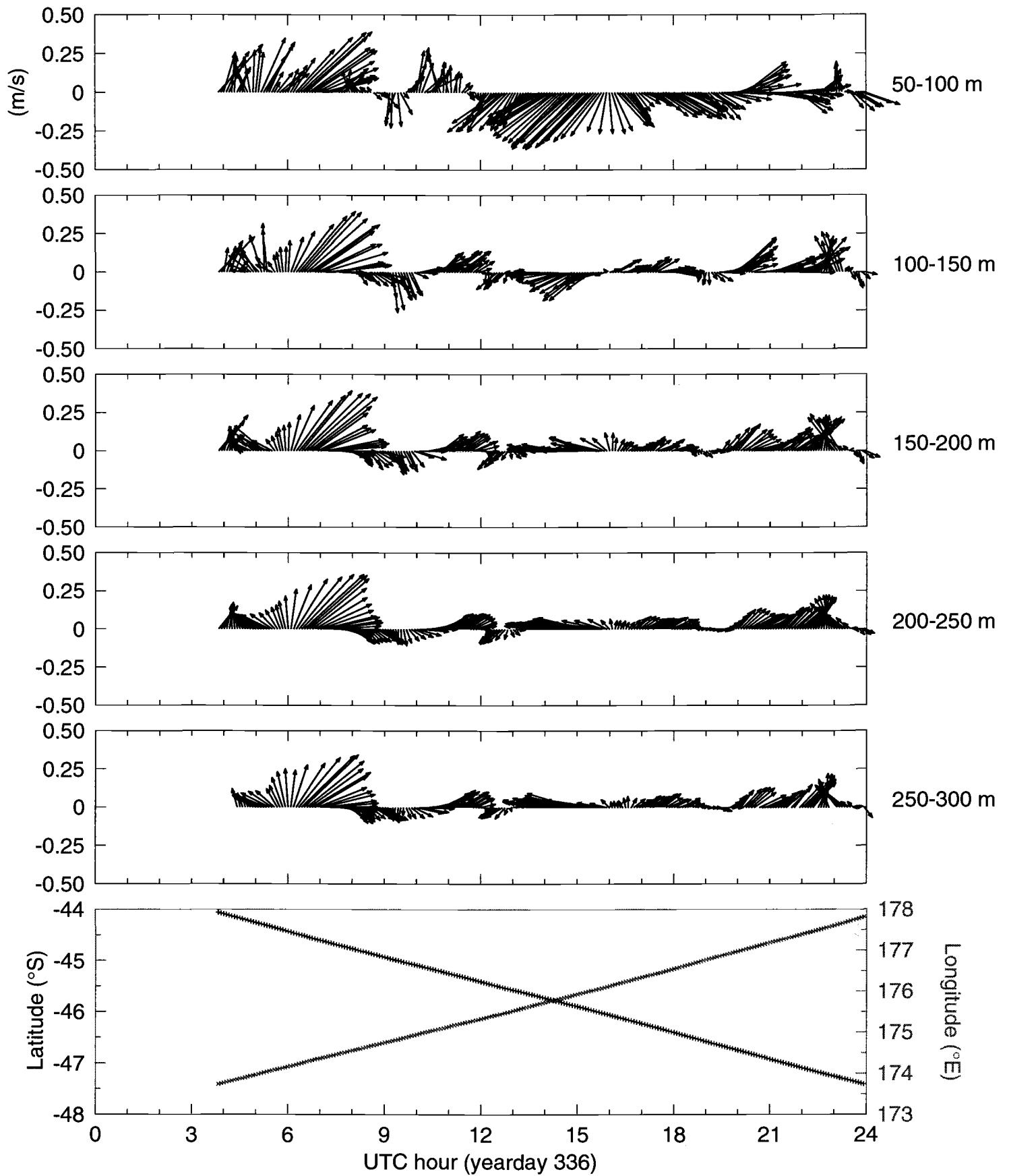
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (02-Dec-1997, yearday 336)



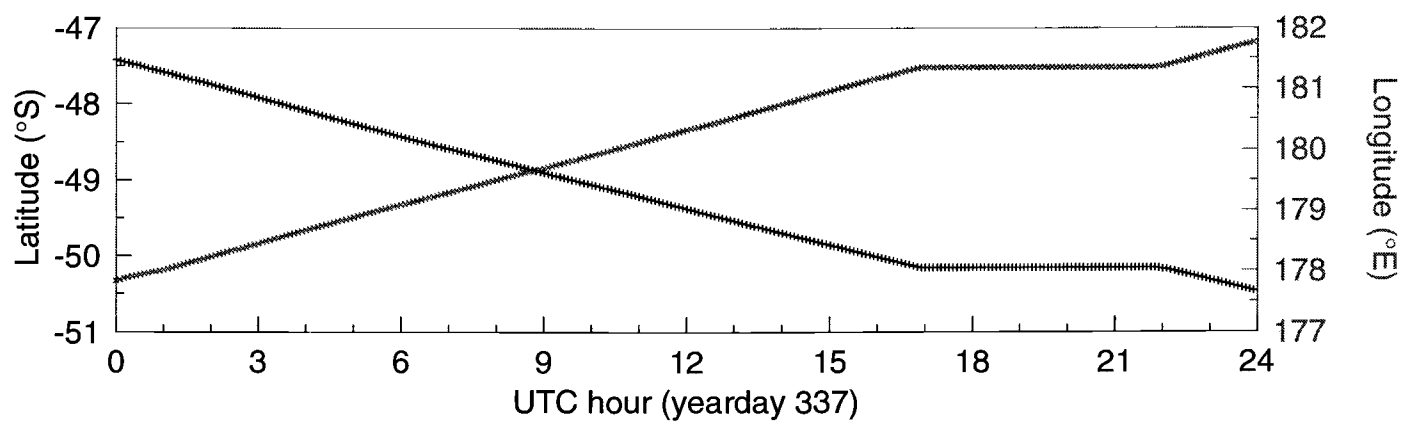
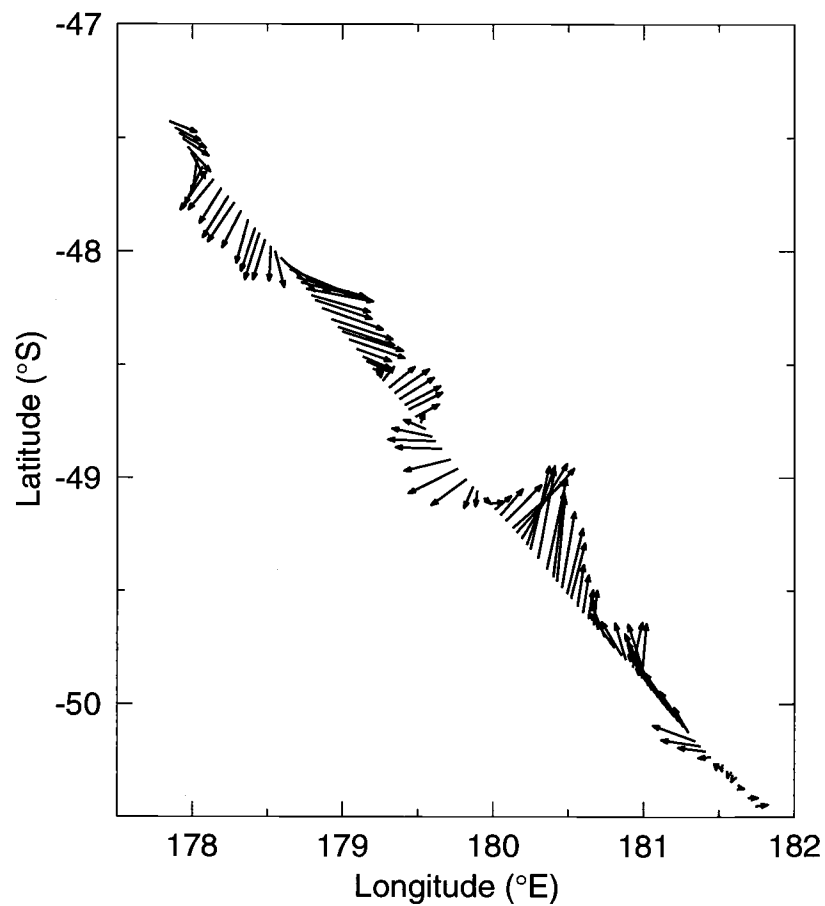
SOJGOFS Process 1 cruise (R9711) ADCP: 02-Dec-1997 (yearday 336)

N
↑



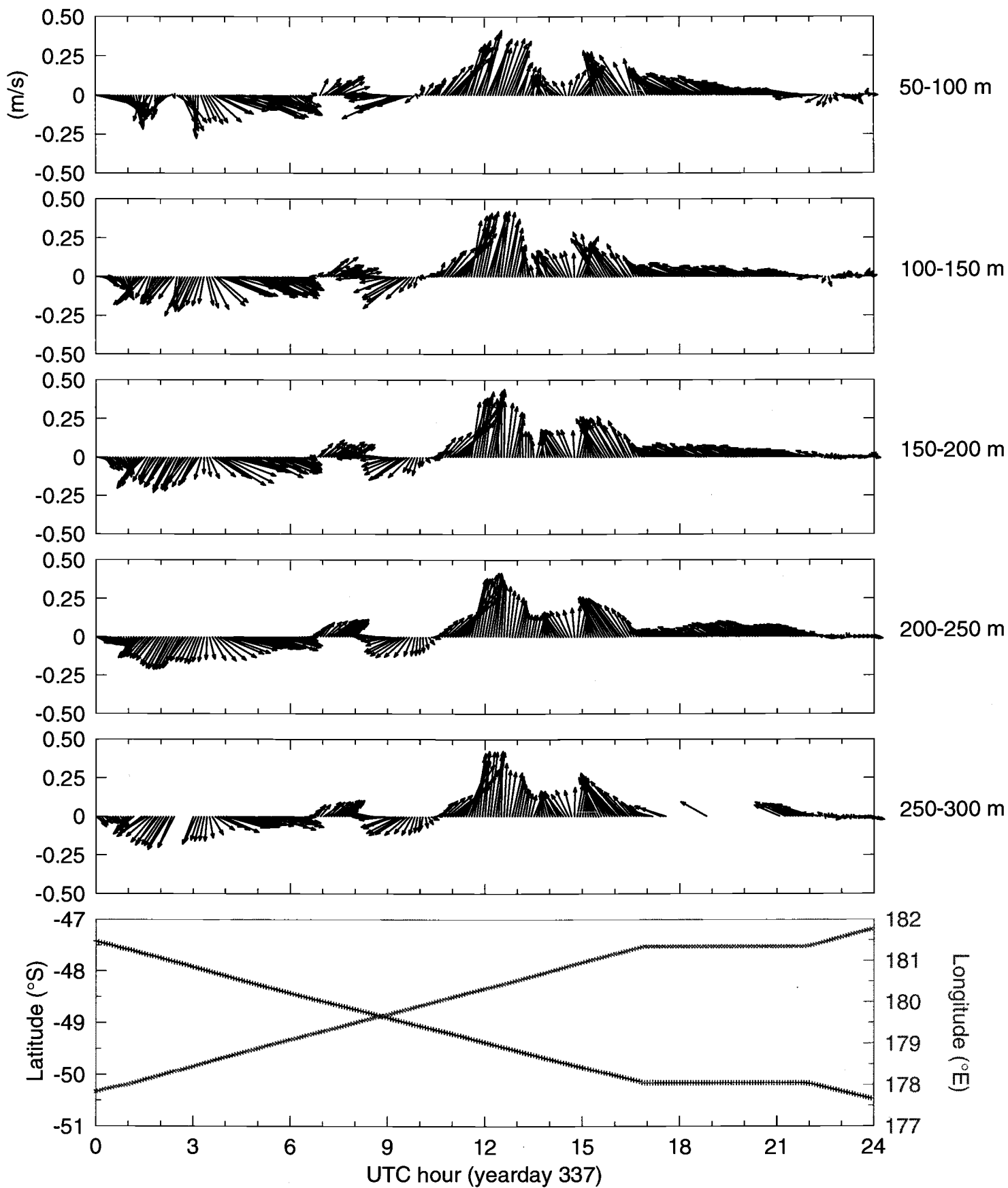
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (03-Dec-1997, yearday 337)



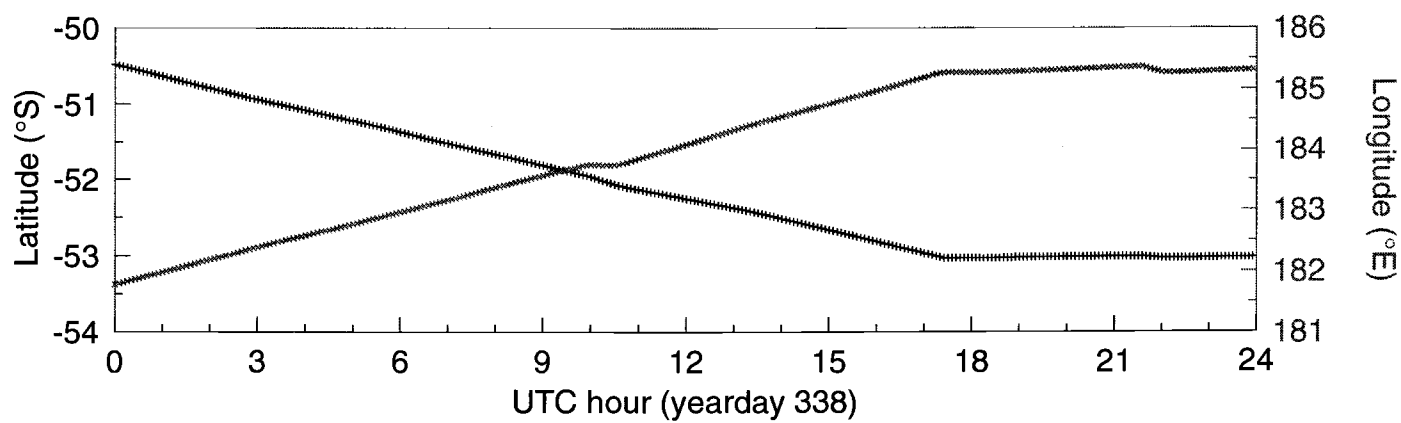
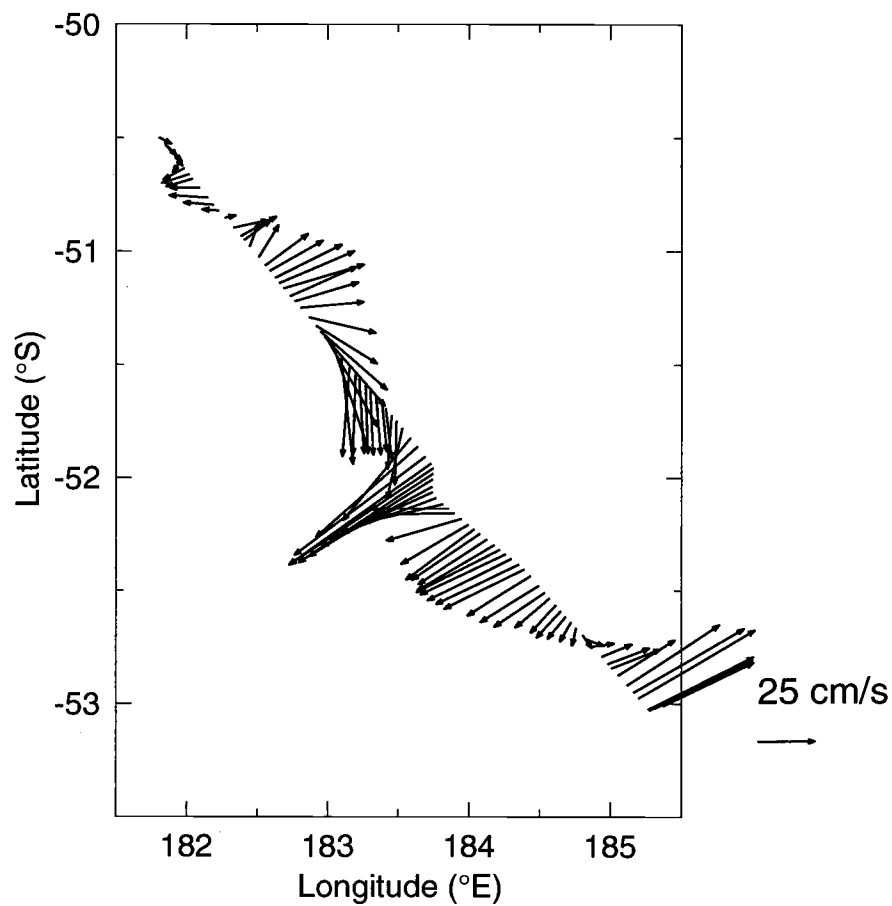
SOJGOFS Process 1 cruise (R9711) ADCP: 03-Dec-1997 (yearday 337)

N
↑



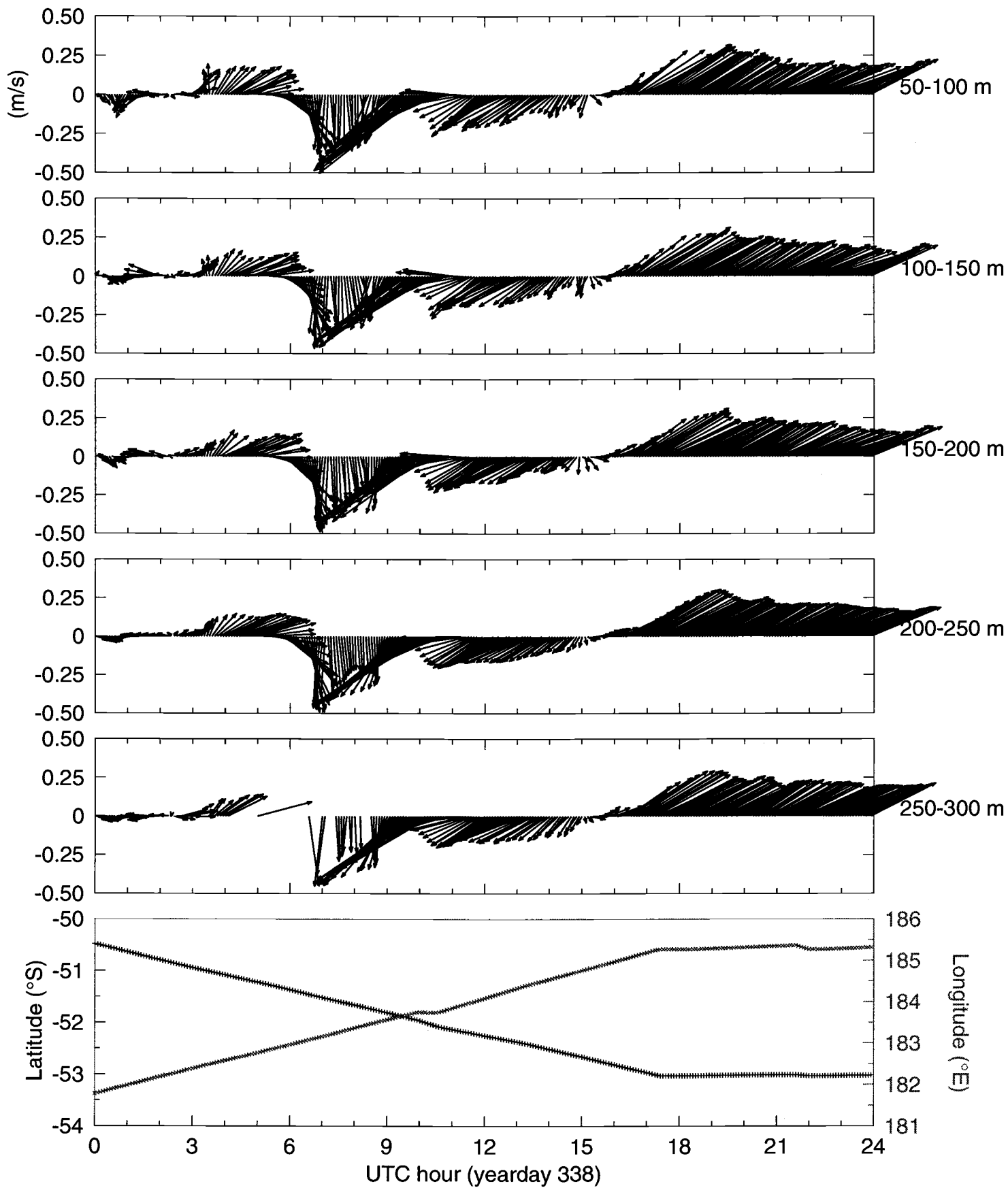
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (04-Dec-1997, yearday 338)



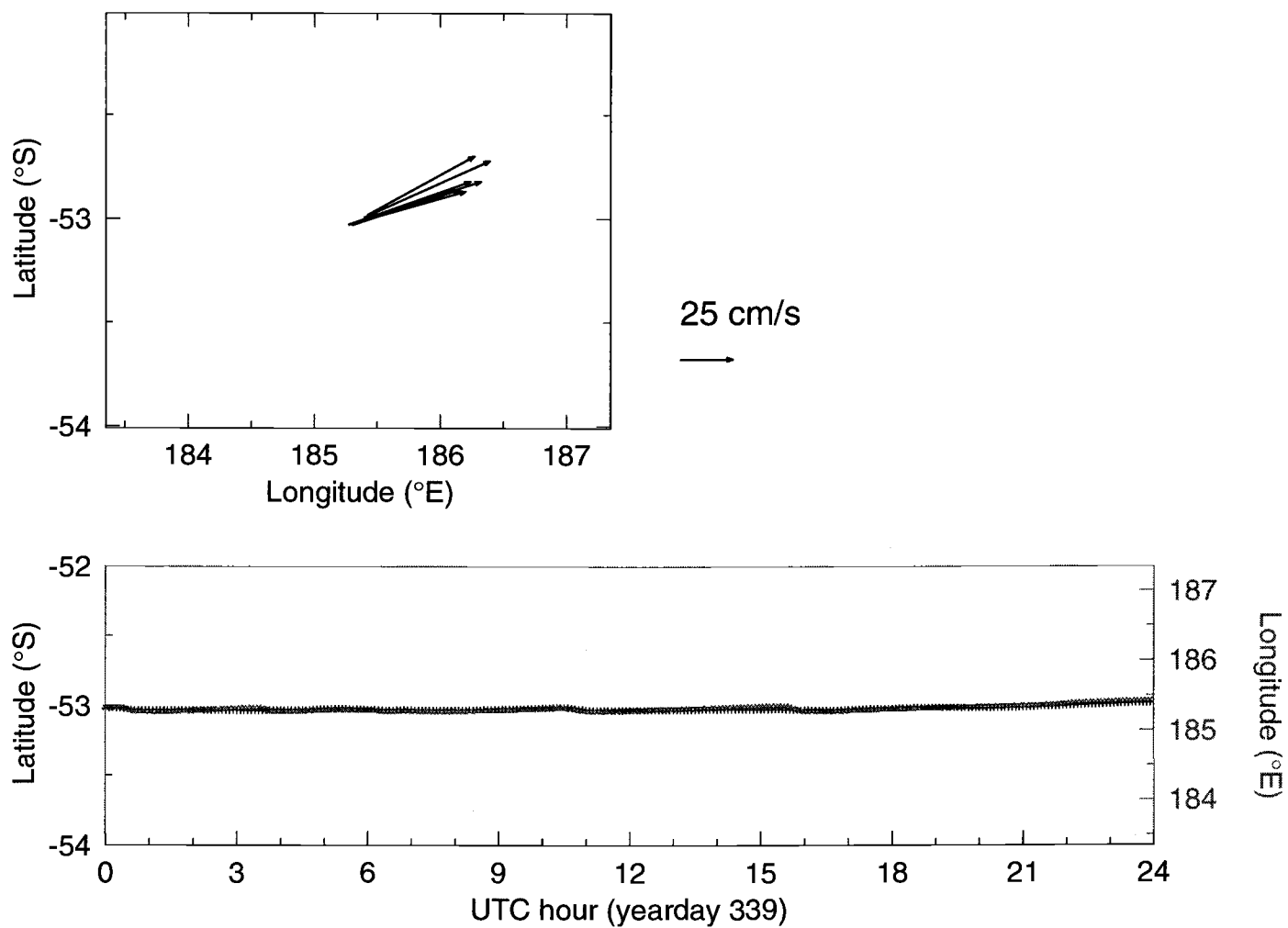
SOJGOFS Process 1 cruise (R9711) ADCP: 04-Dec-1997 (yearday 338)

N
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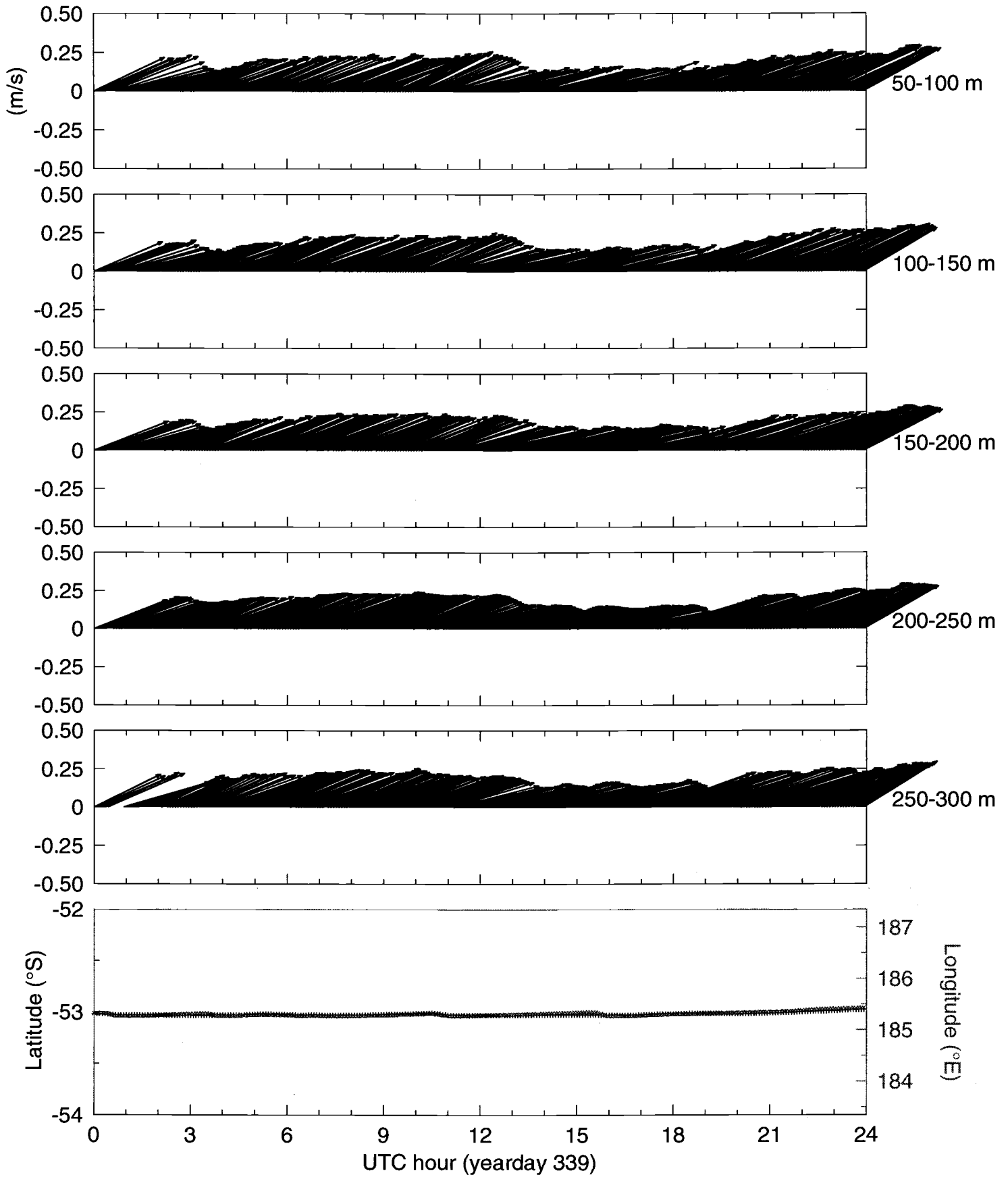
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (05-Dec-1997, yearday 339)



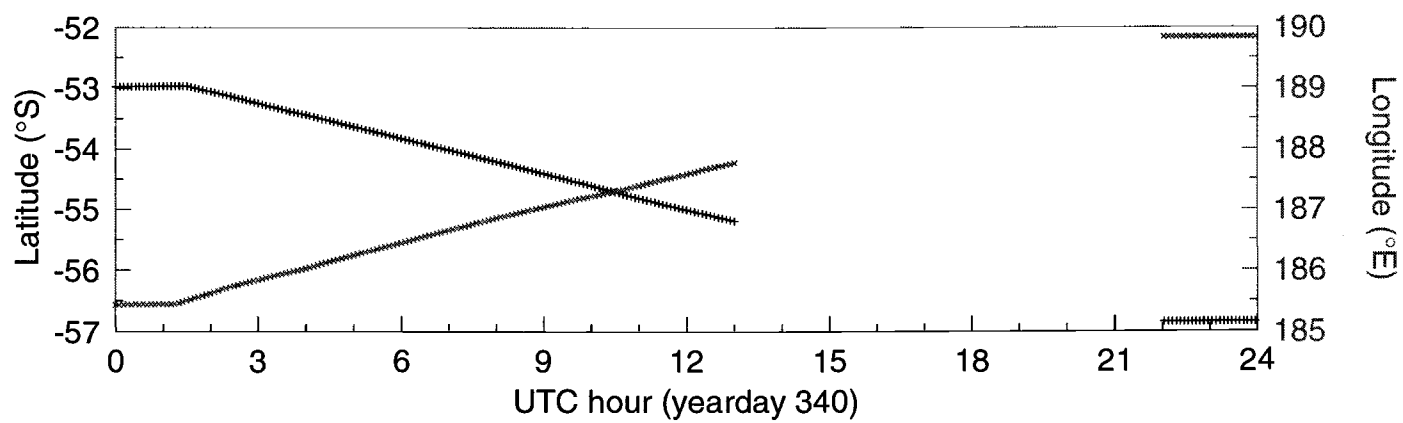
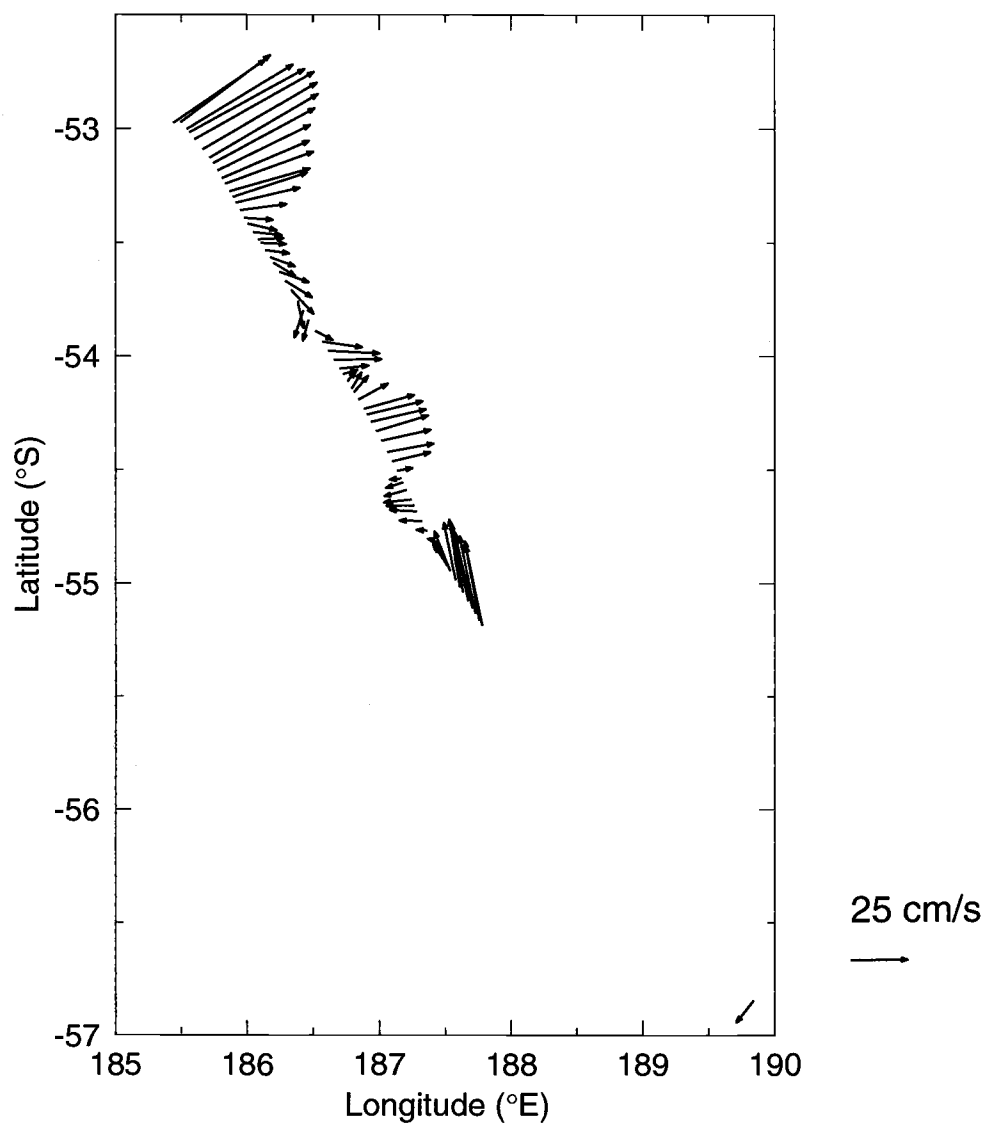
SOJGOFS Process 1 cruise (R9711) ADCP: 05-Dec-1997 (yearday 339)

N
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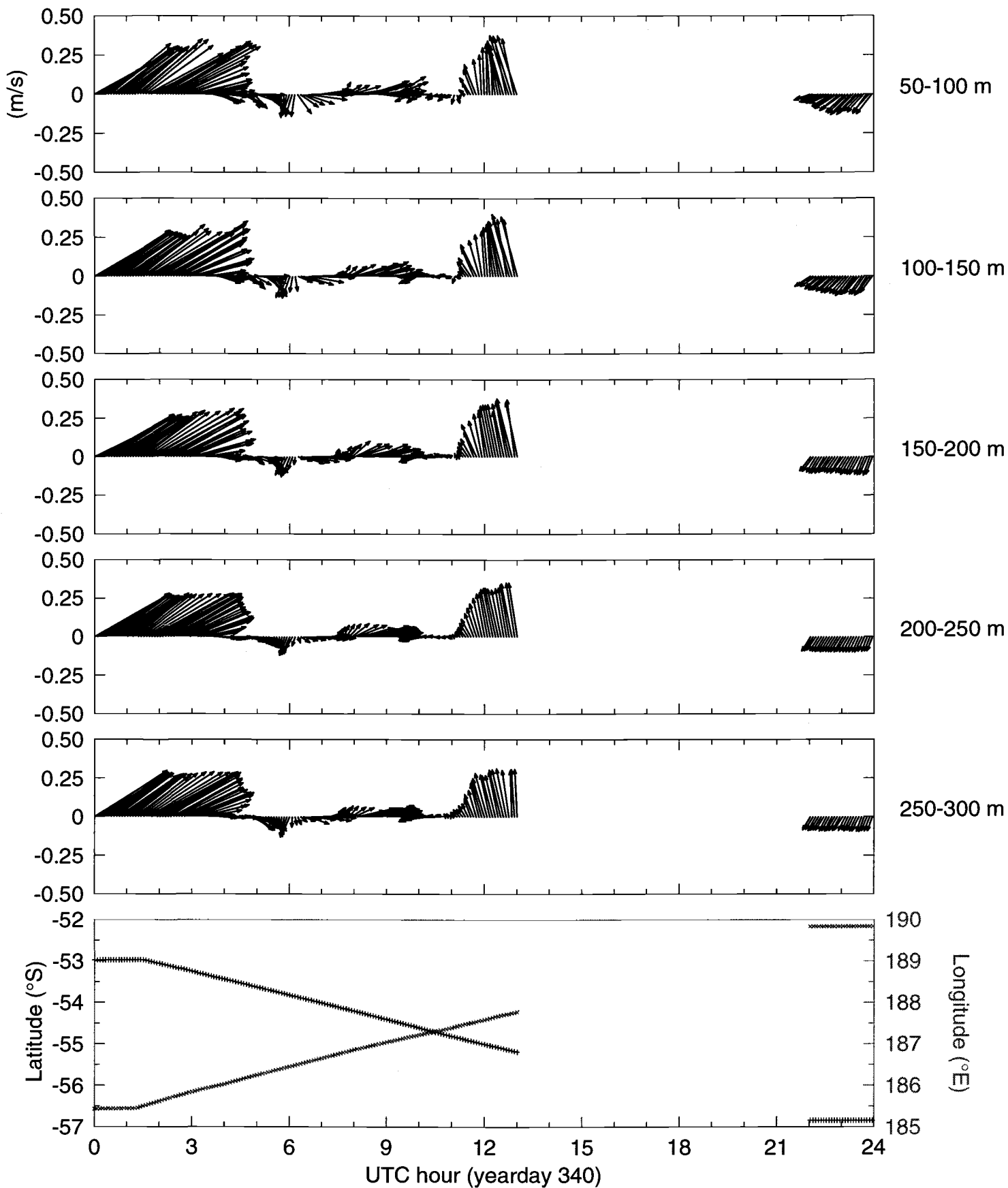
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (06-Dec-1997, yearday 340)



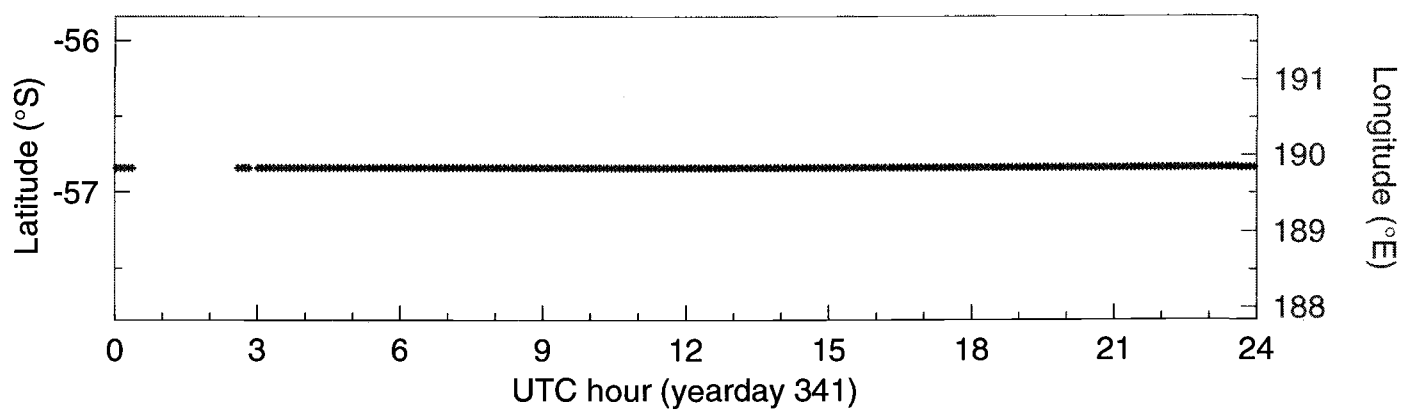
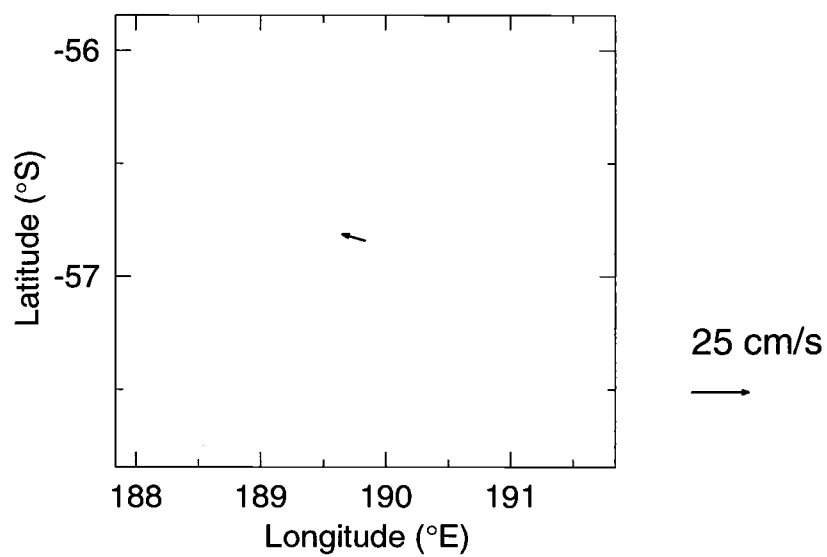
SOJGOFS Process 1 cruise (R9711) ADCP: 06-Dec-1997 (yearday 340)

N
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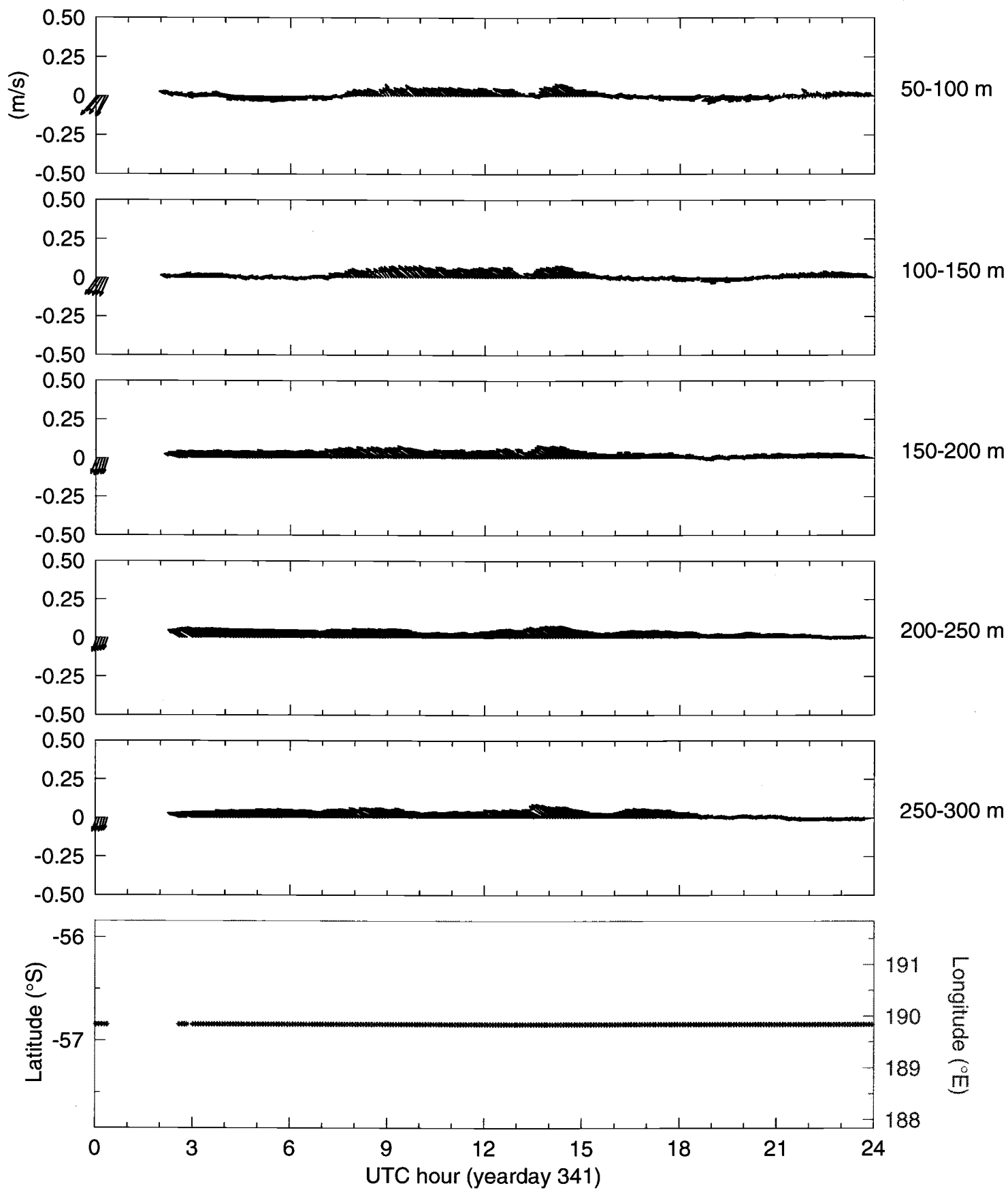
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (07-Dec-1997, yearday 341)



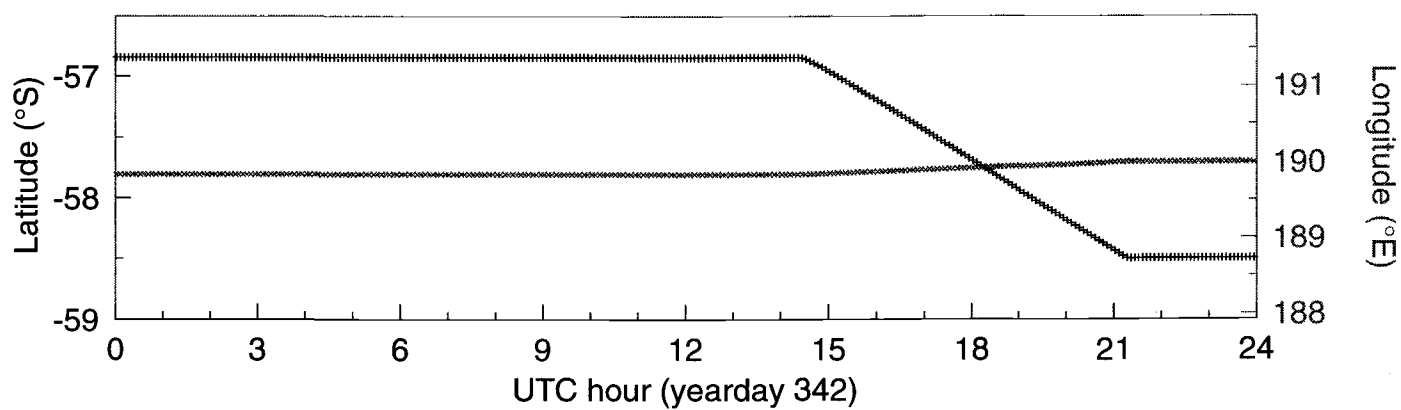
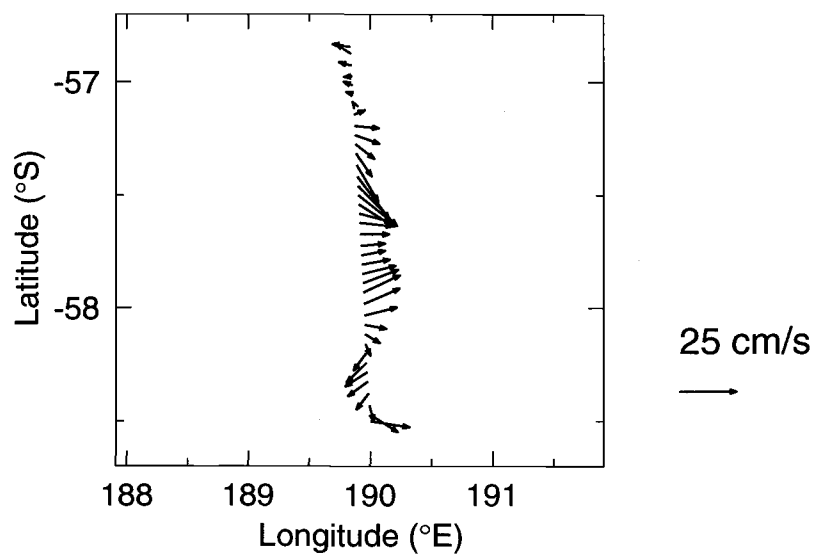
SOJGOFS Process 1 cruise (R9711) ADCP: 07-Dec-1997 (yearday 341)

N
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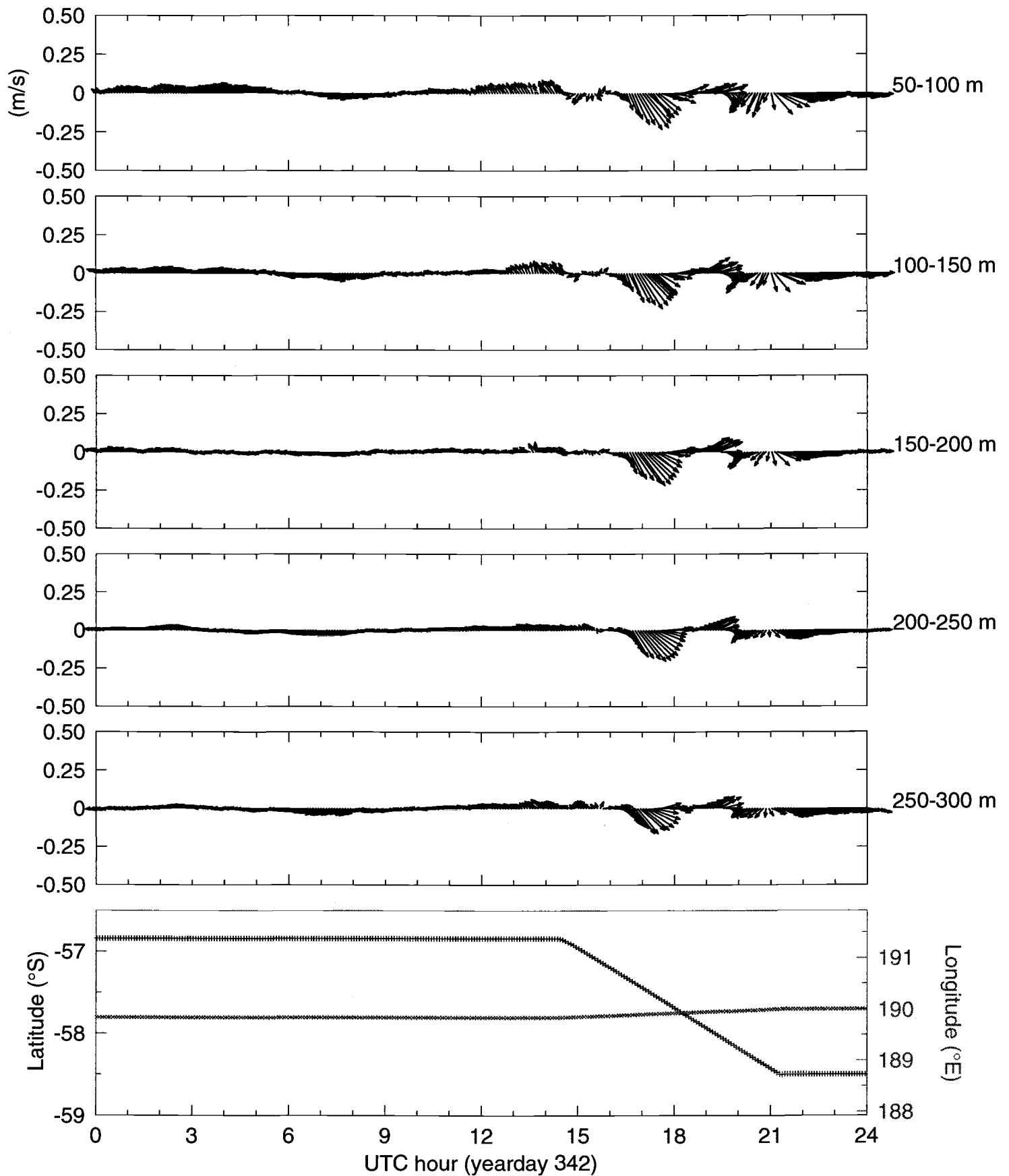
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (08-Dec-1997, yearday 342)



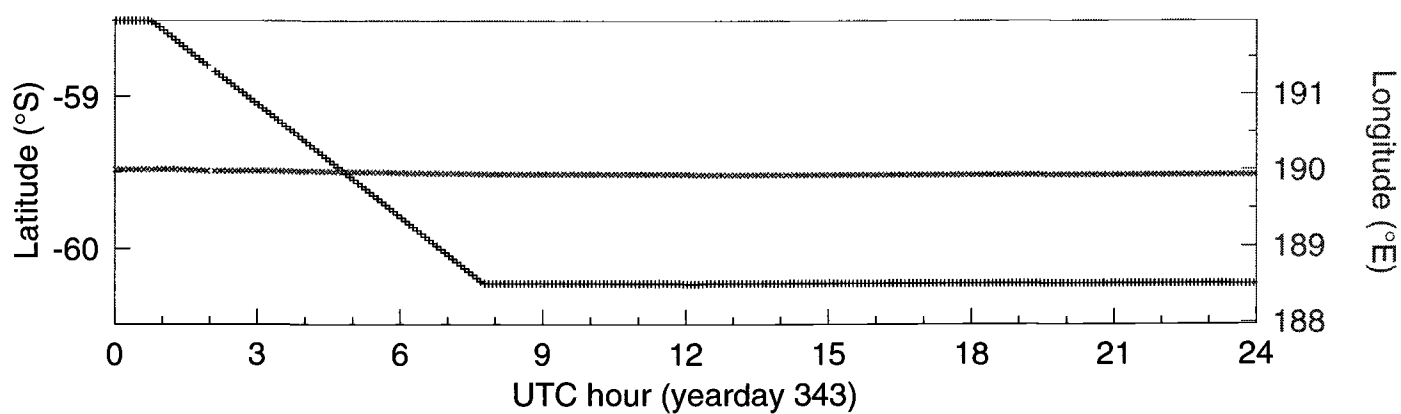
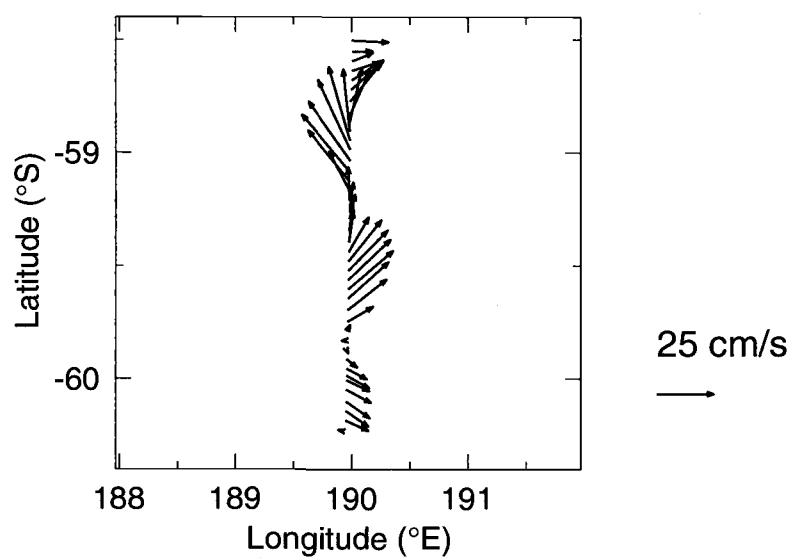
SOJGOFS Process 1 cruise (R9711) ADCP: 08-Dec-1997 (yearday 342)

