



The FRUELA (name of an 8th-century king of Asturias) project, part of the Spanish contribution to the study of biogeochemical carbon fluxes in the Southern Ocean, was based on two consecutive cruises of the B.I.O.; Hespérides which took place in the Bransfield and Gerlache Straits and Bellingshausen Sea between early December and early February of Austral summer 1995-1996. In addition to the cruises, data were obtained from an array of sediment traps deployed for one year in the Western Bransfield Strait Basin. The basic objectives of FRUELA were the quantification of carbon standing stocks and fluxes through the main components of the "biological pump" and the determination of carbon fluxes across different water column boundaries, including the transfer of CO₂ between the atmosphere and the ocean, the export of particulate carbon (PC) out of the euphotic zone, the vertical flux of PC in deep waters and the accumulation of carbon in sediments.

The main hydrographical features found in the study region were the Southern Boundary of the Antarctic Circumpolar Current (SbyACC) and the Bransfield Front. Three major zones, with contrasting physico-chemical and biological characteristics were considered: Bellingshausen, including the Northwest Bellingshausen Sea and comprising the SbyACC, Bransfield, including the Western Bransfield Strait and the northeastern part of the Gerlache Strait, and Gerlache, with the rest of the Gerlache Strait. This paper summarizes the distribution of different properties and rate processes in these zones and discusses the major findings of the cruise concerning carbon fluxes. Our results indicate that, during the summer period, the studied area could be considered as a sink for atmospheric carbon. The amount of PC exported out of the photic layer was a moderate fraction of primary production and a low fraction of the suspended PC; high chlorophyll a systems dominated by microphytoplankton showed higher PC export fluxes than low chlorophyll a systems dominated by small flagellates and cryptomonads. The amount of PC arriving at deep waters or accumulating in the sediments was two to three orders of magnitude lower than that exported from the photic layer, probably due to biological recycling and advection out of the area.

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