

Auxiliary material for
Metabolic balance of coastal Antarctic waters revealed by
autonomous $p\text{CO}_2$ and $\Delta\text{O}_2/\text{Ar}$ measurements

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Geophysical Research Letters MS# 2014GL060491

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Introduction

The auxiliary information provides 3 additional figures.

fs01. Map of the Palmer Station sampling region showing the location of the seawater pump intake (SWP) and PAL-LTER Station B (StnB). Bathymetry is shown on the color scale. The black arrow highlights the presence of a bathymetric trough, which runs perpendicular to the coast towards Station B and facilitates the entrainment of Upper Circumpolar Deep Water (UCDW) onto the continental shelf.

Fs02. Relationship between DIC consumption and O₂ production during the net autotrophic portion of each diel cycle. DIC drawdown was calculated from MIMS-based pCO₂ data and discrete alkalinity measurements interpolated to the frequency of MIMS data. Biological O₂ production was computed from MIMS ΔO₂/Ar data using a temperature and salinity-dependent solubility function (1). Daily O₂ production was corrected for air-sea fluxes using a wind-speed dependent parameterization of the gas exchange coefficient (2). The lines on the figure represent photosynthetic quotients (PQ; mol O₂ evolved per mol DIC consumed) ranging from 0.6 to 1.4.

Fs03. Sea surface irradiance levels (PAR = photosynthetically-active irradiance; 400 – 700 nm) during the 2012 – 2013 sampling season at Palmer Station. The grey dashed line represents daily mean values and the thicker black line represents a 4 point running mean. Note the presence of both a large-scale seasonal cycle in surface PAR as well as higher frequency (~ bi-weekly) oscillations related to the periodicity nature of regional cloud cover.

1. Garcia HE & Gordon LI (1992) Oxygen solubility in seawater - better fitting equations. *Limnology and Oceanography* 37(6):1307-1312.

2. Wanninkhof R (1992) Relationship between wind-speed and gas exchange over the ocean. *Journal of Geophysical Research-Oceans* 97(C5):7373-7382.