N
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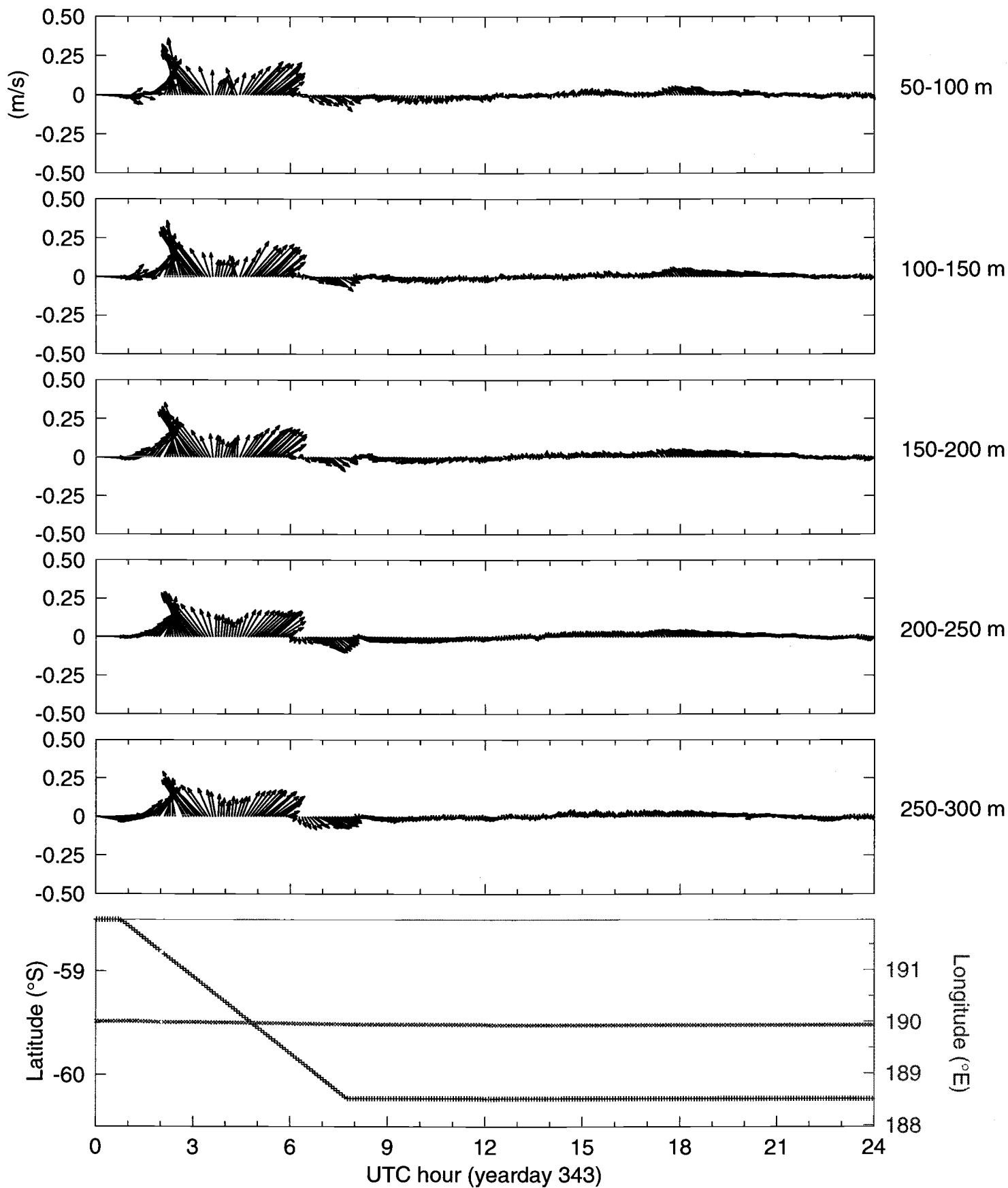
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (09-Dec-1997, yearday 343)



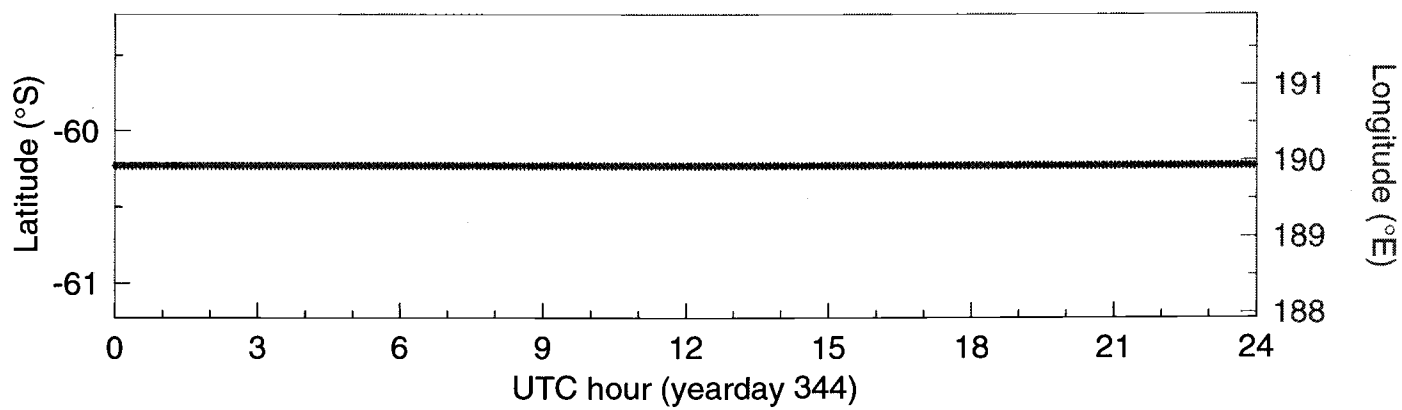
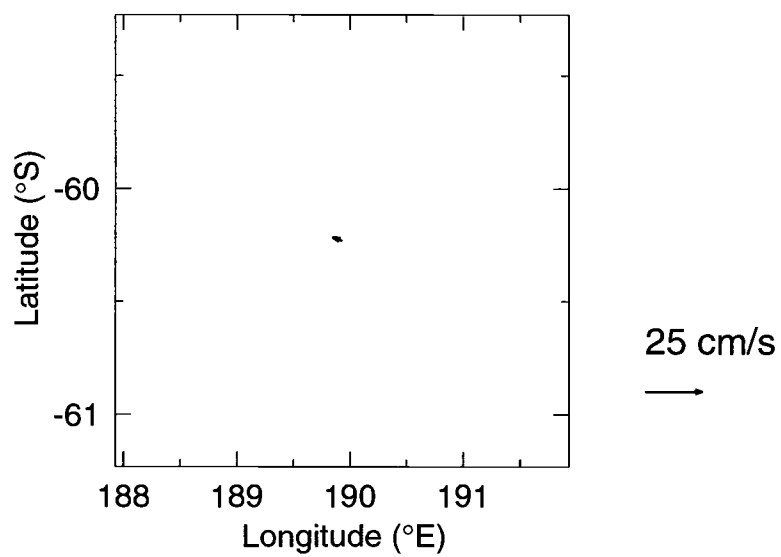
SOJGOFS Process 1 cruise (R9711) ADCP: 09-Dec-1997 (yearday 343)

N
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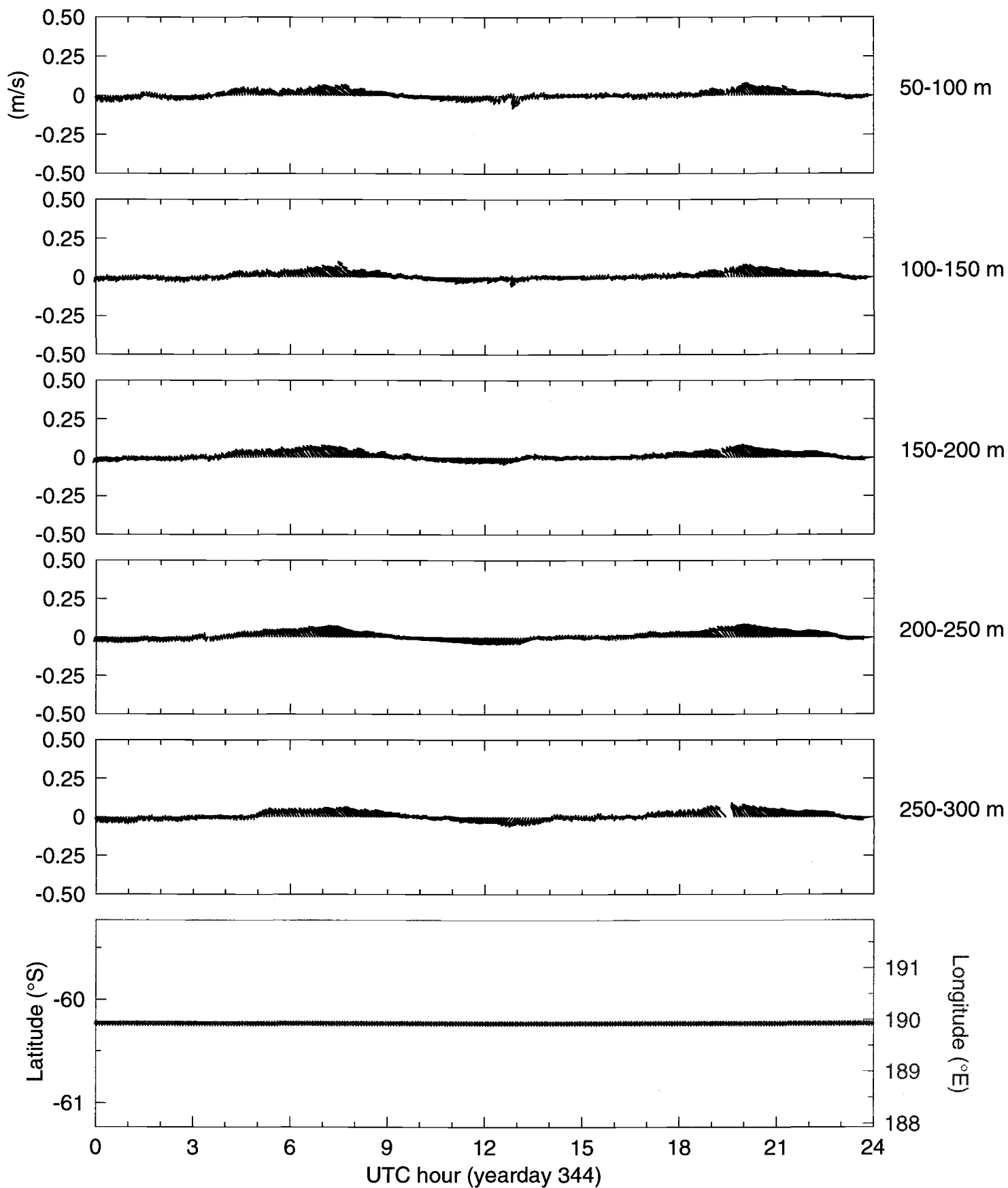
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (10-Dec-1997, yearday 344)



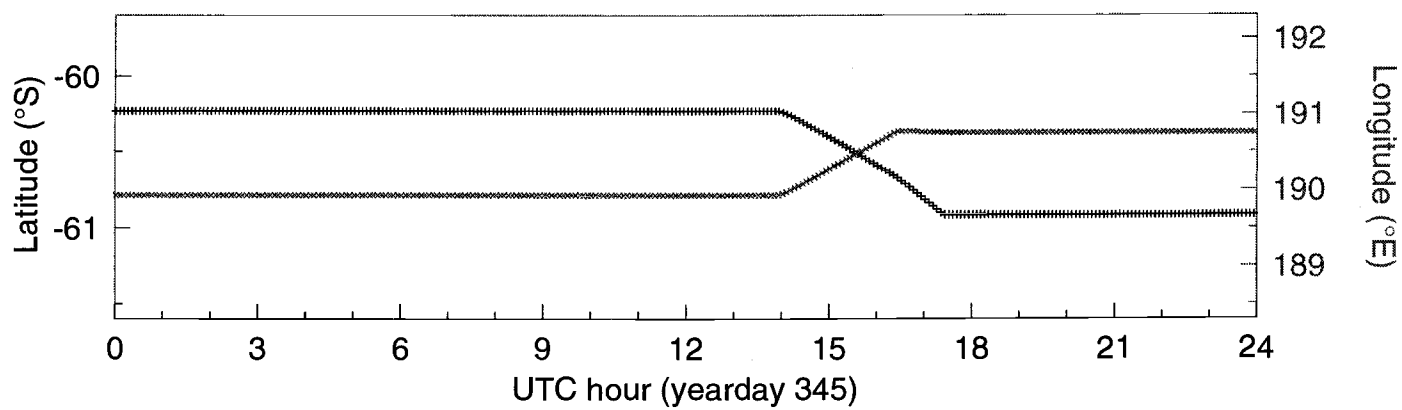
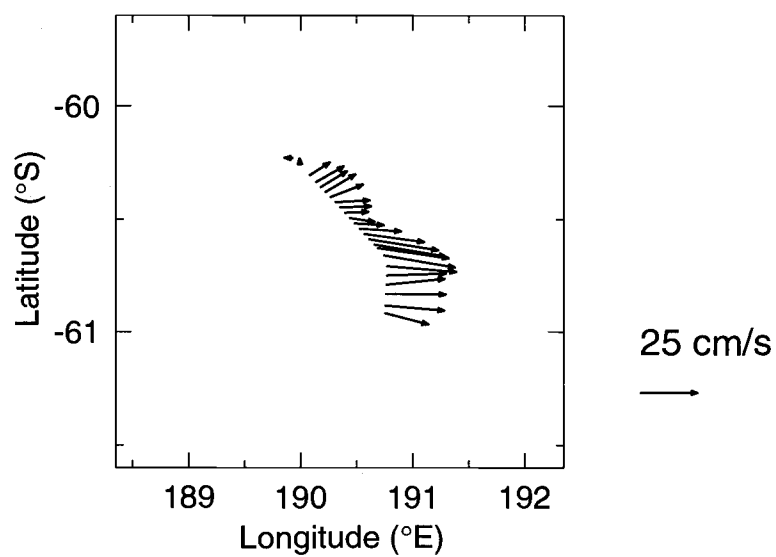
SOJGOFS Process 1 cruise (R9711) ADCP: 10-Dec-1997 (yearday 344)

N
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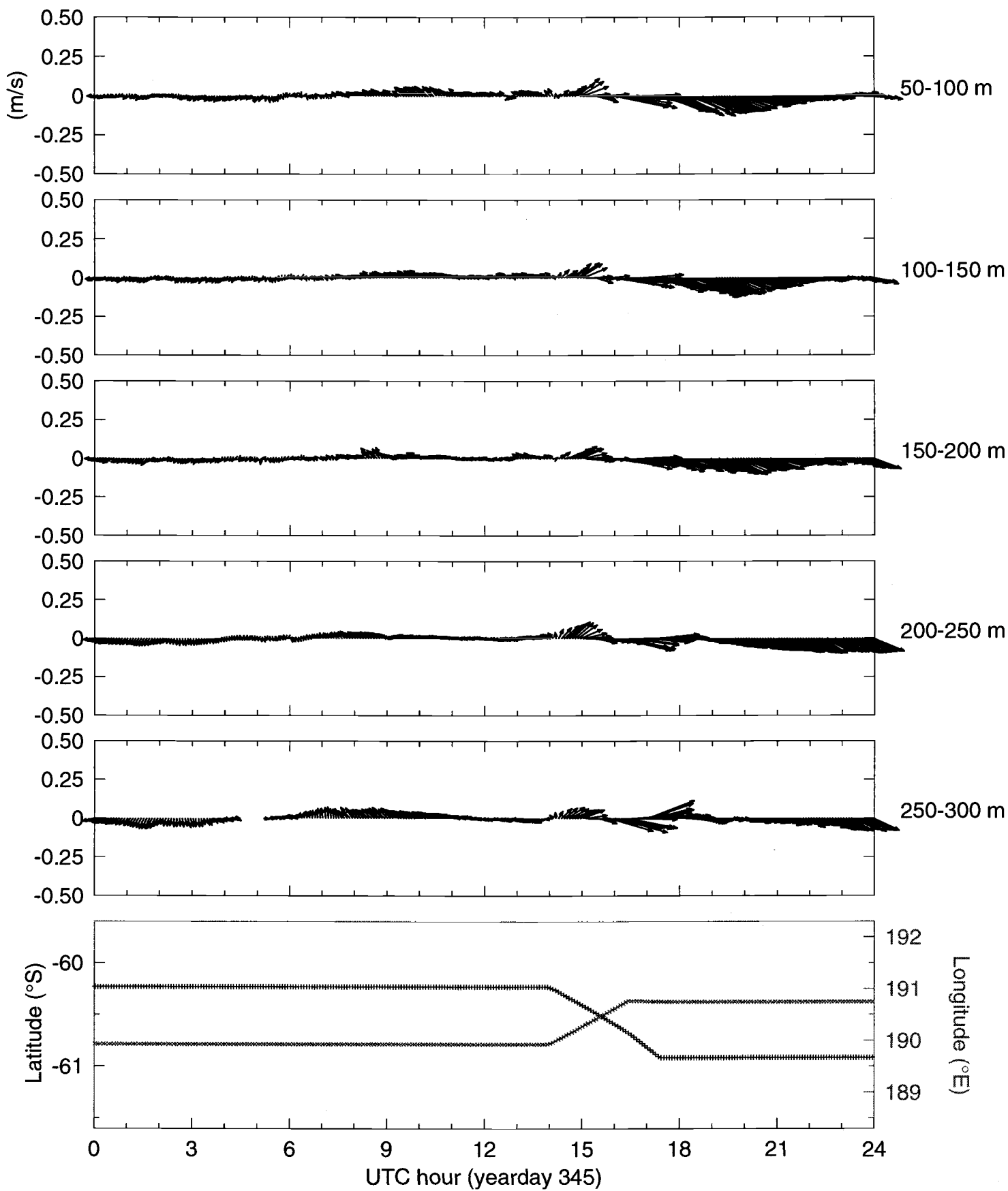
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (11-Dec-1997, yearday 345)



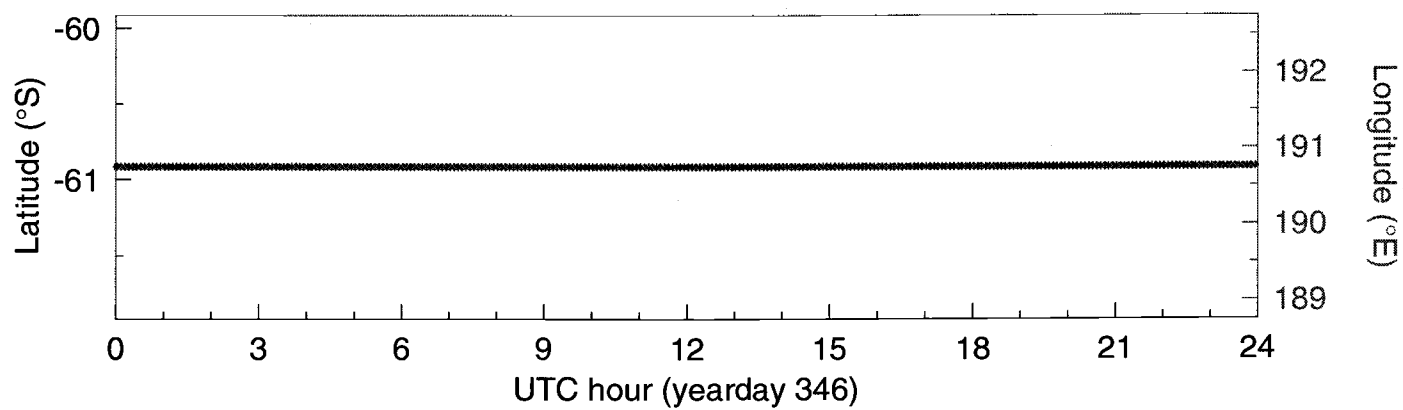
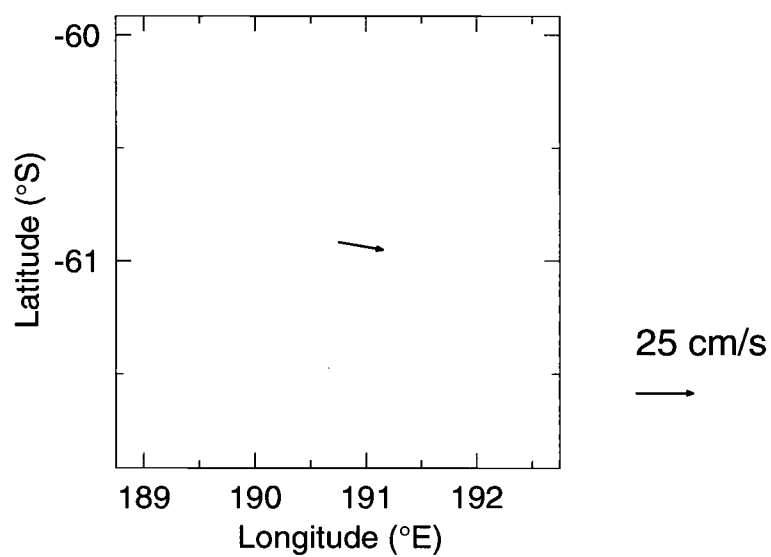
SOJGOFS Process 1 cruise (R9711) ADCP: 11-Dec-1997 (yearday 345)

N
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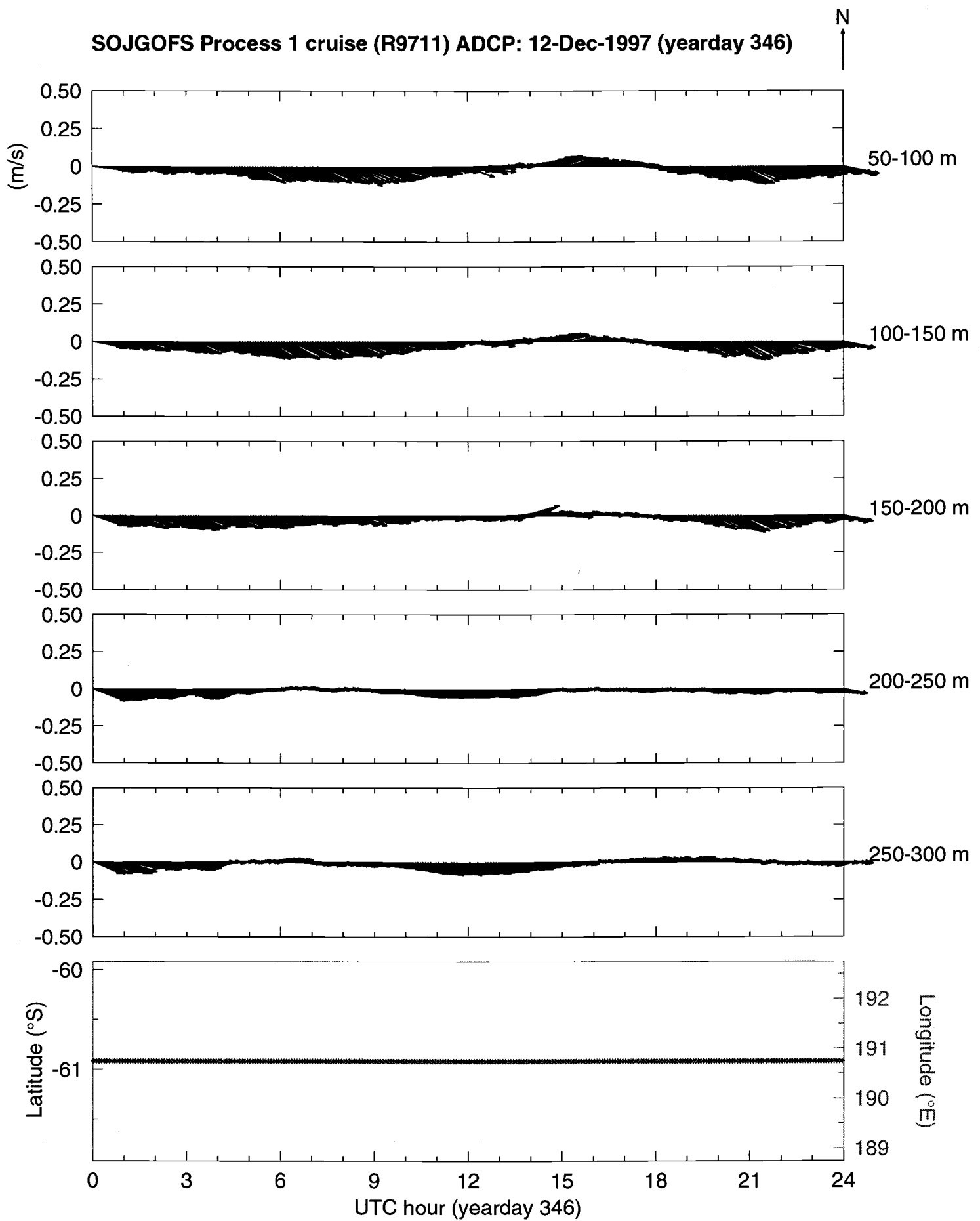


SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (12-Dec-1997, yearday 346)

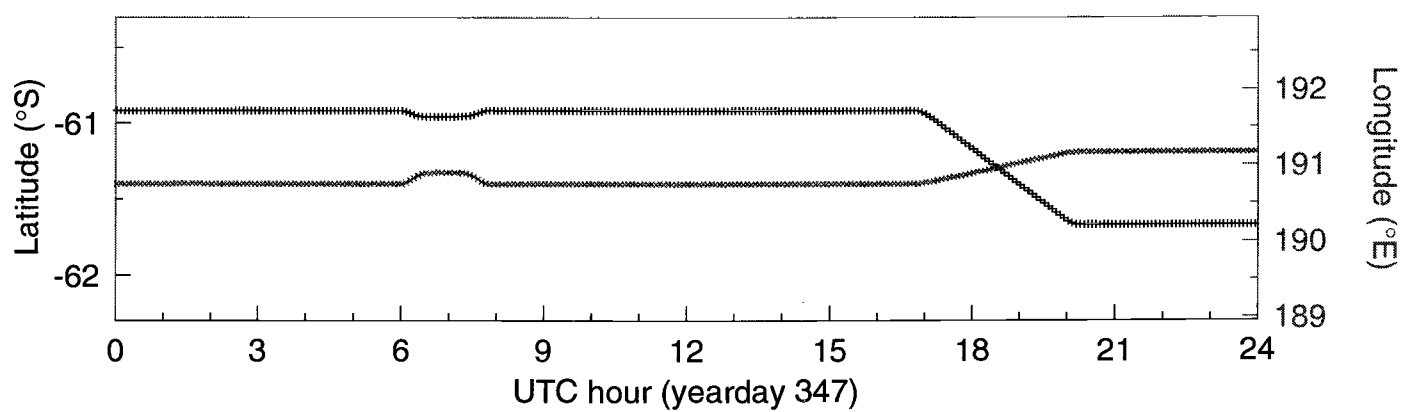
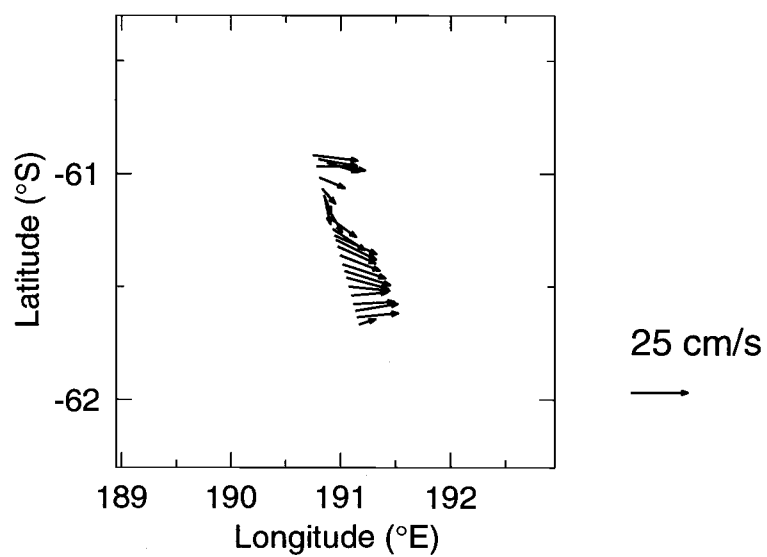


SOJGOFS Process 1 cruise (R9711) ADCP: 12-Dec-1997 (yearday 346)



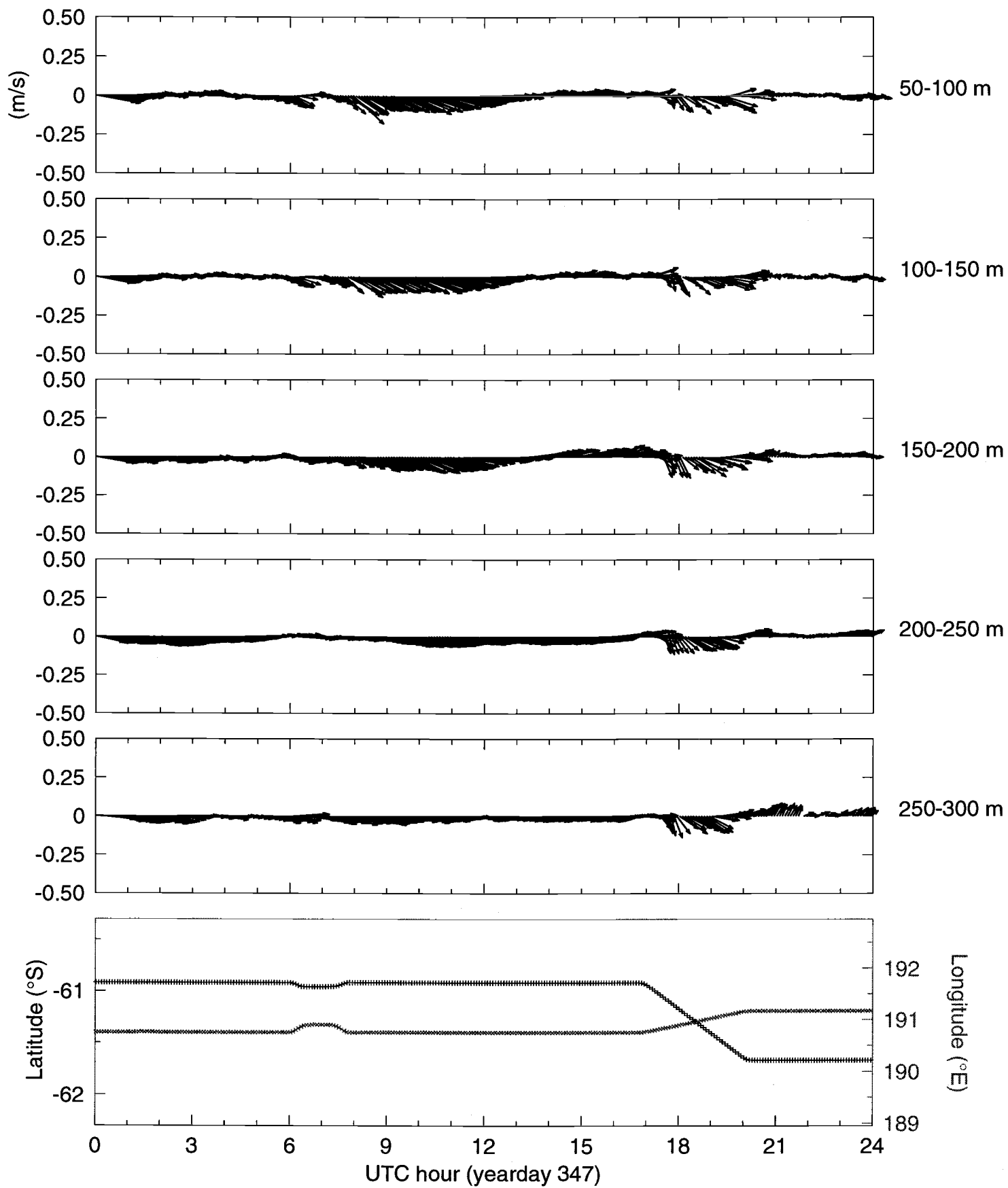
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (13-Dec-1997, yearday 347)



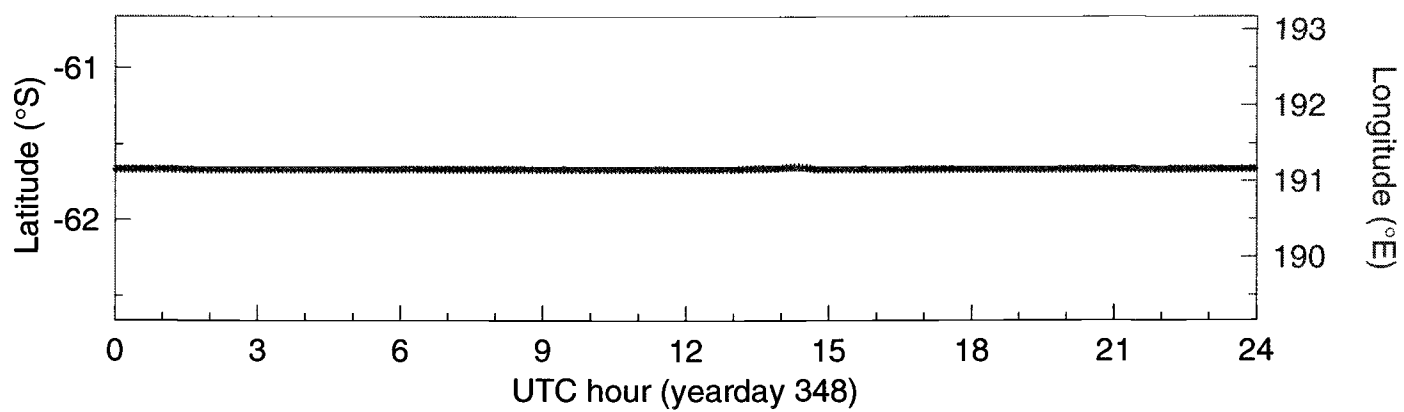
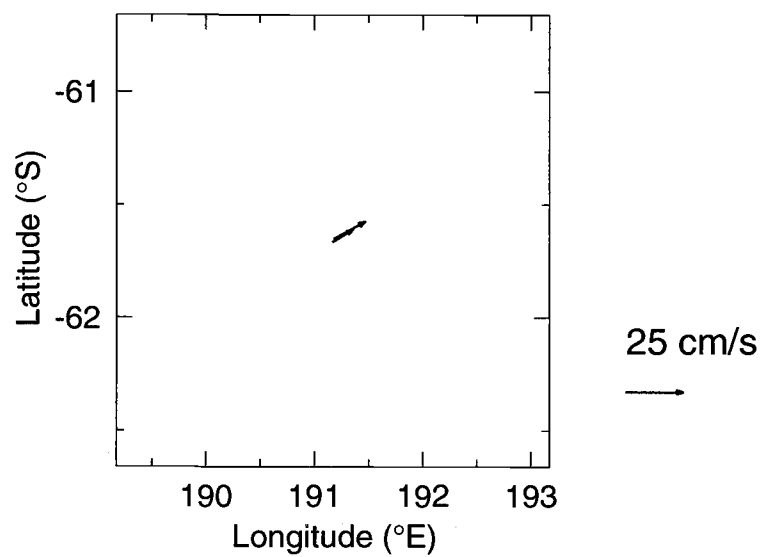
SOJGOFS Process 1 cruise (R9711) ADCP: 13-Dec-1997 (yearday 347)

N
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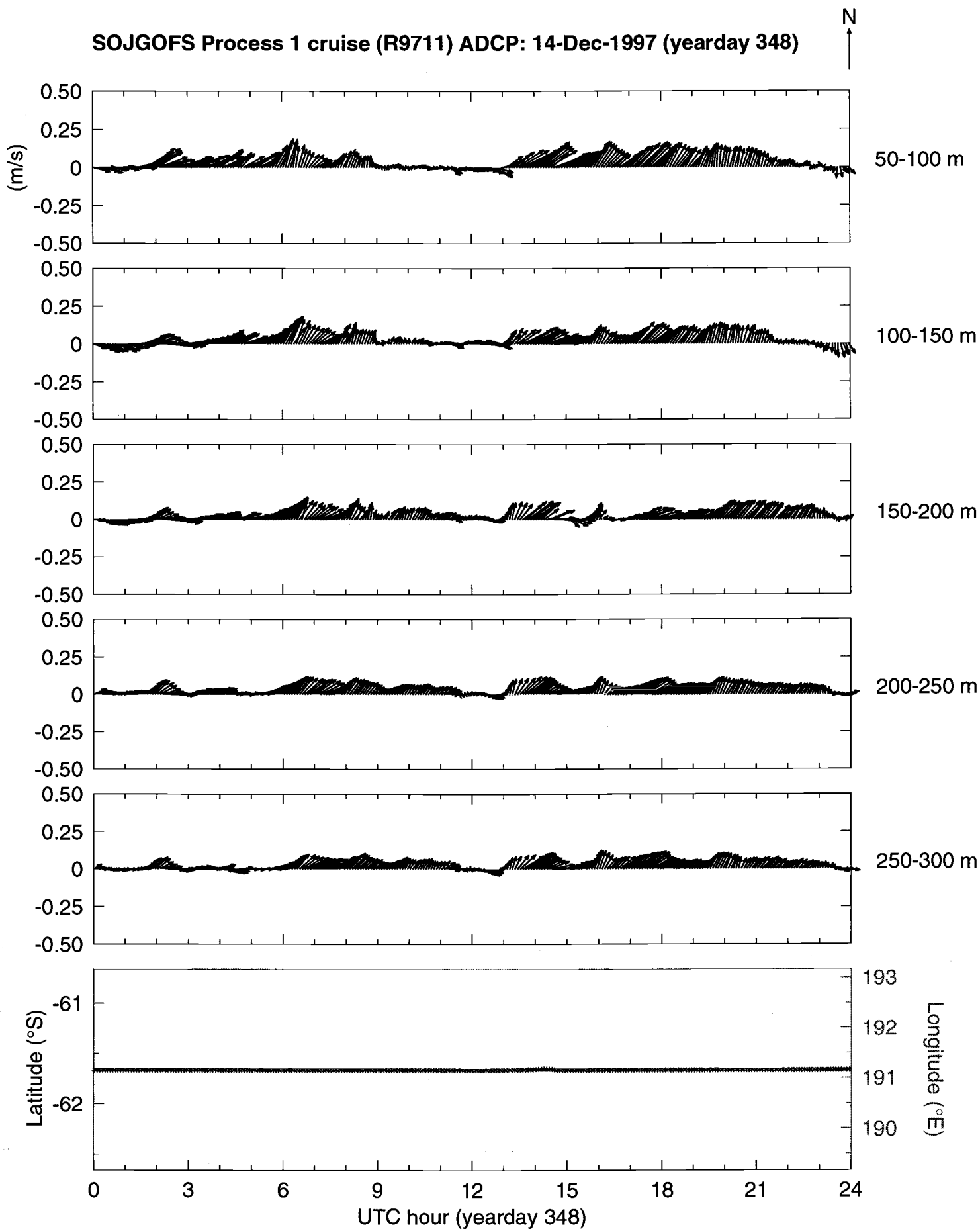


SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (14-Dec-1997, yearday 348)

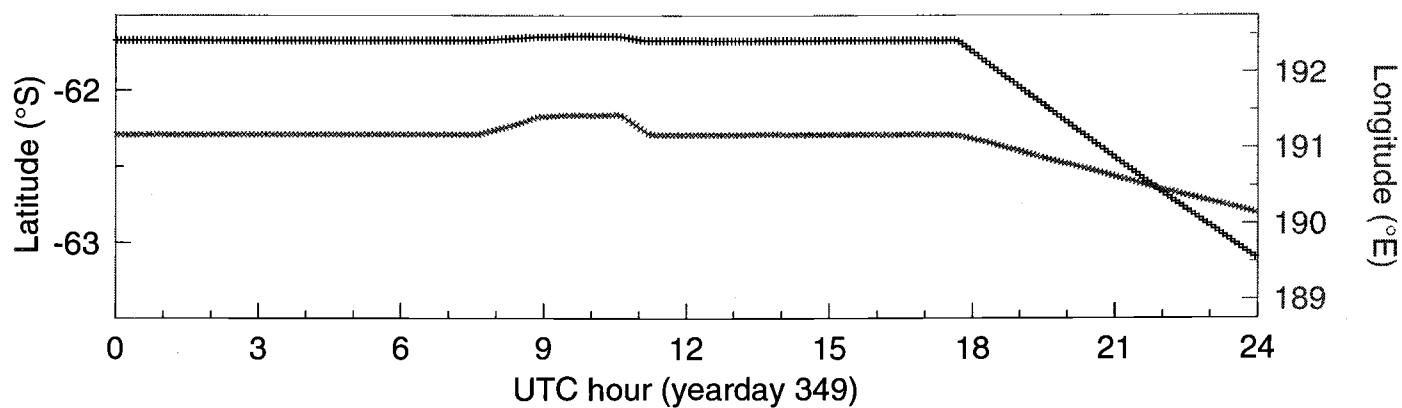
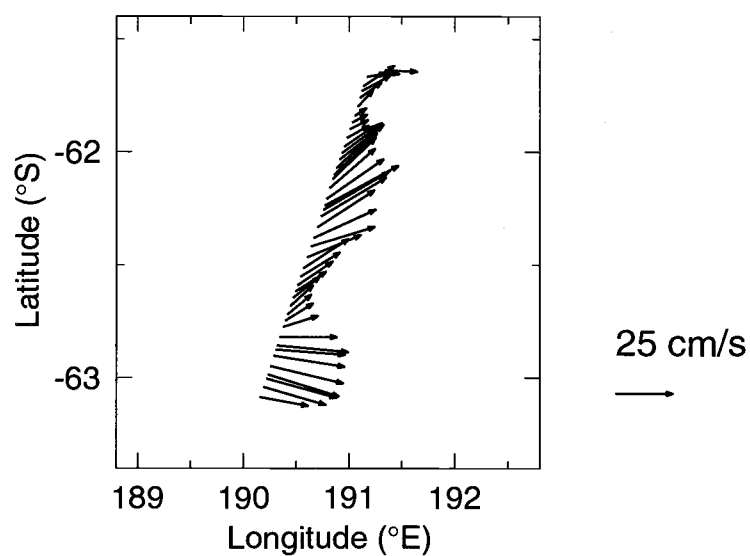


SOJGOFS Process 1 cruise (R9711) ADCP: 14-Dec-1997 (yearday 348)



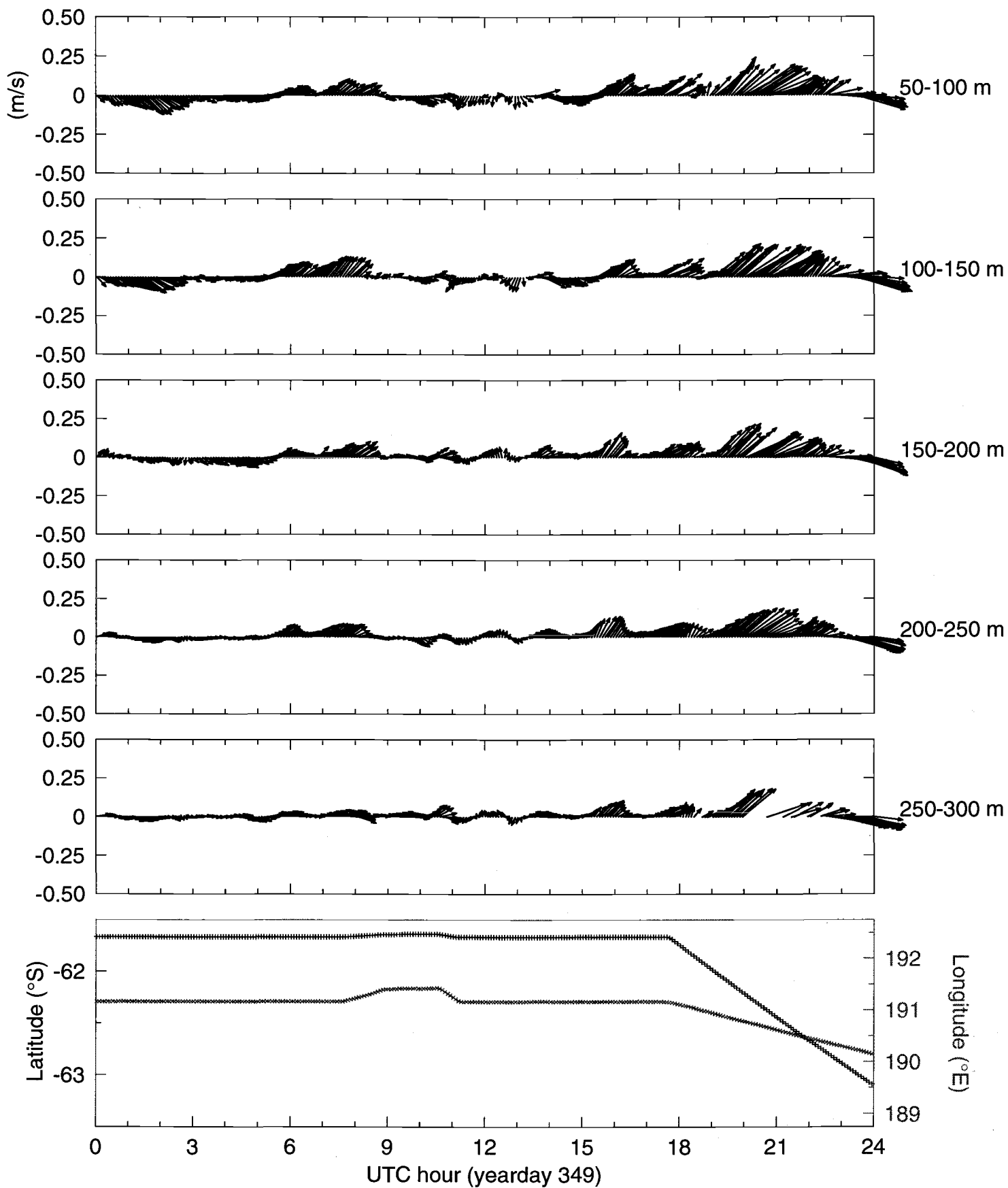
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (15-Dec-1997, yearday 349)



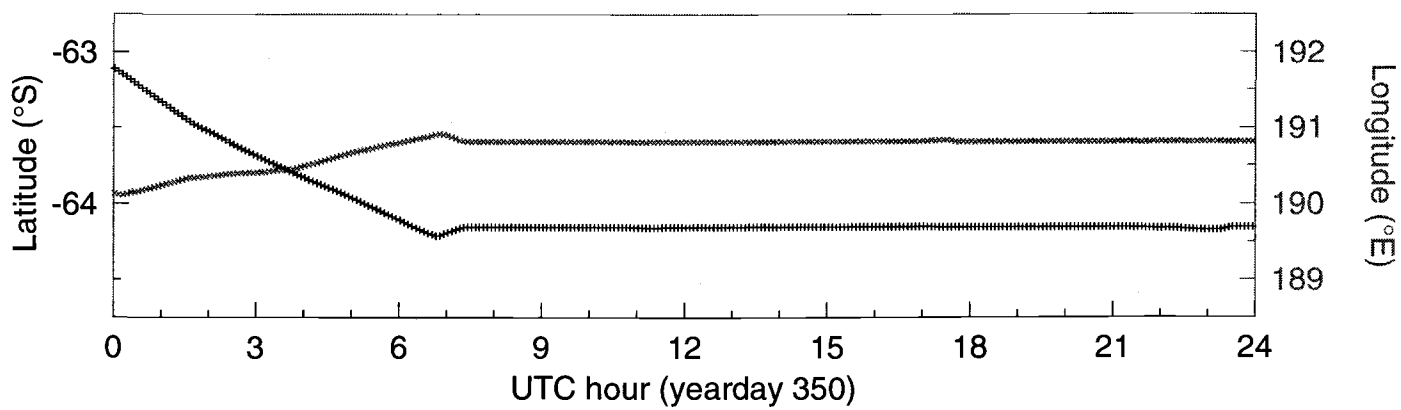
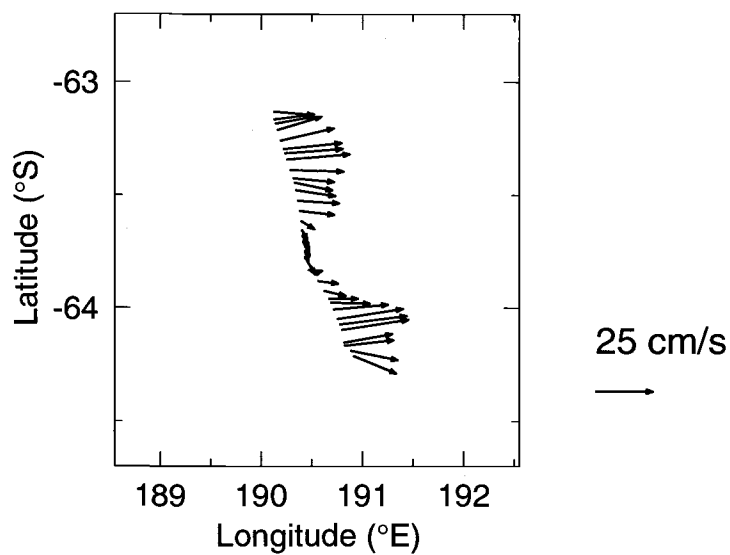
SOJGOFS Process 1 cruise (R9711) ADCP: 15-Dec-1997 (yearday 349)

N
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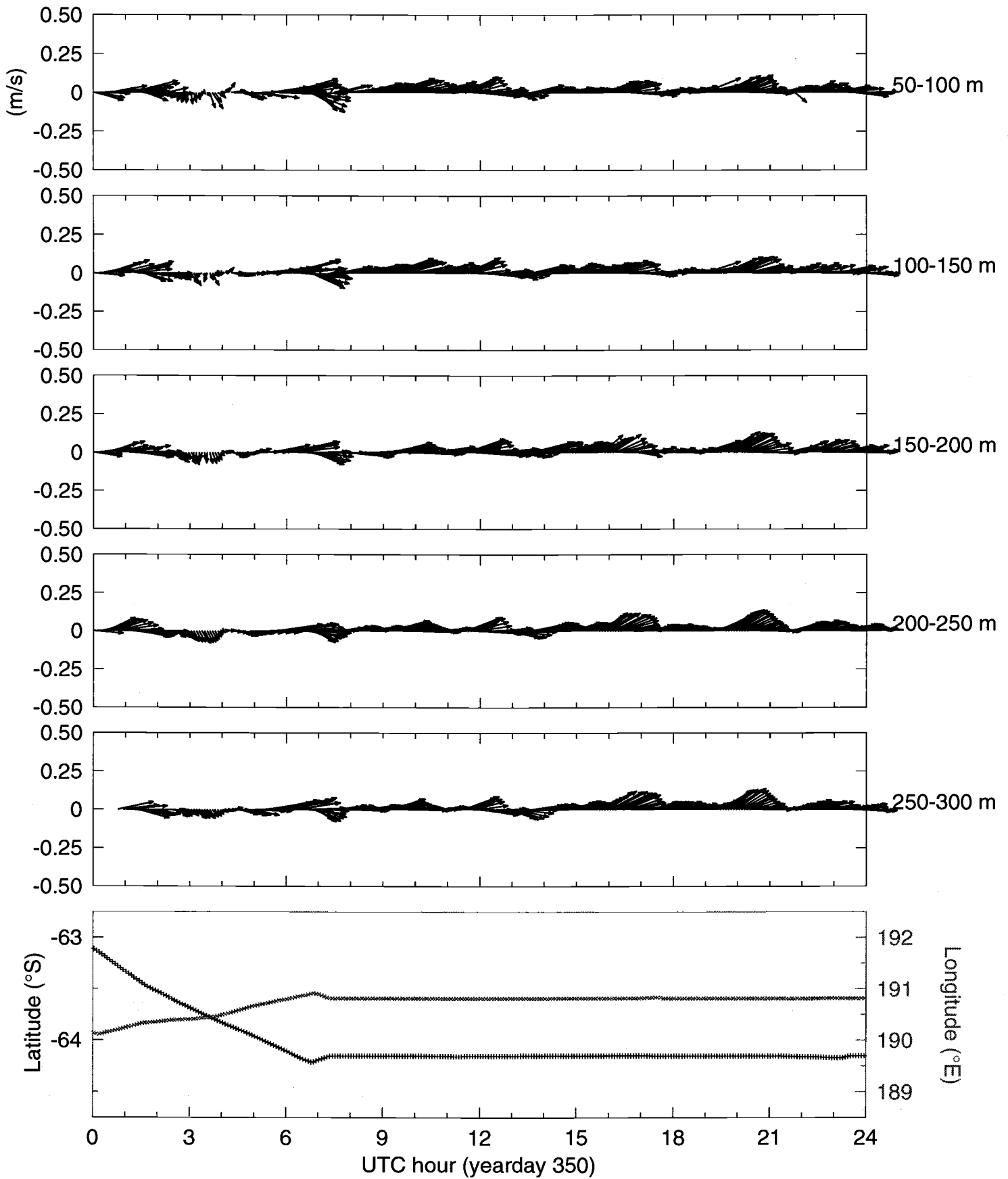
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (16-Dec-1997, yearday 350)



