

PHYTOPLANKTON PRIMARY PRODUCTION AND BACTERIAL PRODUCTION RATES ALONG THE WOCE SR3 LINE BETWEEN TASMANIA AND ANTARCTICA, NOVEMBER-DECEMBER 2001

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Phytoplankton primary production and bacterial production rates were investigated along the SR3 transect between ~ 46S and 67S, between Tasmania and Antarctica in November - December 2001. The transect crossed through the Subtropical, Subantarctic, Polar and Antarctic shelf water masses, crossing the Subtropical, Subantarctic, northern and southern Polar Fronts, and the Antarctic Circumpolar Current. Nitrate:phosphate ratios were in approximate Redfield balance (~15:1) south of the Subtropical Convergence (STC), but were slightly less (~14:1) in the STC and Subtropical water. Nitrate:silicate values showed marked departures from Redfield (up to ~5:1 rather than ~1:1) in Subtropical and northern Subantarctic Zone (SAZ) water masses with SiO₄ values low enough (<4 microMolar) to possibly limit diatom growth in the upper 200m. Nitrate concentrations were > 2.6 microMolar in the mixed layer in the STC, and always > 3 microMolar in the SAZ and other more southern water masses. The only phytoplankton bloom (Chl a > 1mg m⁻³) was in STC region near 45S. A second region of elevated chlorophyll (0.6 to 0.9 mg m⁻³) was seen in the upper 50m between 60S-64S in the Antarctic Circumpolar Current (ACC) region. Chlorophylls in the SAZ and Polar water masses and associated frontal regions were low, < 0.4 mg m⁻³. Primary production in the northern SAZ was very high (>2 g C m⁻² d⁻¹) but was very low (<0.5 g C m⁻² d⁻¹) between 48S and 58S. There was a small increase (>0.6 g C m⁻² d⁻¹) in the ACC region to about 64S, where it then increased to between 1.0-1.5 g C m⁻² d⁻¹. Bacterial production broadly followed this same pattern, with maximum bacterial production rates in the SAZ and seasonal ice zone of about 0.12 g C m⁻² d⁻¹ and at times approaching 20% of the primary production. The patterns of production will be discussed in relation to microzooplankton grazing and role of nutrients in constraining primary and bacterial production along the SR 3 transect.