



The United States Southern Ocean Joint Global Ocean Flux Study (JGOFS), also known as AESOPS (Antarctic Environment and Southern Ocean Process Study), focused on two distinct regions. The first was the Ross-Sea continental shelf, where a series of six cruises collected a variety of data from October 1996 through February 1998. The second area was the southwest Pacific sector of the Southern Ocean, spanning the Antarctic Circumpolar Current (ACC) at  $\sim 170^{\circ}\text{W}$ . Data were collected within this region during five cruises from September 1996 through March 1998, as well as during selected transits between New Zealand and the Ross Sea. The first results of these cruises are described in this issue. The Ross-Sea investigation extensively sampled the area along  $76^{\circ}30'\text{S}$  to elucidate the temporal patterns and processes that contribute to making this one of the Antarctic's most productive seas. Hydrographic distributions confirm that stratification is initiated early in October within the polynya, generating an environment that is favorable for phytoplankton growth. Significant spatial variations in mixed-layer depths, the timing of the onset of stratification, and the strength of the stratification existed throughout the growing season. Nutrient concentrations reflected phytoplankton uptake, and reached their seasonal minimal in early February. Chlorophyll concentrations were maximal in early January, whereas productivity was maximal in late November, which reflects the temporal uncoupling between growth and biomass accumulation in the region. Independent estimates of biogenic export suggest that majority of the flux occurred in late summer and was strongly uncoupled from phytoplankton growth. The ACC region exhibited seasonal changes that in some cases were greater than those observed in the Ross Sea. Sea ice covered much of the region south of the Polar Front in winter, and retreated rapidly in late spring and early summer. Mixed layers throughout the region shoaled in summer due to surface heating, while the addition of freshwater from melting sea ice enhanced stratification in the Seasonal Ice Zone, creating conditions favorable for phytoplankton growth. For example, silicic acid concentrations decreased from initial values as high as 65 to less than  $2\ \mu\text{M}$  within approximately 100 km (from  $65.7$  to  $64.8^{\circ}\text{S}$ ). Fluorescence values, however, showed less than a two-fold variation over the same distance. The vertical flux of carbon in the Polar Front area is substantial, and marked variations in the composition of exported material existed over the region. The results provide a means whereby the controls of phytoplankton growth and organic matter flux and remineralization can be analyzed in great detail.

Walker O. Smith, Jr., Robert F. Anderson, J. Keith Moore, Louis A. Codispoti and John M. Morrison -- The US Southern Ocean Joint Global Ocean Flux Study: an introduction to AESOPS -- 3073-3093

L.I. Gordon et al. -- Seasonal evolution of hydrographic properties in the Ross Sea, Antarctica, 1996-1997 -- 3095-3117

Walker O. Smith, Jr, John Marra, Michael R. Hiscock and Richard T. Barber -- The seasonal cycle of phytoplankton biomass and primary productivity in the Ross Sea, Antarctica -- 3119-3140

Michael L. Bender, Mary-Lynn Dickson and Joseph Orchardo -- Net and gross production in the Ross Sea as determined by incubation experiments and dissolved  $\text{O}_2$  studies -- 3141-3158

S.E. Fitzwater, K.S. Johnson, R.M. Gordon, K.H. Coale and W.O. Smith, Jr. -- Trace metal concentrations in the Ross Sea and their relationship with nutrients and phytoplankton growth -- 3159-3179

R.J. Olson, H.M. Sosik, A.M. Chekalyuk and A. Shalapyonok -- Effects of iron enrichment on phytoplankton in the Southern Ocean during late summer: active fluorescence and flow cytometric analyses -- 3181-3200

Craig A. Carlson, Dennis A. Hansell, Edward T. Peltzer and Walker O. Smith, Jr. -- Stocks and dynamics of dissolved and particulate organic matter in the southern Ross Sea, Antarctica -- 3201-3225

Hugh W. Ducklow et al. -- Constraining bacterial production, conversion efficiency and respiration in the Ross Sea, Antarctica, January-February, 1997 -- 3227-3247

David A. Caron, Mark R. Dennett, Darcy J. Lonsdale, Dawn M. Moran and Ludmilla Shalapyonok -- Microzooplankton herbivory in the Ross Sea, Antarctica -- 3249-3272

- D.J. Lonsdale, D.A. Caron, M.R. Dennett and R. Schaffner -- Predation by *Oithona* spp. on protozooplankton in the Ross Sea, Antarctica -- 3273-3283
- Mark R. Abbott, James G. Richman, Ricardo M. Letelier and Jasmine S. Bartlett -- The spring bloom in the Antarctic Polar Frontal Zone as observed from a mesoscale array of bio-optical sensors -- 3285-3314
- Valerie M. Franck, Mark A. Brzezinski, Kenneth H. Coale and David M. Nelson -- Iron and silicic acid concentrations regulate Si uptake north and south of the Polar Frontal Zone in the Pacific Sector of the Southern Ocean -- 3315-3338
- R.N. Sambrotto and B.J. Mace -- Coupling of biological and physical regimes across the Antarctic Polar Front as reflected by nitrogen production and recycling -- 3339-3367
- Colm Sweeney et al. -- Biogeochemical regimes, net community production and carbon export in the Ross Sea, Antarctica -- 3369-3394
- Colm Sweeney et al. -- Nutrient and carbon removal ratios and fluxes in the Ross Sea, Antarctica -- 3395-3421
- Wilford D. Gardner, Mary Jo Richardson and Walker O. Smith, Jr. -- Seasonal patterns of water column particulate organic carbon and fluxes in the Ross Sea, Antarctica -- 3423-3449
- J.K. Cochran et al. -- Short-lived thorium isotopes ( $^{234}\text{Th}$ ,  $^{228}\text{Th}$ ) as indicators of POC export and particle cycling in the Ross Sea, Southern Ocean -- 3451-3490
- Robert Collier et al. -- The vertical flux of biogenic and lithogenic material in the Ross Sea: moored sediment trap observations 1996-1998 -- 3491-3520
- Susumu Honjo, Roger Francois, Steven Manganini, Jack Dymond and Robert Collier -- Particle fluxes to the interior of the Southern Ocean in the Western Pacific sector along 170°W -- 3521-3548