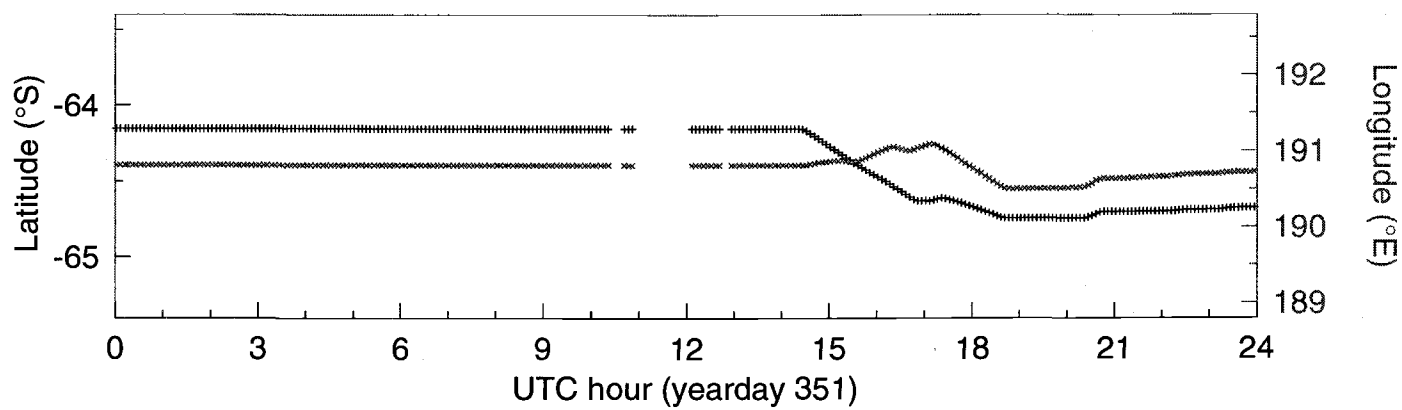
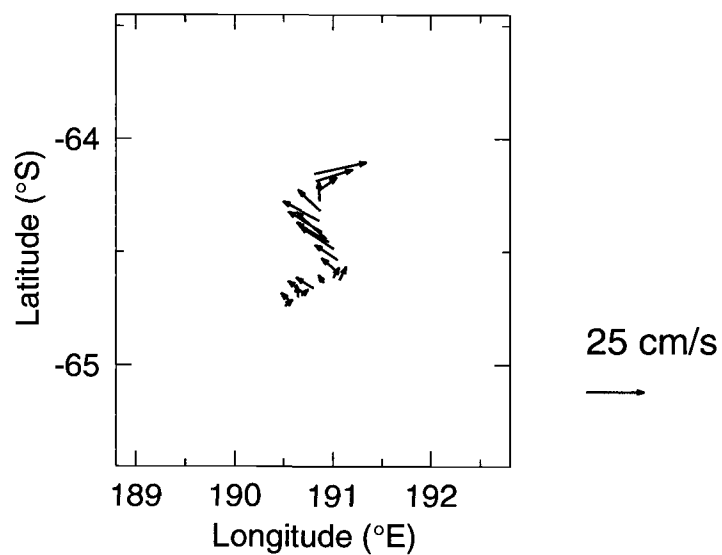
SOJGOFS Process 1 cruise (R9711) ADCP: 16-Dec-1997 (yearday 350)

N
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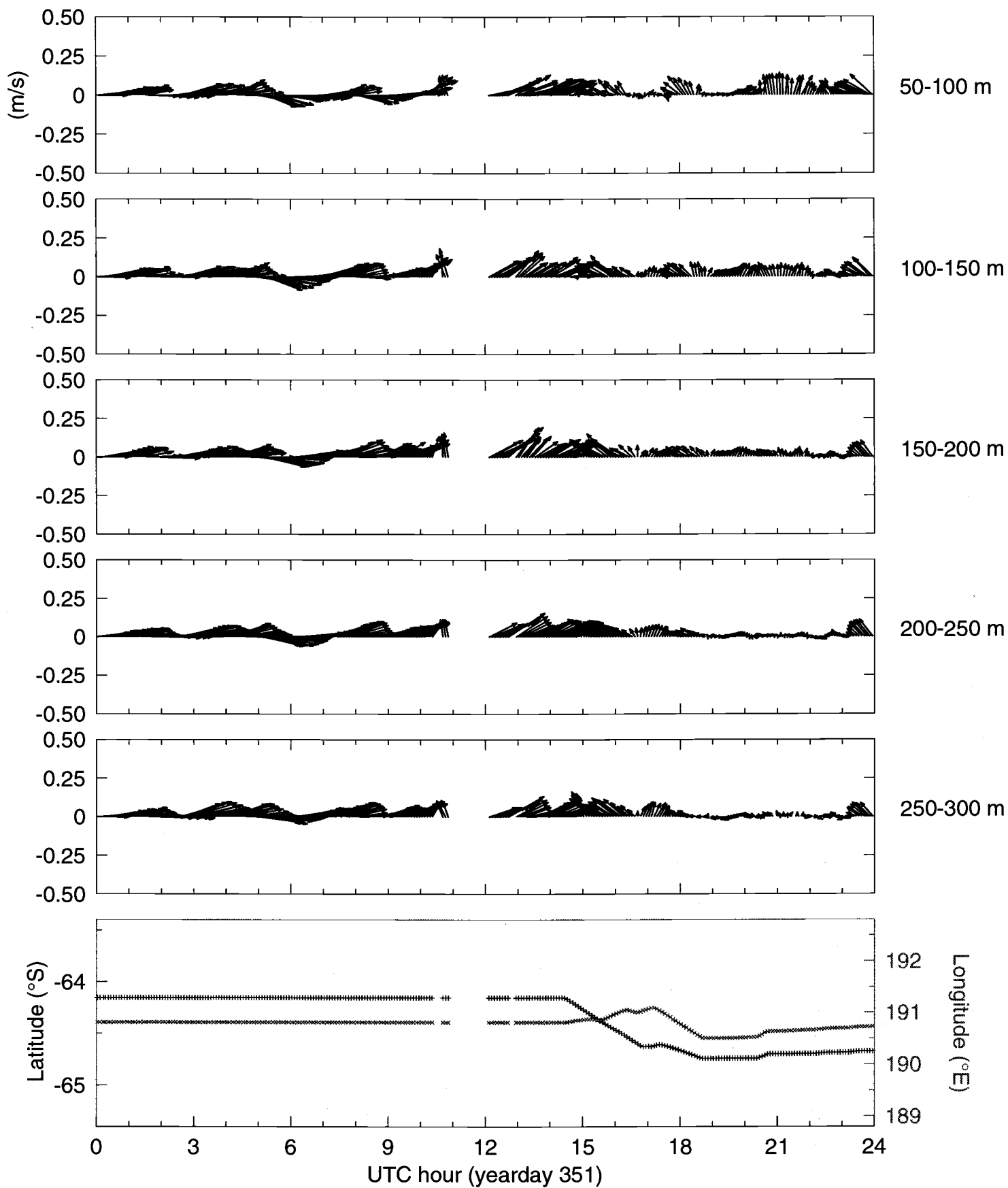
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (17-Dec-1997, yearday 351)



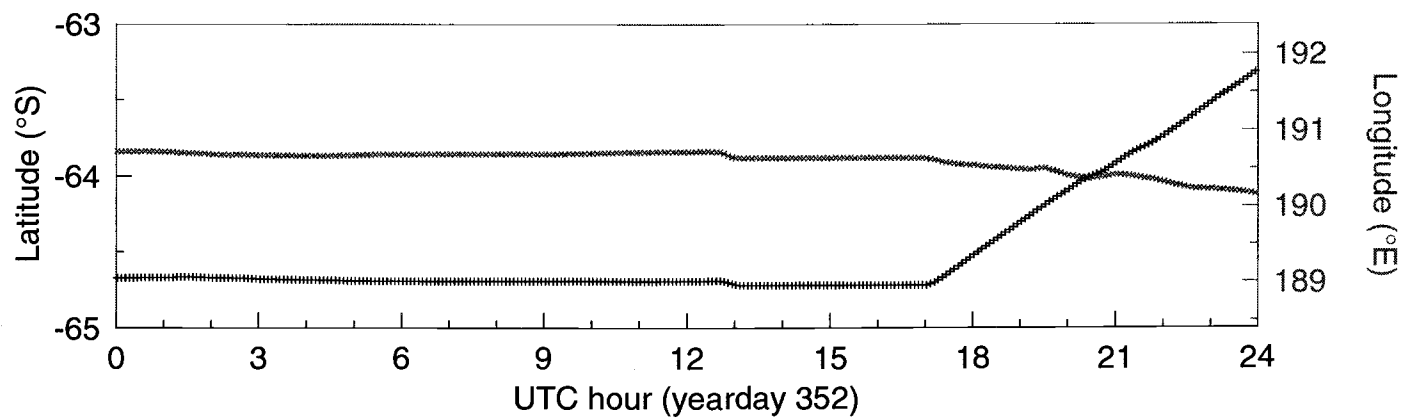
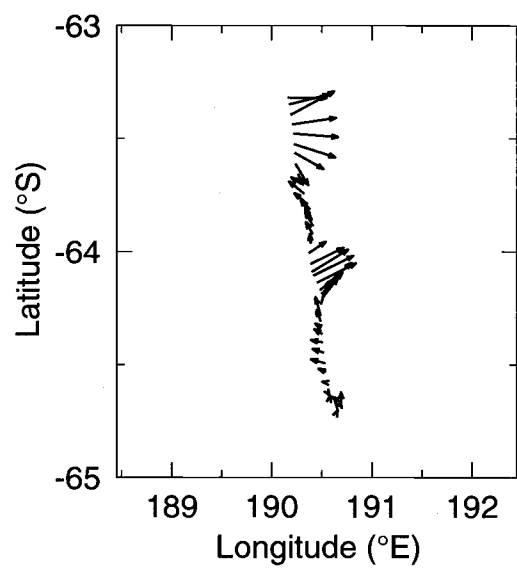
SOJGOFS Process 1 cruise (R9711) ADCP: 17-Dec-1997 (yearday 351)

N
↑



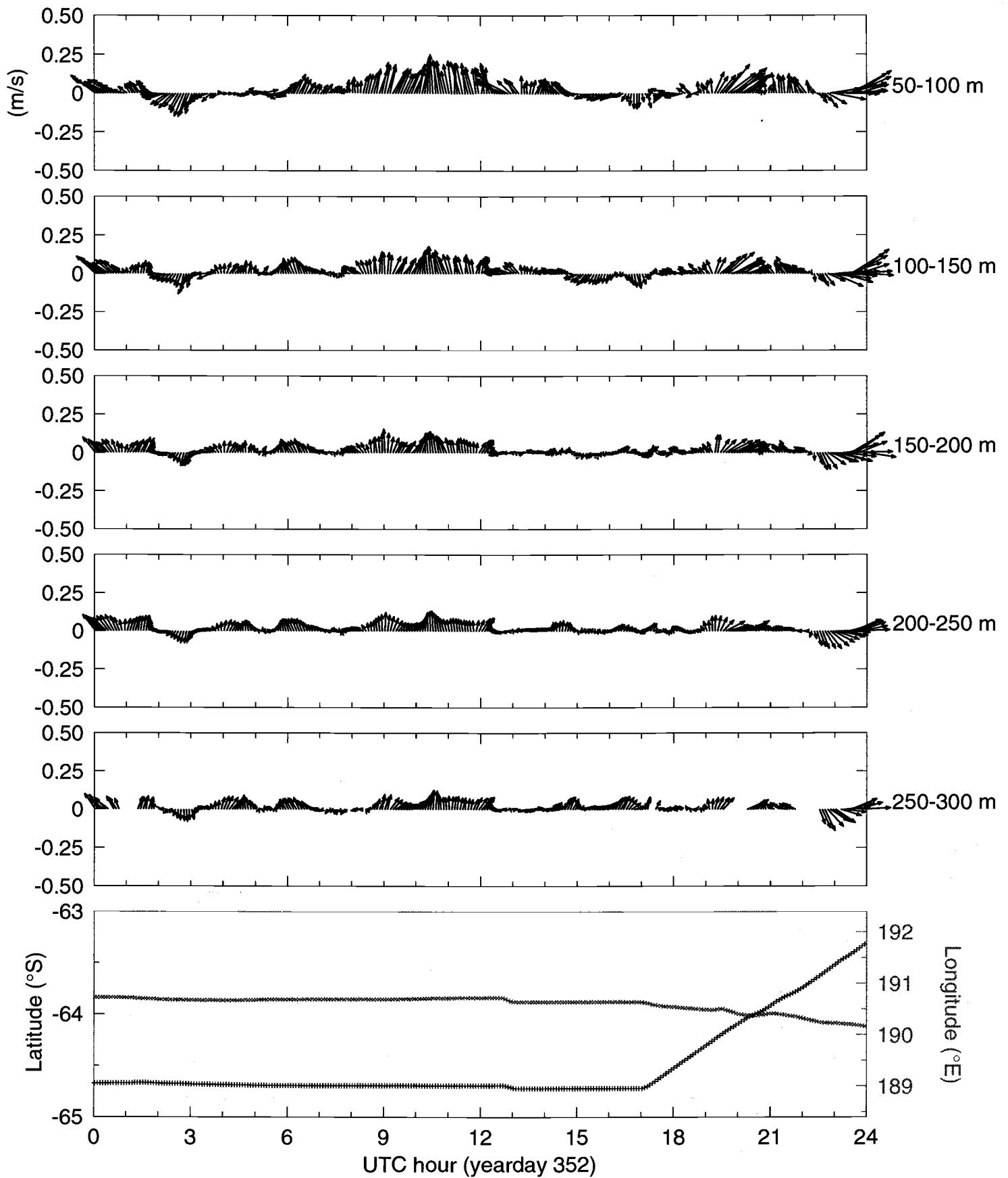
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (18-Dec-1997, yearday 352)



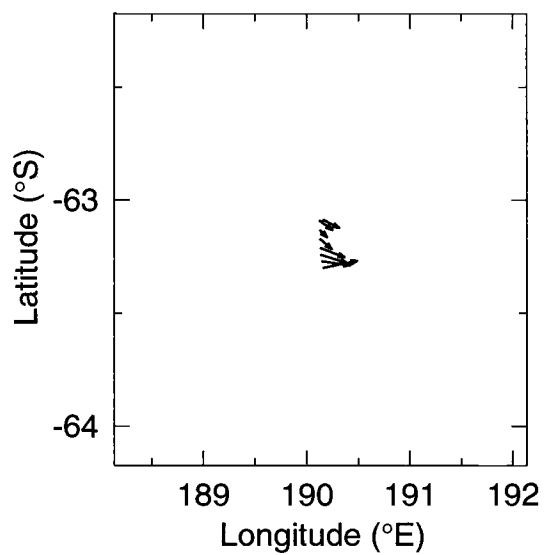
SOJGOFS Process 1 cruise (R9711) ADCP: 18-Dec-1997 (yearday 352)

N
↑

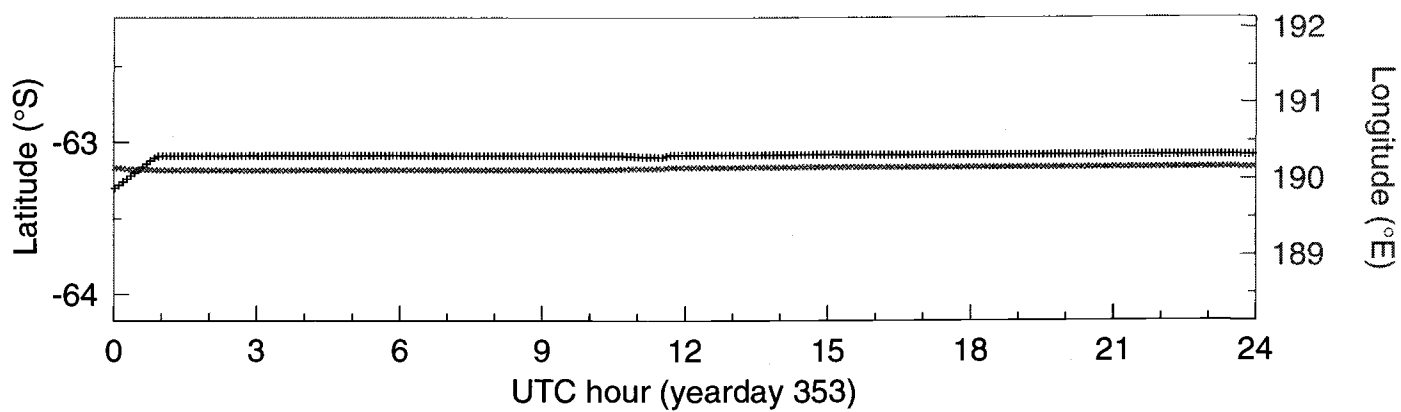


SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (19-Dec-1997, yearday 353)

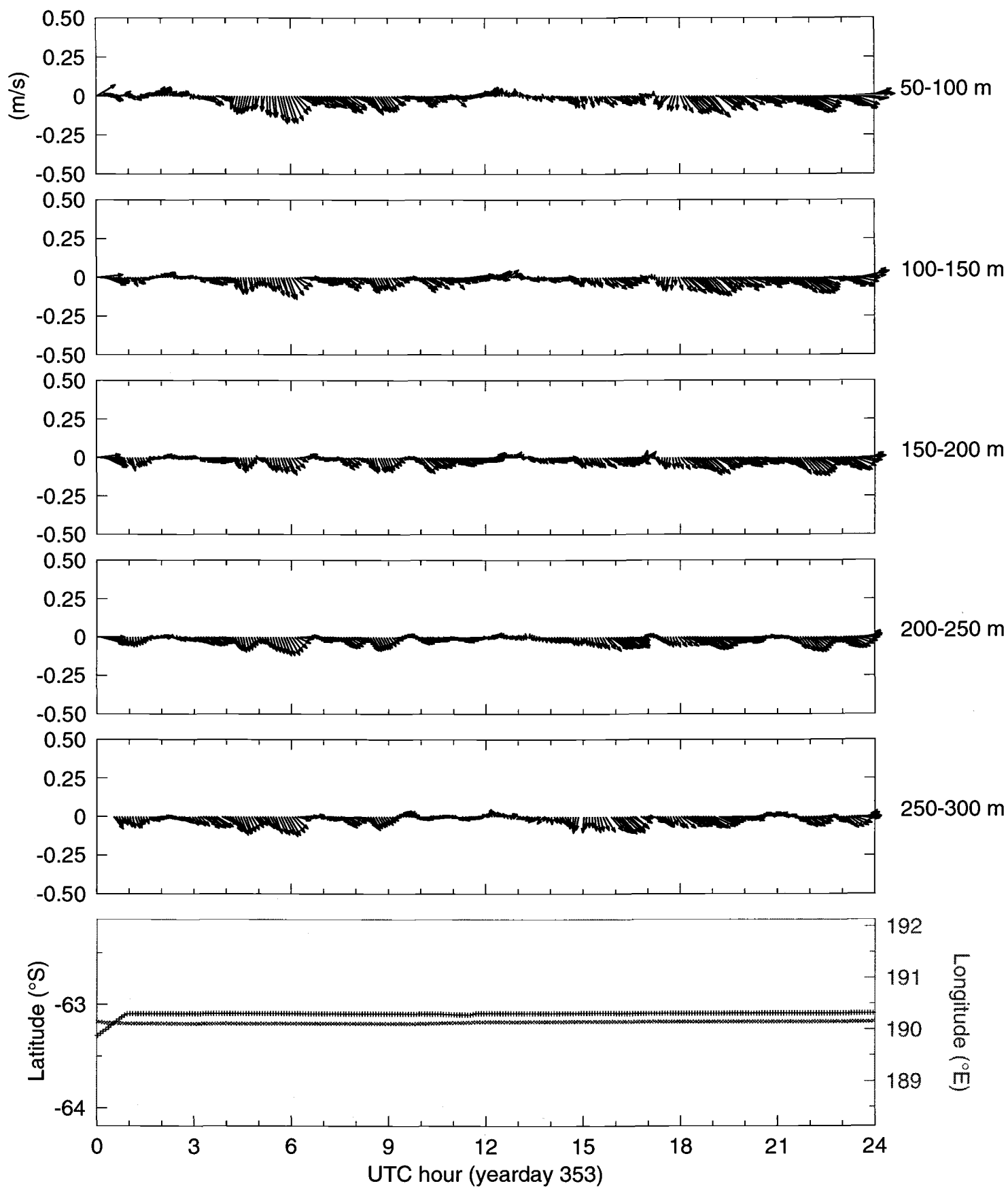


25 cm/s



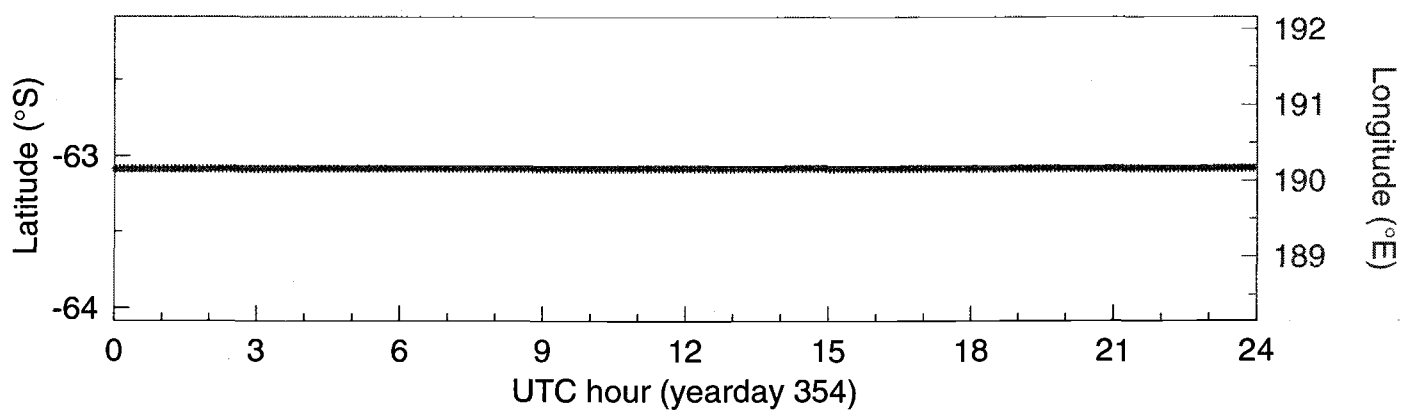
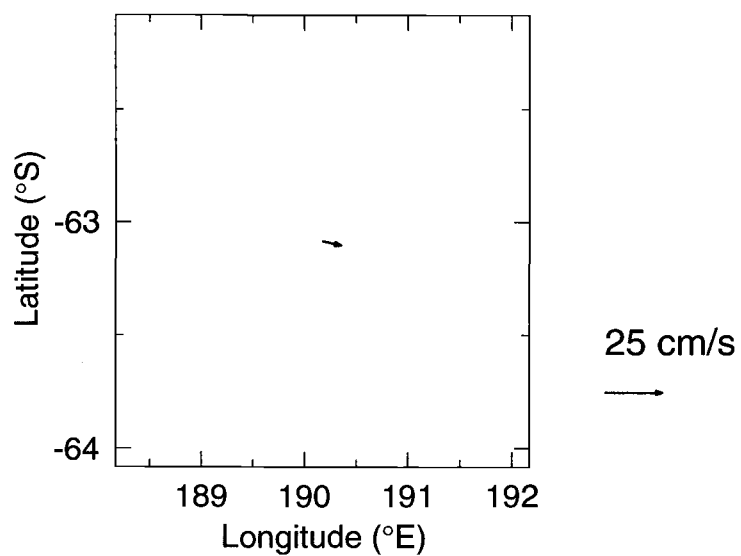
SOJGOFS Process 1 cruise (R9711) ADCP: 19-Dec-1997 (yearday 353)

N
↑



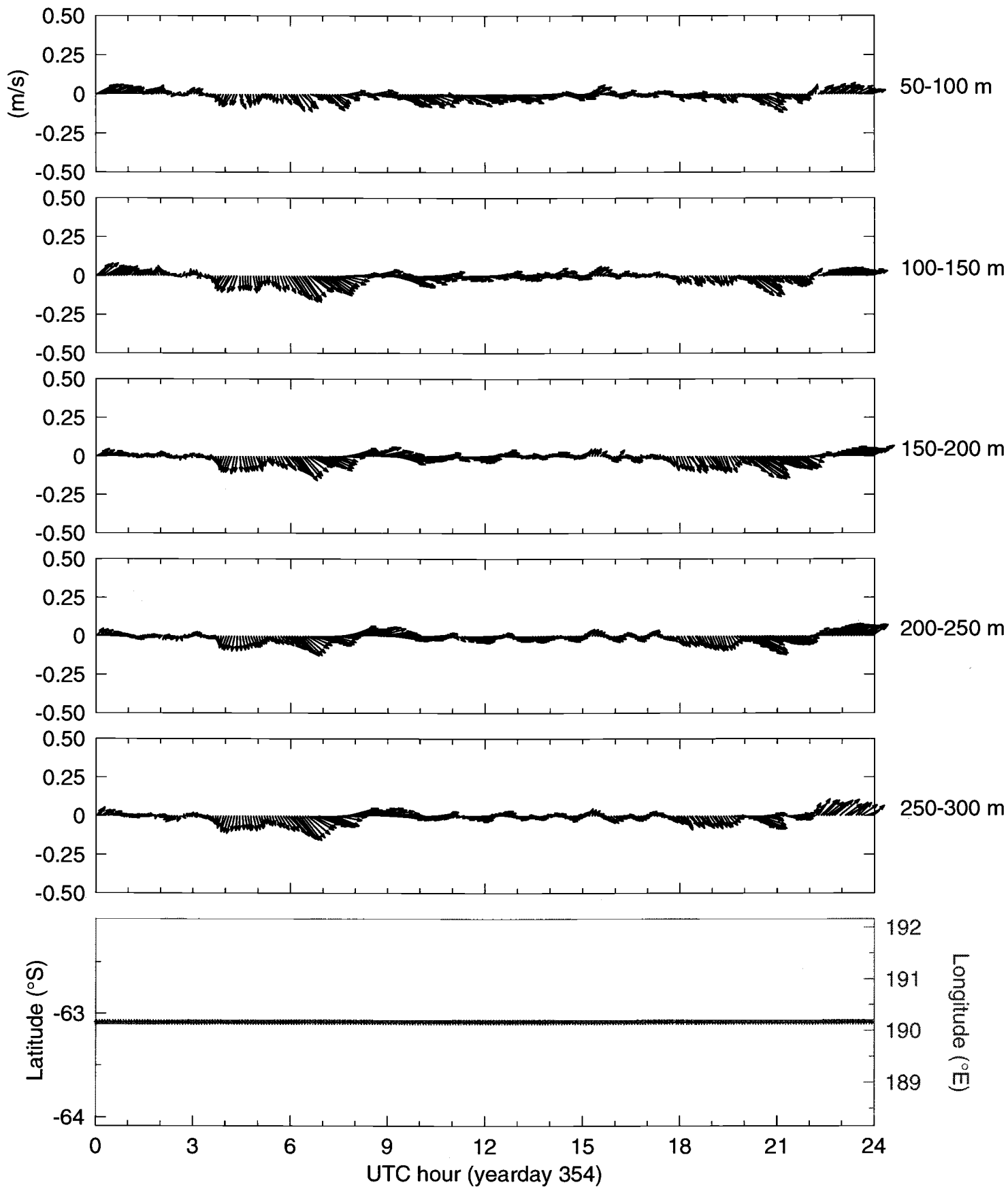
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (20-Dec-1997, yearday 354)



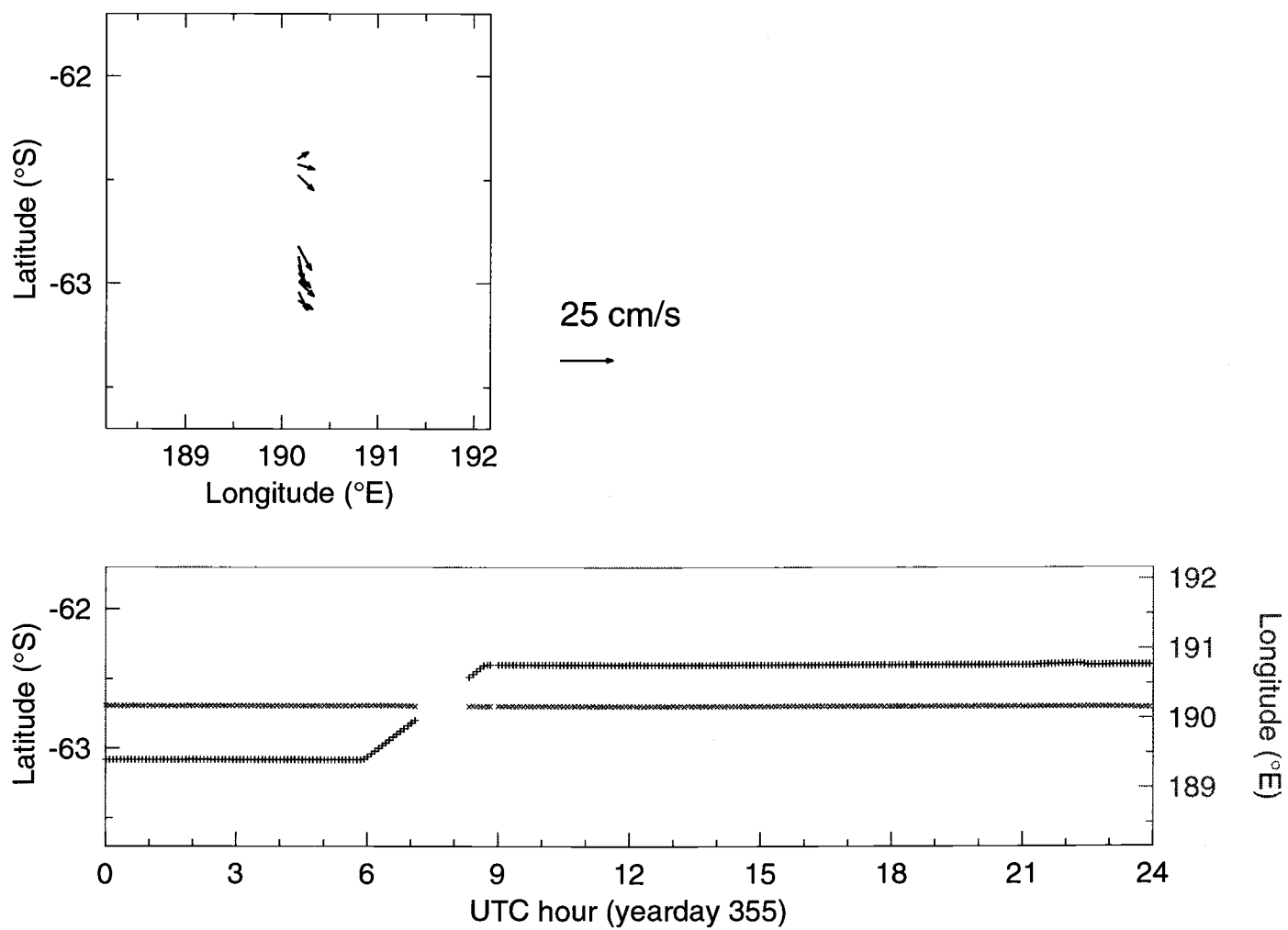
SOJGOFS Process 1 cruise (R9711) ADCP: 20-Dec-1997 (yearday 354)

N
↑



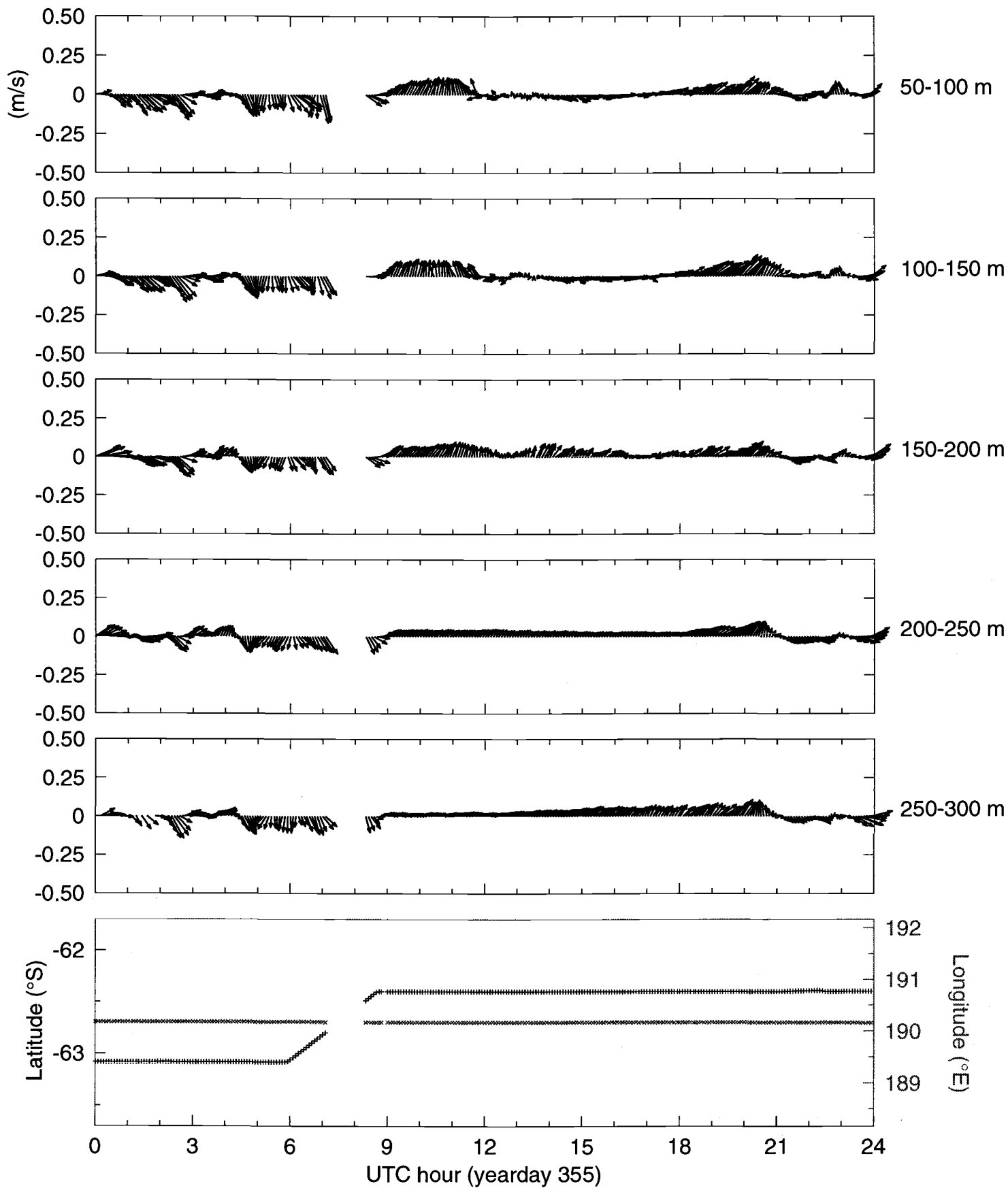
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (21-Dec-1997, yearday 355)



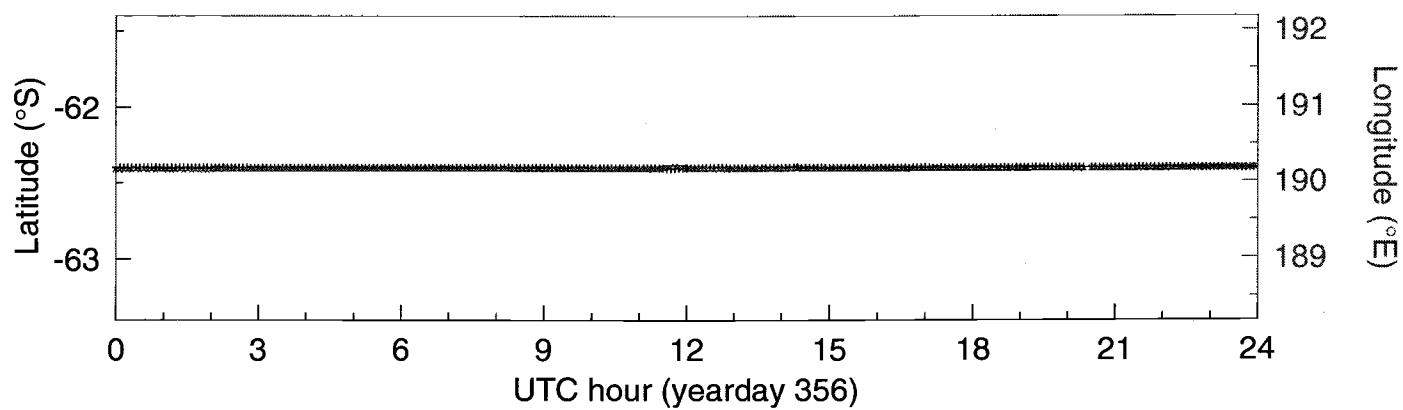
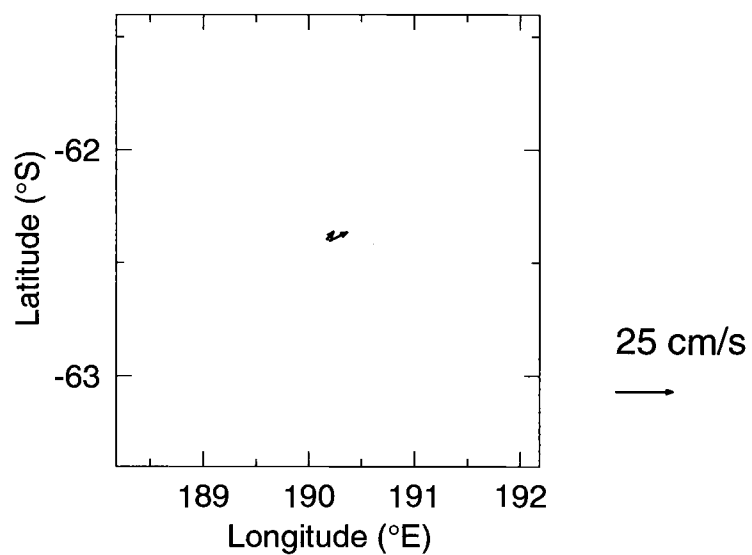
SOJGOFS Process 1 cruise (R9711) ADCP: 21-Dec-1997 (yearday 355)

N
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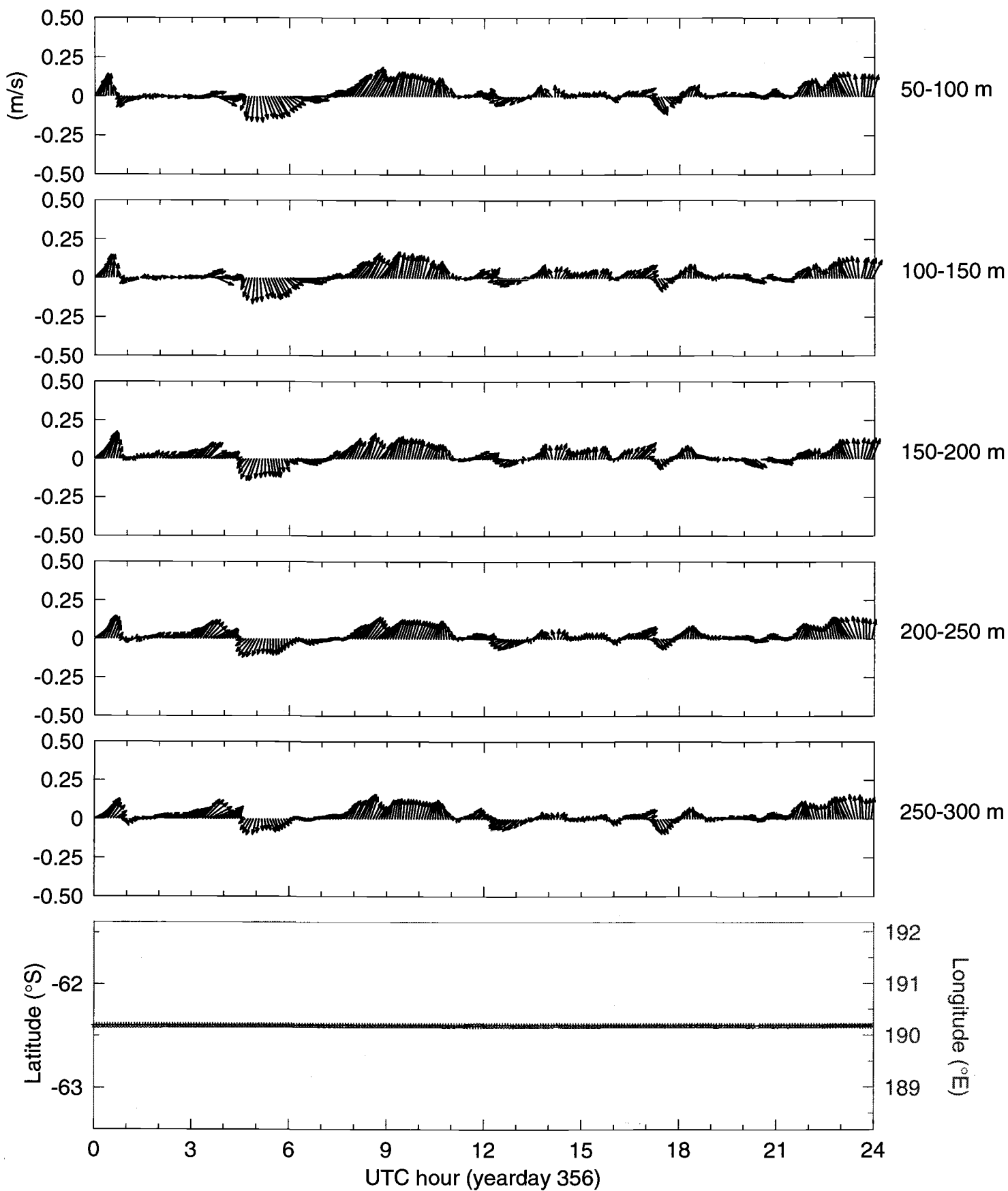
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (22-Dec-1997, yearday 356)



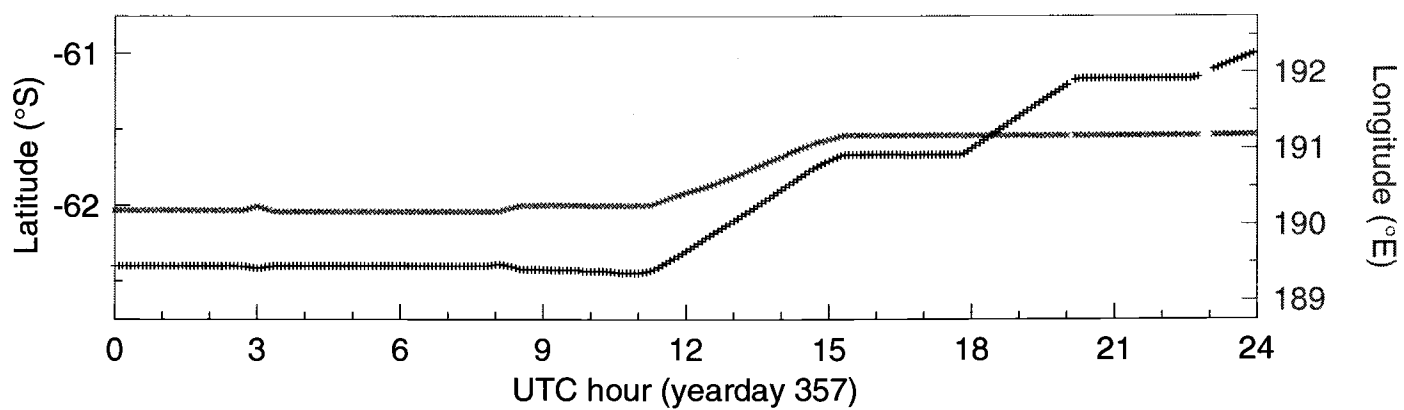
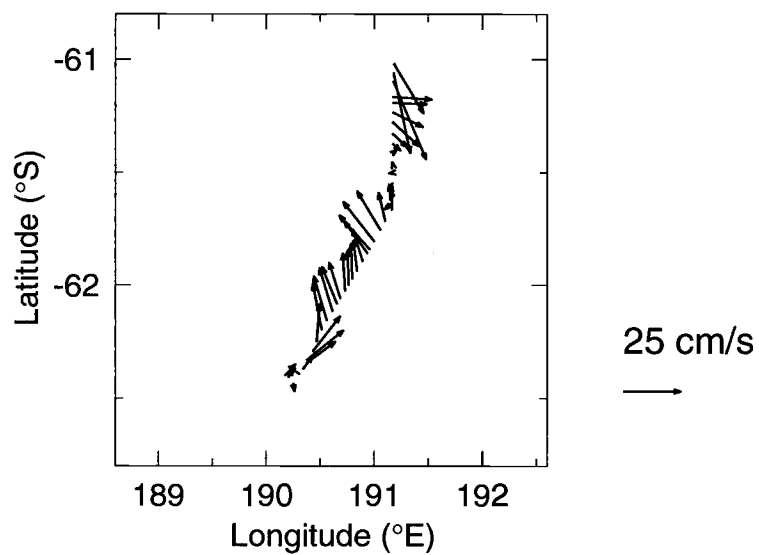
SOJGOFS Process 1 cruise (R9711) ADCP: 22-Dec-1997 (yearday 356)

N
↑



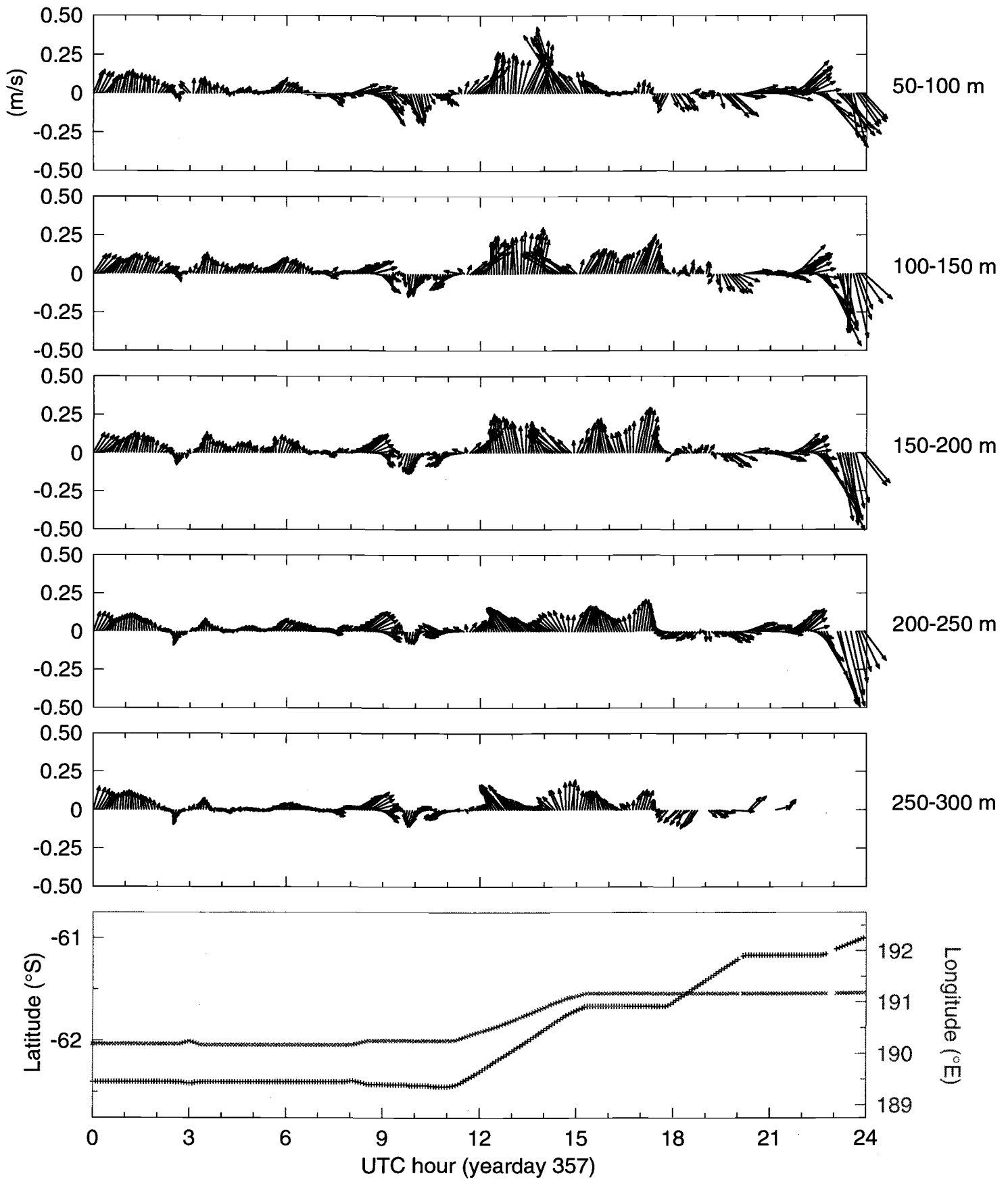
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (23-Dec-1997, yearday 357)



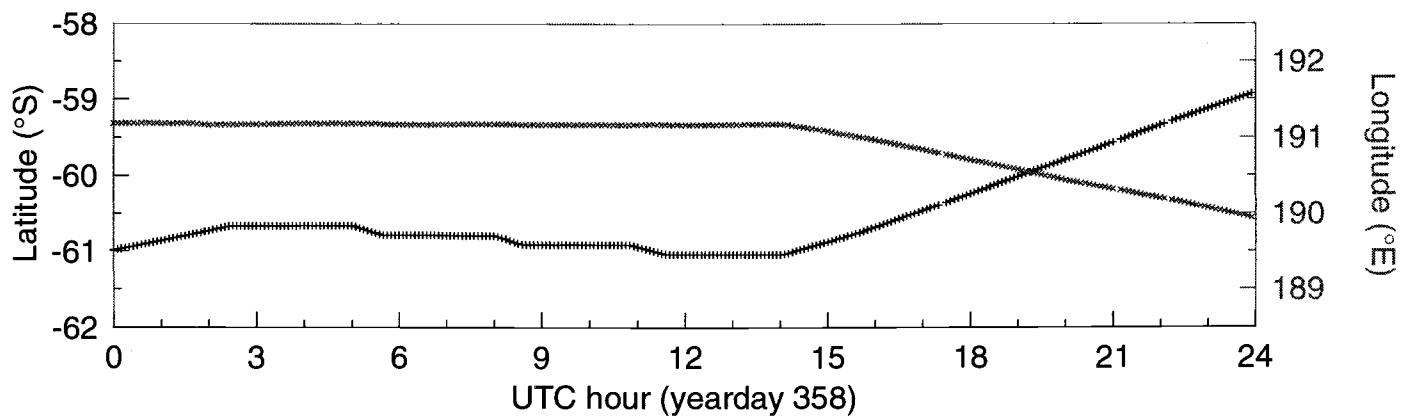
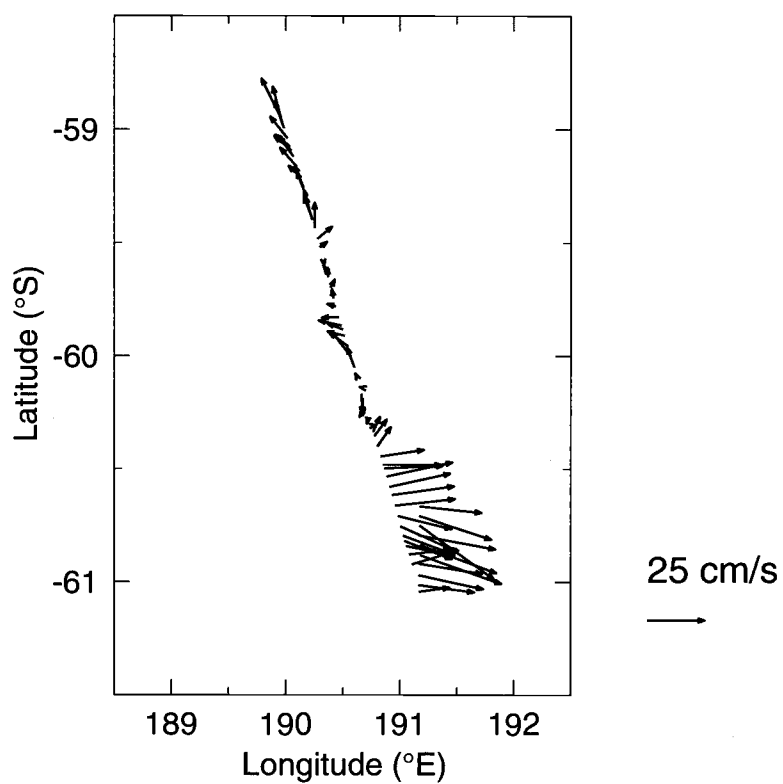
SOJGOFS Process 1 cruise (R9711) ADCP: 23-Dec-1997 (yearday 357)

N
↑



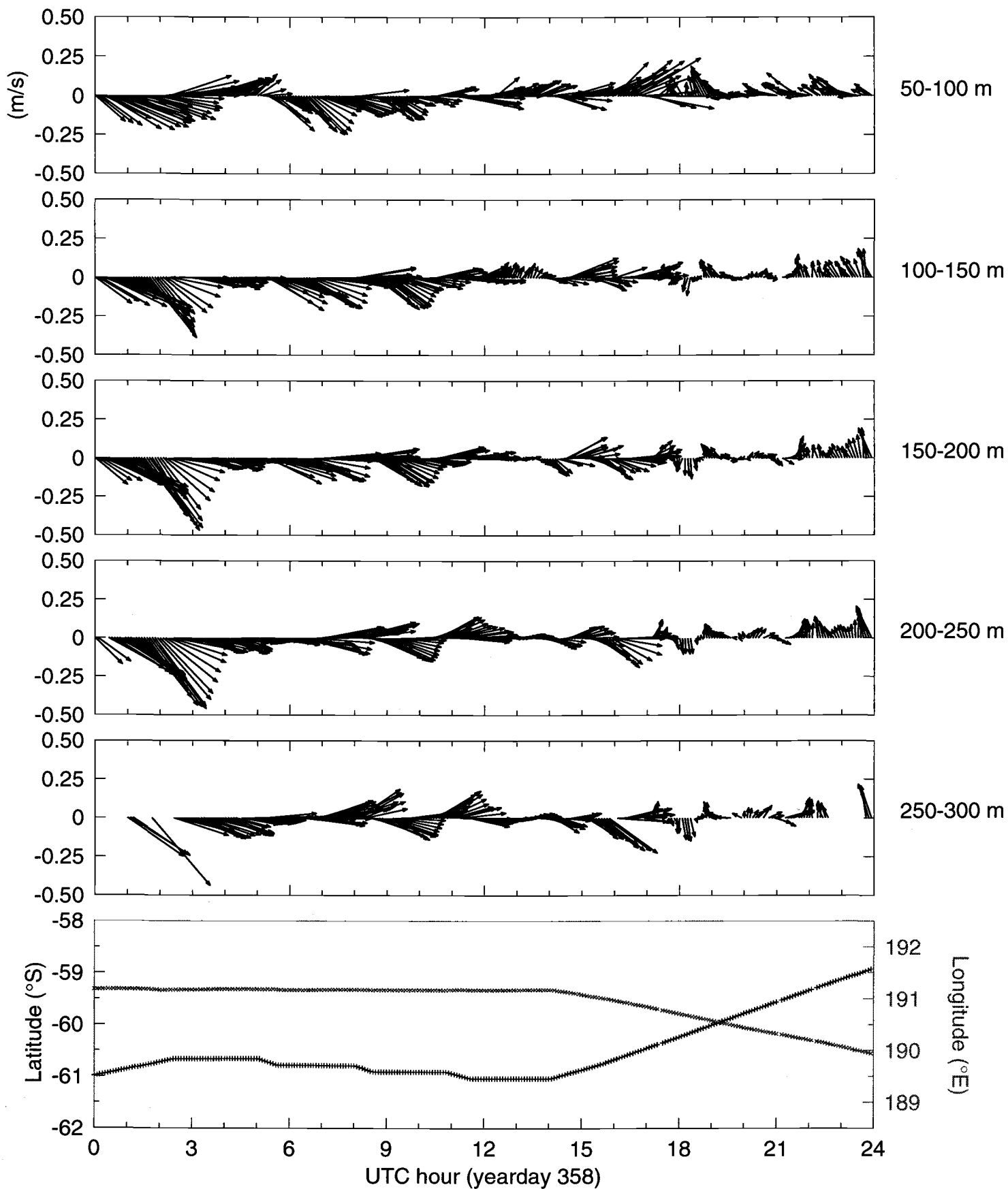
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (24-Dec-1997, yearday 358)



