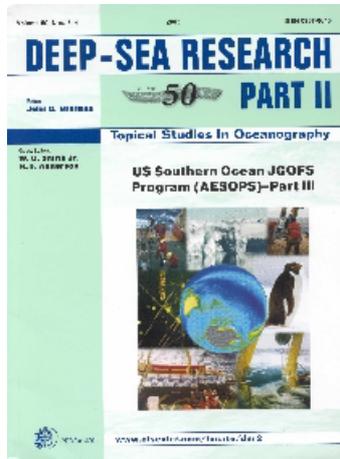


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US Southern Ocean JGOFS Program (AESOPS): Part III

W.O. Smith Jr. and R.F. Anderson



This is the third and final volume of manuscripts comprising the results from a series of process studies conducted in the Southern Ocean, under the project AESOPS, as part of the US Joint Global Ocean Flux Study. The objectives of this study were to provide insights into the quantities and controls of fluxes, to elucidate the processes that control primary production in both space and time, and to use these results to model the processes that were dominant in past environments. The results demonstrate the importance of the Southern Ocean with regard to both the present and past productivity patterns and vertical fluxes from the surface layer.

Relative to the other, large programs that have and are being conducted, the specific accomplishments of the Antarctic Southern Ocean Environment Study (AESOPS) are as follows:

- demonstration of the critical role and interaction of iron and silicic acid in regulating productivity in the Polar Front, and of iron and irradiance in controlling the seasonal cycle of phytoplankton in the Ross Sea;
- documentation of the extraordinarily large biogenic fluxes that occur in the Southern Ocean, and the functional relationships among carbon, nitrogen and silica fluxes;
- documentation of the large export fluxes which occur despite low mean annual primary productivity because recycling of biogenic materials in surface waters is less efficient than in regions at lower latitudes;
- demonstration of the "Redfield ratios" deviation from expected values, as a function of both, time (bloom status) and phytoplankton composition;
- documentation of the bloom in the Polar Front and its extreme short-life but intensity in nature; and
- documentation of the importance of ice-edge processes in the Pacific sector of the Antarctic.

The Southern Ocean remains of paramount importance to the global marine carbon cycle, and while much has been learned by the efforts of AESOPS investigators, more detailed field and modeling investigations are needed to elucidate the AESOPS results. It is a tribute to this field program that other projects (e.g., SOFeX: Southern Ocean Iron Experiment) used the data obtained to plan and execute additional field efforts in the region.

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