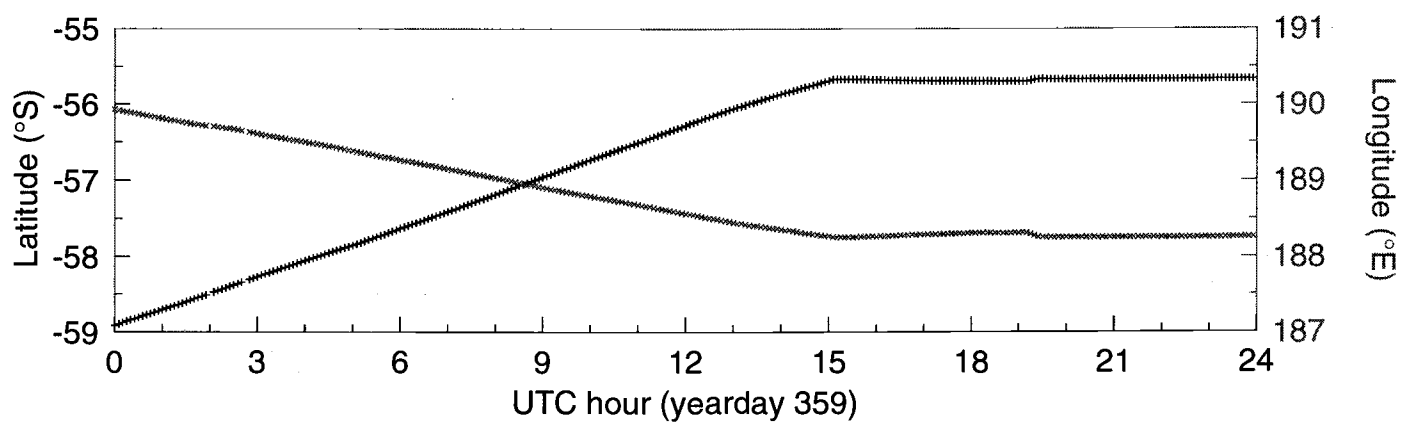
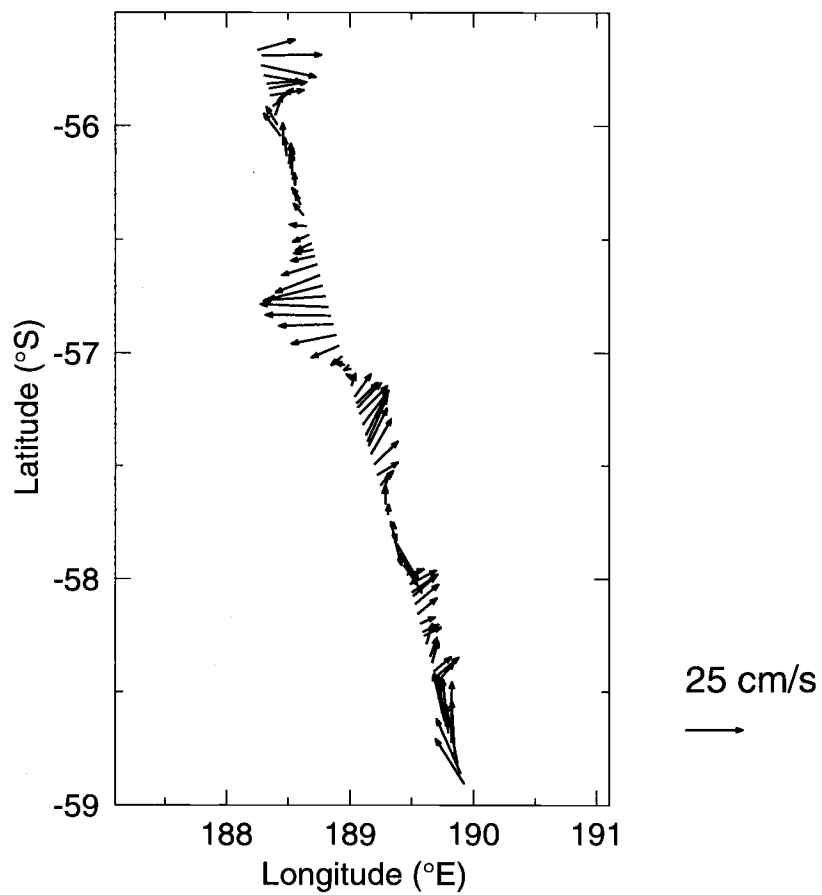
SOJGOFS Process 1 cruise (R9711) ADCP: 24-Dec-1997 (yearday 358)

N



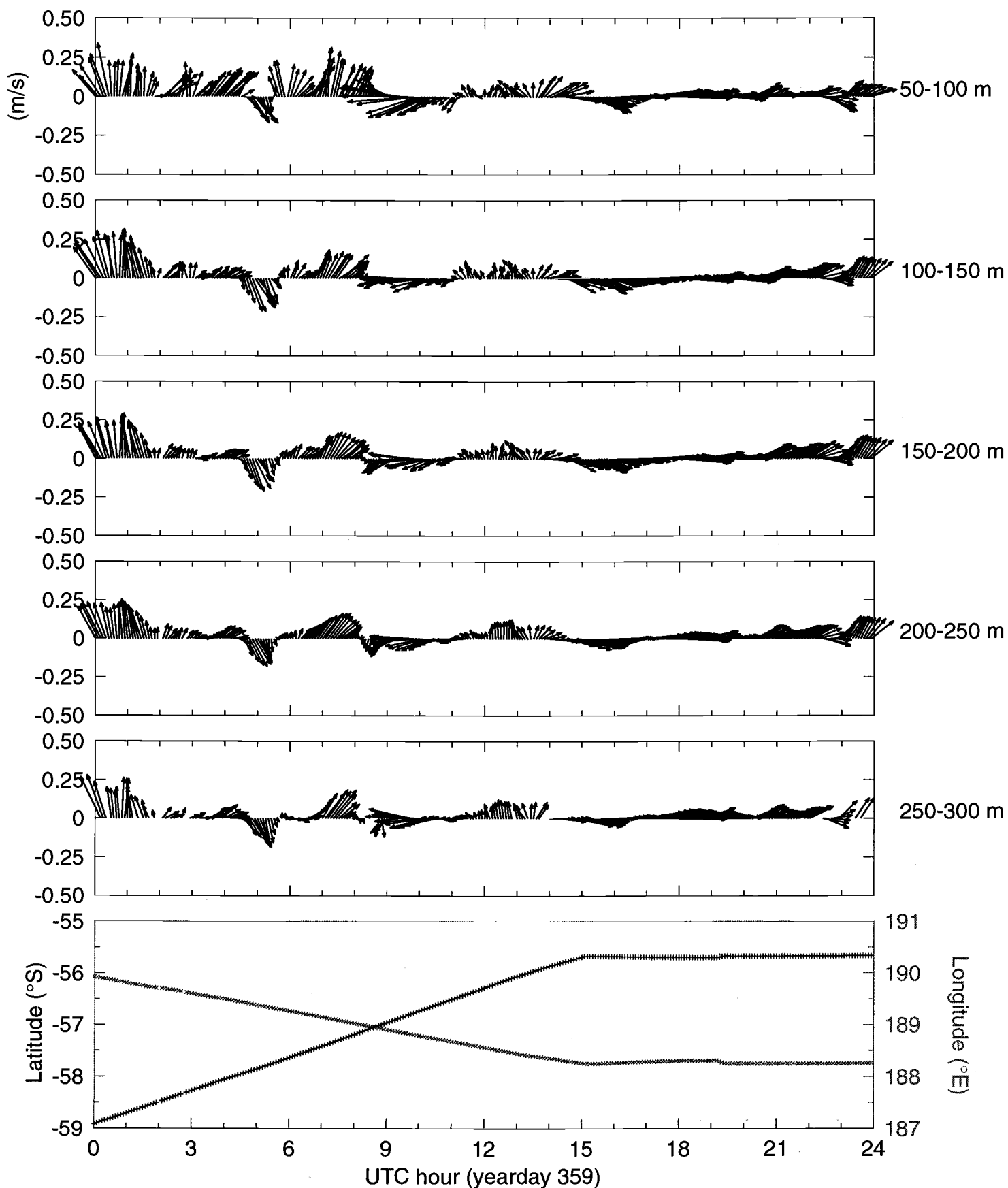
SOJGOFs Process 1 cruise (R9711)

50-330 m layer ADCP (25-Dec-1997, yearday 359)



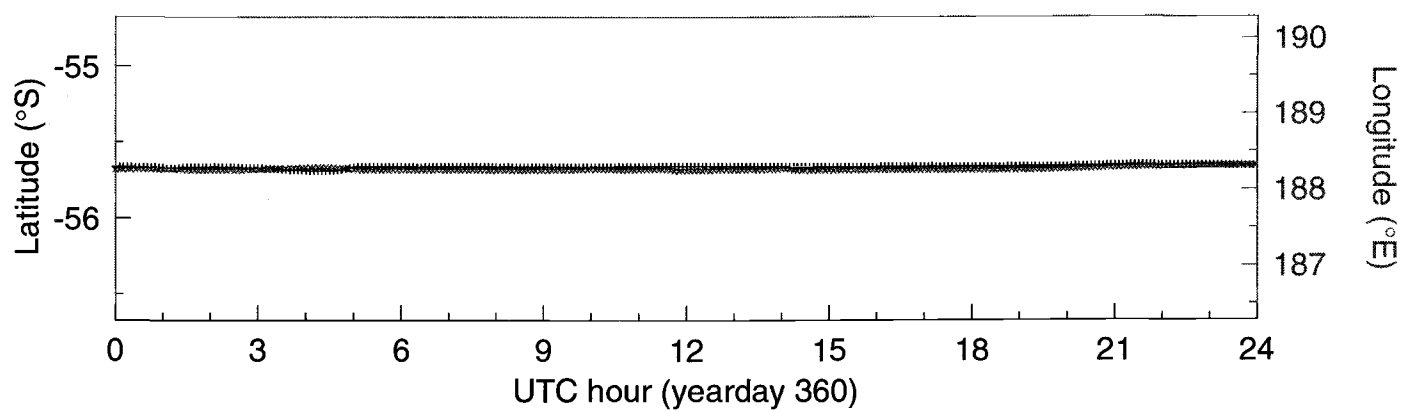
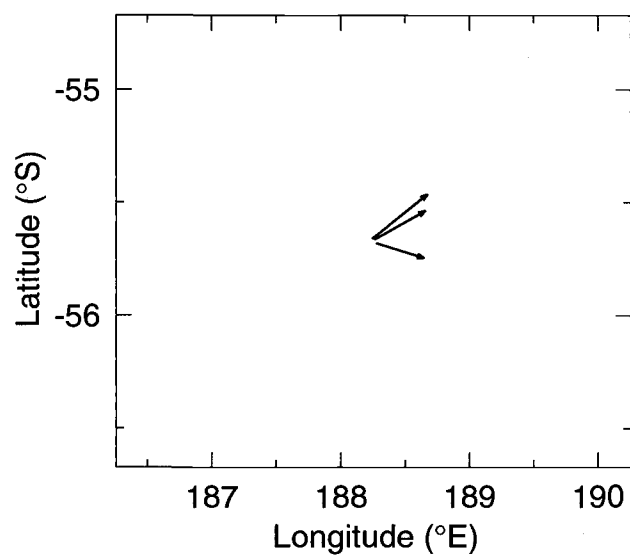
SOJGOFS Process 1 cruise (R9711) ADCP: 25-Dec-1997 (yearday 359)

N
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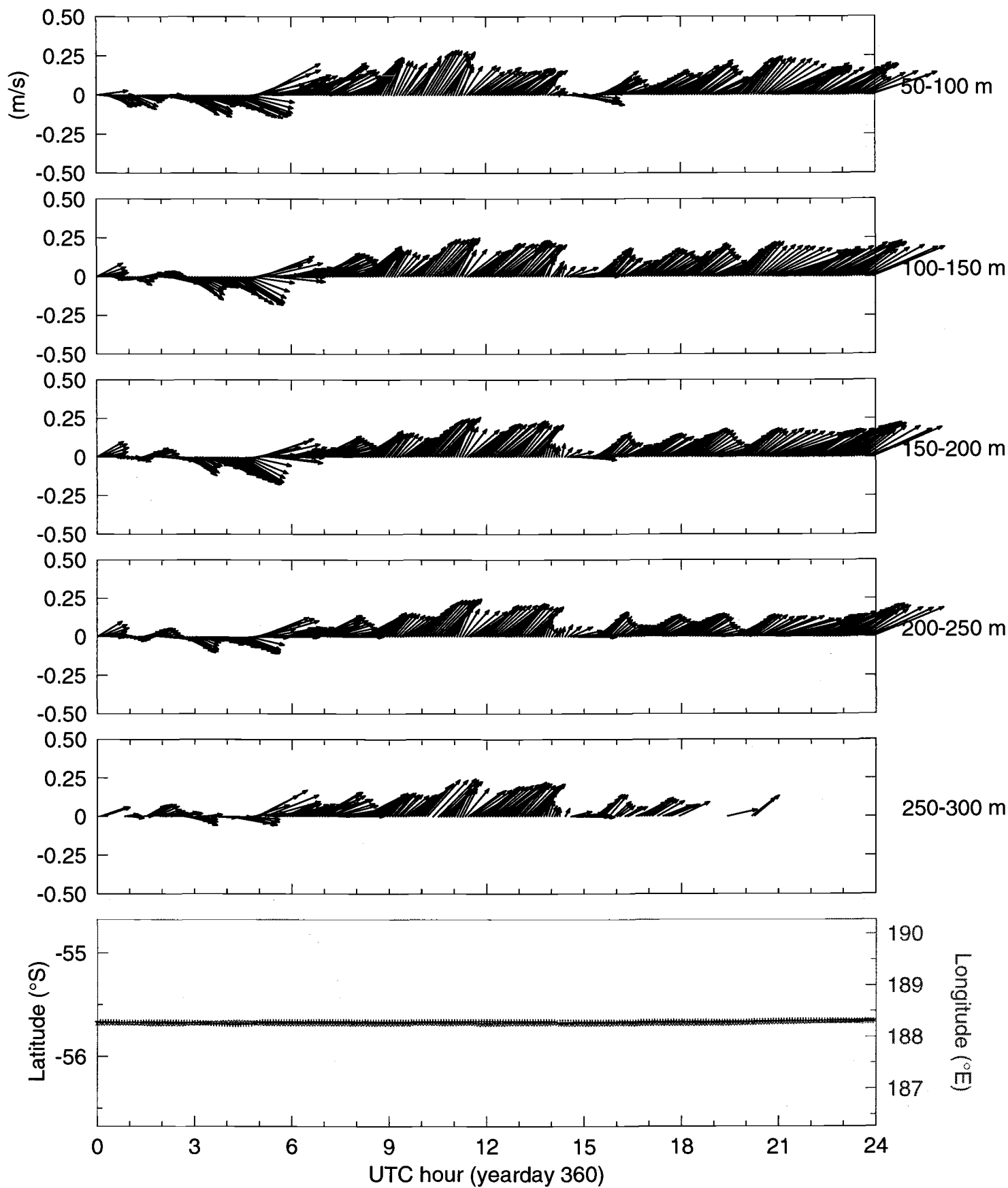
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (26-Dec-1997, yearday 360)



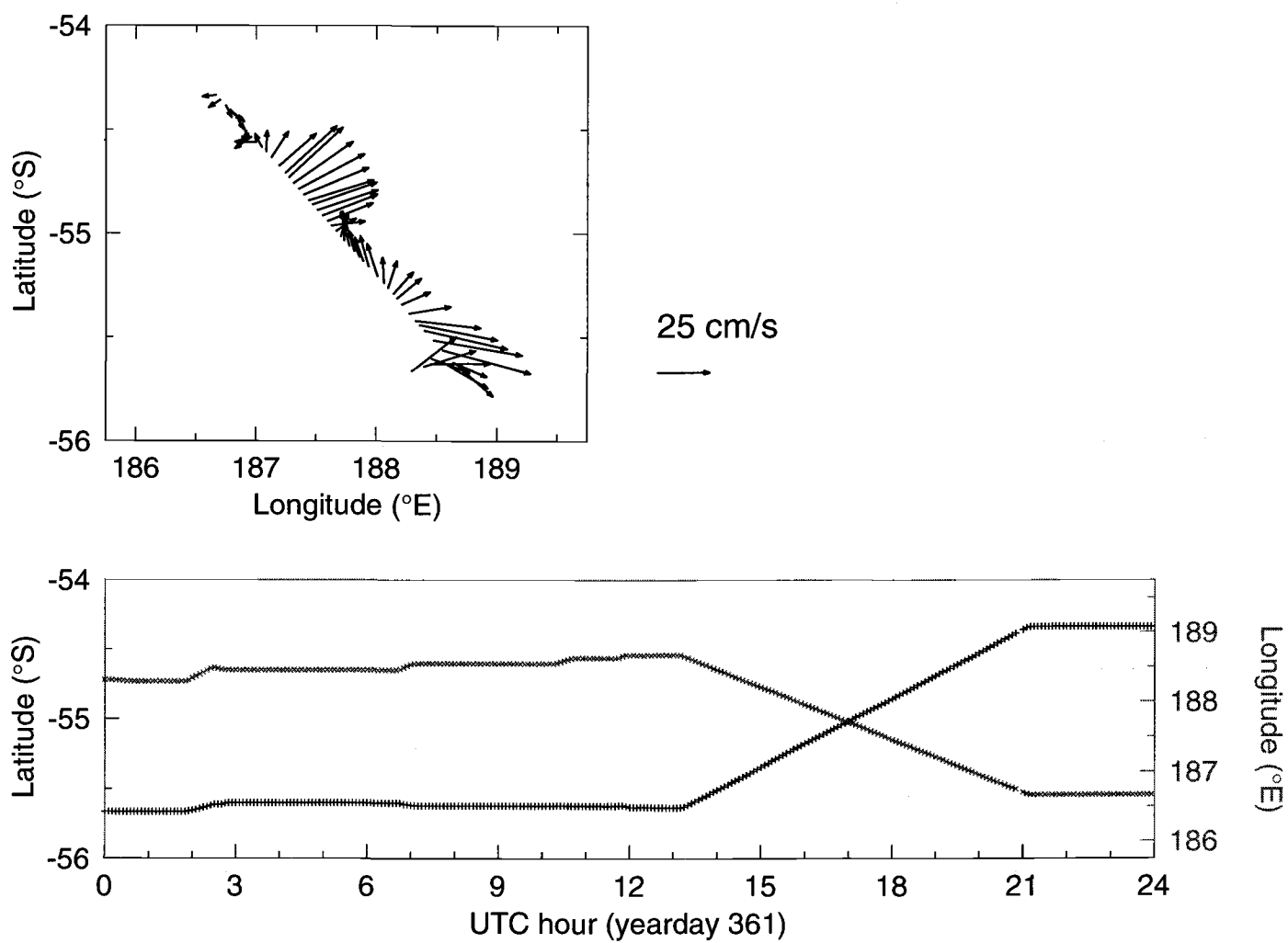
SOJGOFS Process 1 cruise (R9711) ADCP: 26-Dec-1997 (yearday 360)

N
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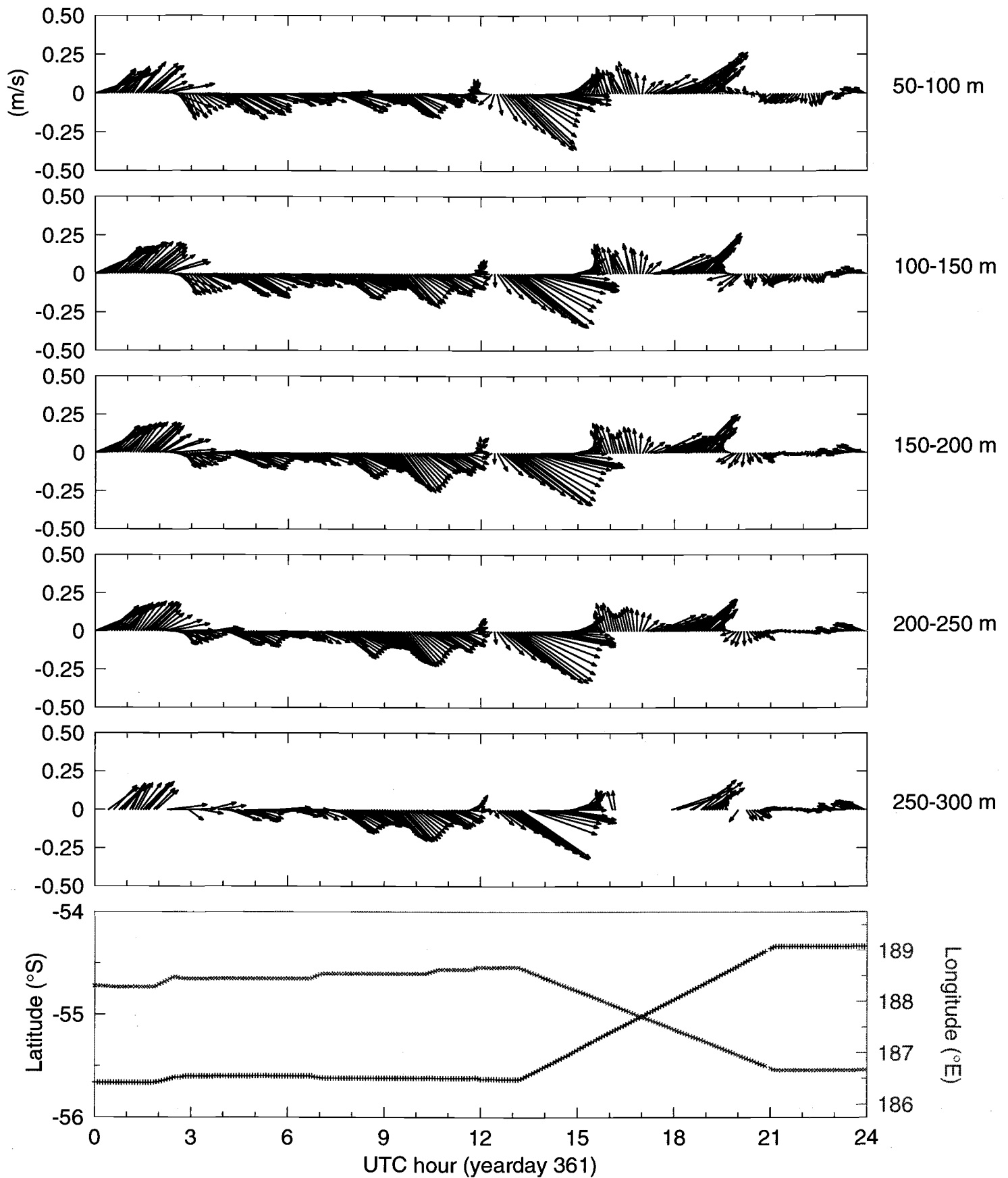
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (27-Dec-1997, yearday 361)



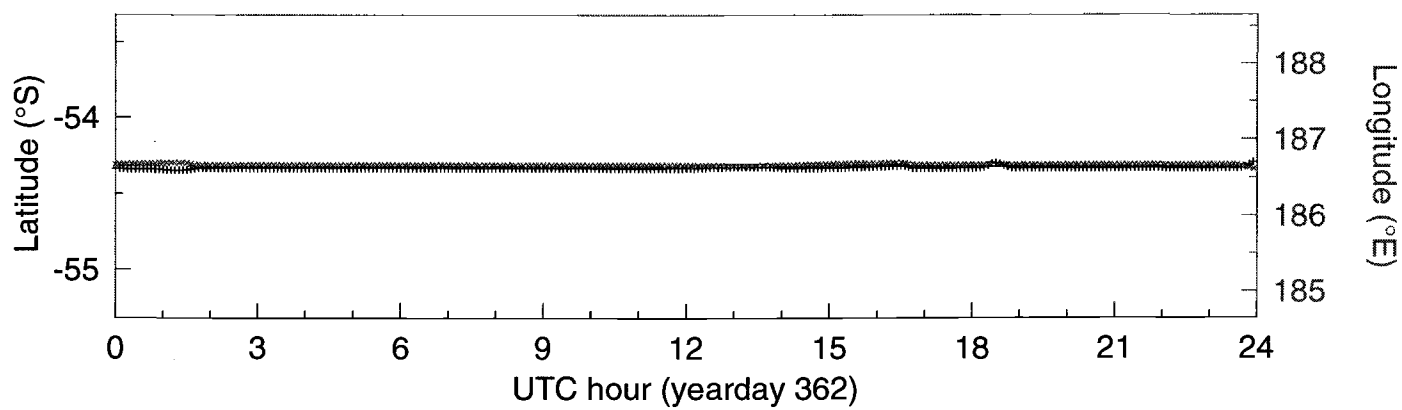
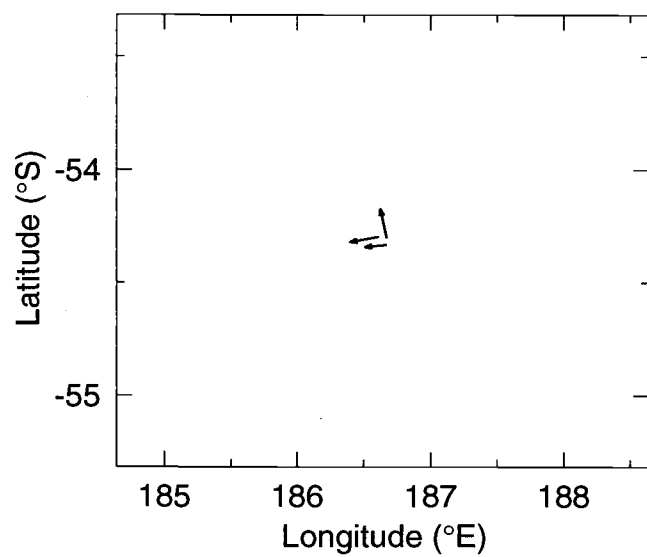
SOJGOFS Process 1 cruise (R9711) ADCP: 27-Dec-1997 (yearday 361)

N



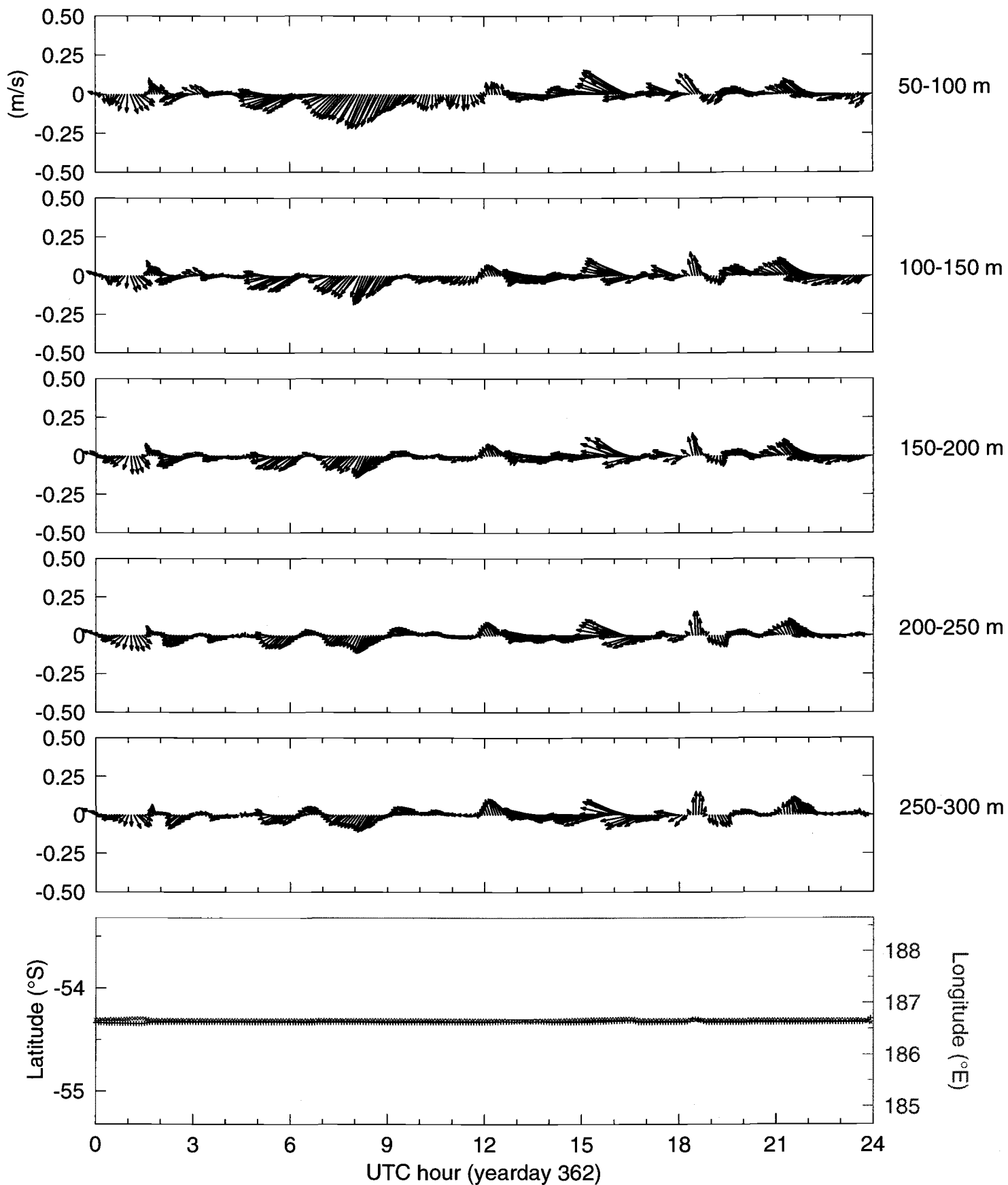
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (28-Dec-1997, yearday 362)



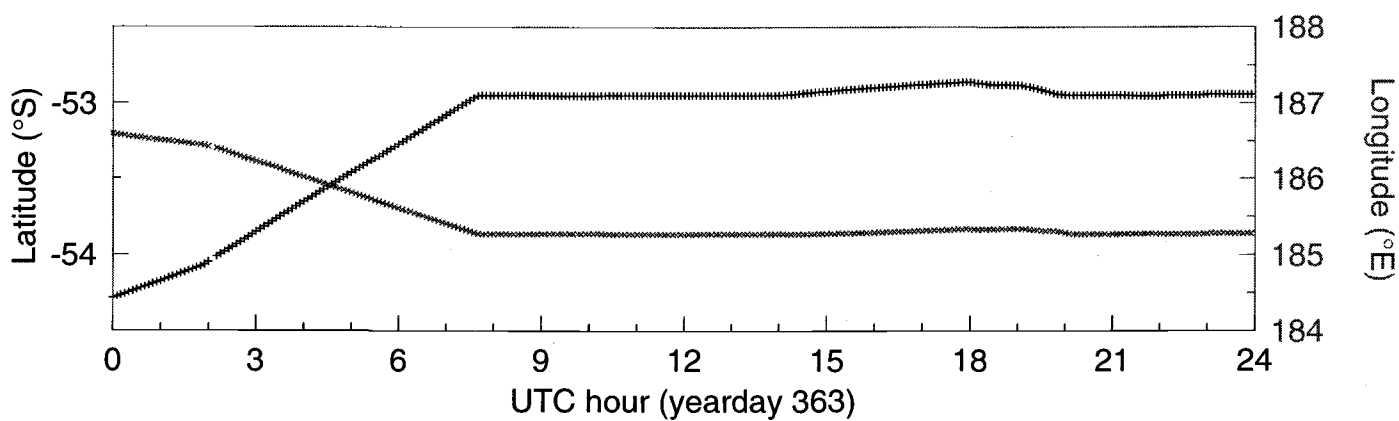
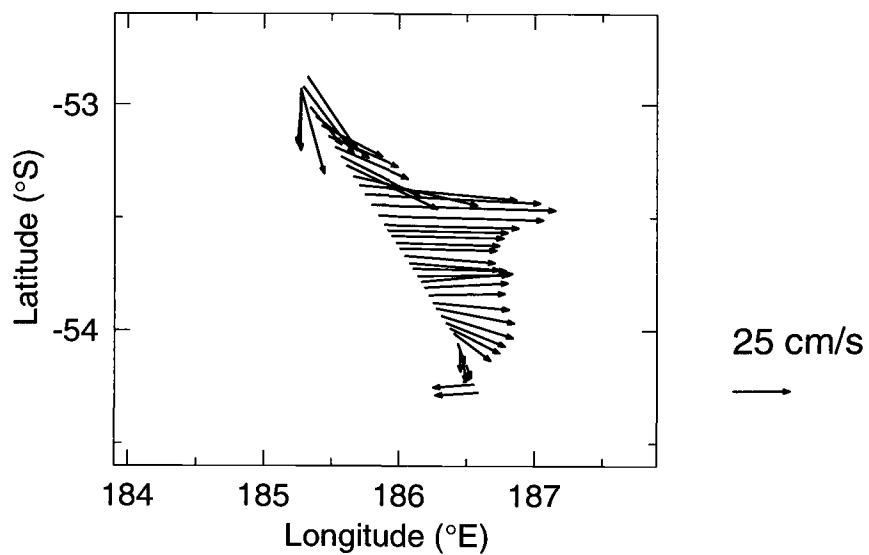
SOJGOFS Process 1 cruise (R9711) ADCP: 28-Dec-1997 (yearday 362)

N
↑



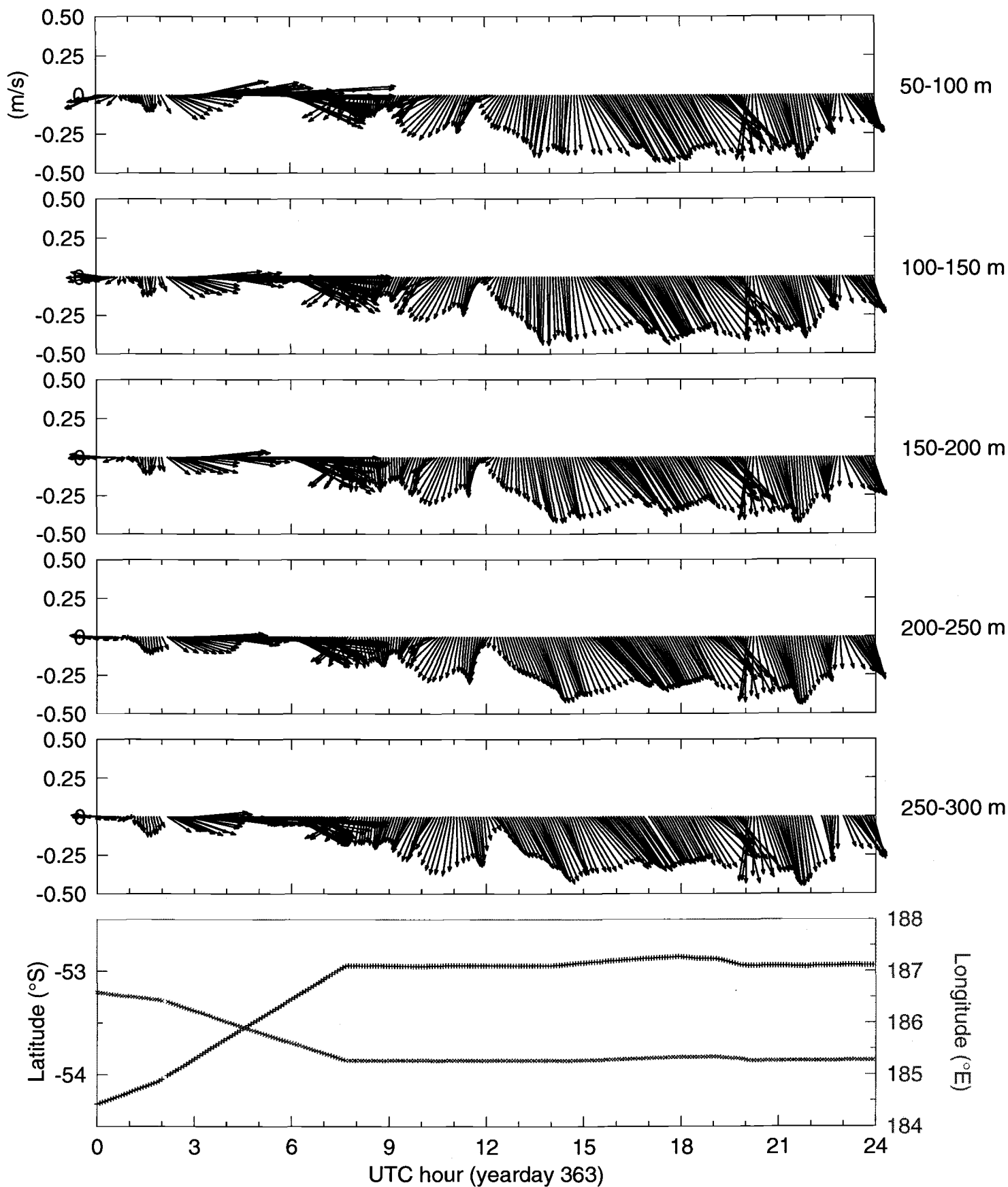
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (29-Dec-1997, yearday 363)



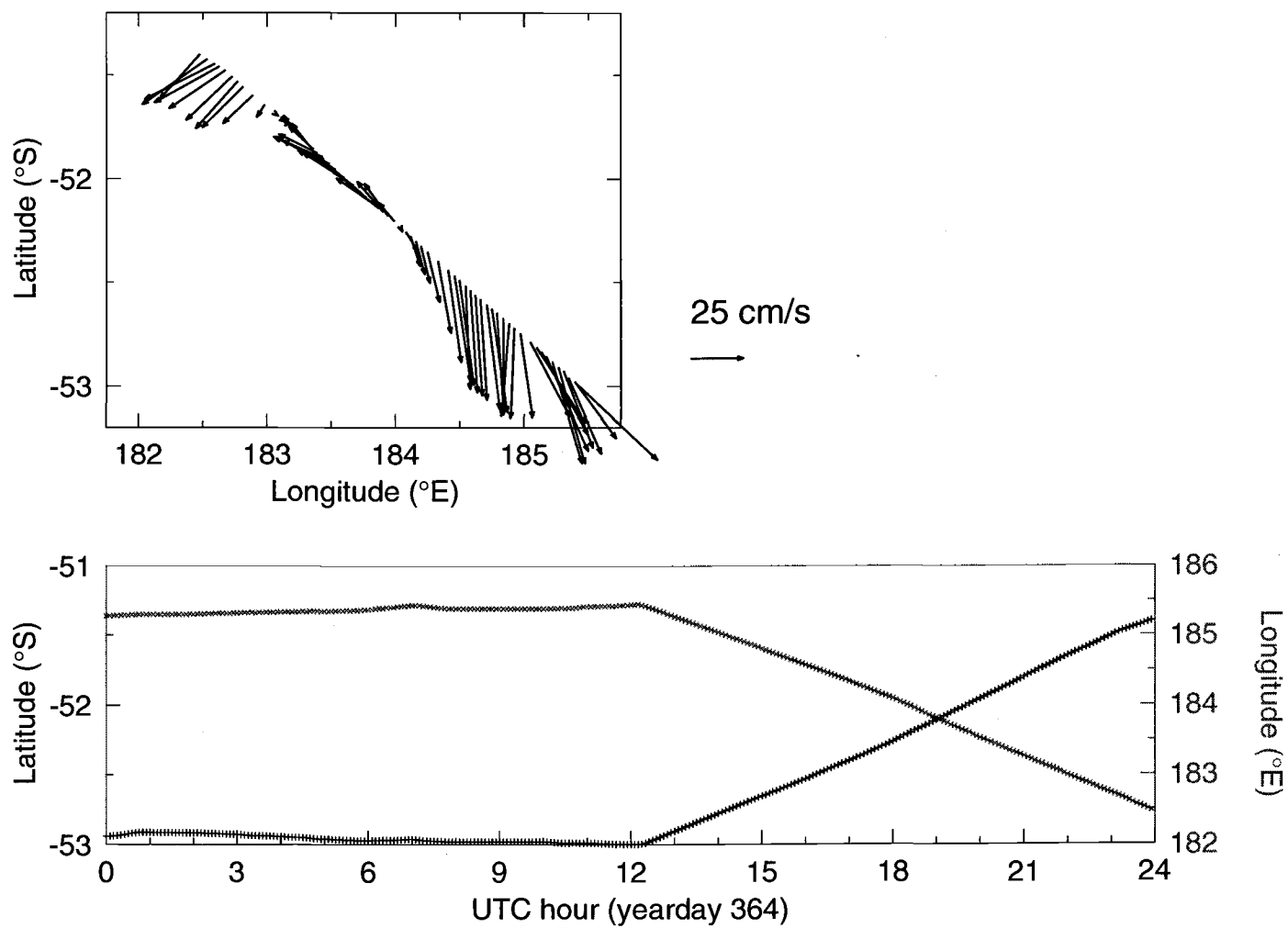
SOJGOFS Process 1 cruise (R9711) ADCP: 29-Dec-1997 (yearday 363)

N
↑



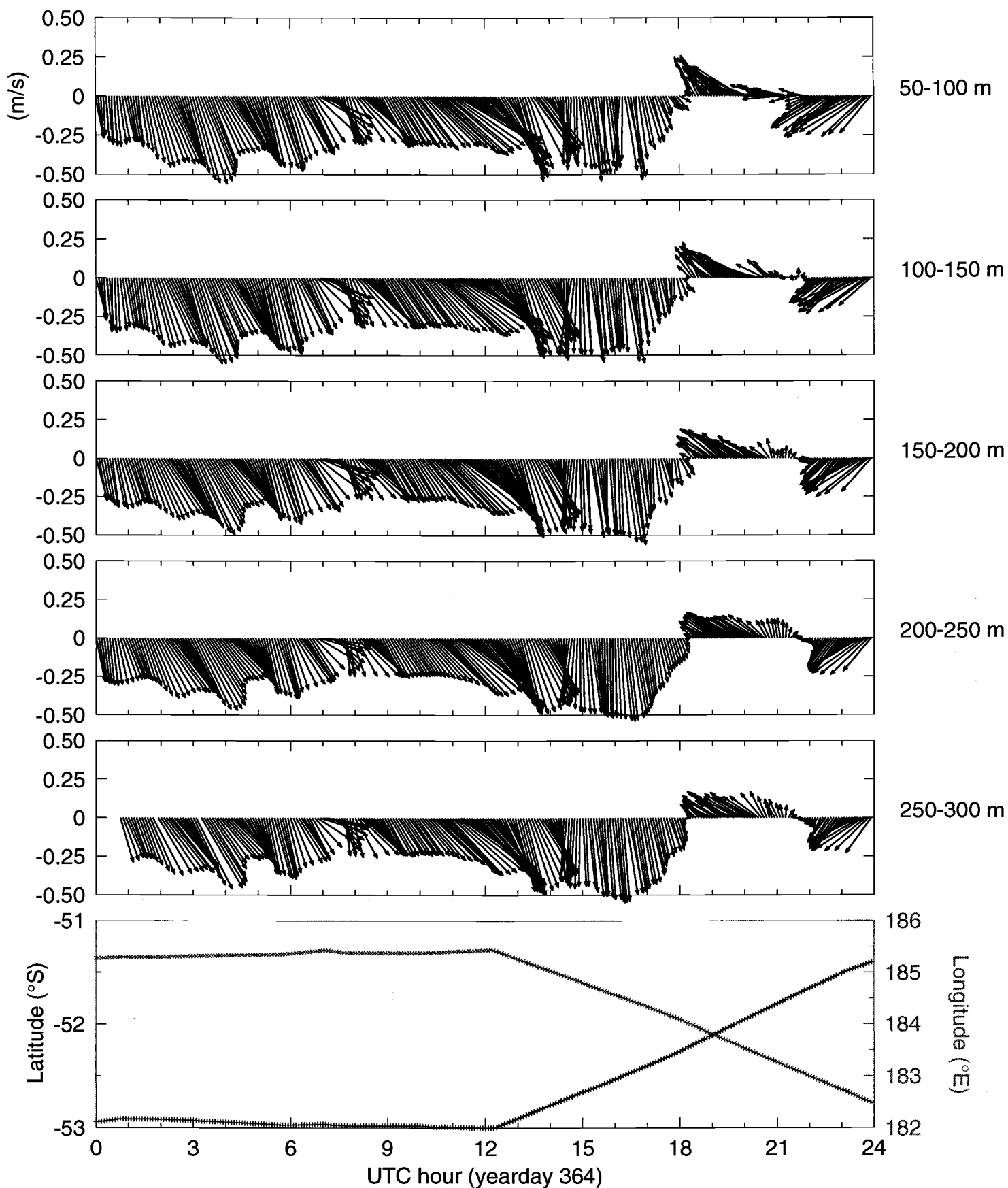
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (30-Dec-1997, yearday 364)



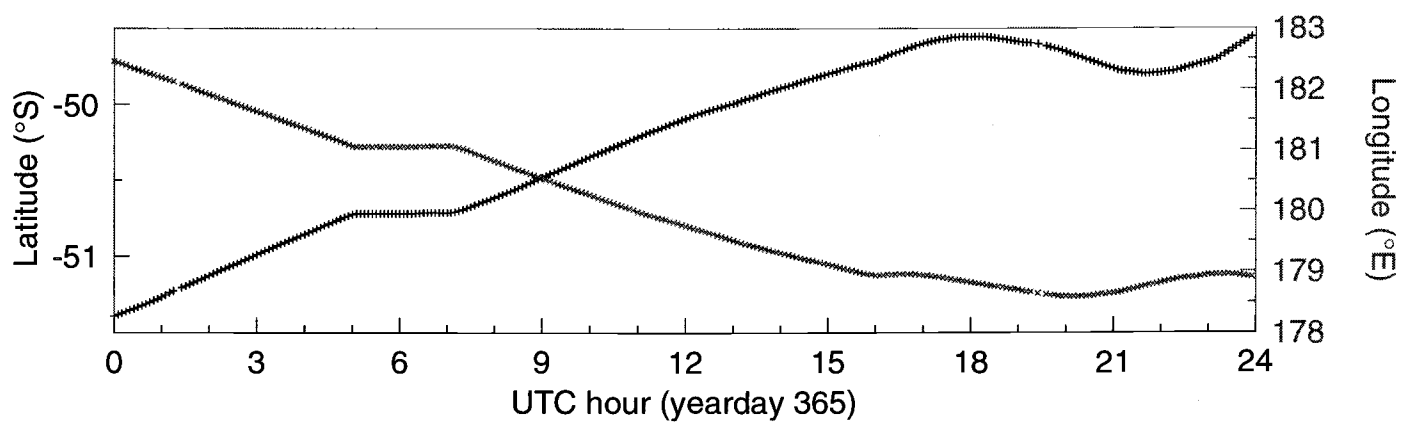
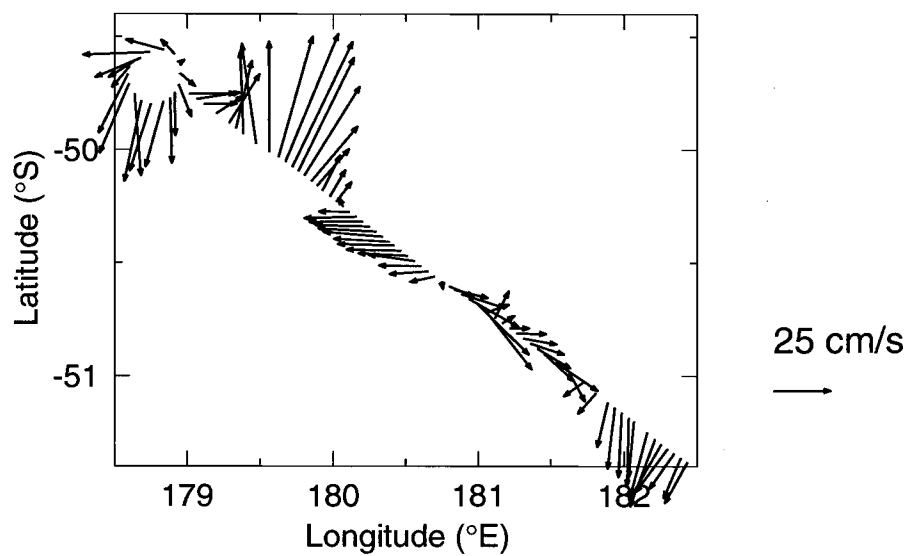
SOJGOFS Process 1 cruise (R9711) ADCP: 30-Dec-1997 (yearday 364)

N



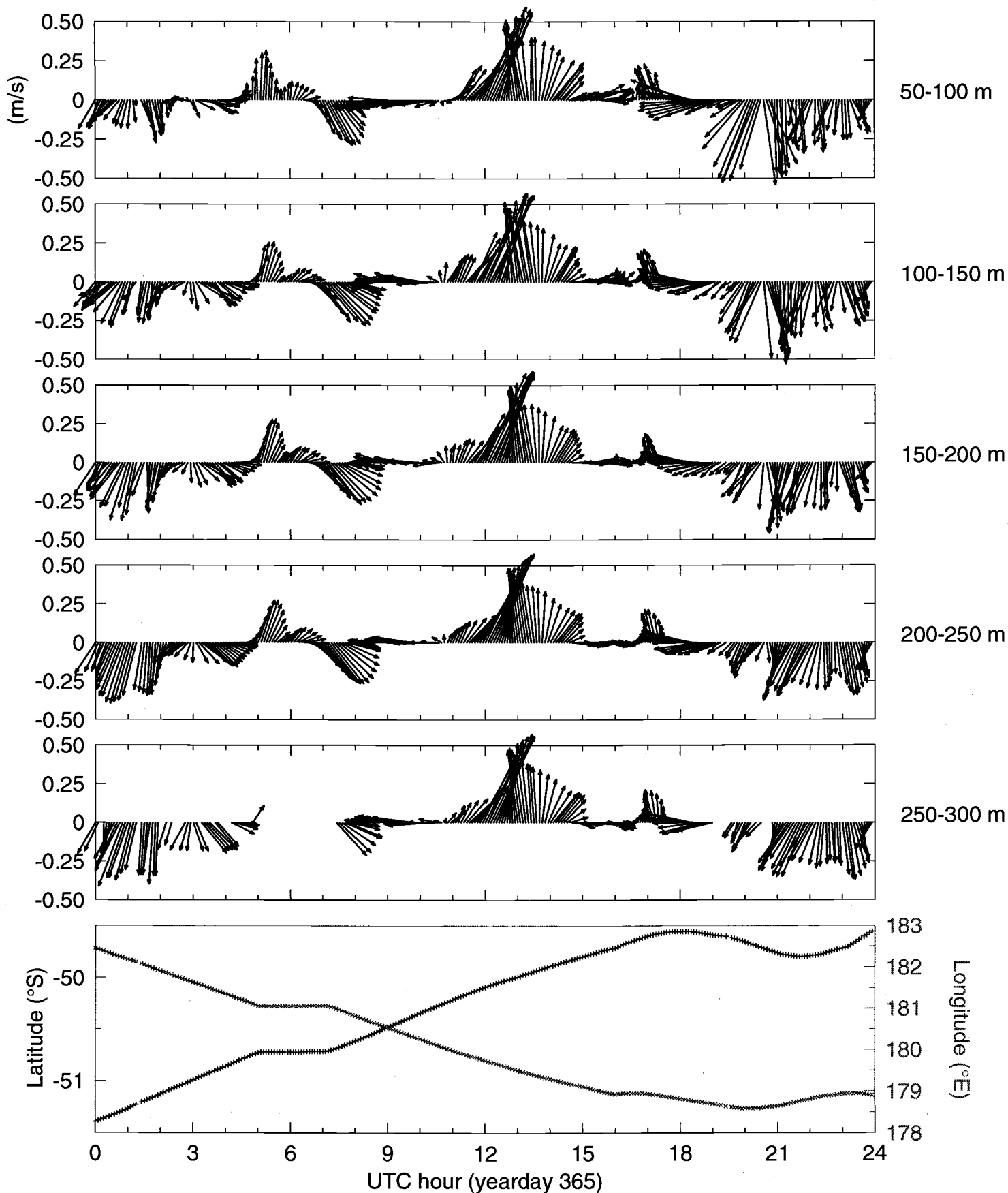
SOJGOFS Process 1 cruise (R9711)

50-330 m layer ADCP (31-Dec-1997, yearday 365)

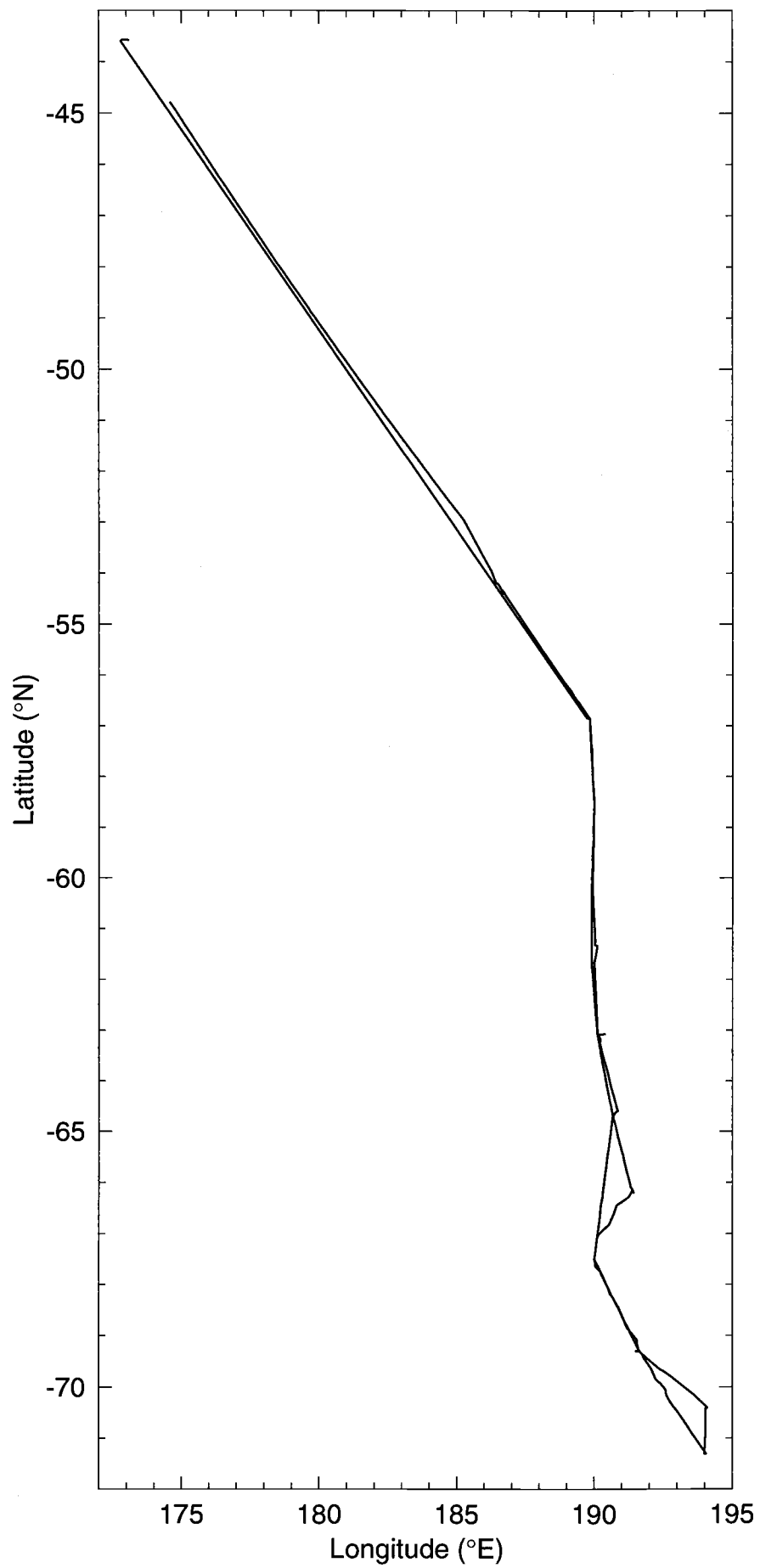


SOJGOFS Process 1 cruise (R9711) ADCP: 31-Dec-1997 (yearday 365)

N
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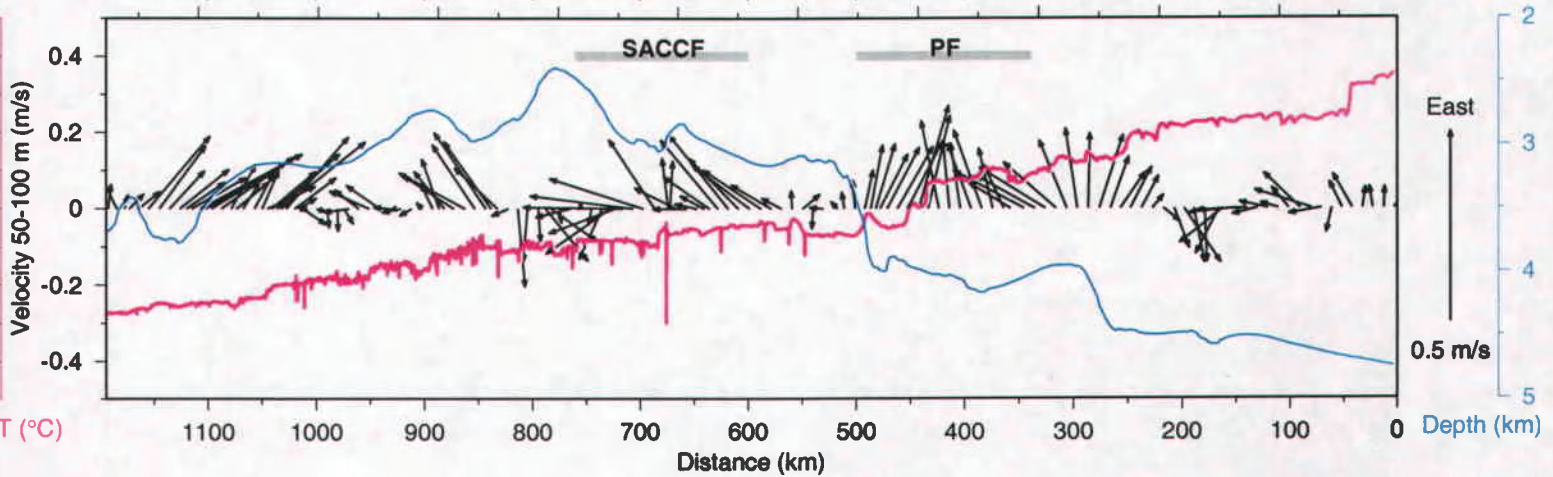
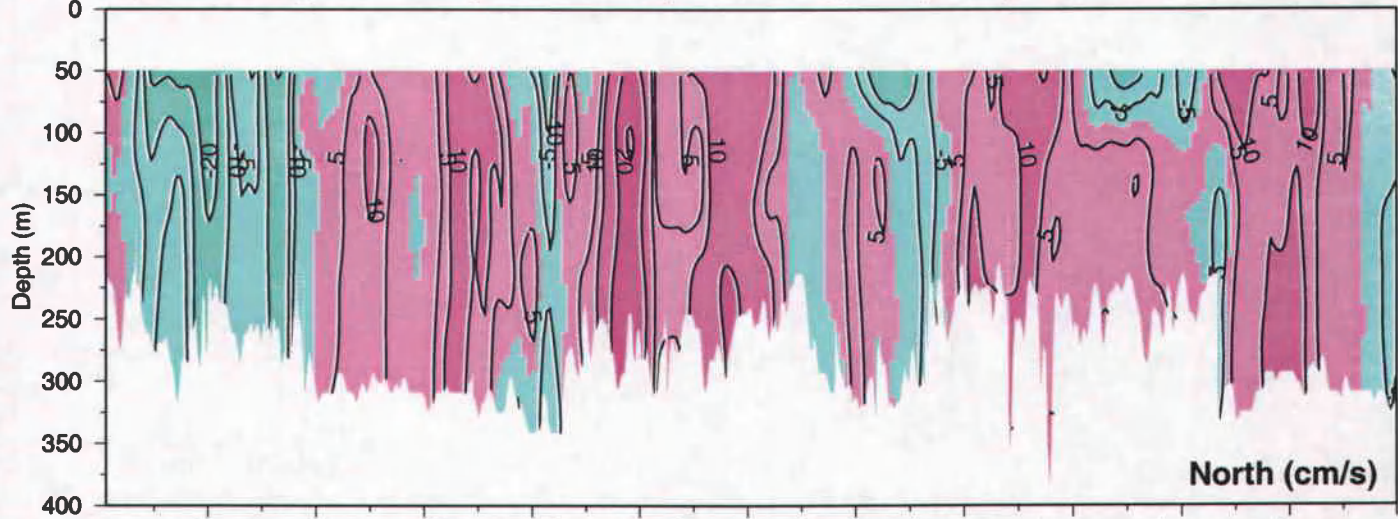
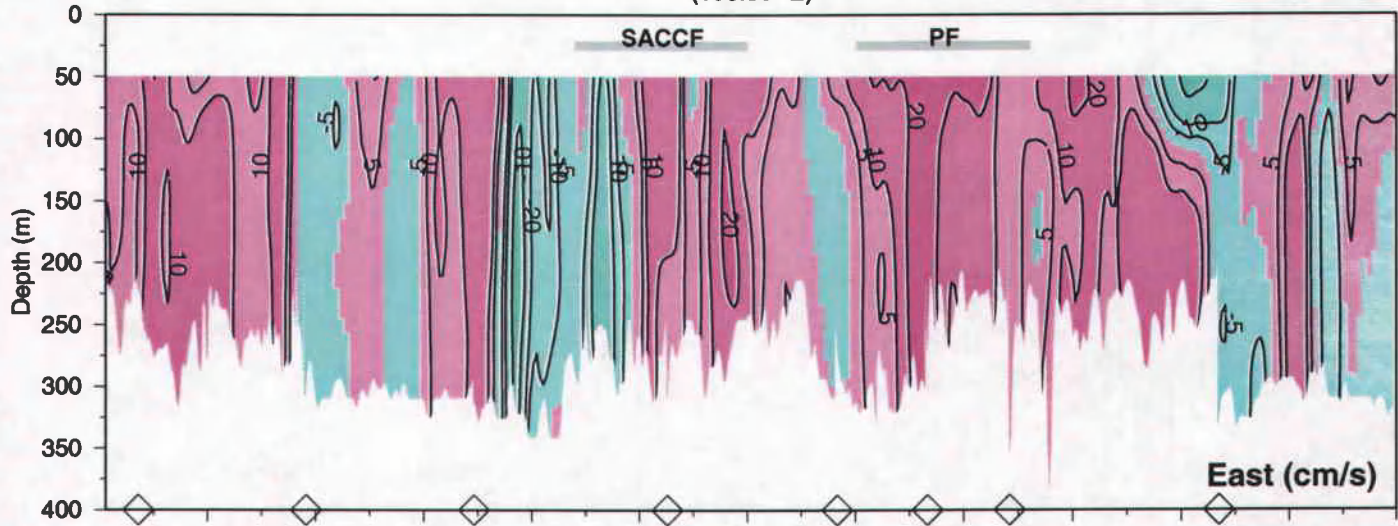
R9802



Process 2: Transect south ADCP, 20-Feb-1998 08:48:29 to 28-Feb-1998 22:14:53 (51.367-59.927)

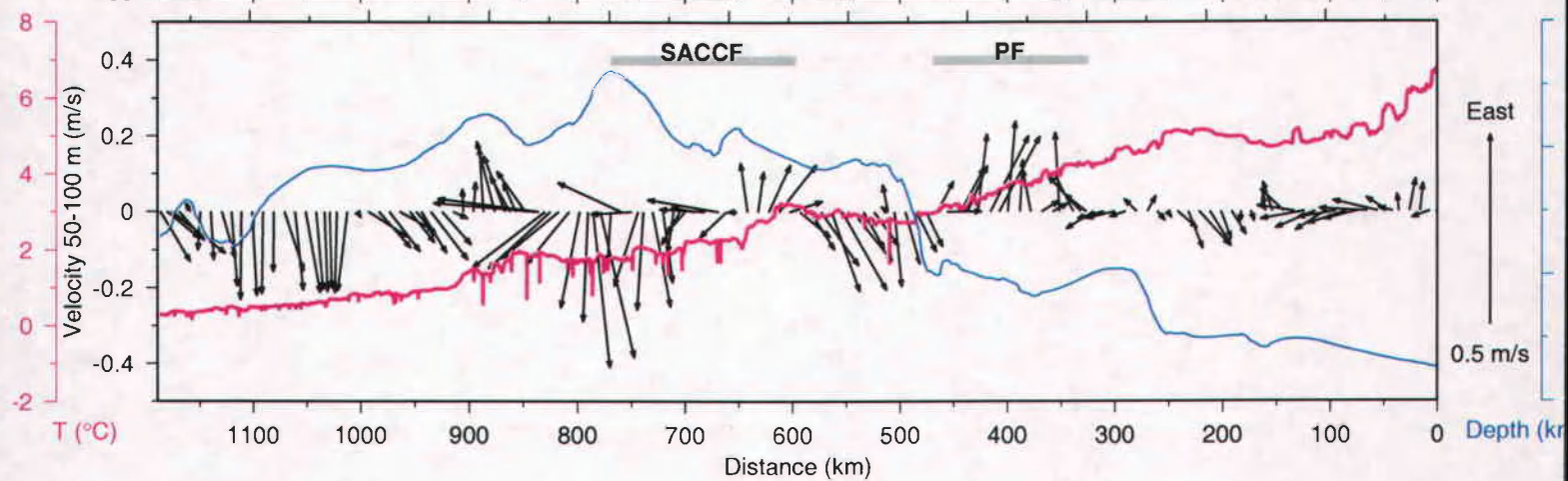
Latitude (°S)
-67.0 -66.0 -65.0 -64.0 -63.0 -62.0 -61.0 -60.0 -59.0 -58.0

(190.36 °E)



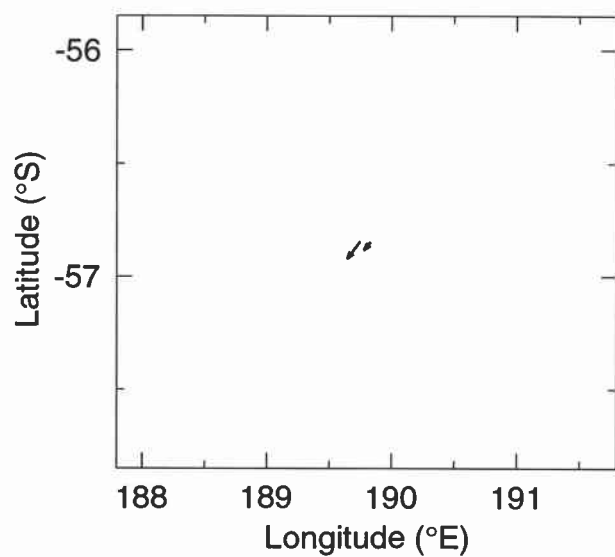
Latitude (°S)

67.0 66.0 65.0 64.0 63.0 62.0 61.0 60.0 59.0 58.0

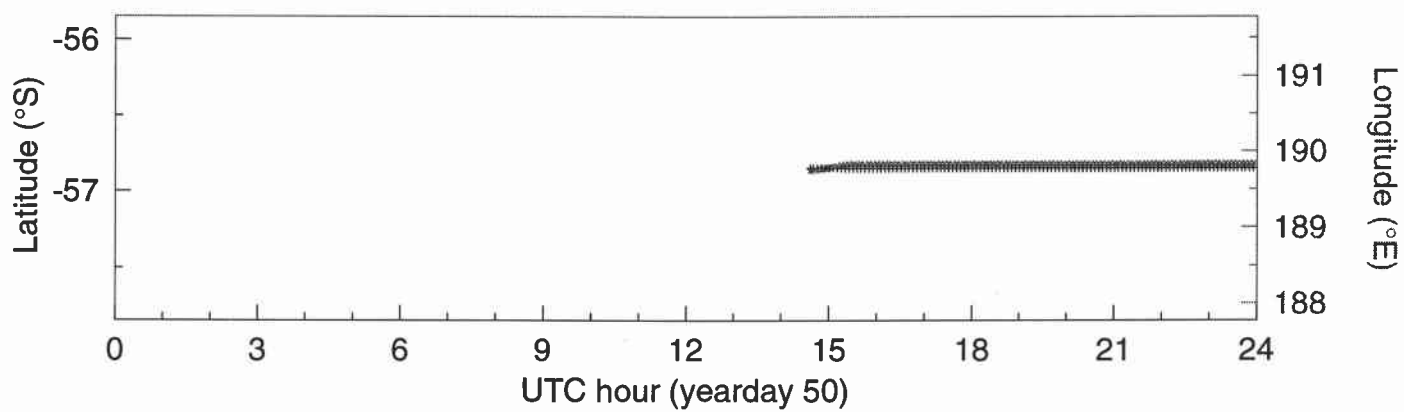


SOJGOFS Process 2 cruise (R9802)

50-330 m layer ADCP (19-Feb-1998, yearday 50)

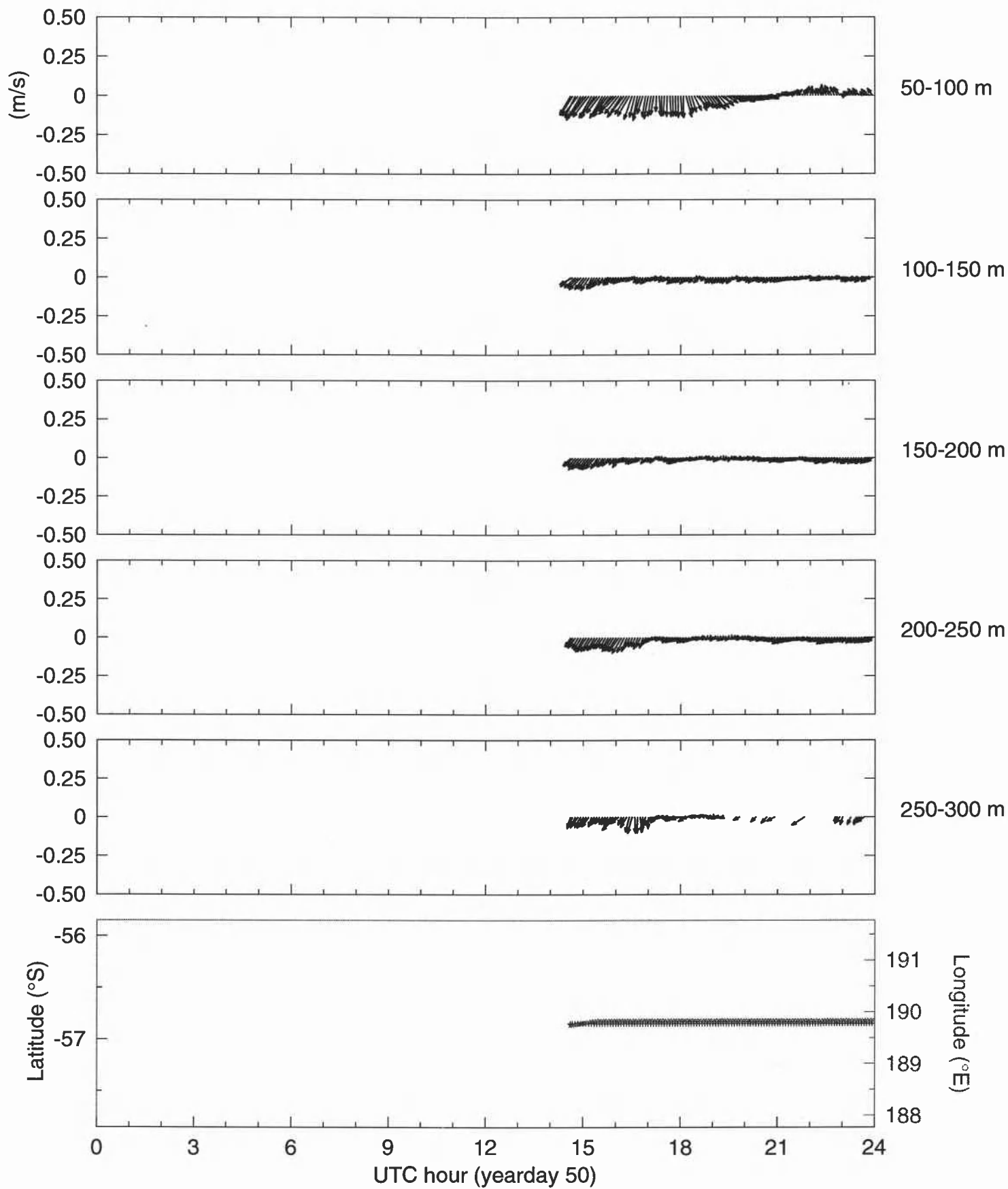


25 cm/s



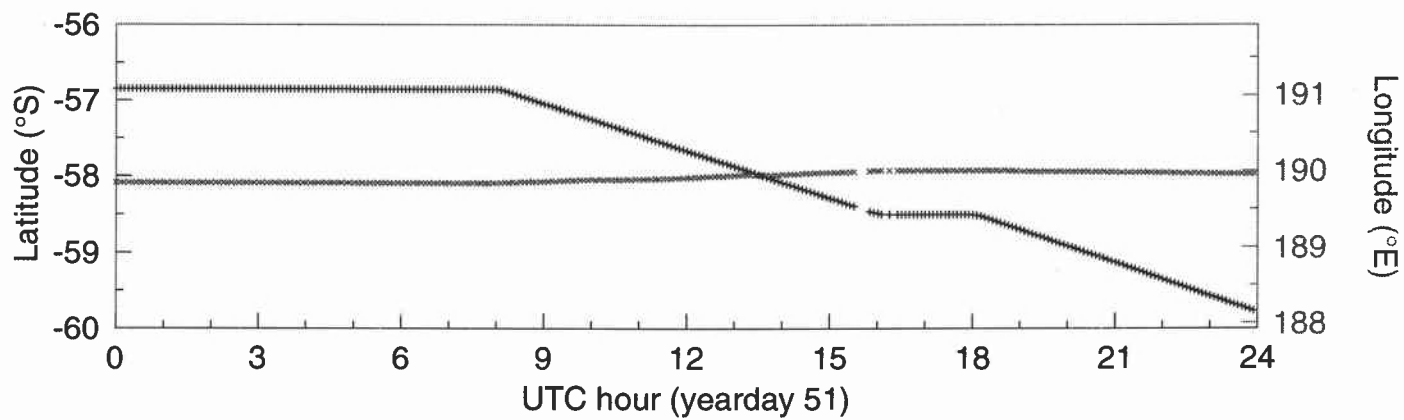
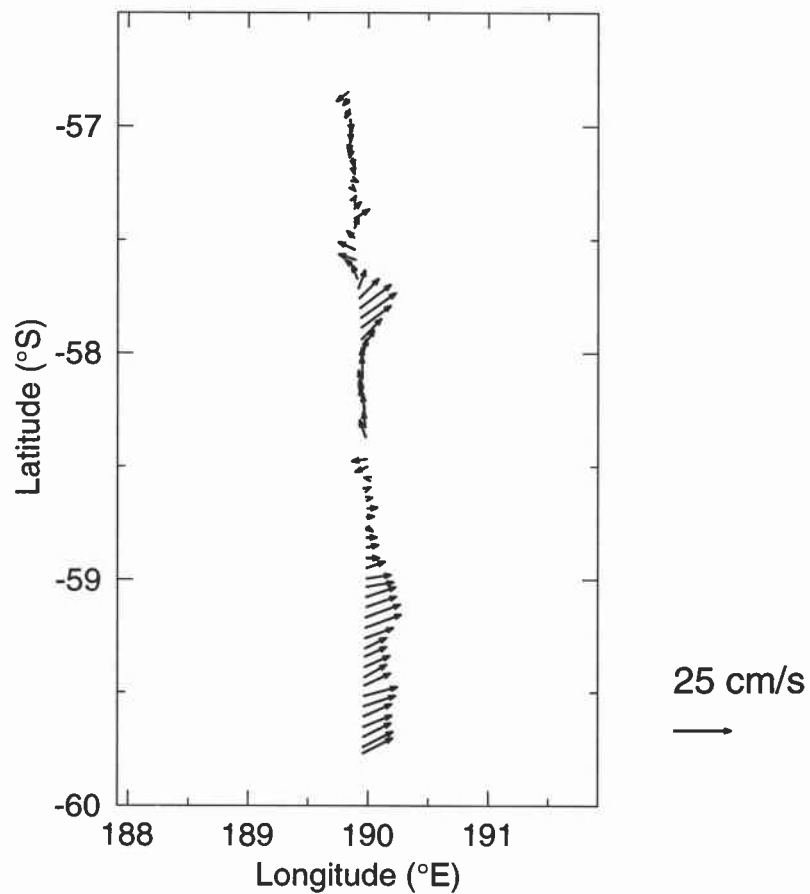
SOJGOFS Process 1 cruise (R9802) ADCP: 19-Feb-1998 (yearday 50)

N



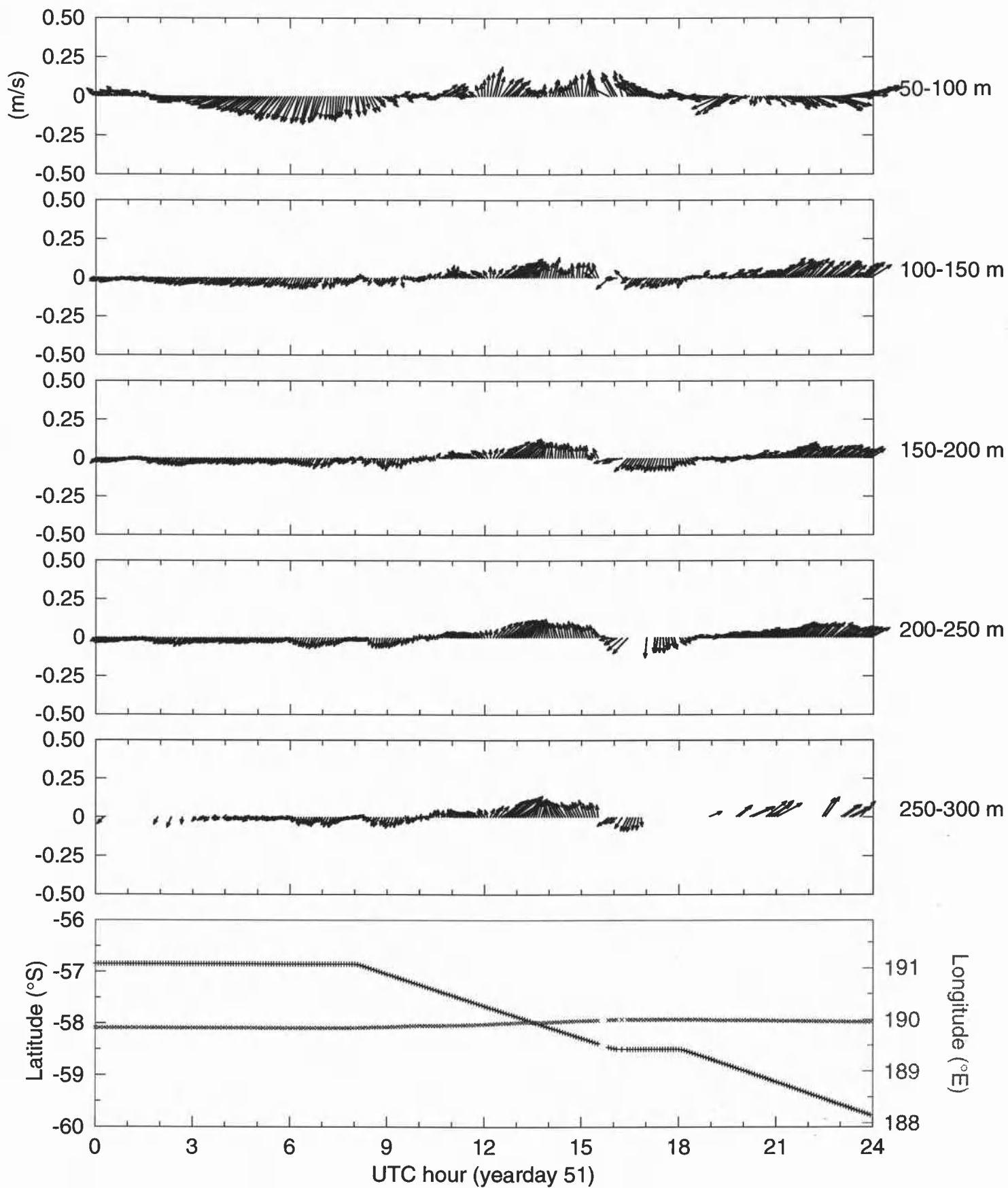
SOJGOFS Process 2 cruise (R9802)

50-330 m layer ADCP (20-Feb-1998, yearday 51)



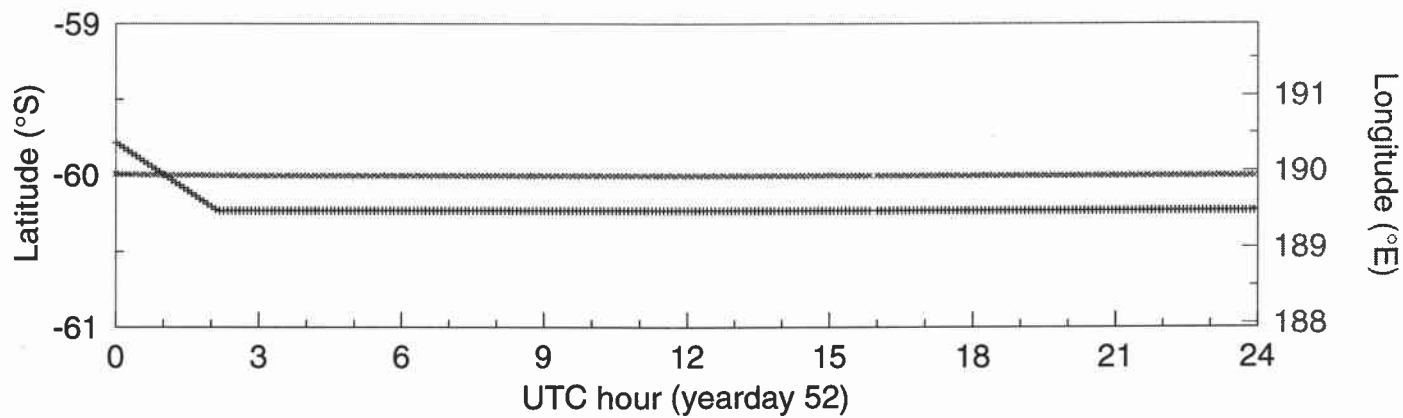
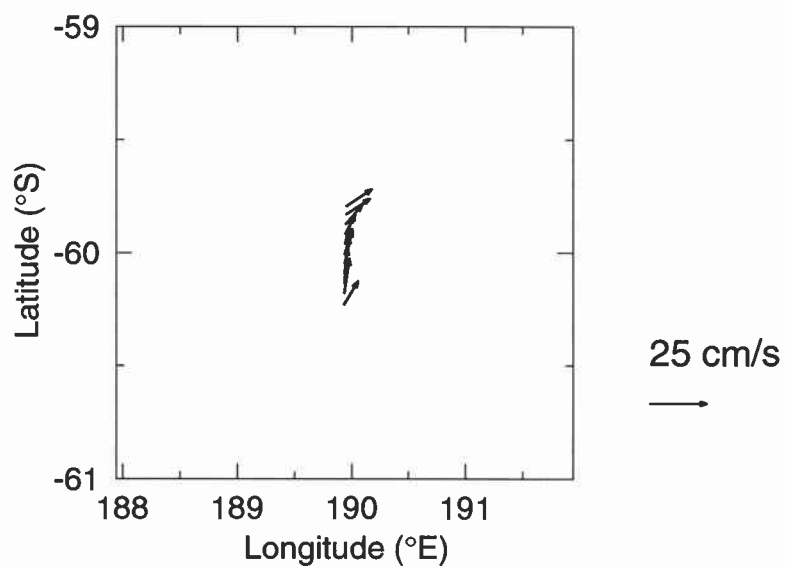
SOJGOFS Process 1 cruise (R9802) ADCP: 20-Feb-1998 (yearday 51)

N
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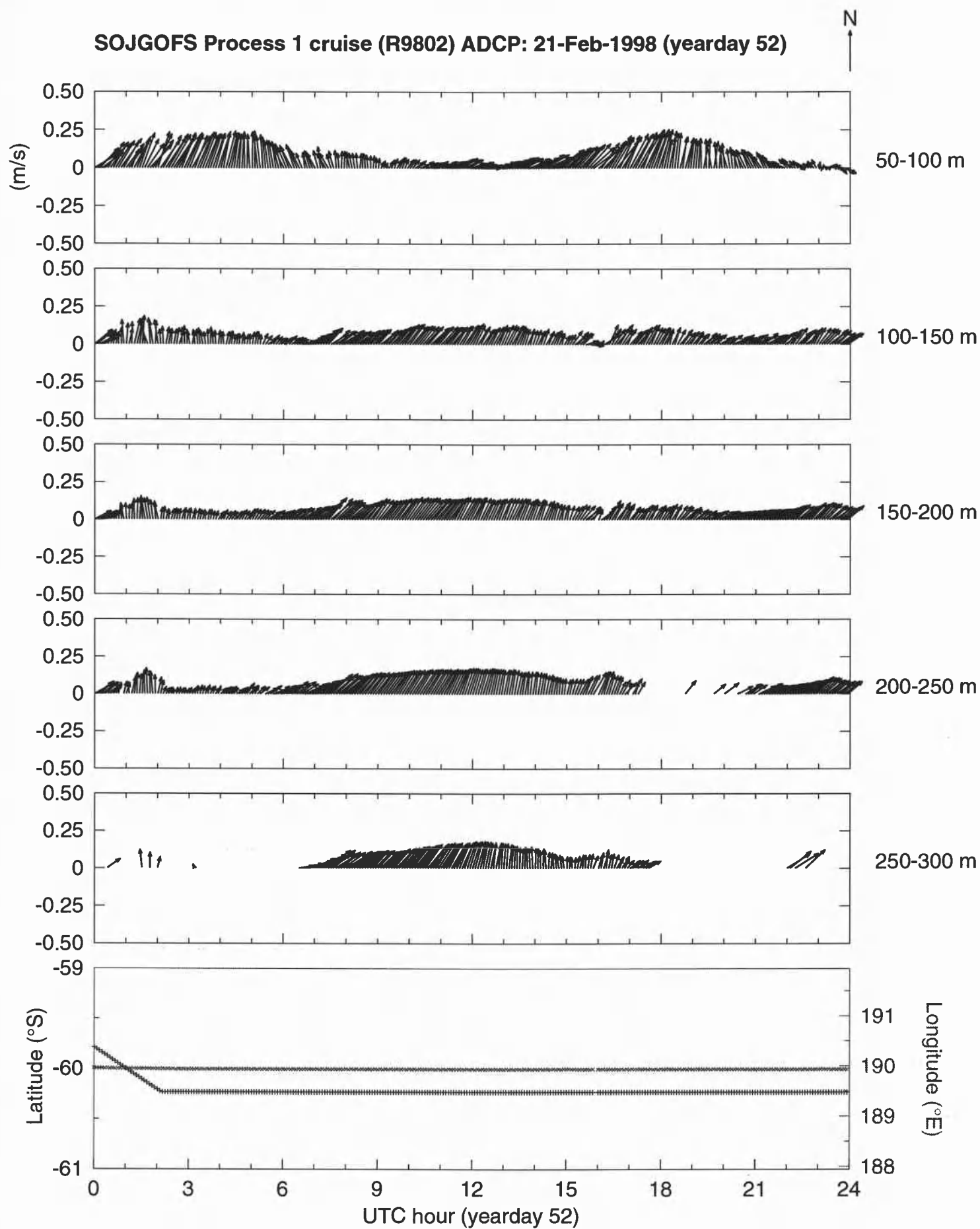


SOJGOFS Process 2 cruise (R9802)

50-330 m layer ADCP (21-Feb-1998, yearday 52)

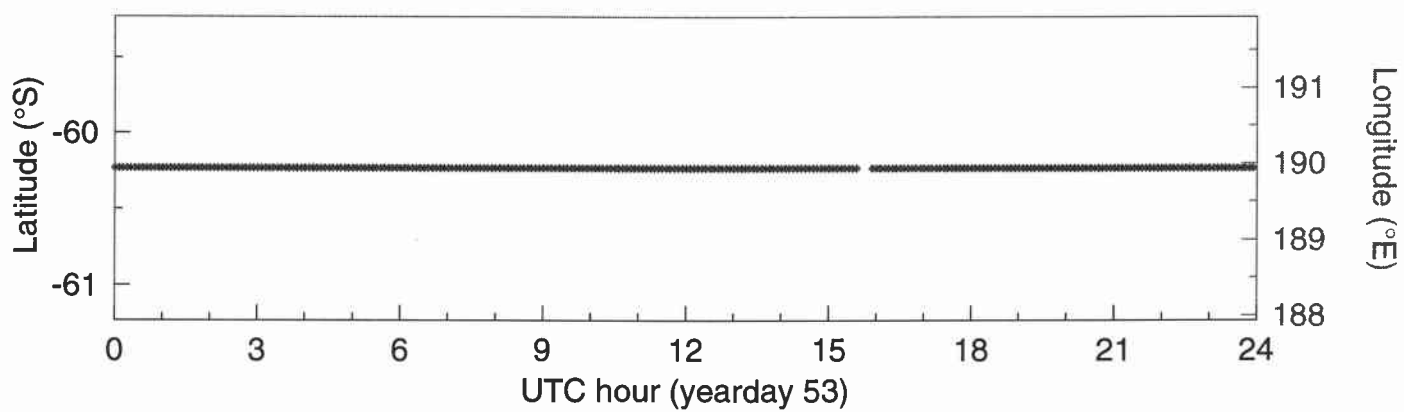
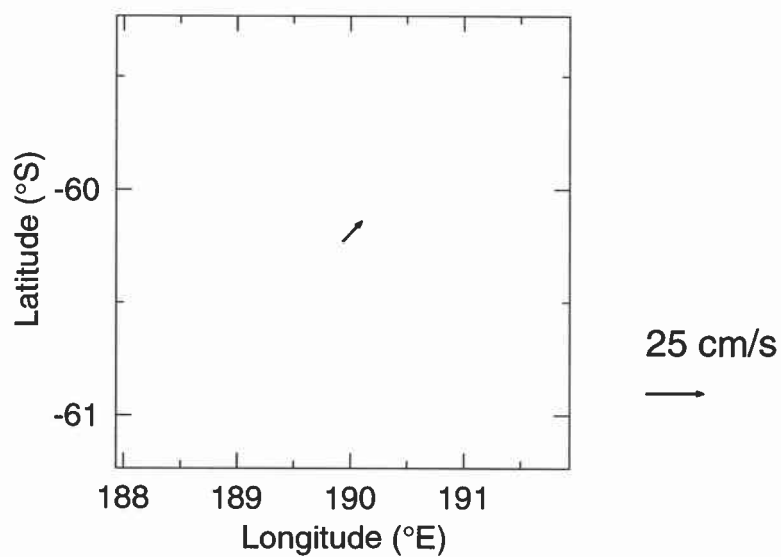


SOJGOFS Process 1 cruise (R9802) ADCP: 21-Feb-1998 (yearday 52)



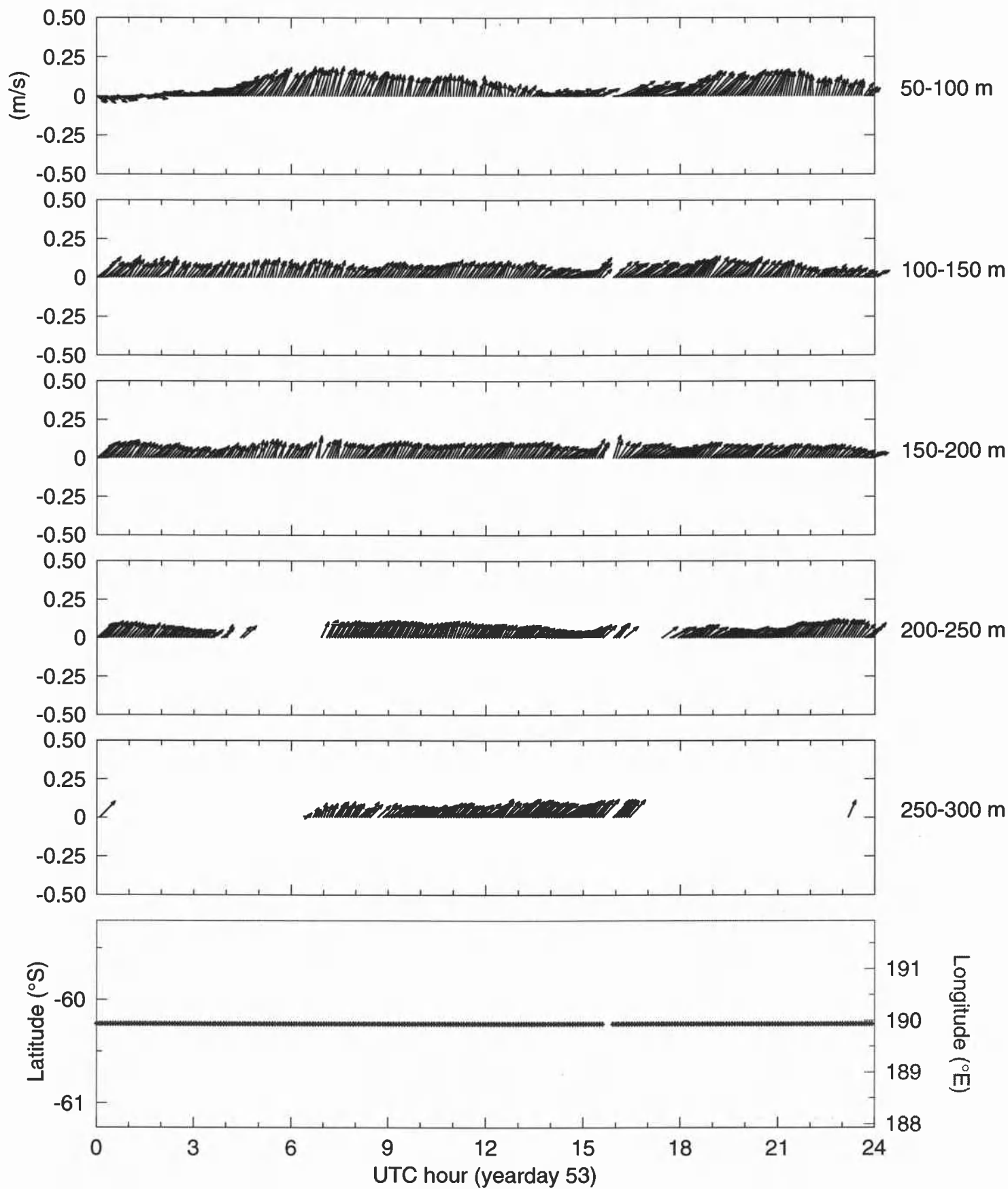
SOJGOFS Process 2 cruise (R9802)

50-330 m layer ADCP (22-Feb-1998, yearday 53)



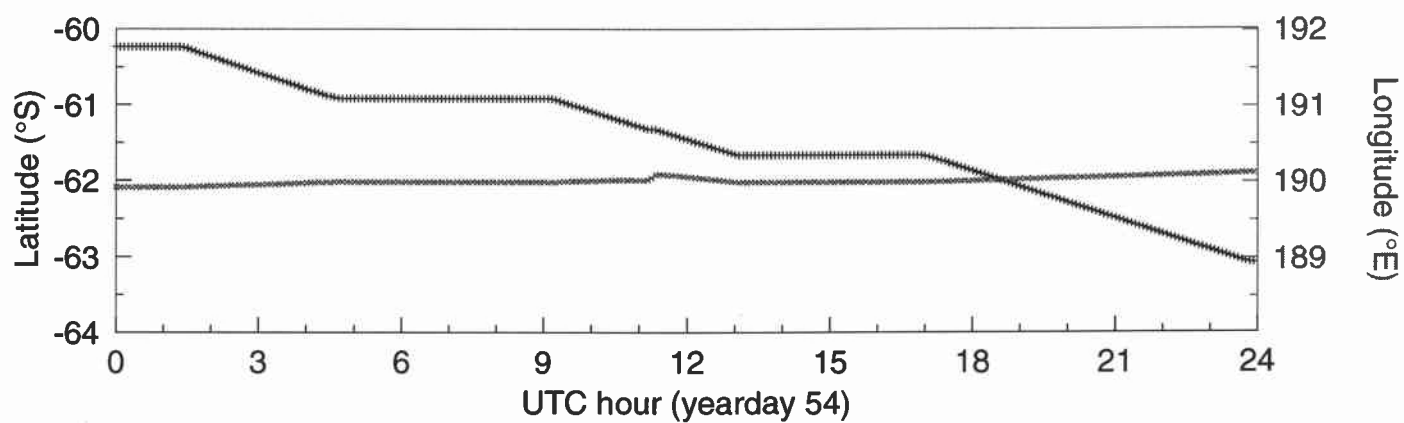
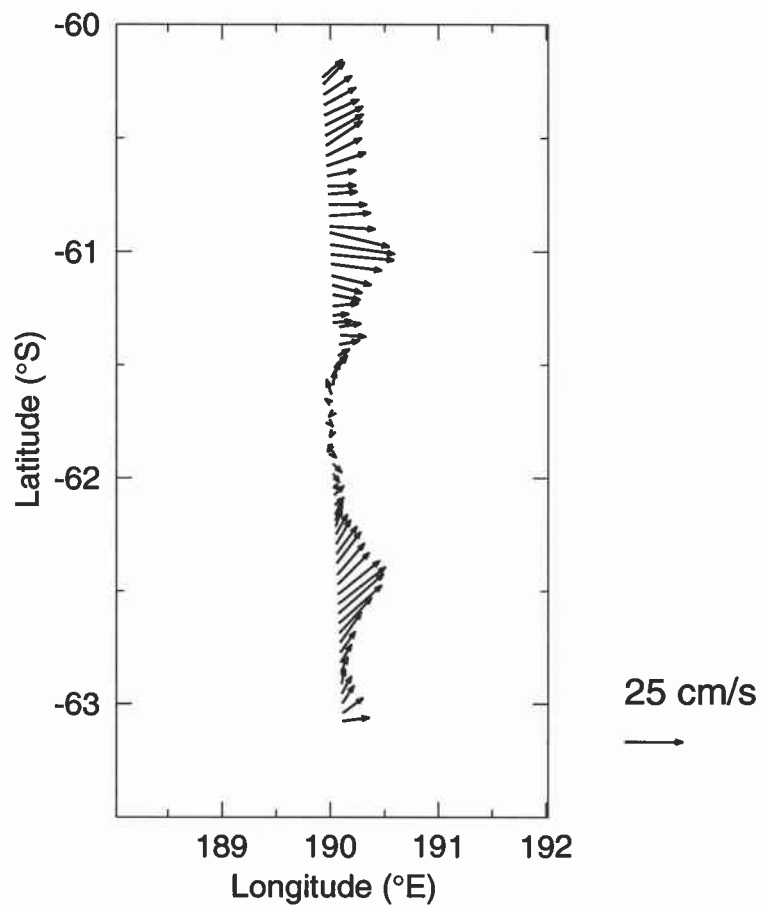
SOJGOFS Process 1 cruise (R9802) ADCP: 22-Feb-1998 (yearday 53)

N
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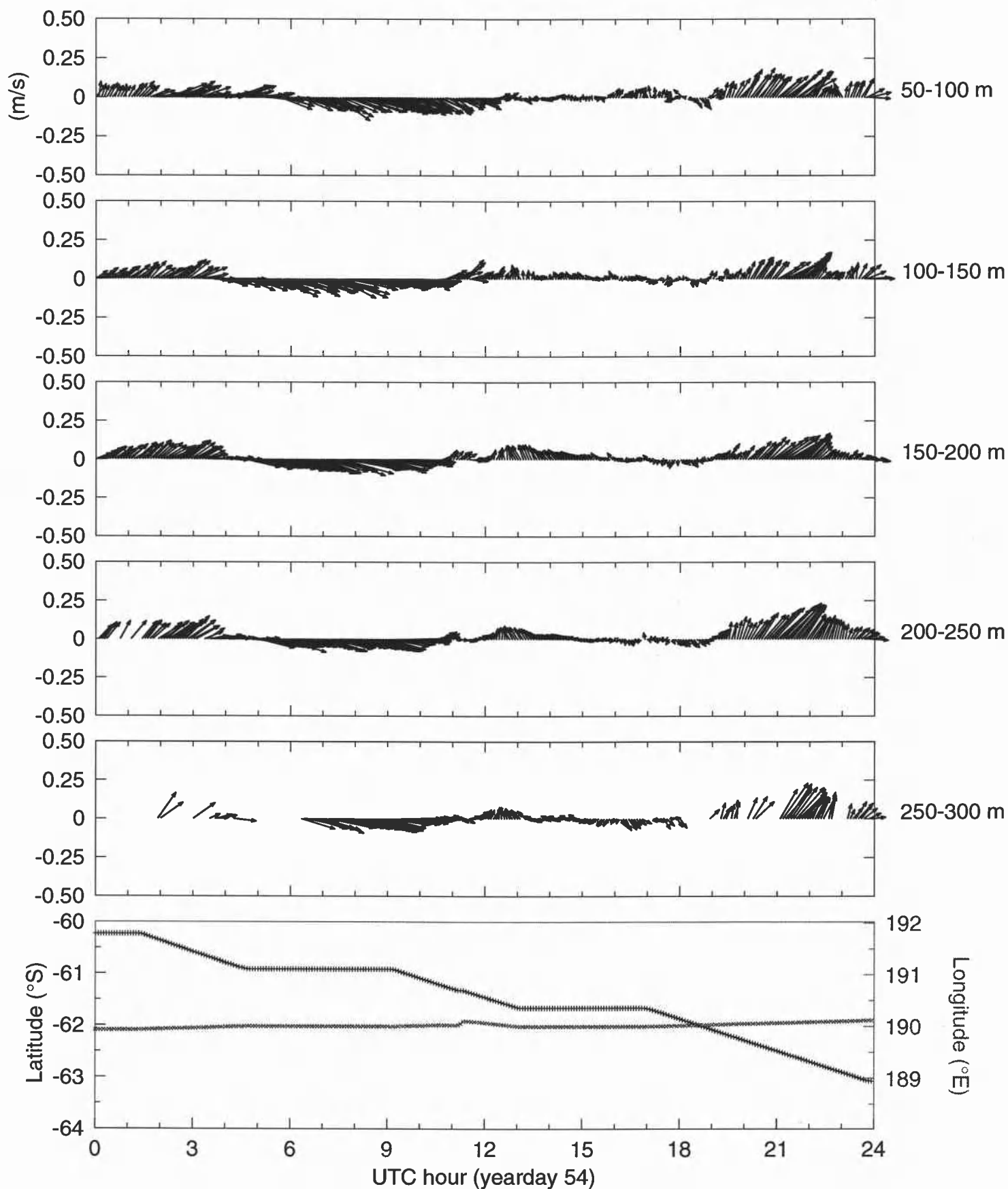
SOJGOFS Process 2 cruise (R9802)

50-330 m layer ADCP (23-Feb-1998, yearday 54)



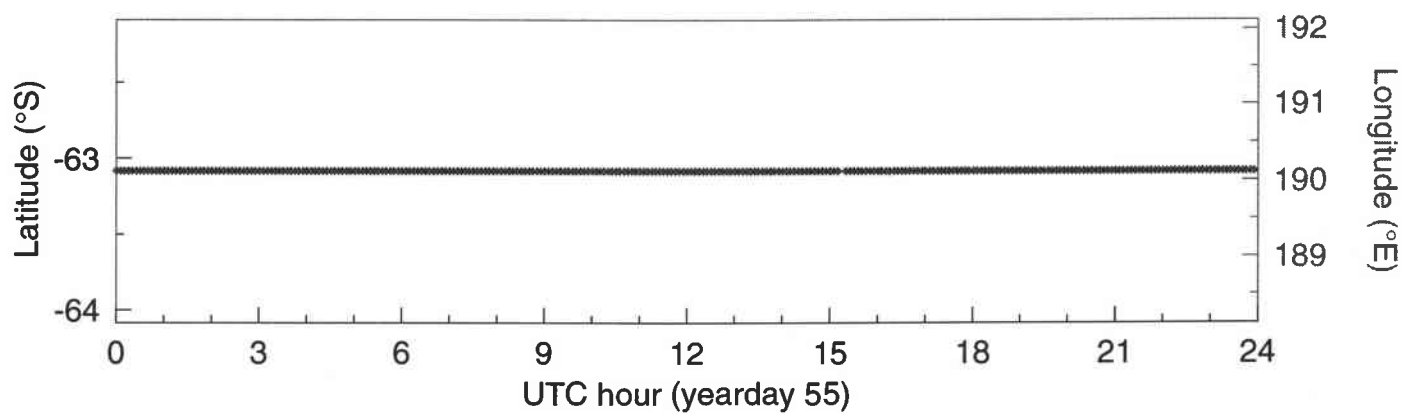
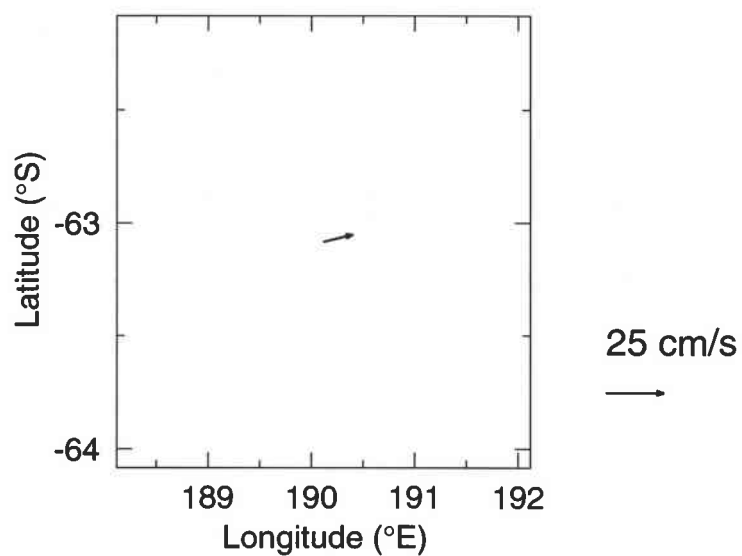
SOJGOFS Process 1 cruise (R9802) ADCP: 23-Feb-1998 (yearday 54)

N
↑



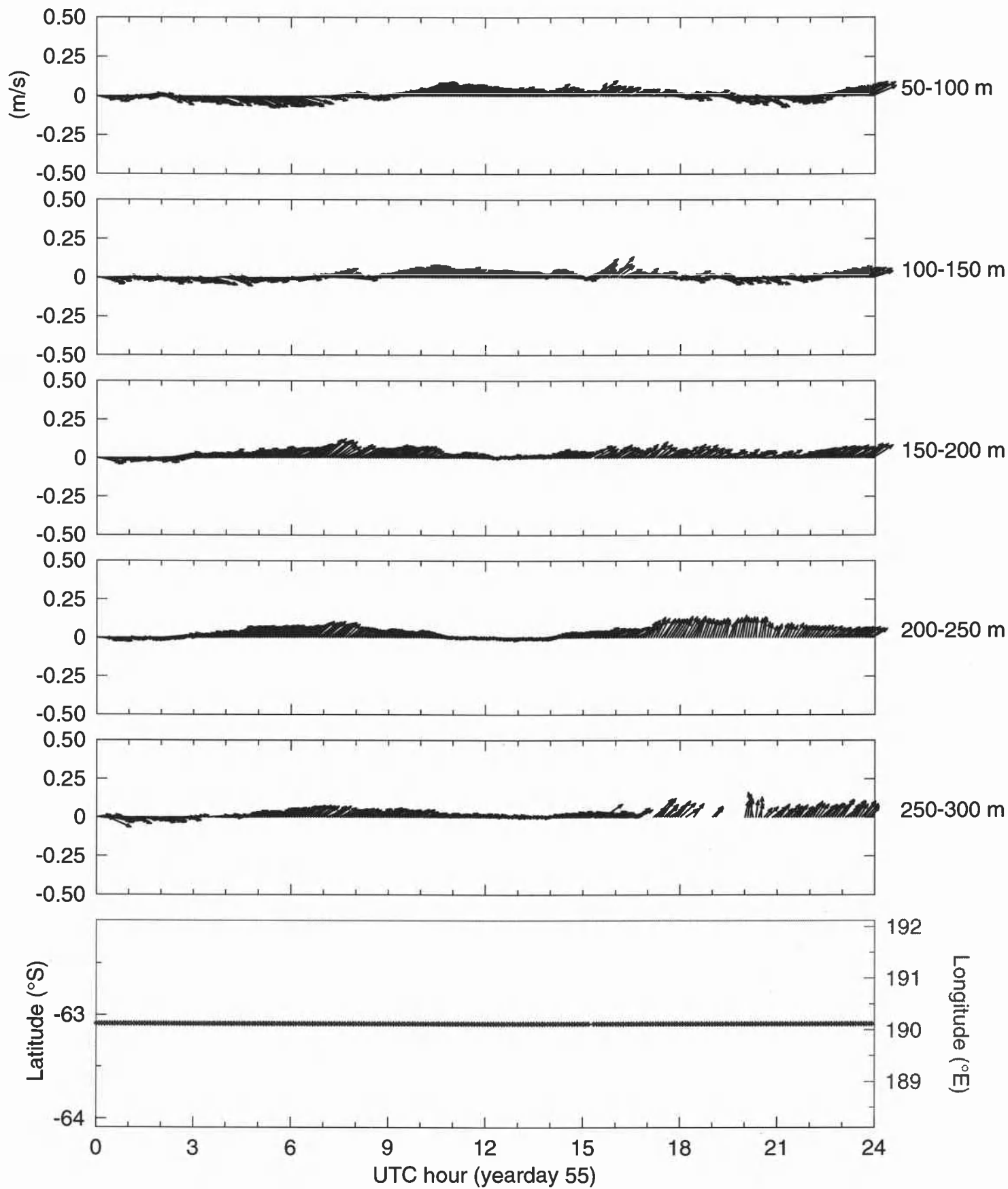
SOJGOFS Process 2 cruise (R9802)

50-330 m layer ADCP (24-Feb-1998, yearday 55)

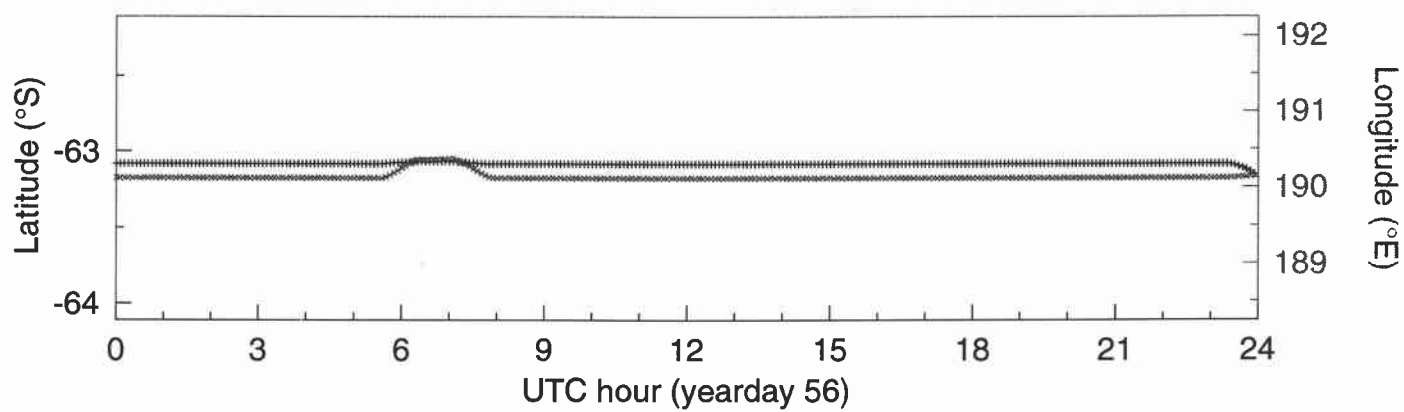
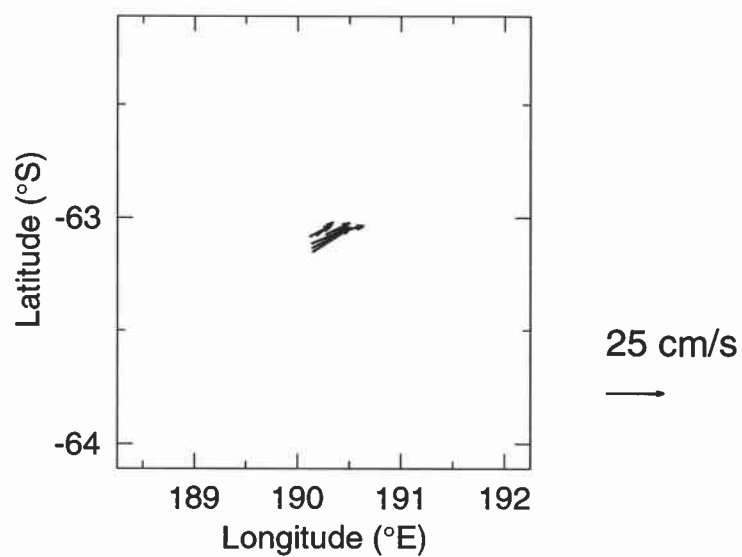


SOJGOFS Process 1 cruise (R9802) ADCP: 24-Feb-1998 (yearday 55)

N
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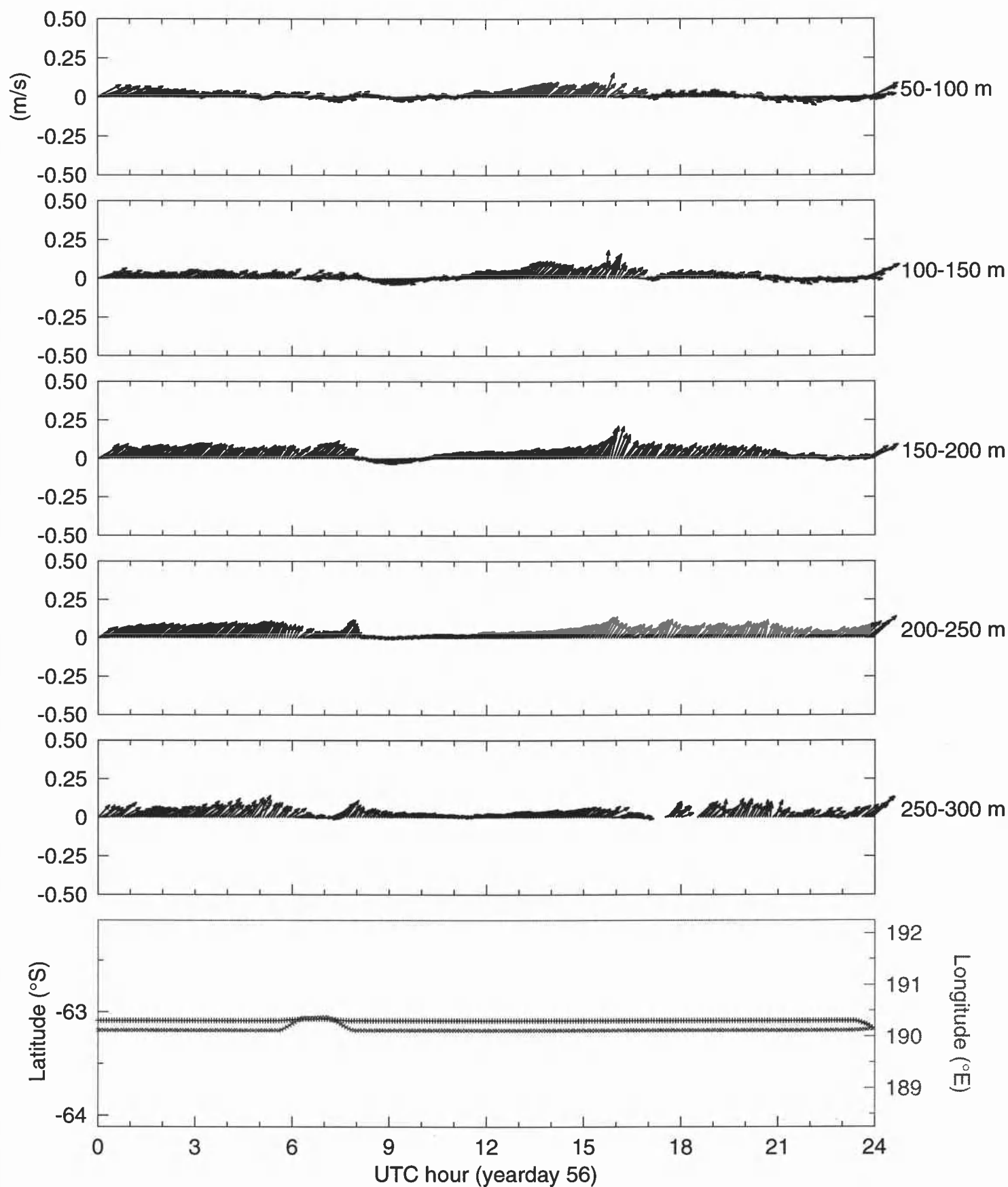


SOJGOFS Process 2 cruise (R9802)
50-330 m layer ADCP (25-Feb-1998, yearday 56)



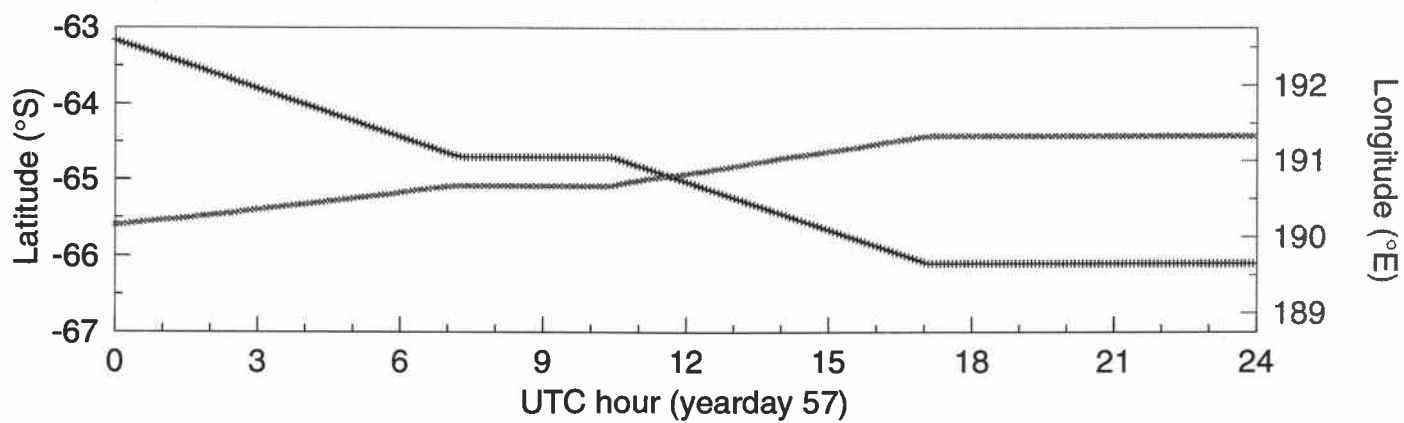
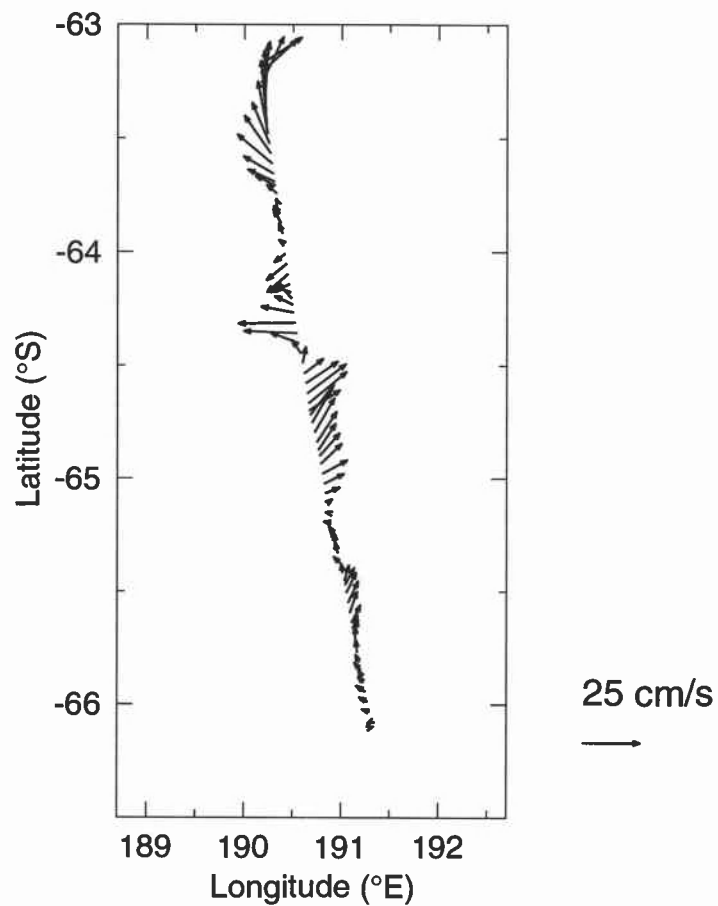
SOJGOFS Process 1 cruise (R9802) ADCP: 25-Feb-1998 (yearday 56)

N
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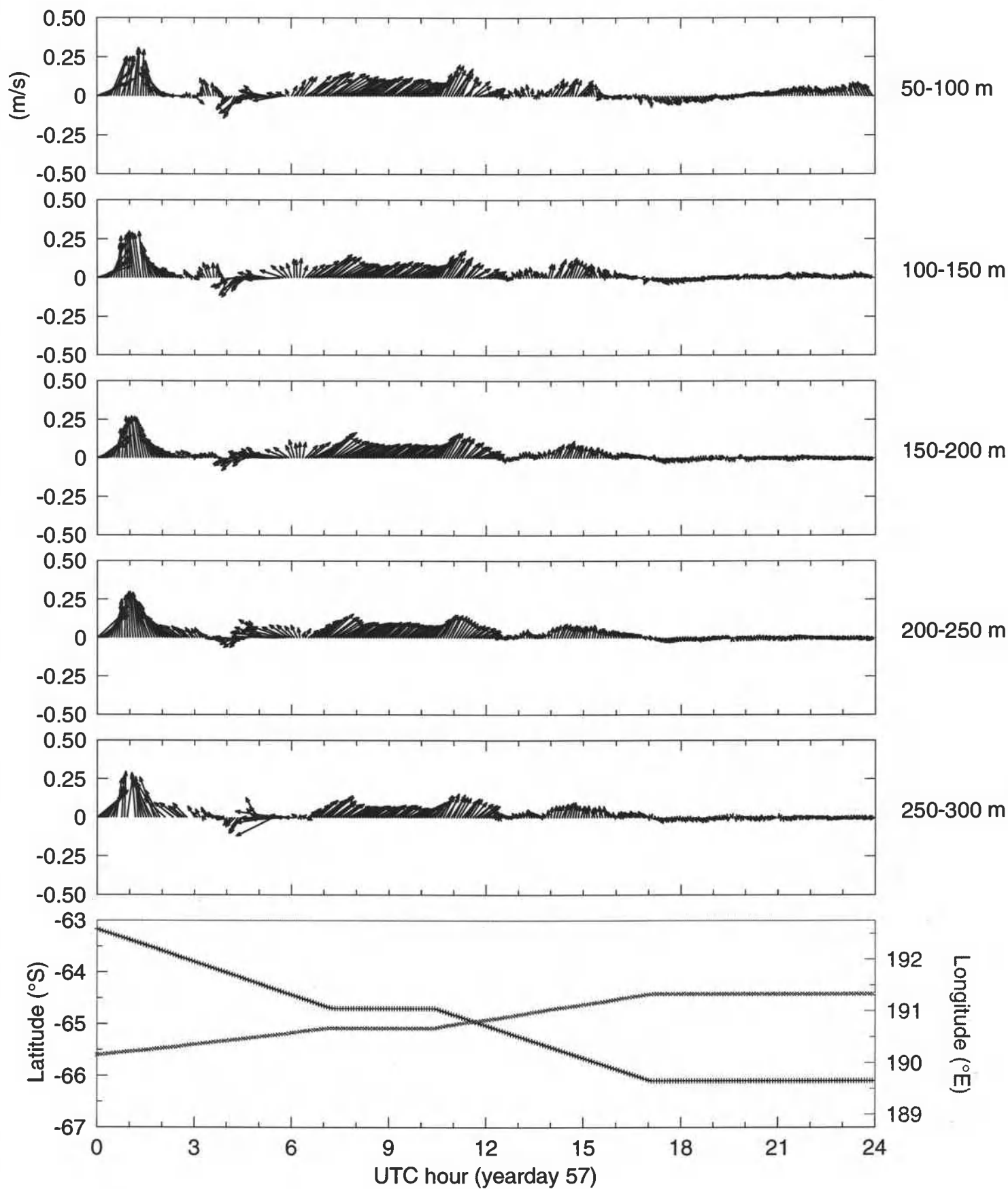


SOJGOFS Process 2 cruise (R9802)

50-330 m layer ADCP (26-Feb-1998, yearday 57)

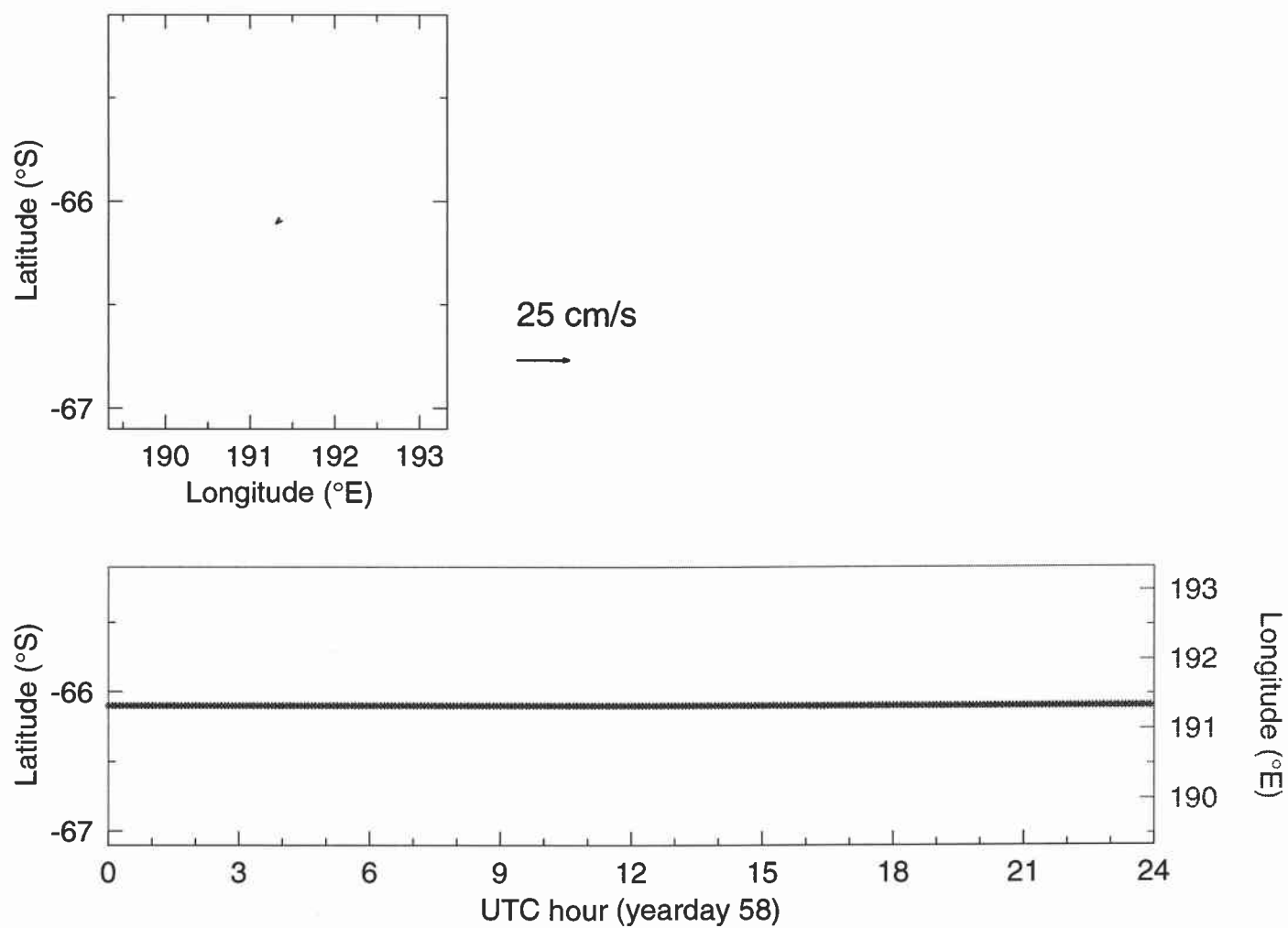


SOJGOFS Process 1 cruise (R9802) ADCP: 26-Feb-1998 (yearday 57)



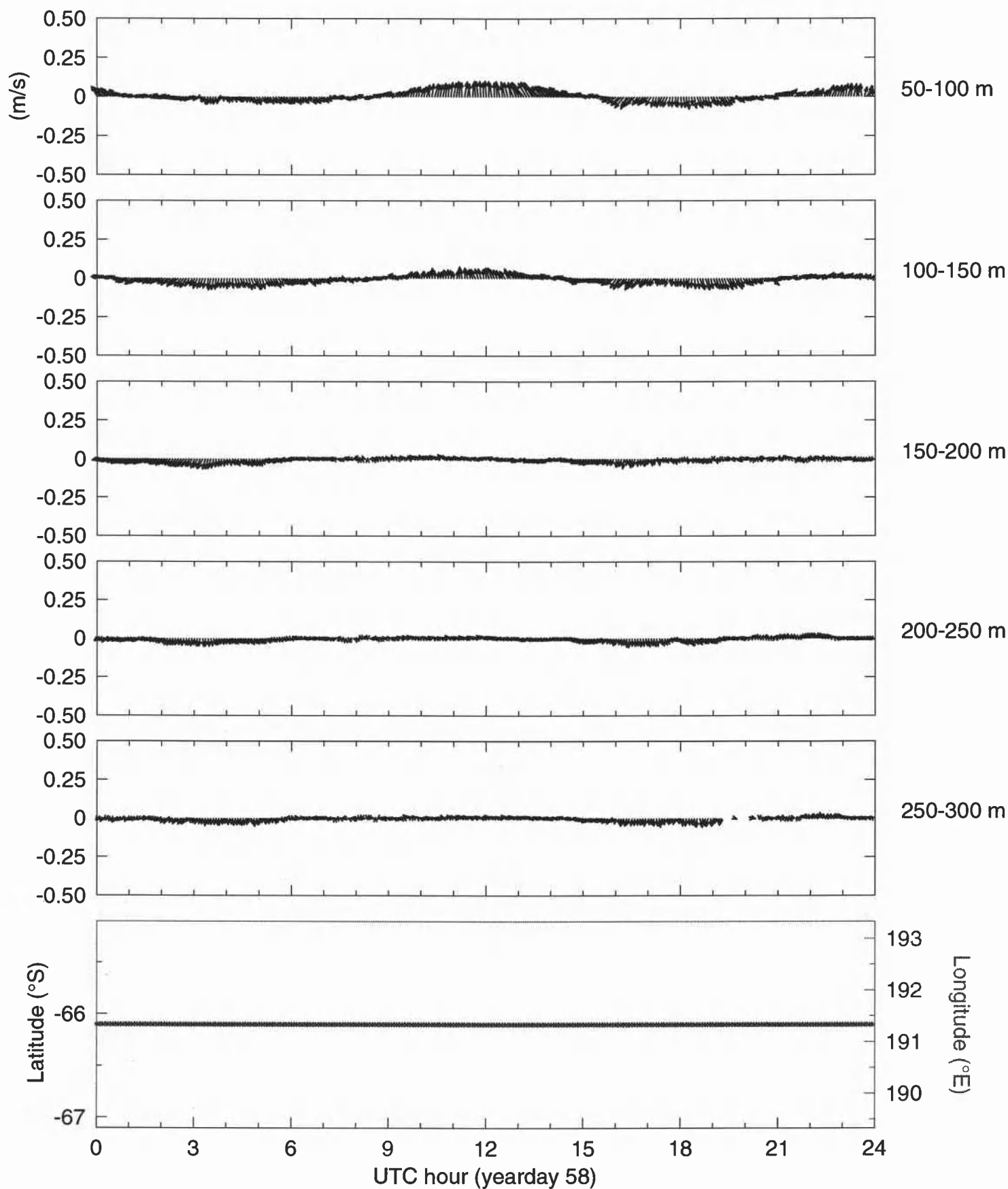
SOJGOFS Process 2 cruise (R9802)

50-330 m layer ADCP (27-Feb-1998, yearday 58)



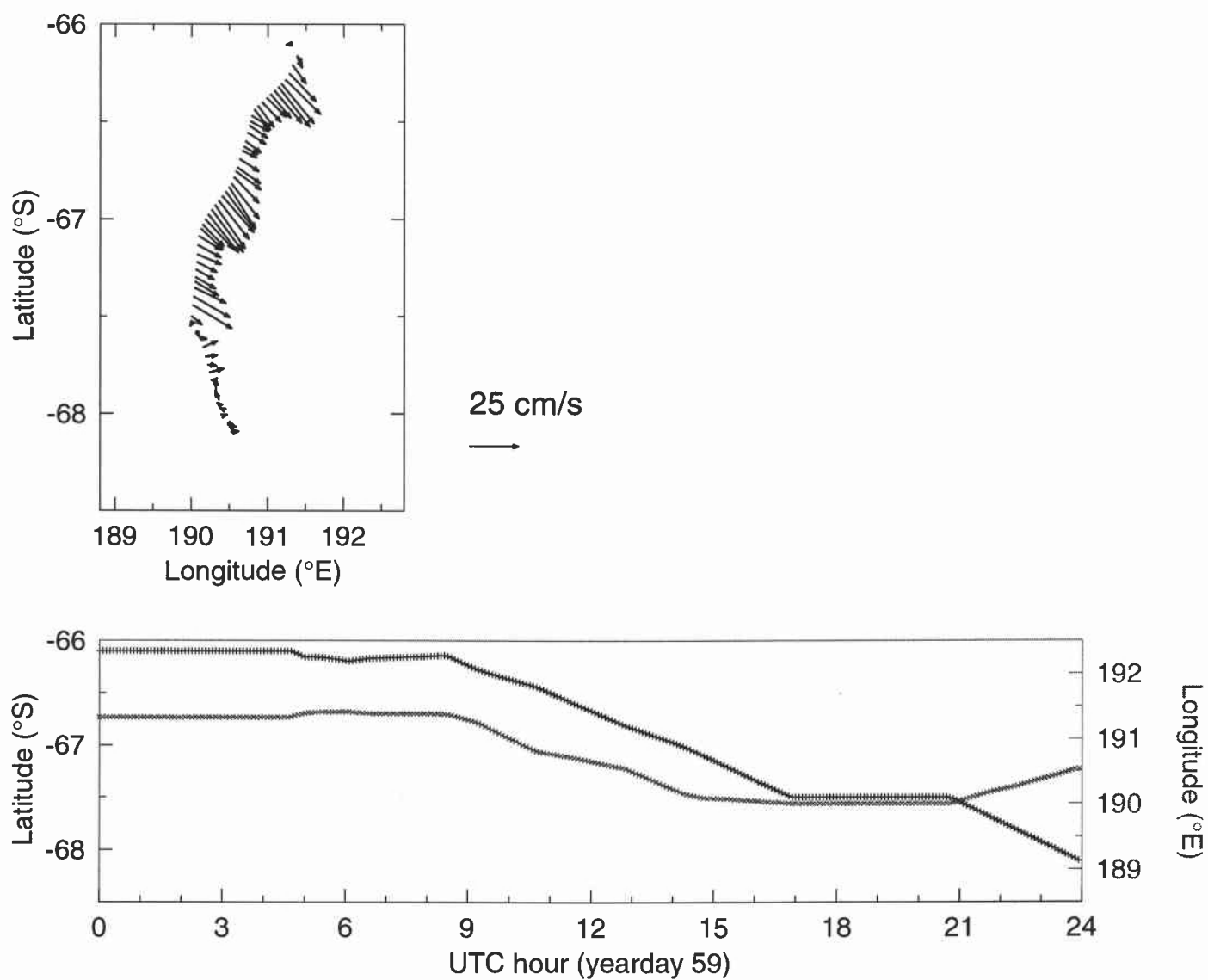
SOJGOFS Process 1 cruise (R9802) ADCP: 27-Feb-1998 (yearday 58)

N
↑



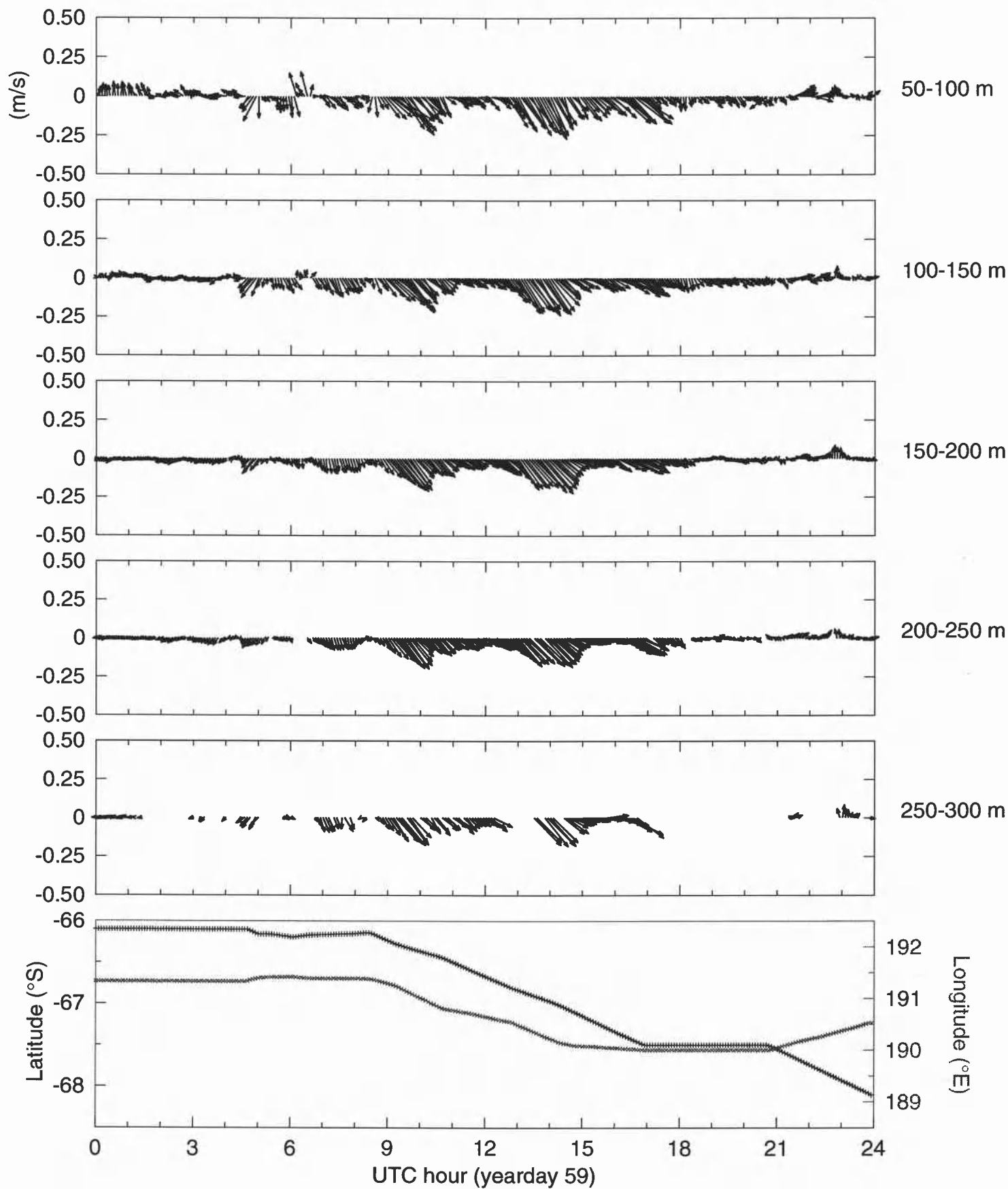
SOJGOFS Process 2 cruise (R9802)

50-330 m layer ADCP (28-Feb-1998, yearday 59)



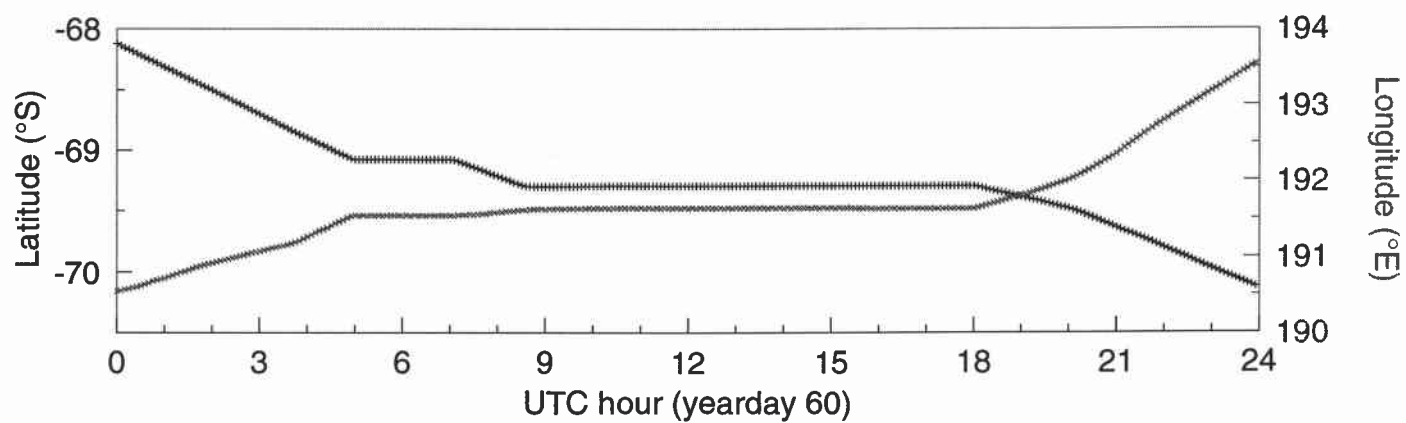
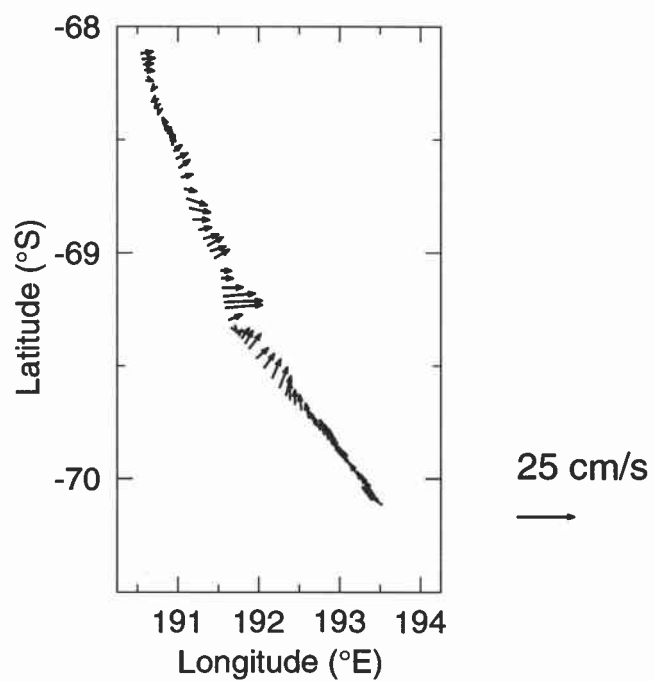
SOJGOFS Process 1 cruise (R9802) ADCP: 28-Feb-1998 (yearday 59)

N



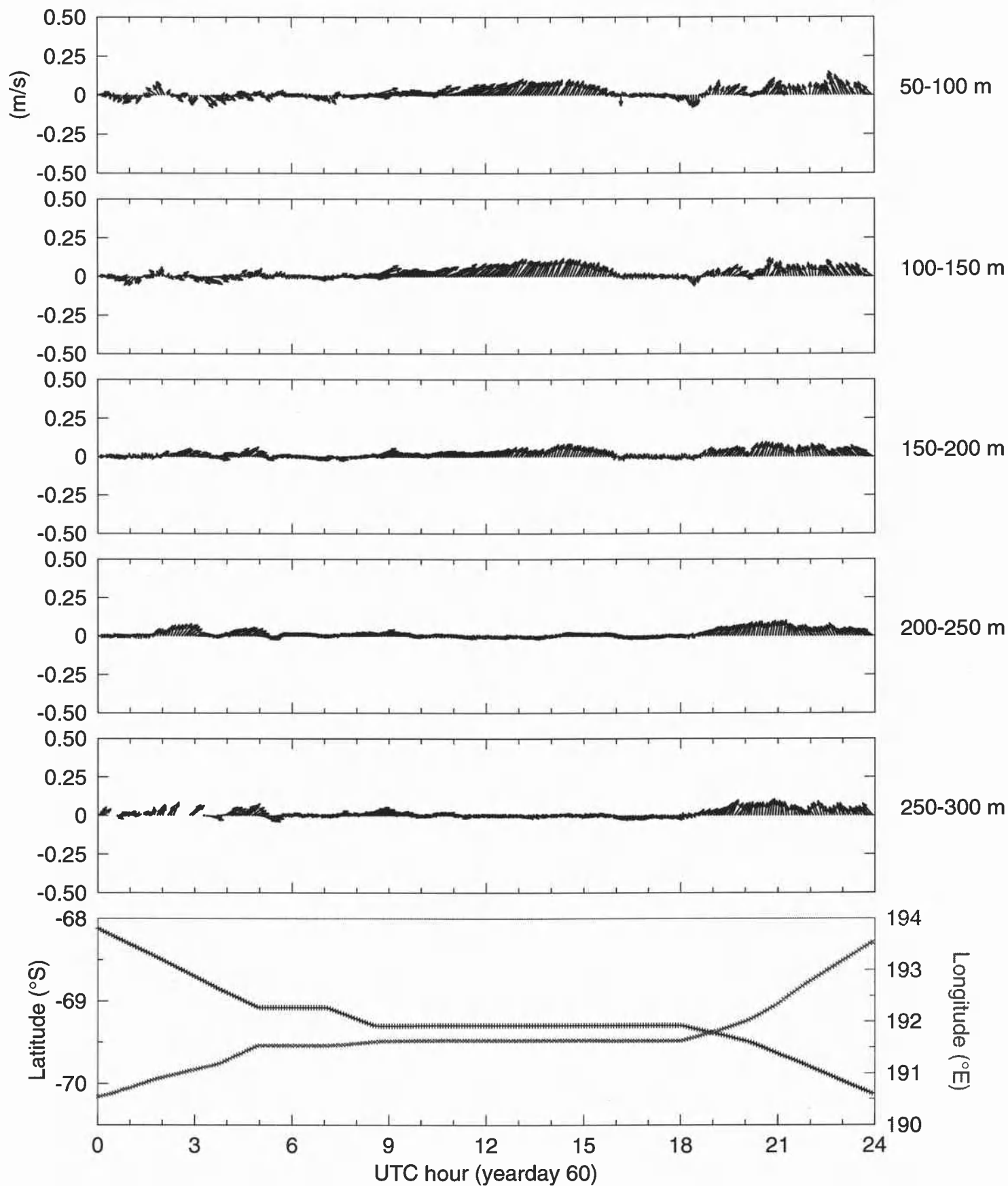
SOJGOFS Process 2 cruise (R9802)

50-330 m layer ADCP (01-Mar-1998, yearday 60)



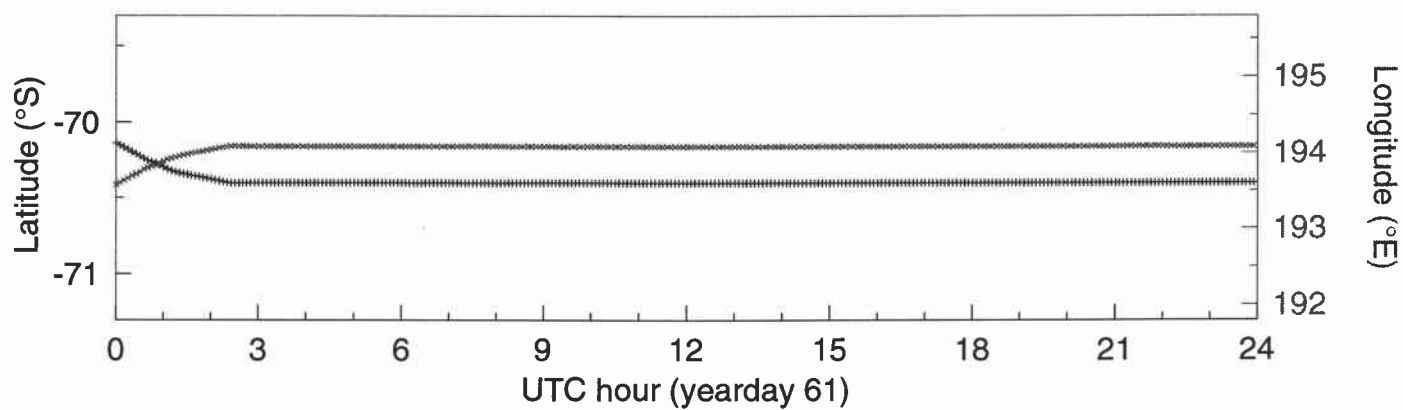
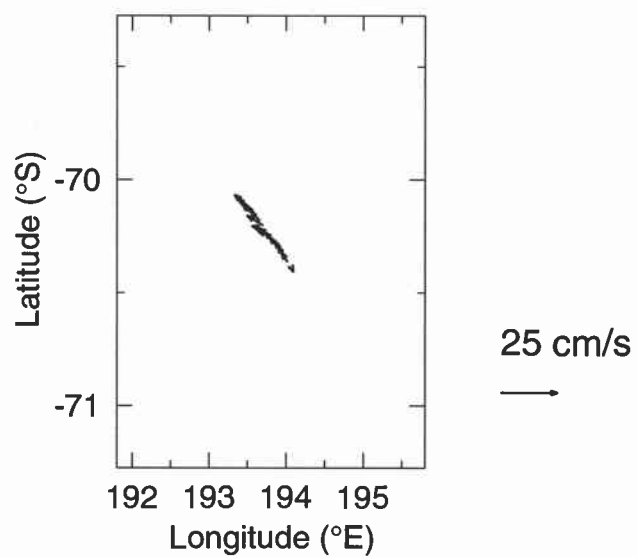
SOJGOFS Process 1 cruise (R9802) ADCP: 01-Mar-1998 (yearday 60)

N
↑



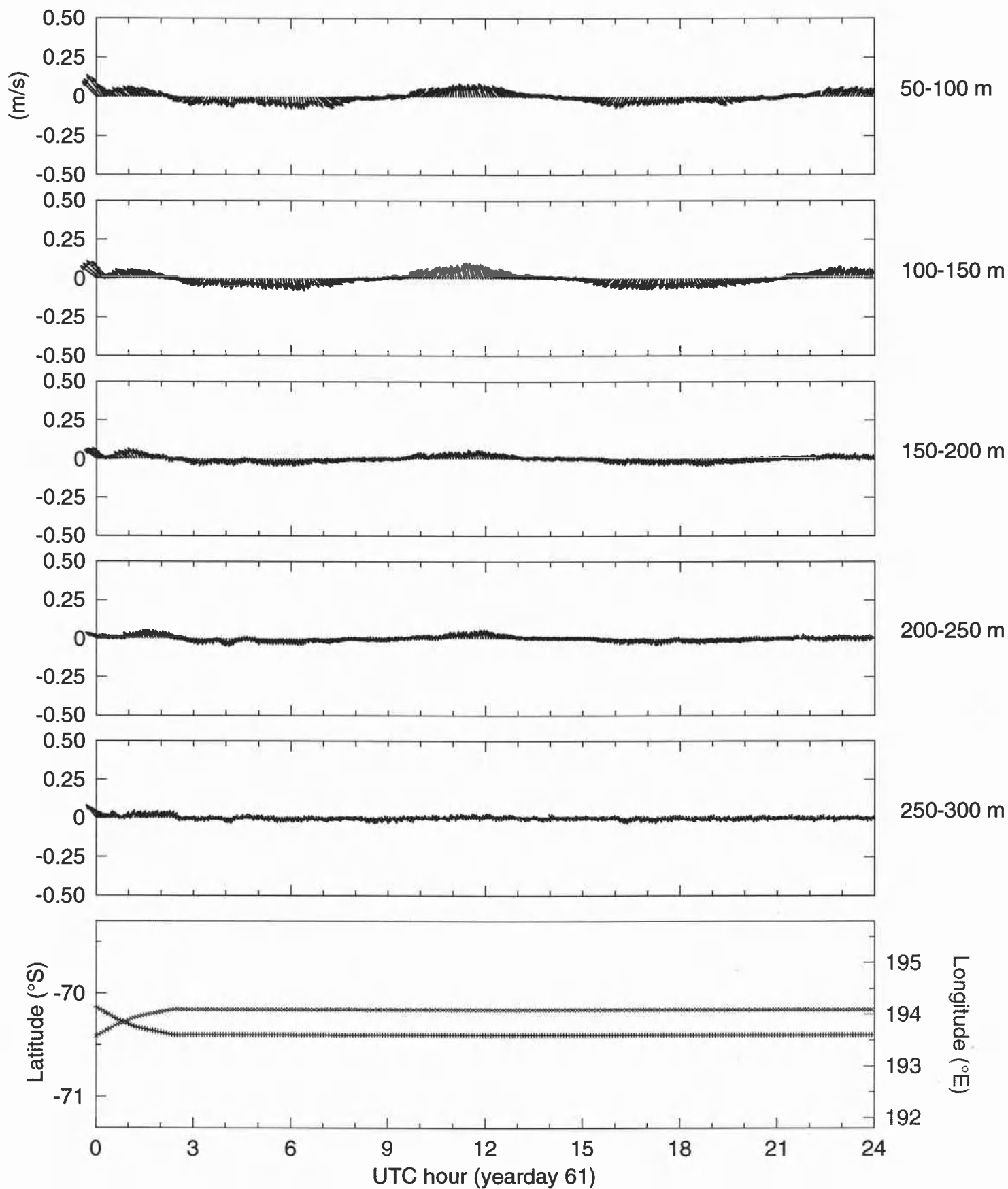
SOJGOFS Process 2 cruise (R9802)

50-330 m layer ADCP (02-Mar-1998, yearday 61)



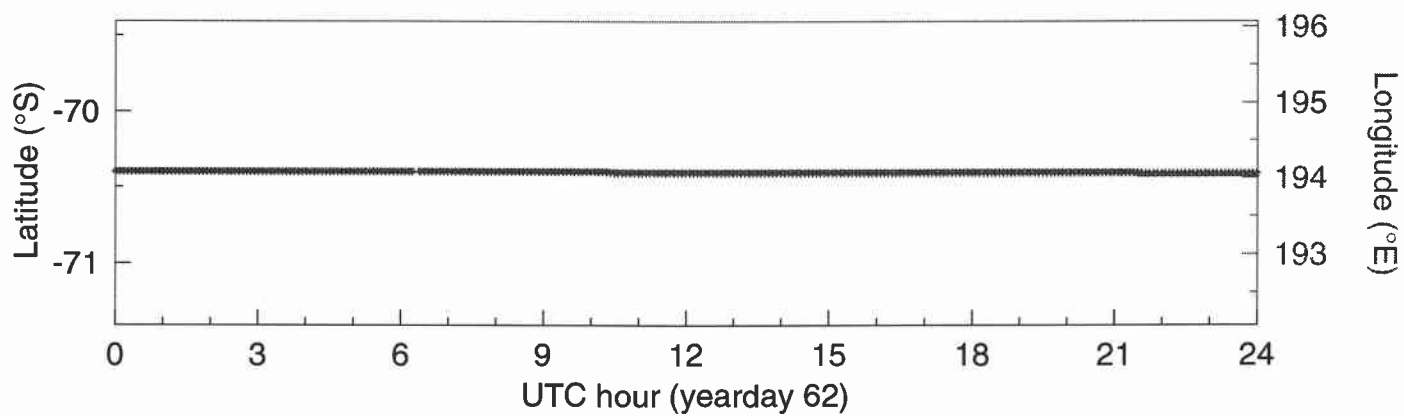
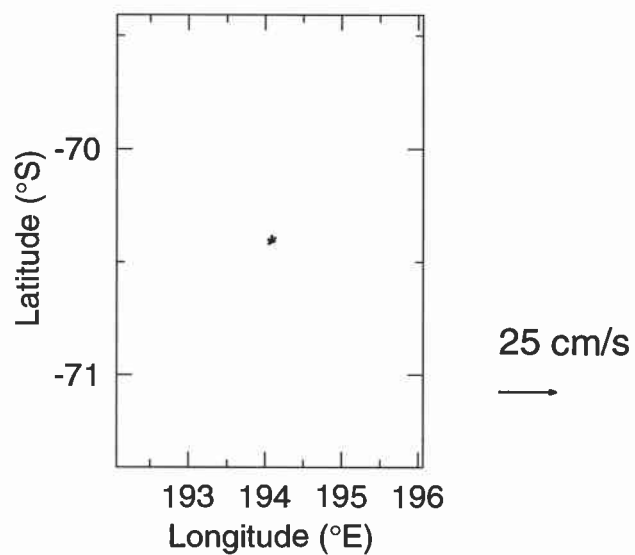
SOJGOFS Process 1 cruise (R9802) ADCP: 02-Mar-1998 (yearday 61)

N
↑

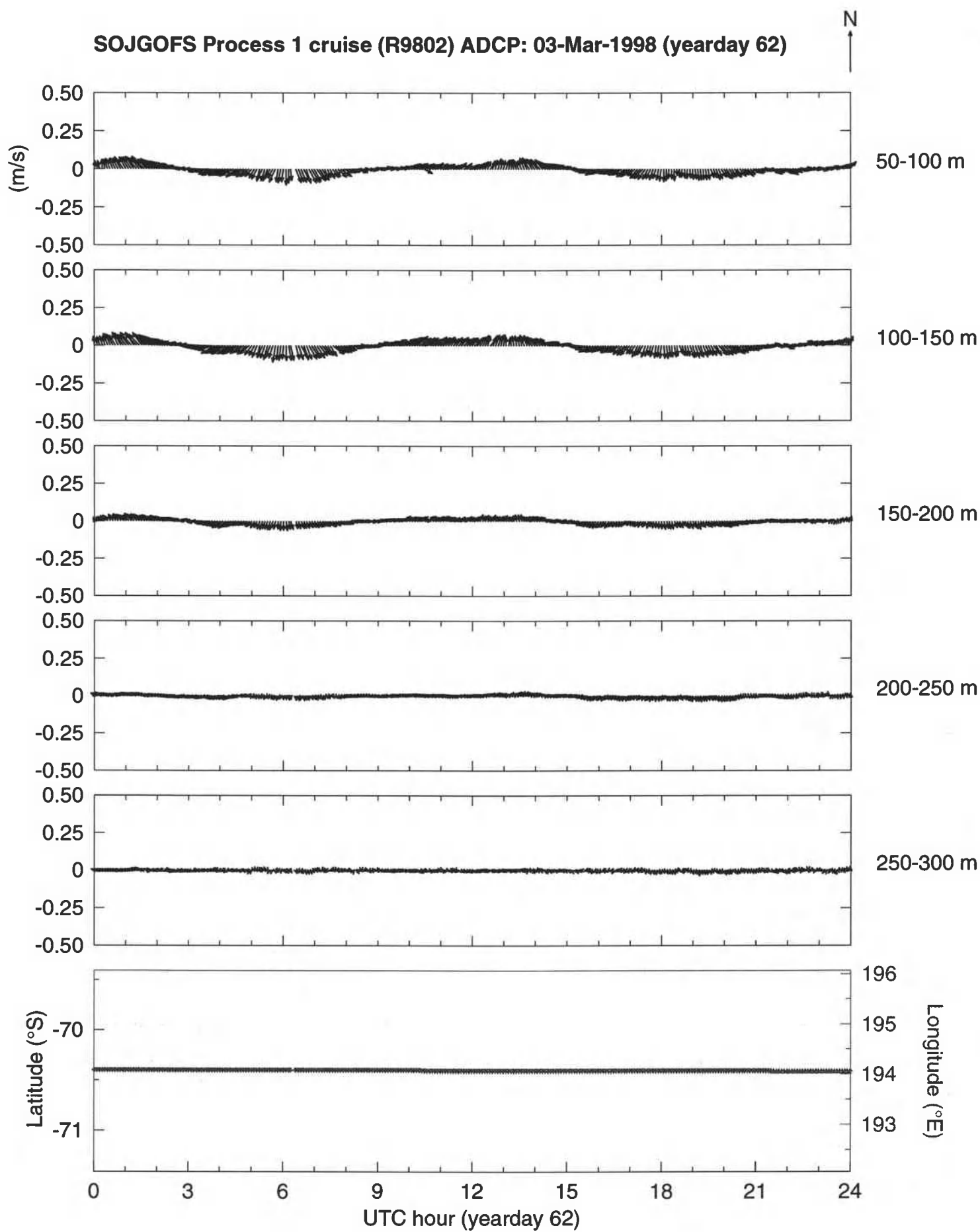


SOJGOFS Process 2 cruise (R9802)

50-330 m layer ADCP (03-Mar-1998, yearday 62)

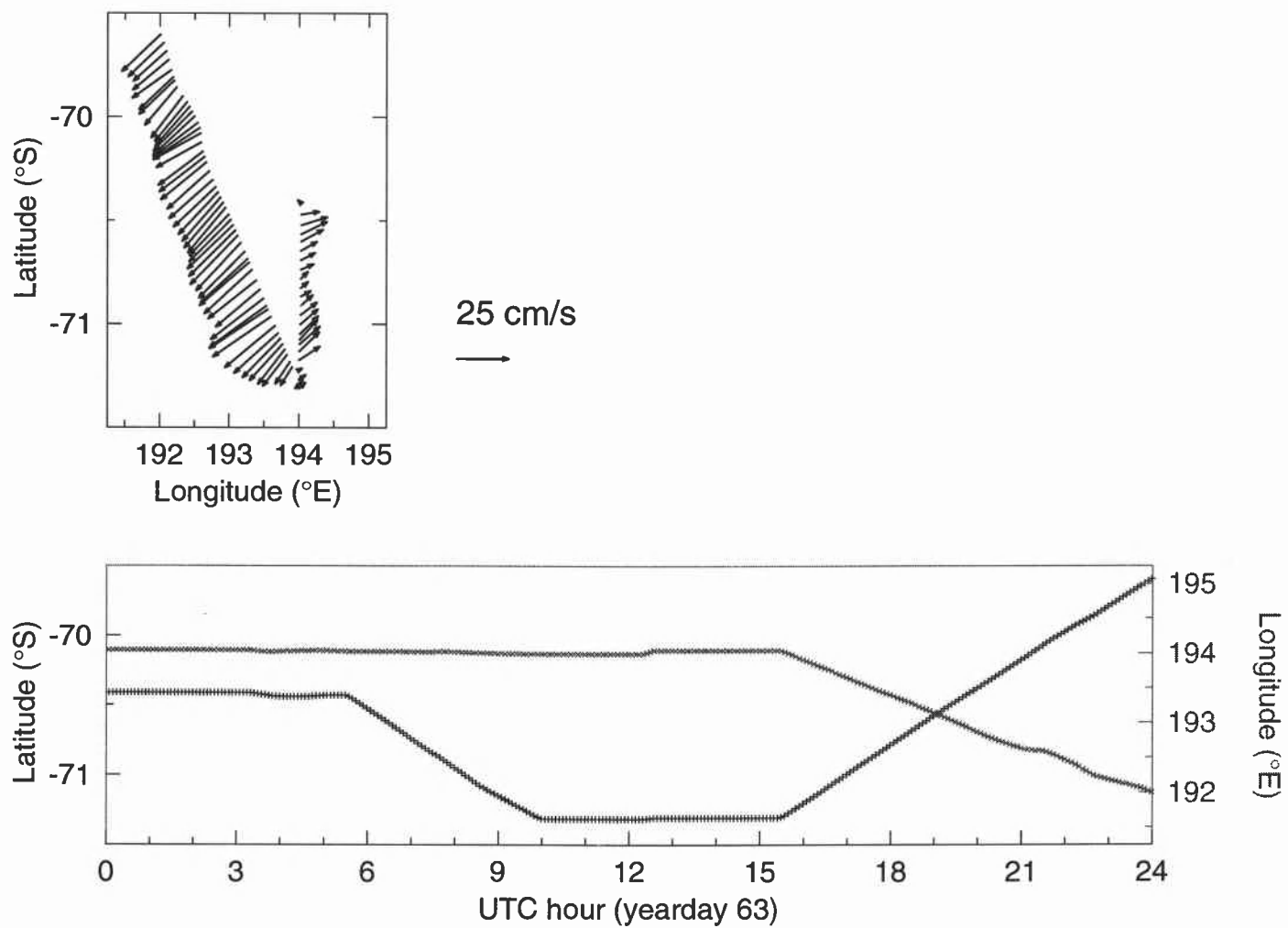


SOJGOFS Process 1 cruise (R9802) ADCP: 03-Mar-1998 (yearday 62)



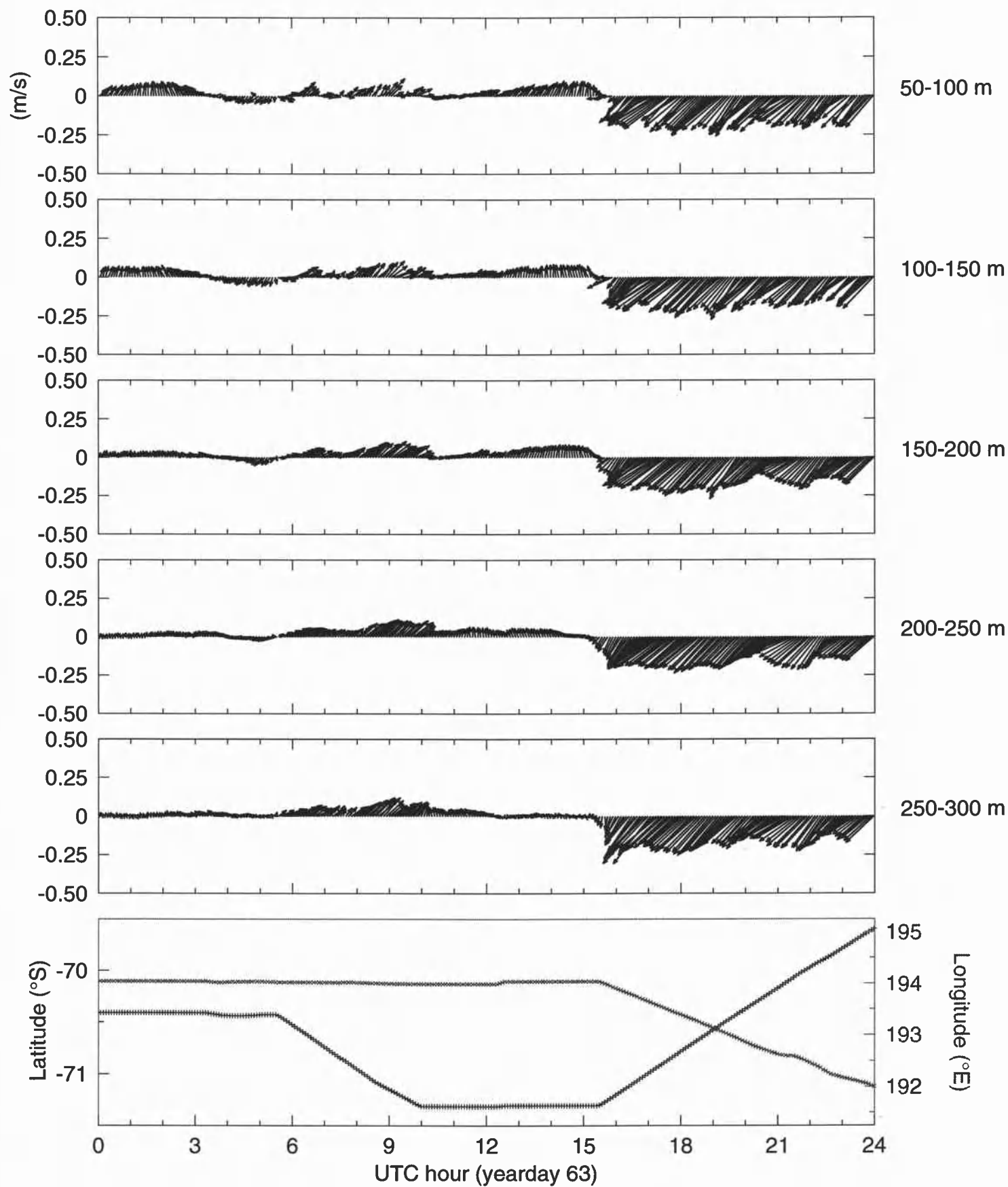
SOJGOFS Process 2 cruise (R9802)

50-330 m layer ADCP (04-Mar-1998, yearday 63)



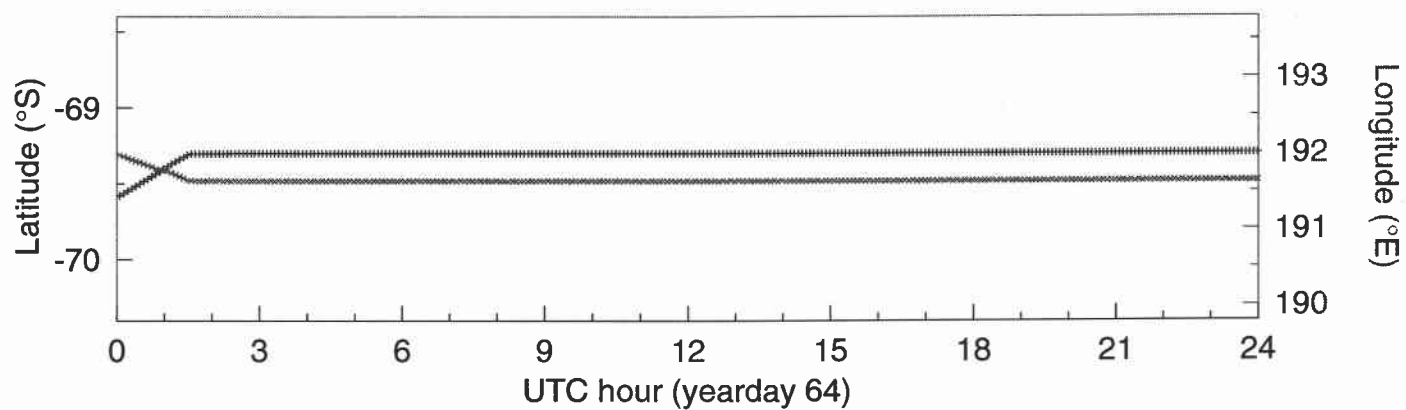
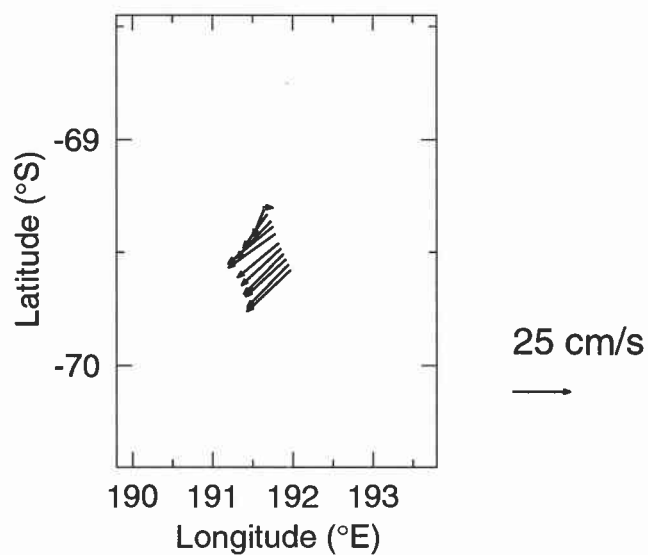
SOJGOFS Process 1 cruise (R9802) ADCP: 04-Mar-1998 (yearday 63)

N
↑



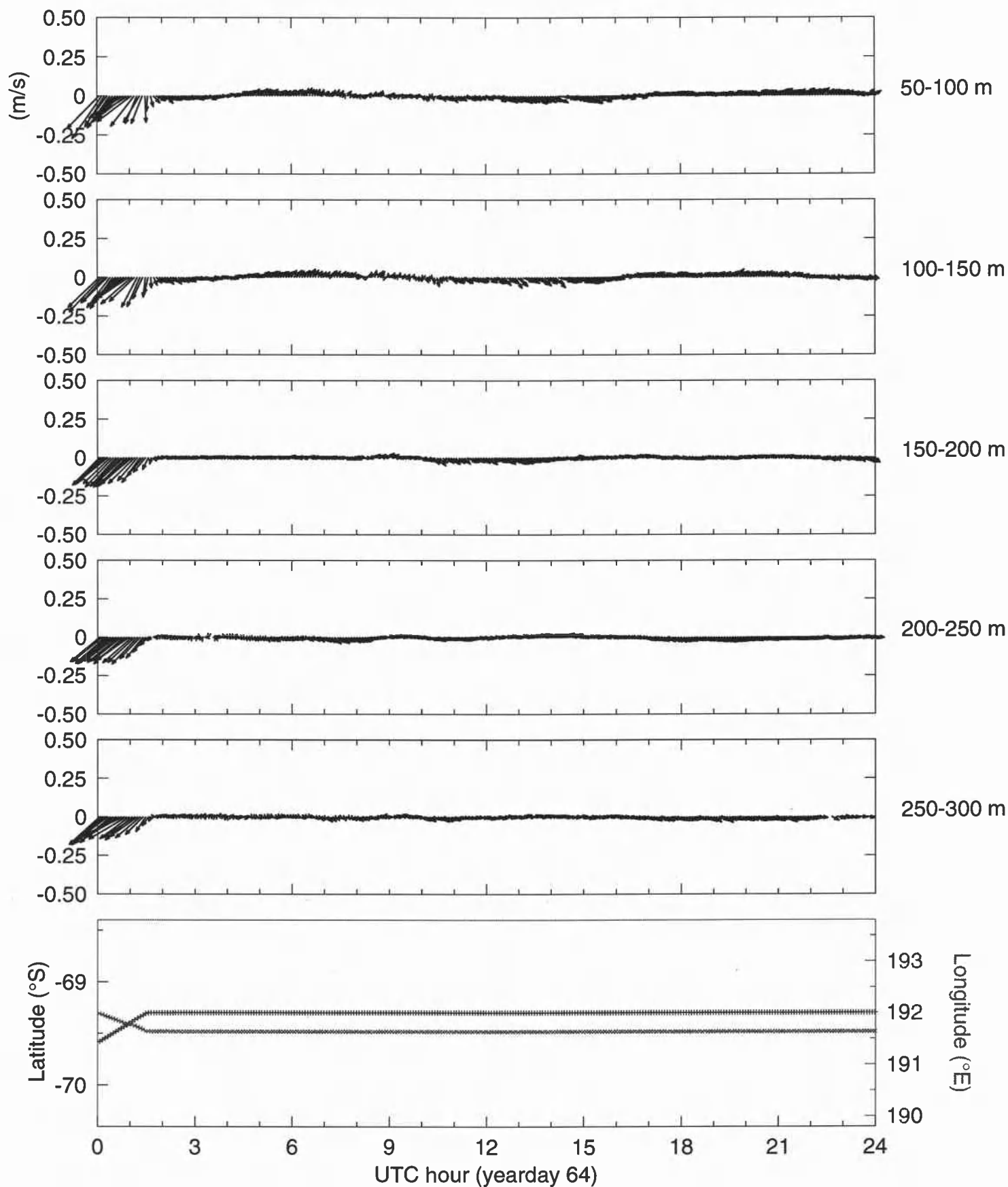
SOJGOFS Process 2 cruise (R9802)

50-330 m layer ADCP (05-Mar-1998, yearday 64)



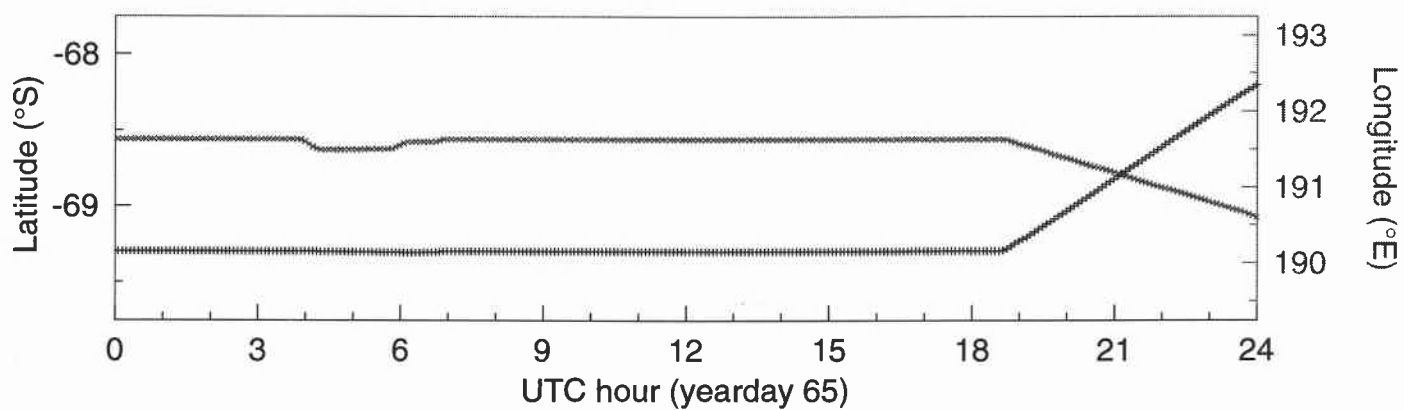
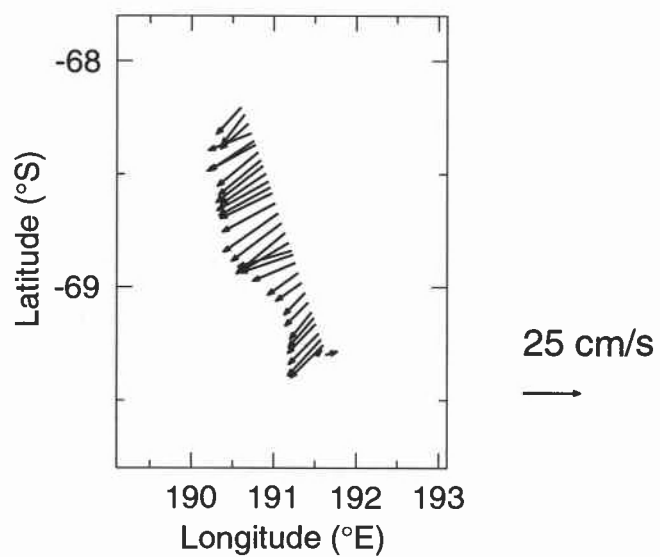
SOJGOFS Process 1 cruise (R9802) ADCP: 05-Mar-1998 (yearday 64)

N
↑



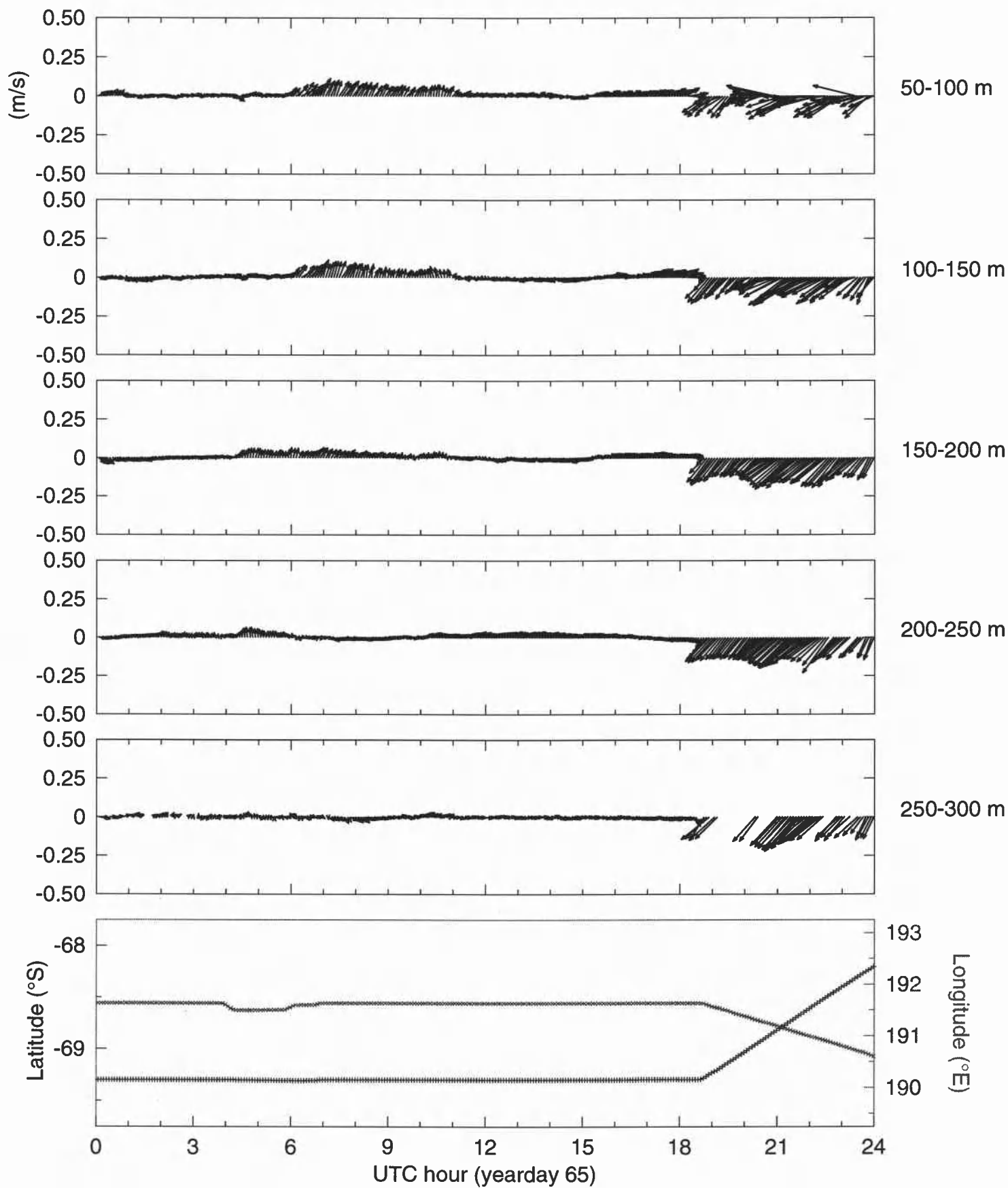
SOJGOFS Process 2 cruise (R9802)

50-330 m layer ADCP (06-Mar-1998, yearday 65)



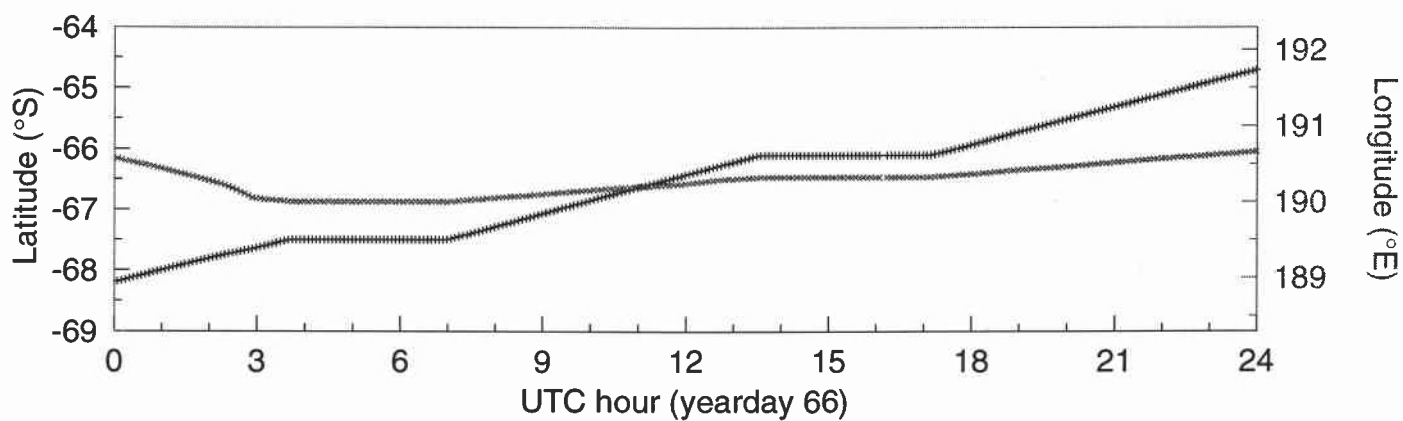
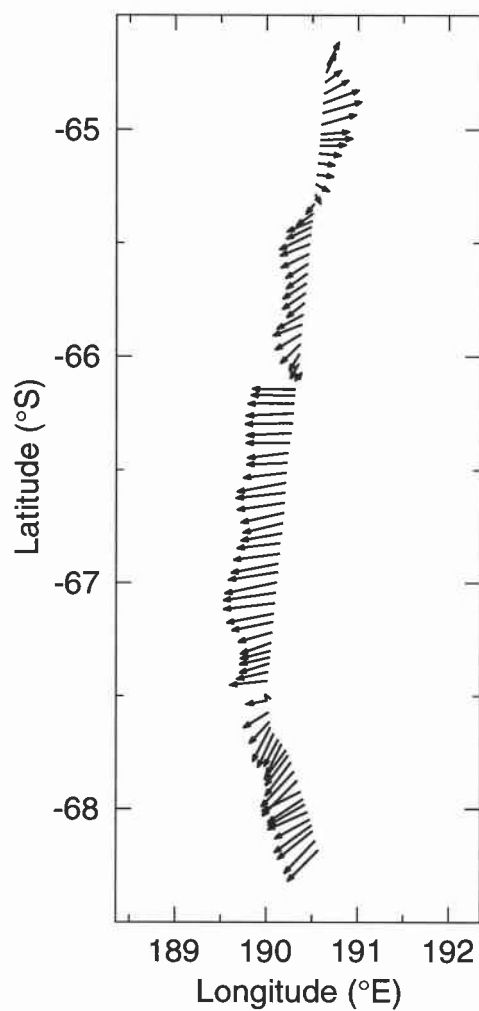
SOJGOFS Process 1 cruise (R9802) ADCP: 06-Mar-1998 (yearday 65)

N
↑



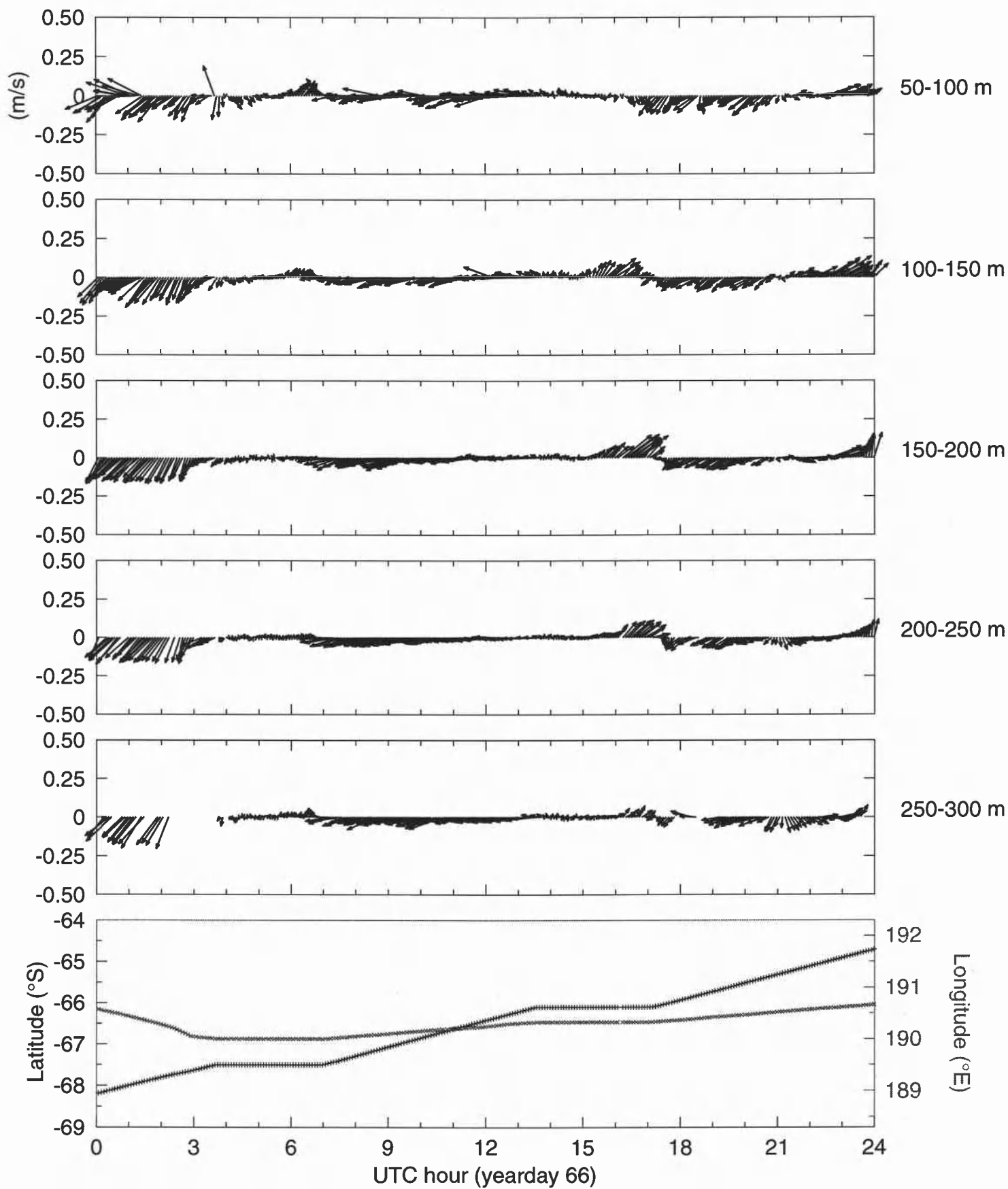
SOJGOFS Process 2 cruise (R9802)

50-330 m layer ADCP (07-Mar-1998, yearday 66)



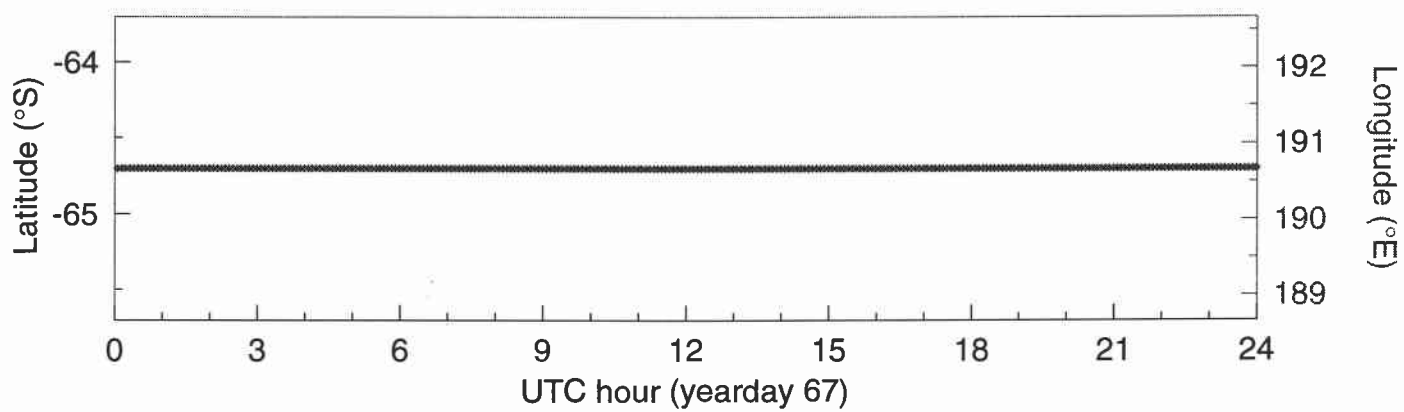
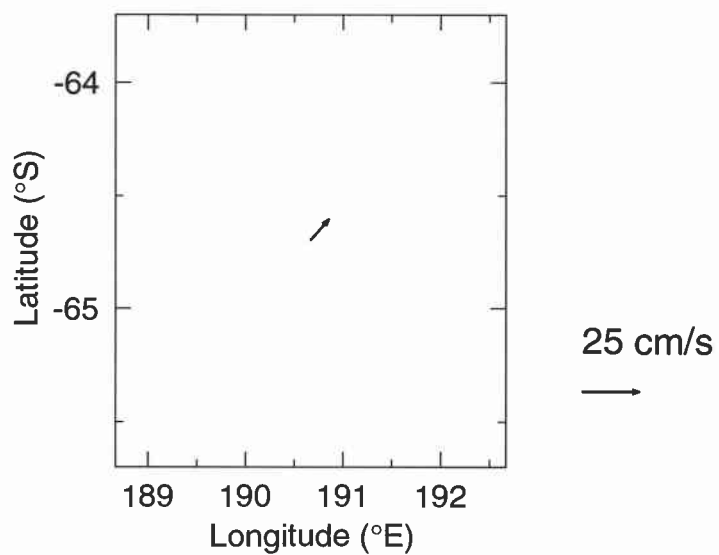
SOJGOFS Process 1 cruise (R9802) ADCP: 07-Mar-1998 (yearday 66)

N
↑



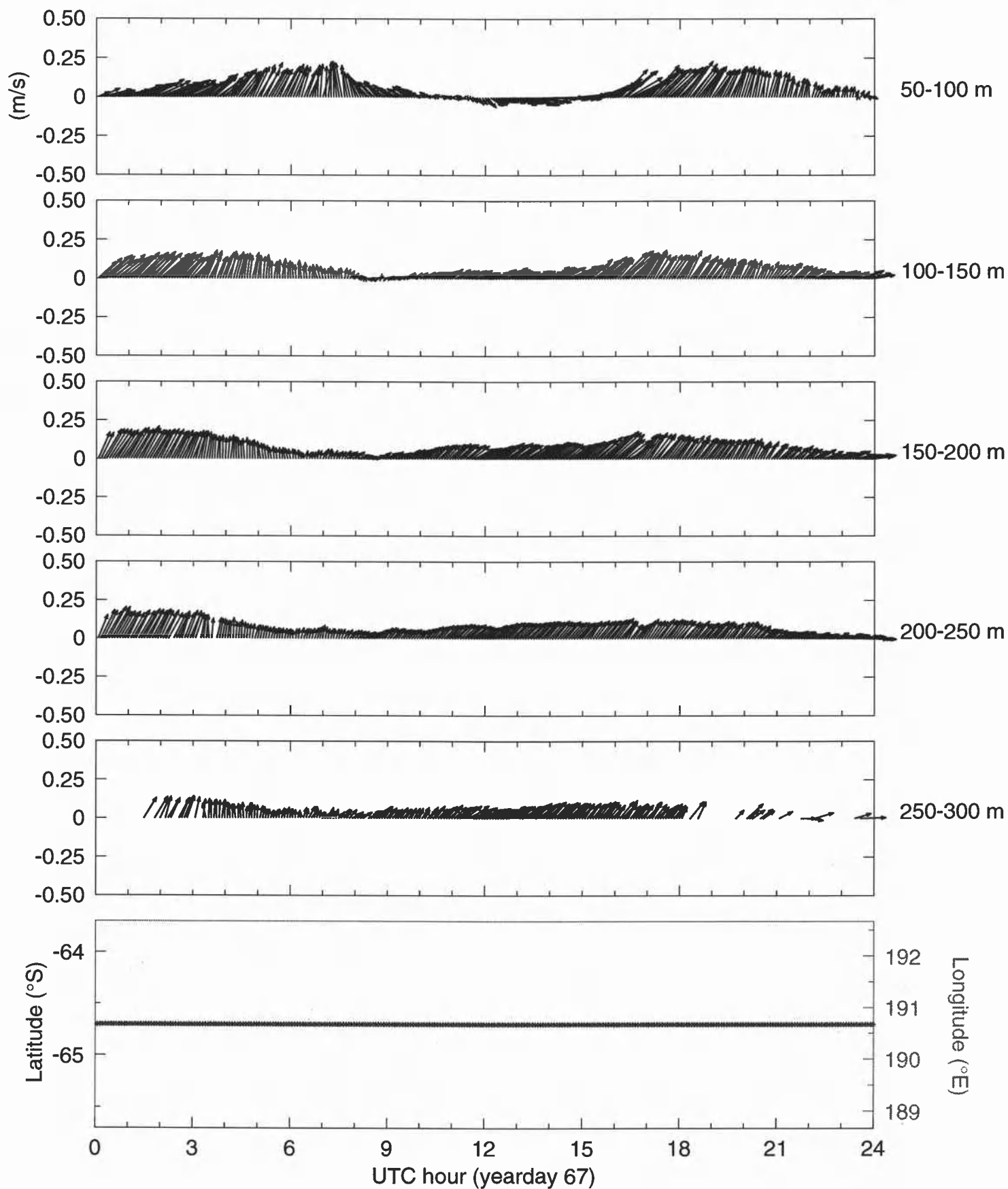
SOJGOFS Process 2 cruise (R9802)

50-330 m layer ADCP (08-Mar-1998, yearday 67)



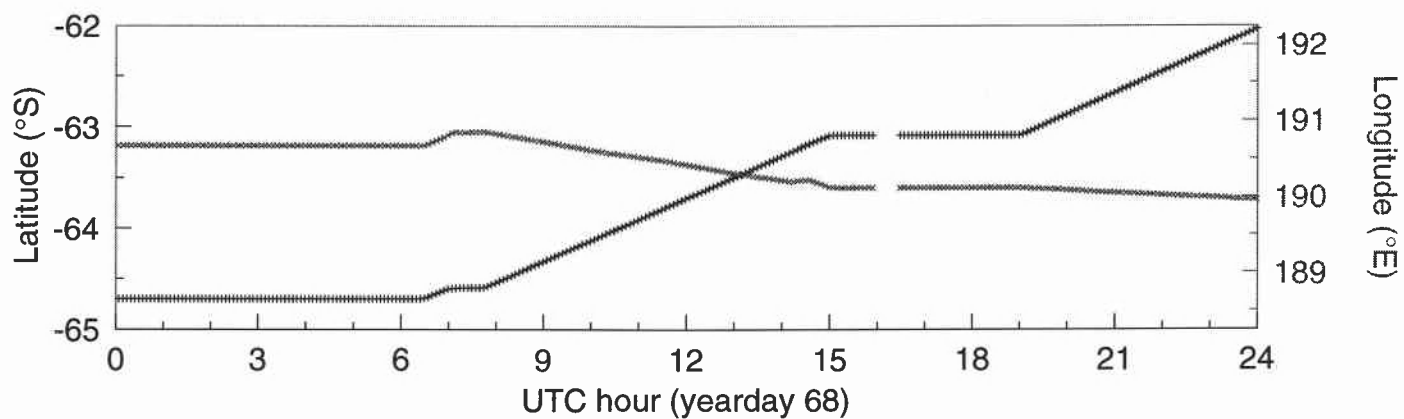
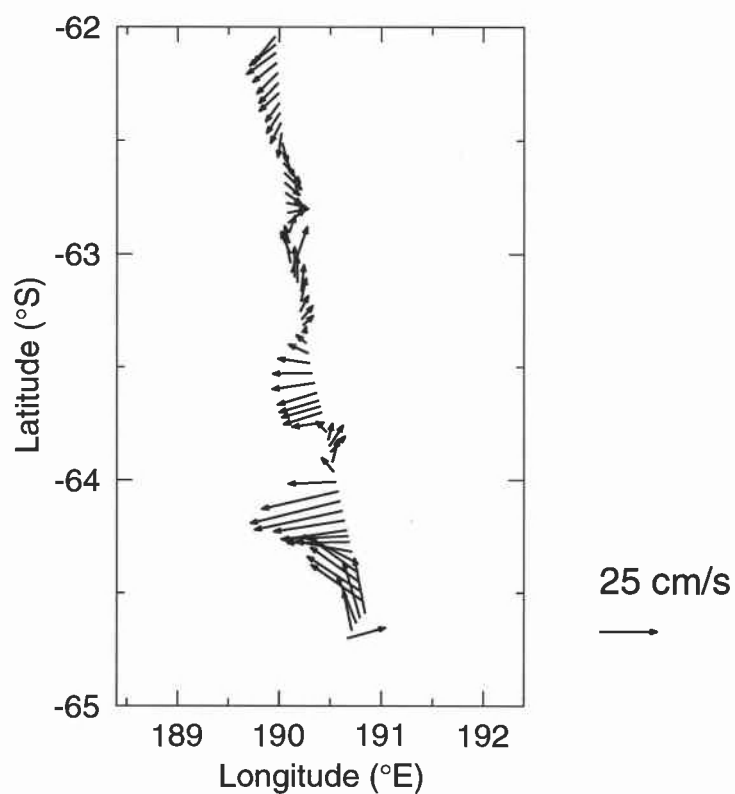
SOJGOFS Process 1 cruise (R9802) ADCP: 08-Mar-1998 (yearday 67)

N
↑



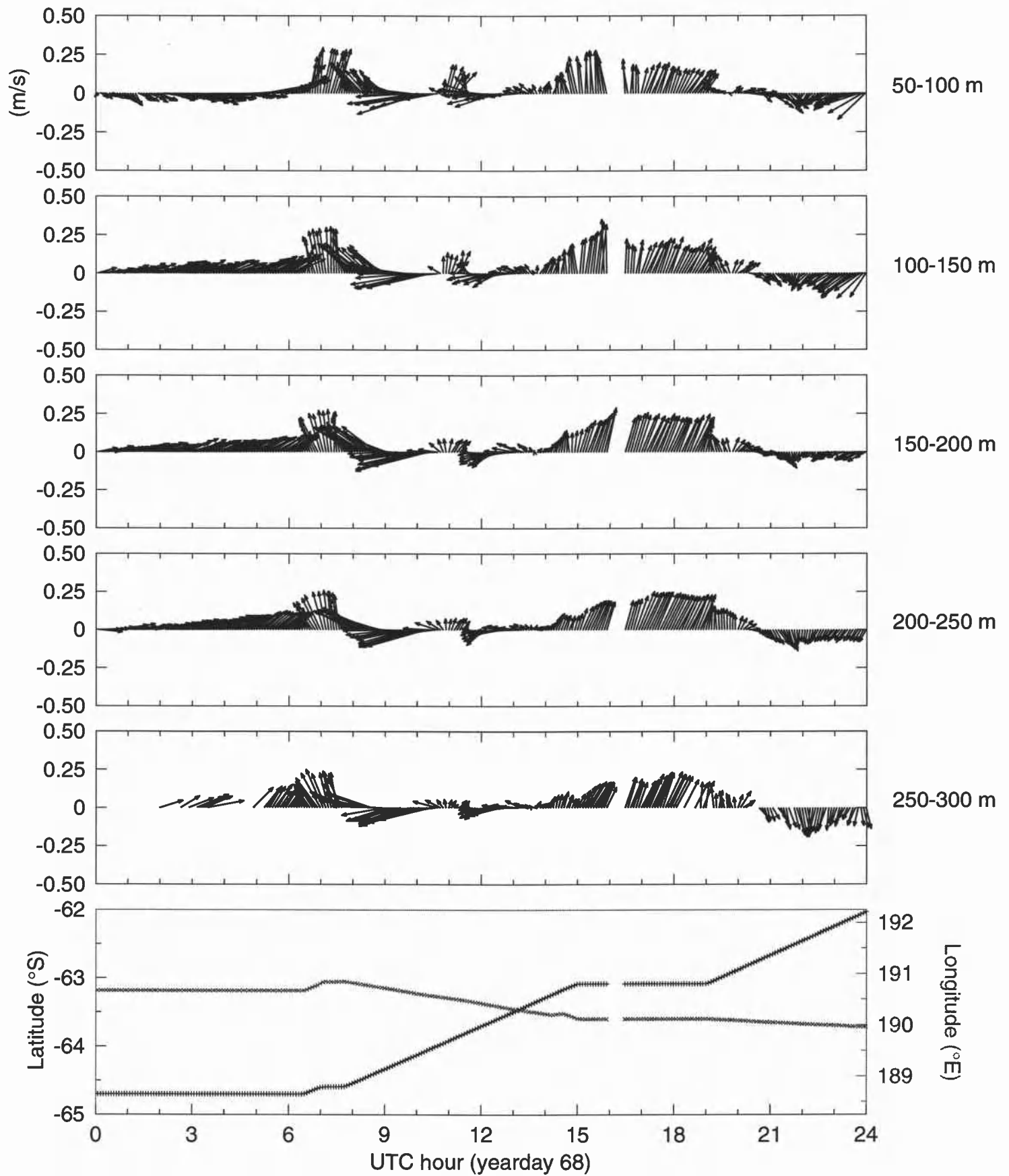
SOJGOFS Process 2 cruise (R9802)

50-330 m layer ADCP (09-Mar-1998, yearday 68)



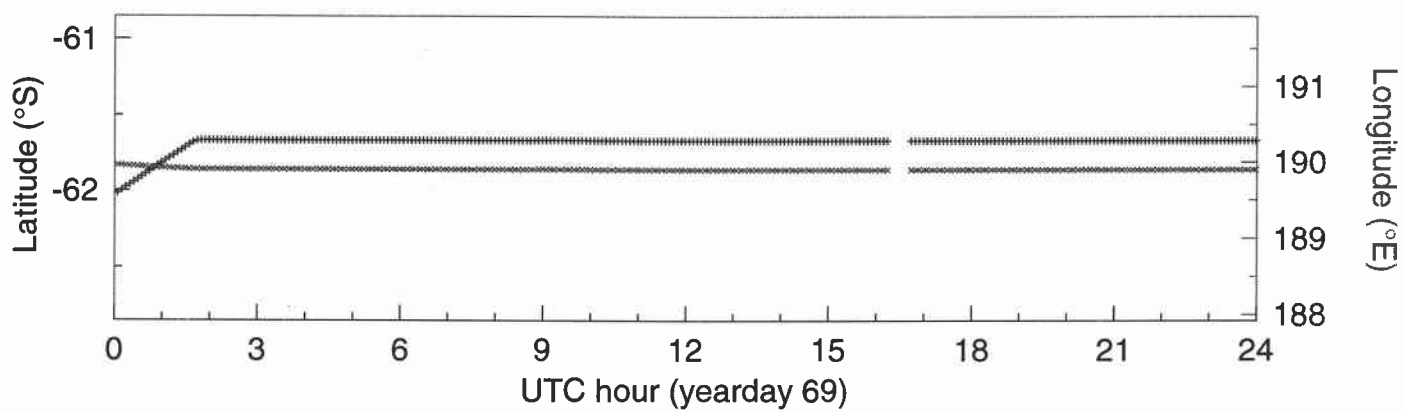
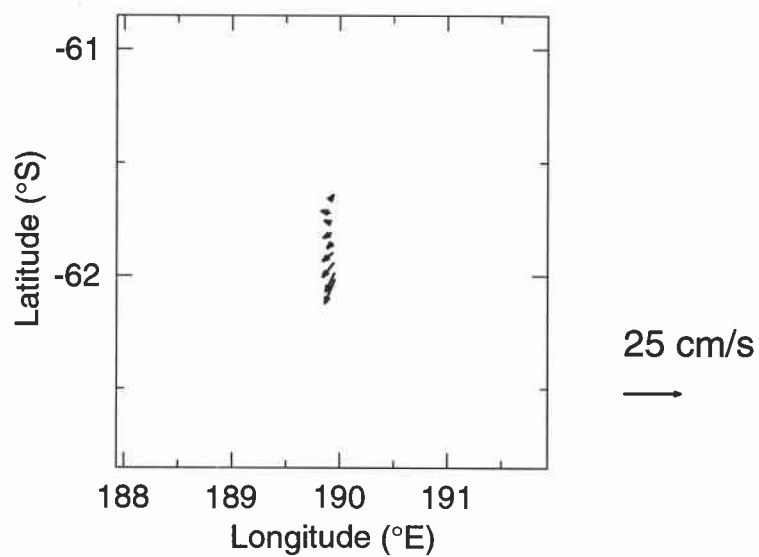
SOJGOFS Process 1 cruise (R9802) ADCP: 09-Mar-1998 (yearday 68)

N
↑

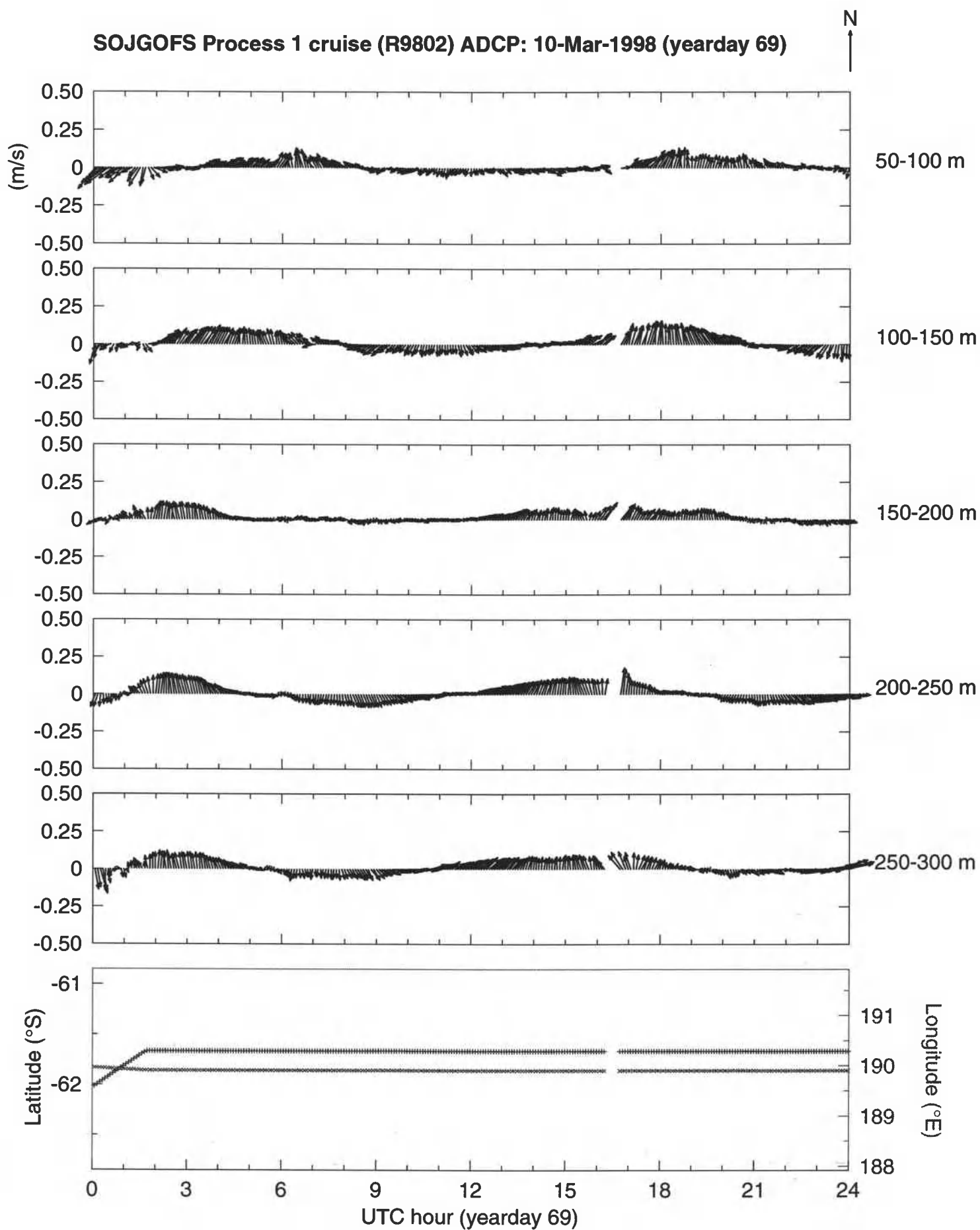


SOJGOFS Process 2 cruise (R9802)

50-330 m layer ADCP (10-Mar-1998, yearday 69)

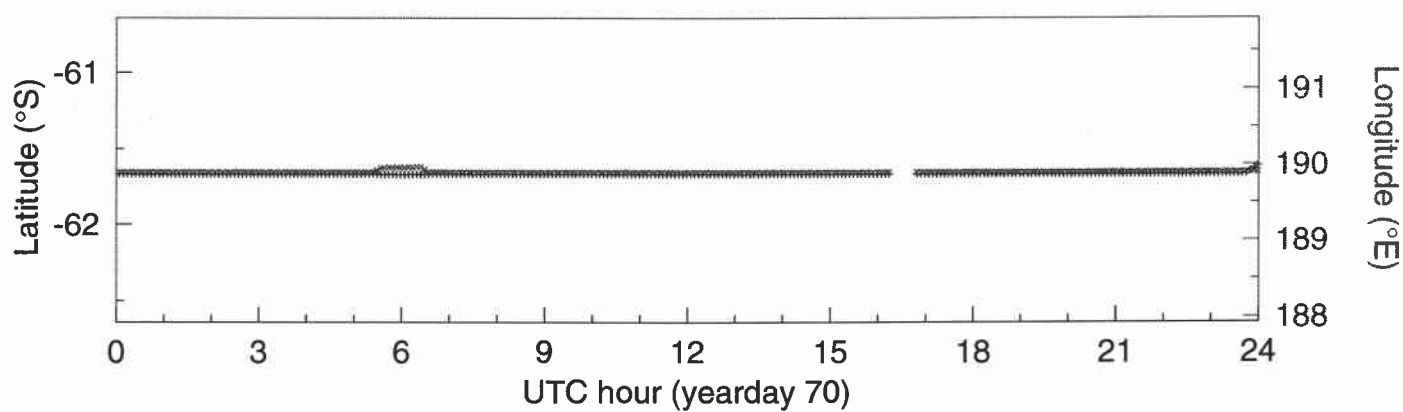
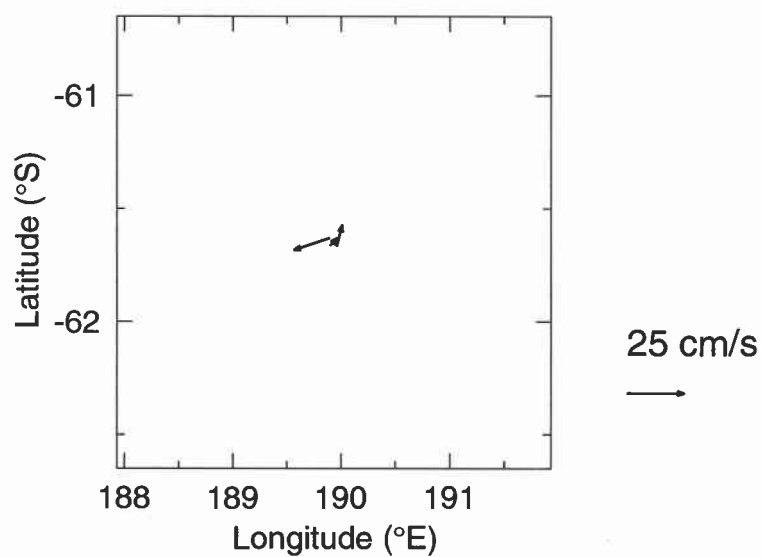


SOJGOFS Process 1 cruise (R9802) ADCP: 10-Mar-1998 (yearday 69)

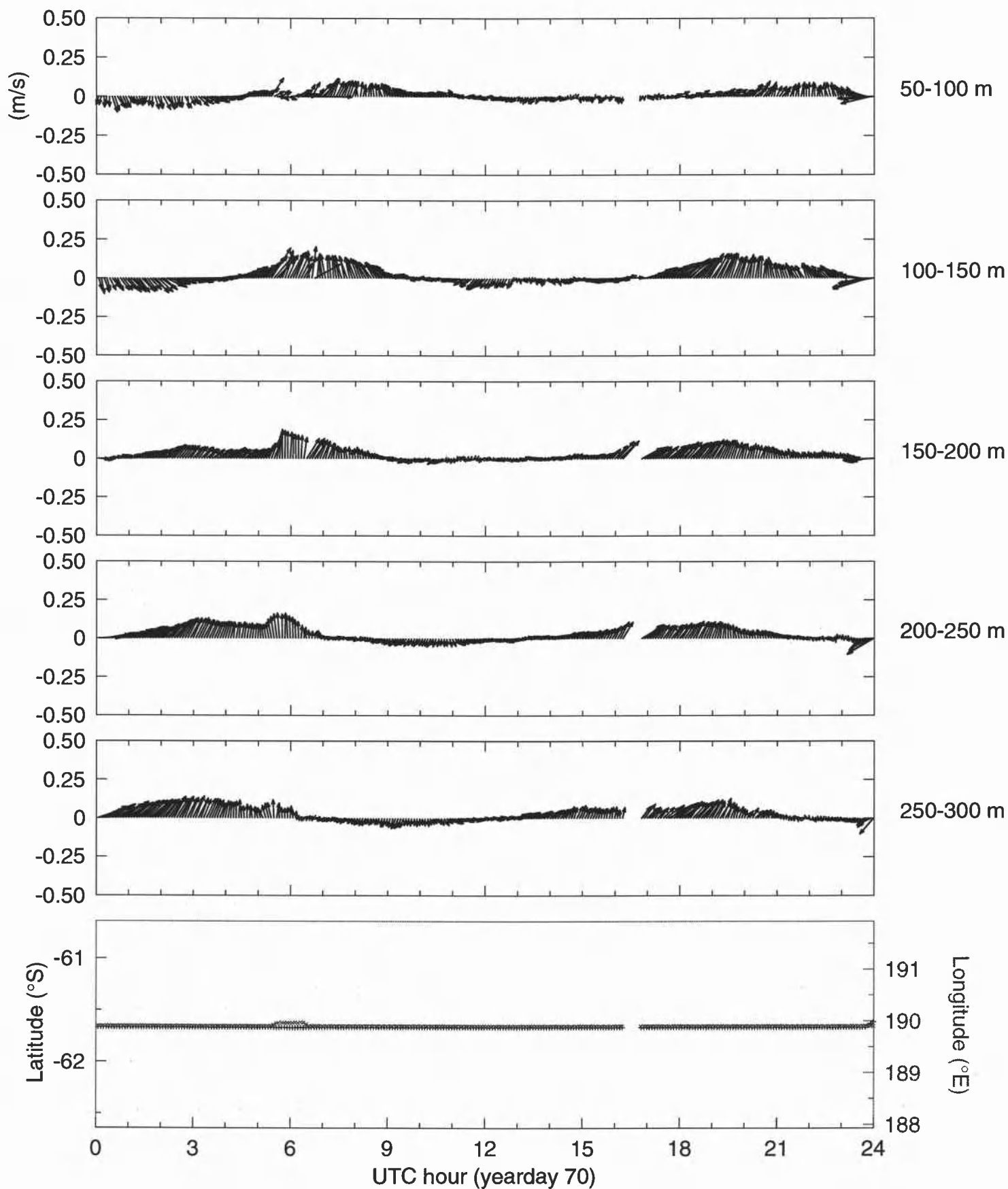


SOJGOFS Process 2 cruise (R9802)

50-330 m layer ADCP (11-Mar-1998, yearday 70)

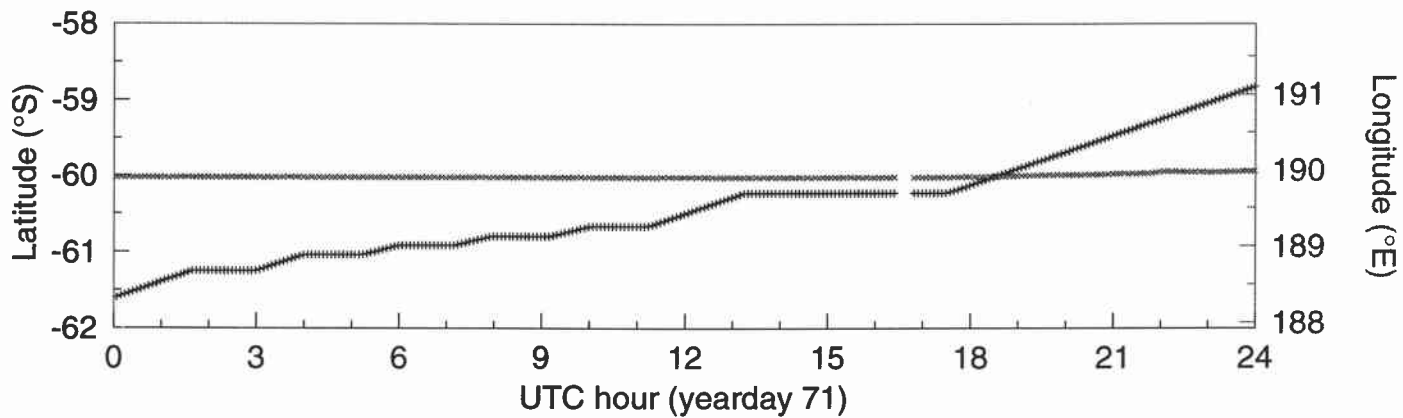
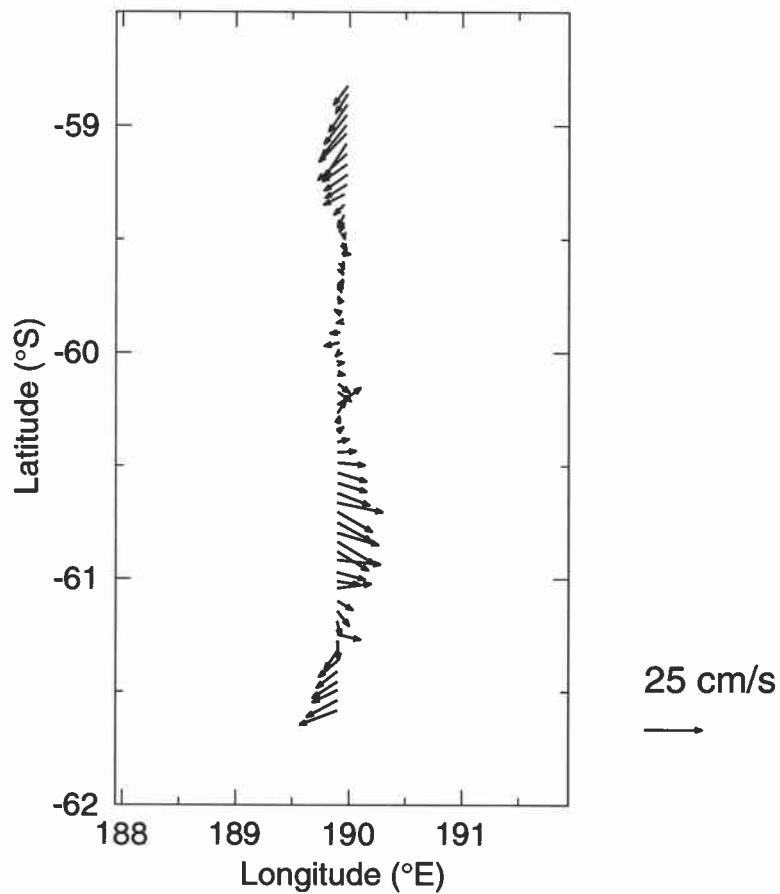


SOJGOFS Process 1 cruise (R9802) ADCP: 11-Mar-1998 (yearday 70)



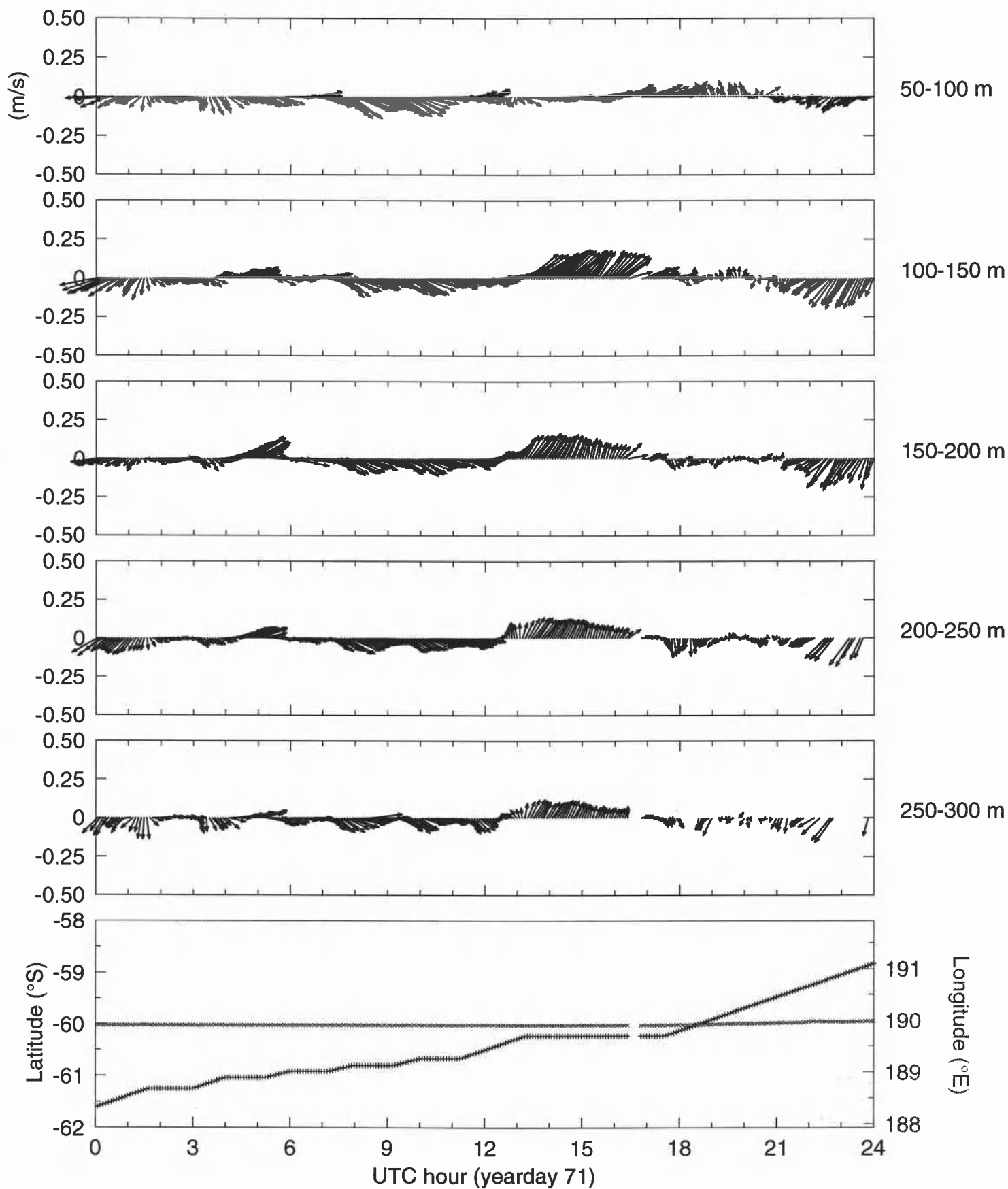
SOJGOFS Process 2 cruise (R9802)

50-330 m layer ADCP (12-Mar-1998, yearday 71)



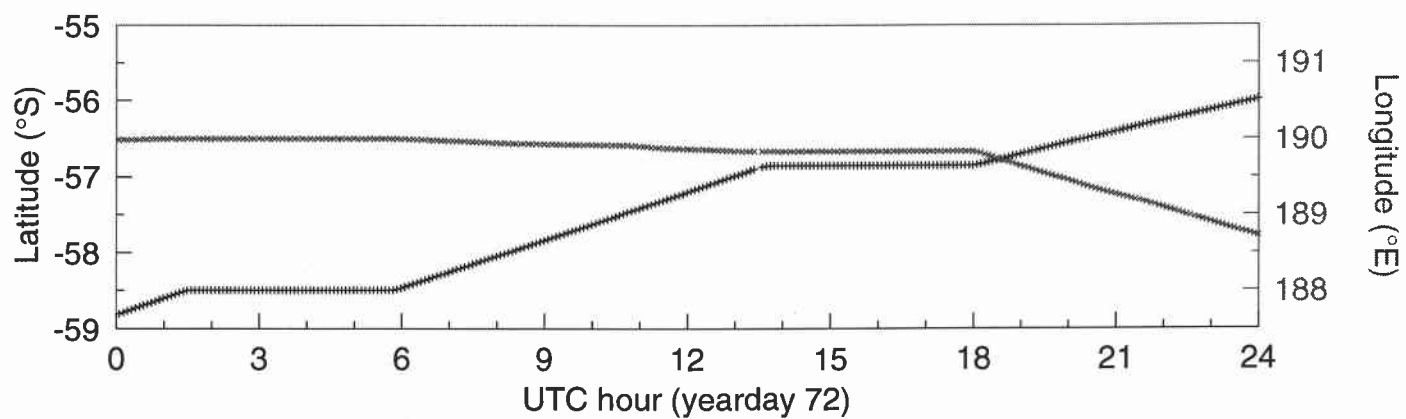
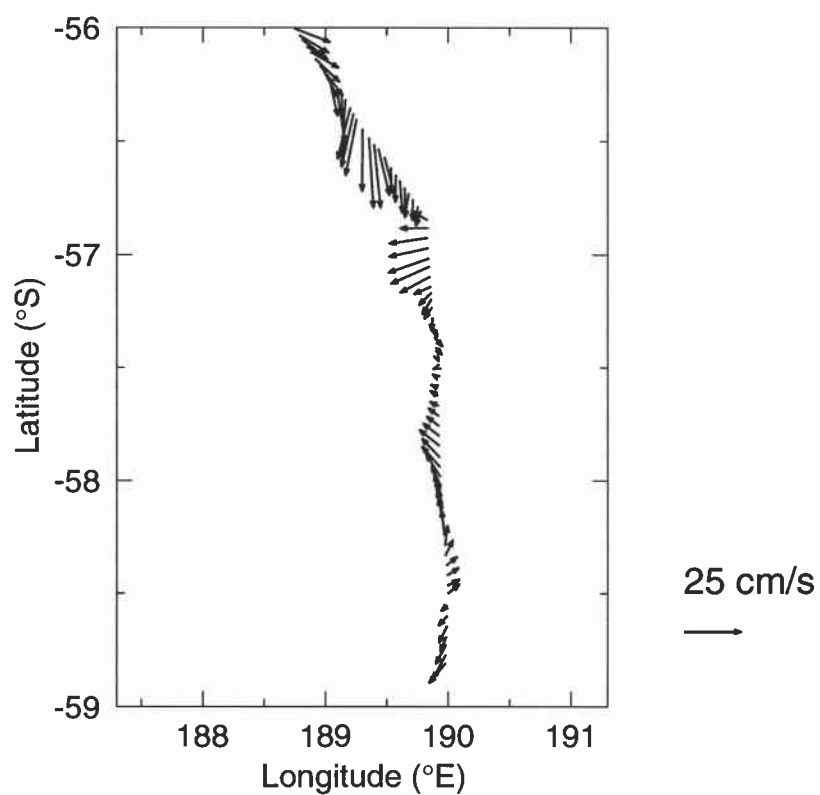
SOJGOFS Process 1 cruise (R9802) ADCP: 12-Mar-1998 (yearday 71)

N
↑



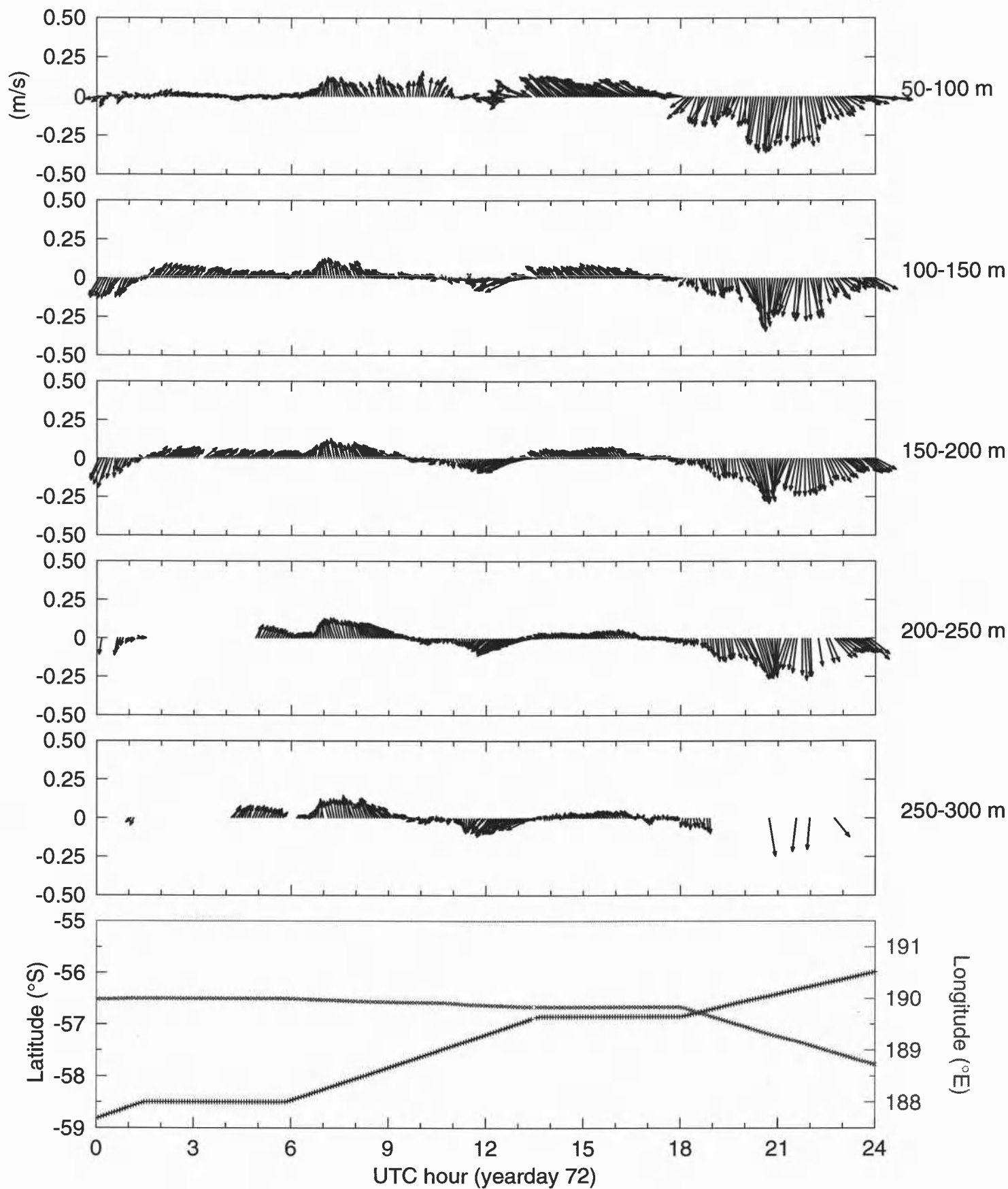
SOJGOFS Process 2 cruise (R9802)

50-330 m layer ADCP (13-Mar-1998, yearday 72)

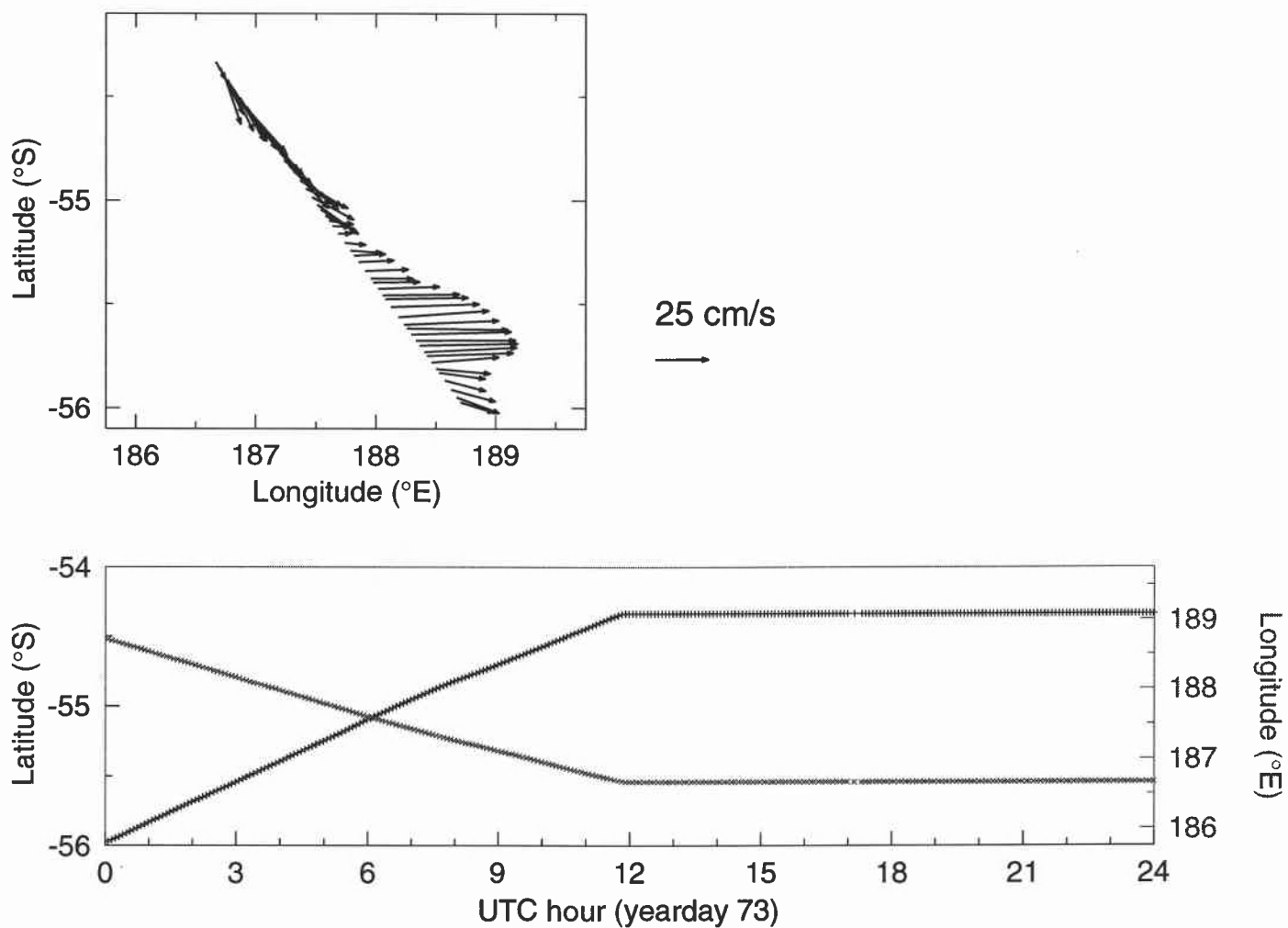


SOJGOFS Process 1 cruise (R9802) ADCP: 13-Mar-1998 (yearday 72)

N
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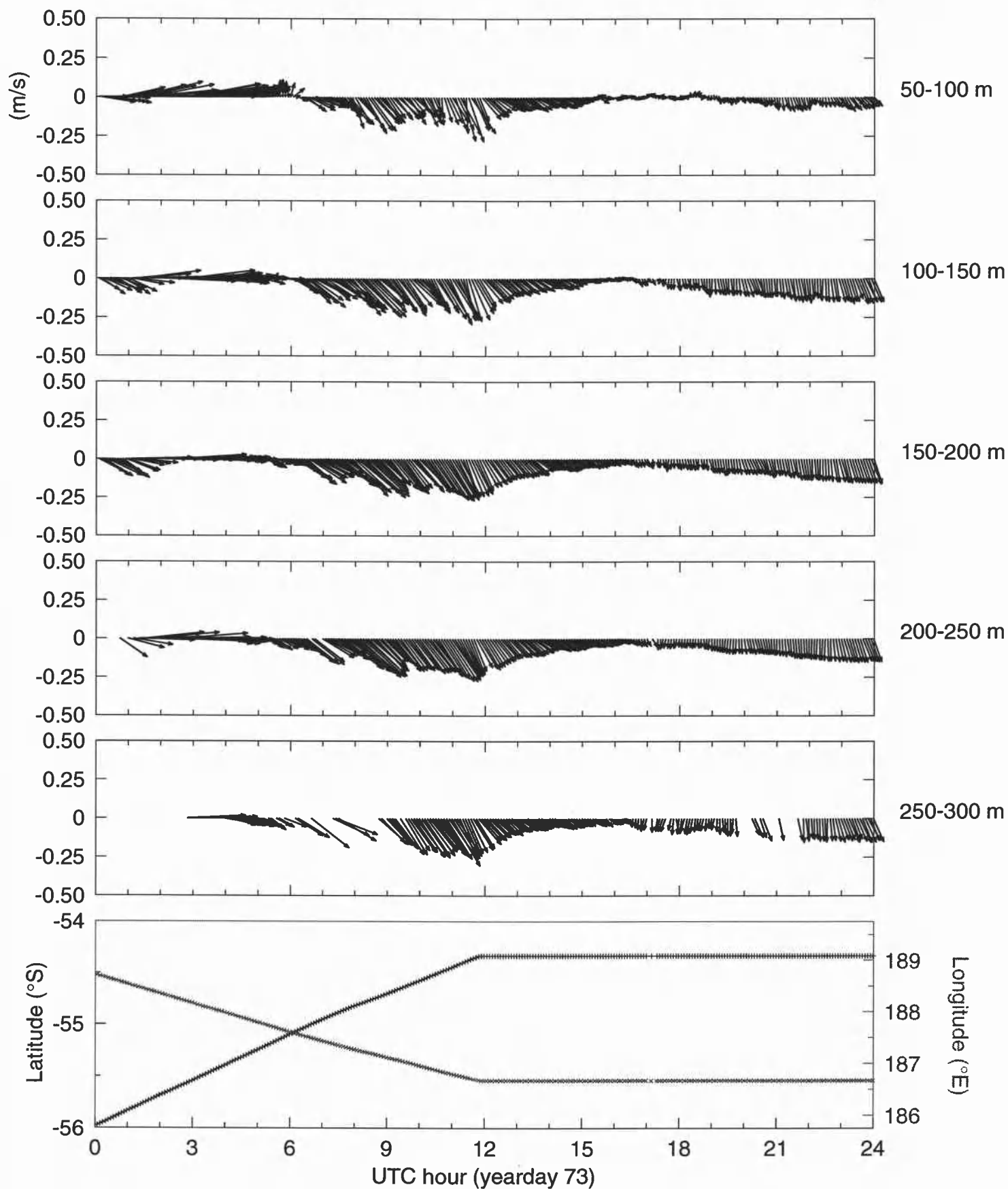


SOJGOFS Process 2 cruise (R9802)
50-330 m layer ADCP (14-Mar-1998, yearday 73)



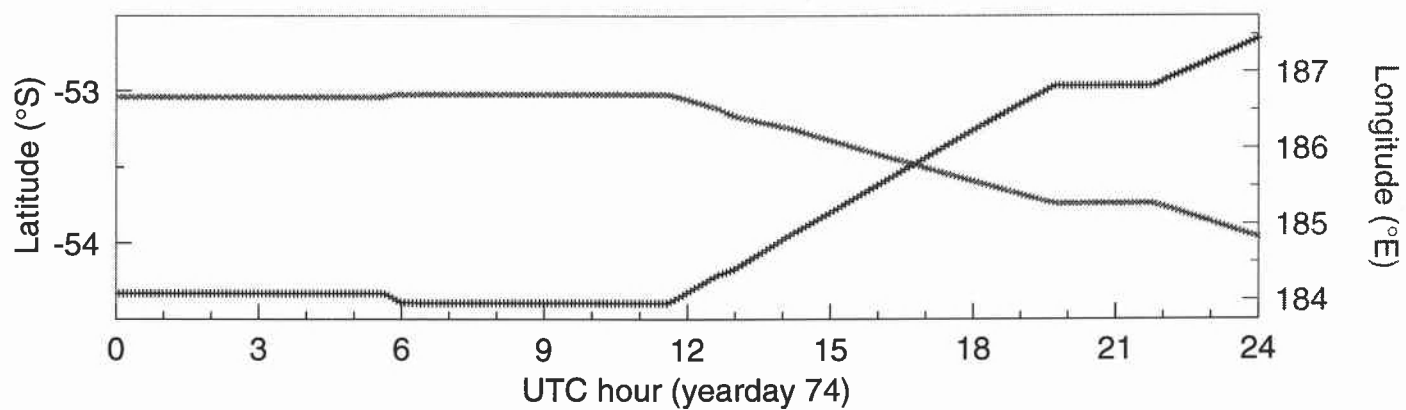
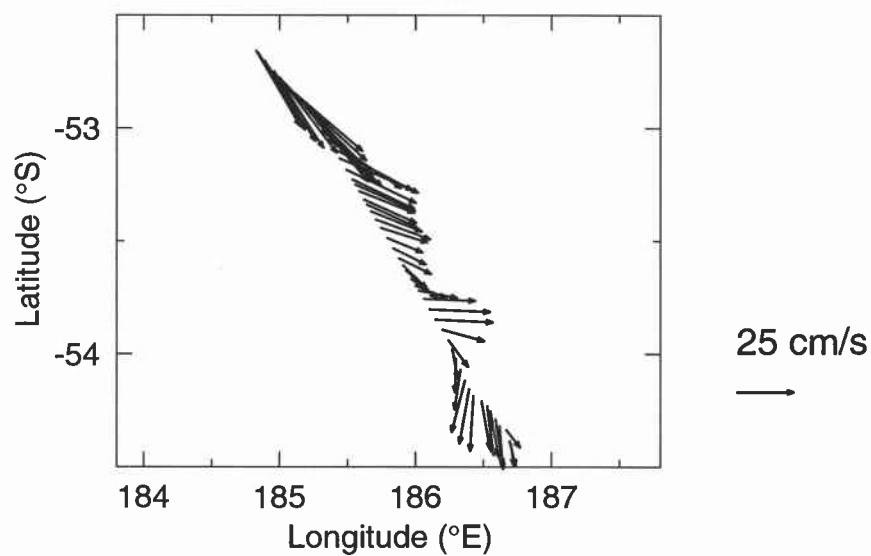
SOJGOFS Process 1 cruise (R9802) ADCP: 14-Mar-1998 (yearday 73)

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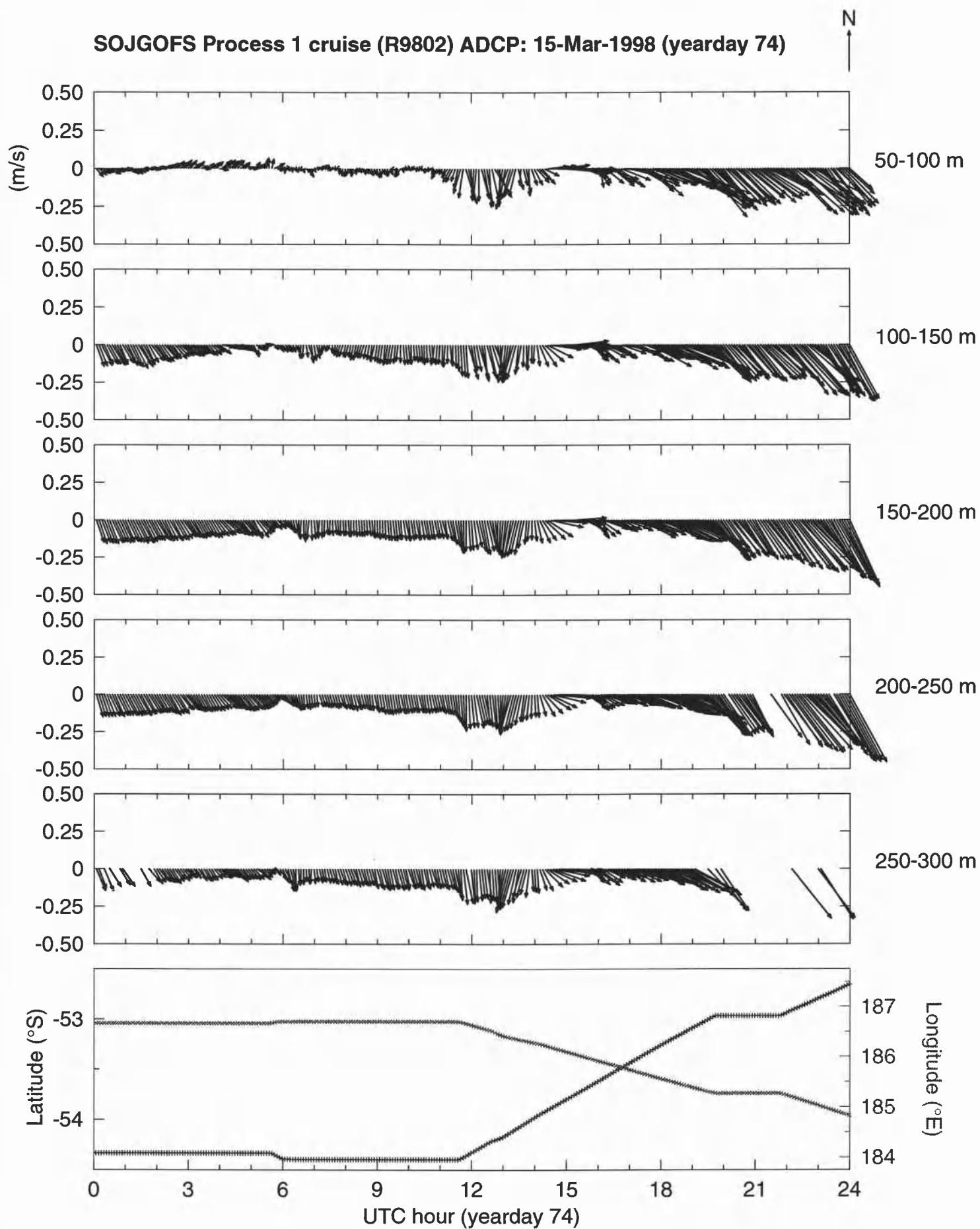


SOJGOFS Process 2 cruise (R9802)

50-330 m layer ADCP (15-Mar-1998, yearday 74)

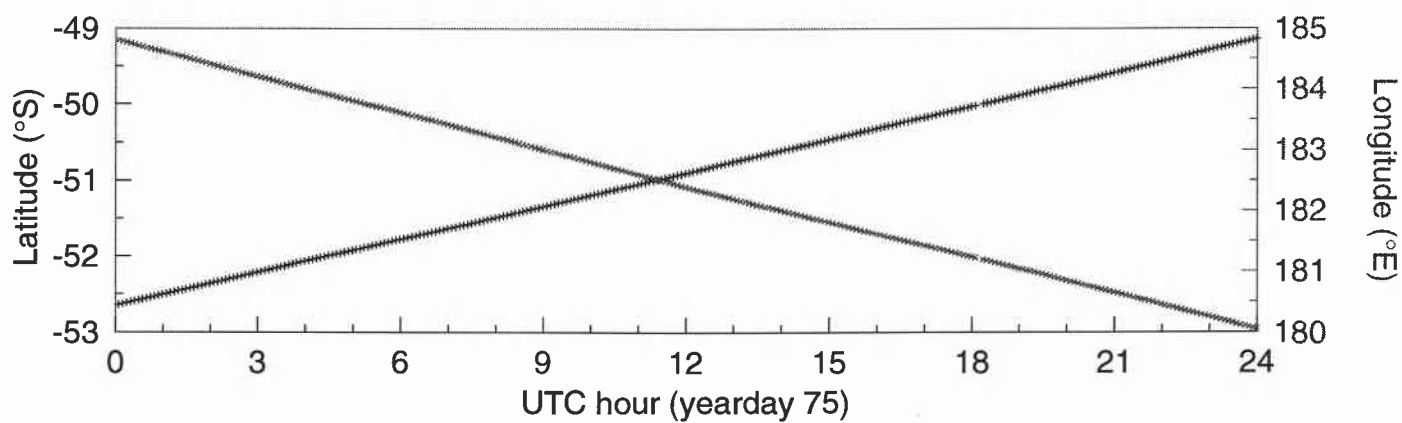
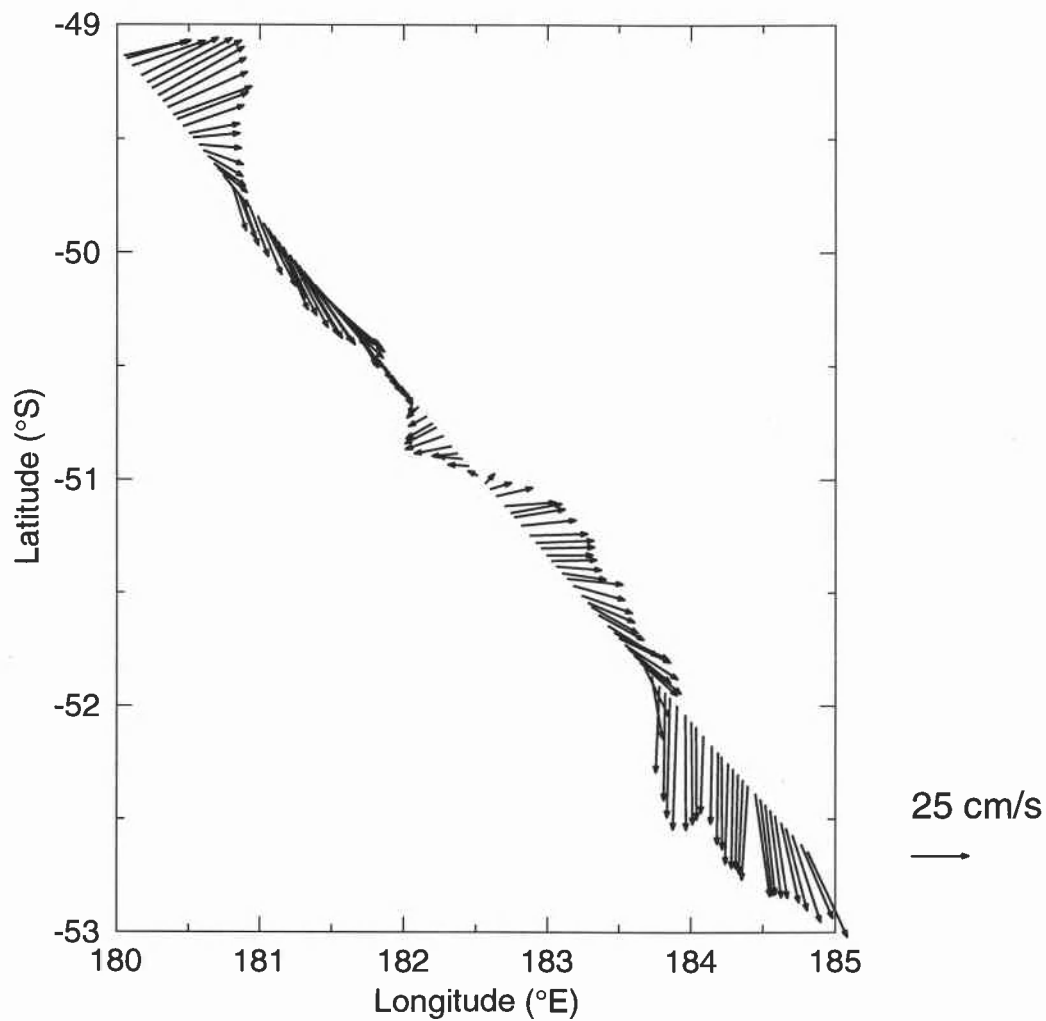


SOJGOFS Process 1 cruise (R9802) ADCP: 15-Mar-1998 (yearday 74)



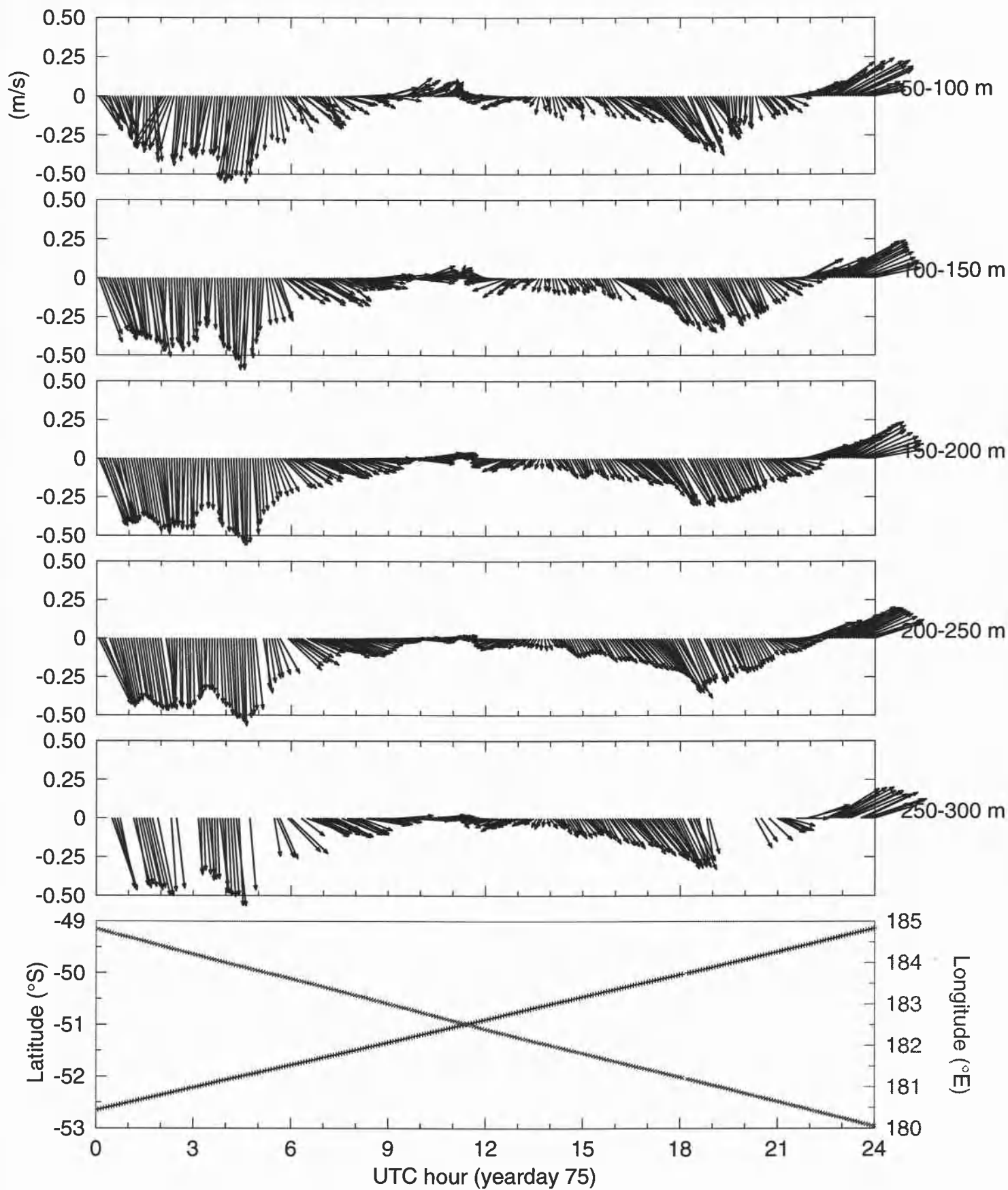
SOJGOFS Process 2 cruise (R9802)

50-330 m layer ADCP (16-Mar-1998, yearday 75)



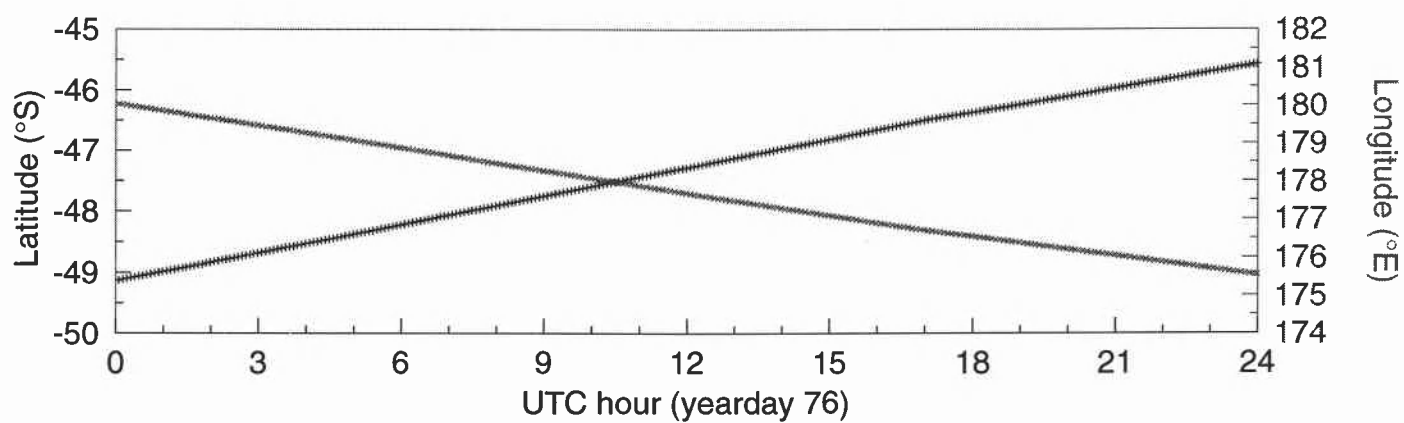
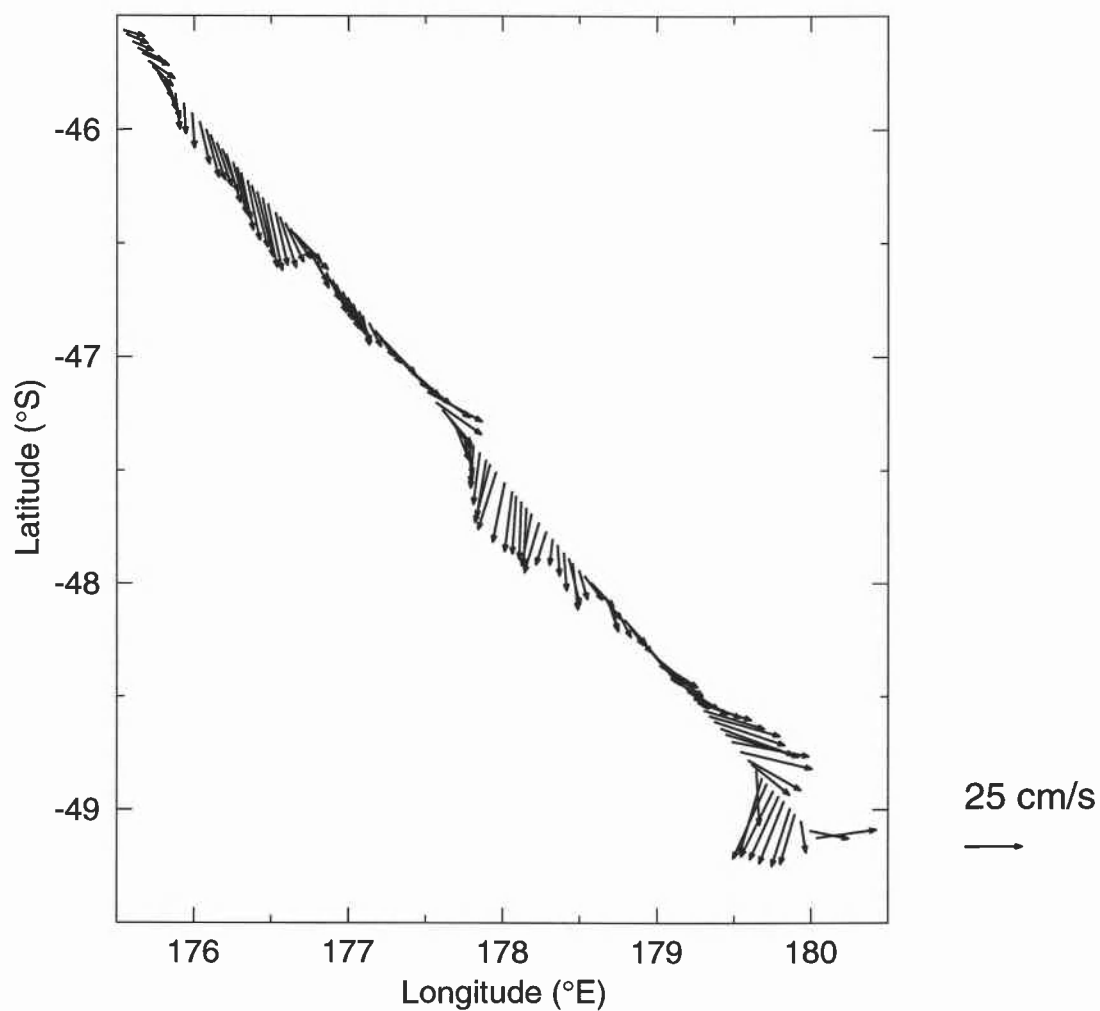
SOJGOFS Process 1 cruise (R9802) ADCP: 16-Mar-1998 (yearday 75)

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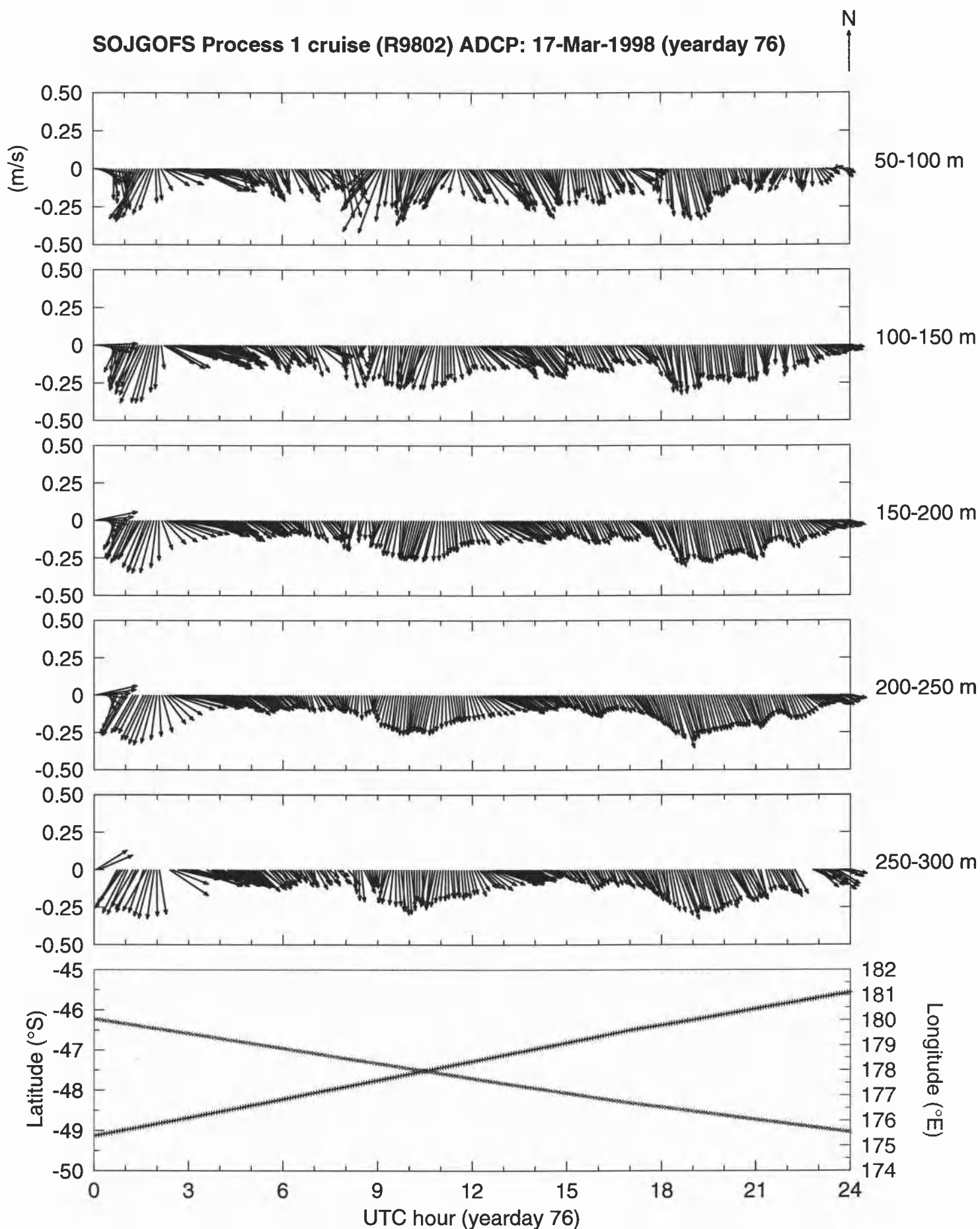


SOJGOFS Process 2 cruise (R9802)

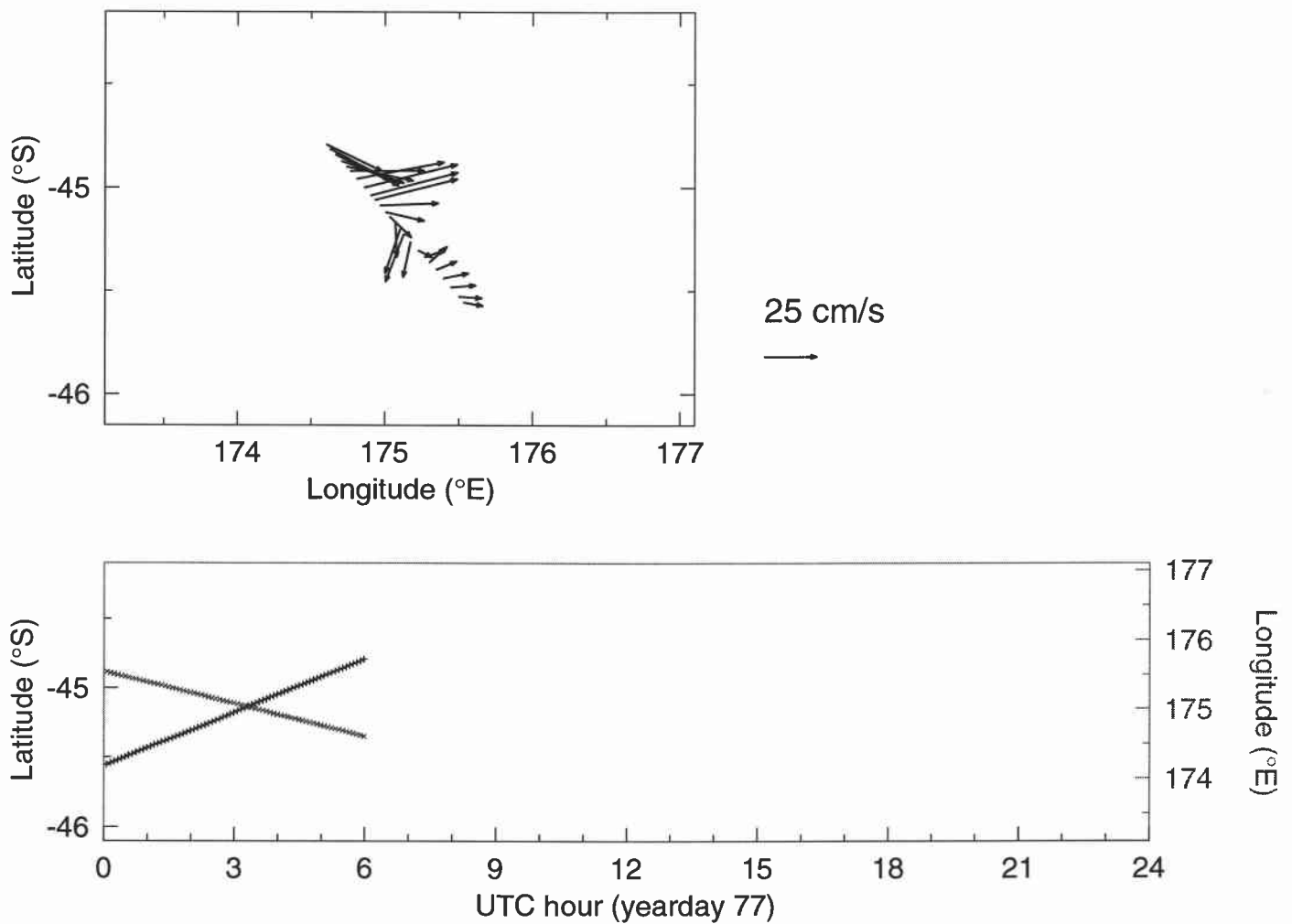
50-330 m layer ADCP (17-Mar-1998, yearday 76)



SOJGOFS Process 1 cruise (R9802) ADCP: 17-Mar-1998 (yearday 76)



SOJGOFS Process 2 cruise (R9802)
50-330 m layer ADCP (18-Mar-1998, yearday 77)



SOJGOFS Process 1 cruise (R9802) ADCP: 18-Mar-1998 (yearday 77)

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