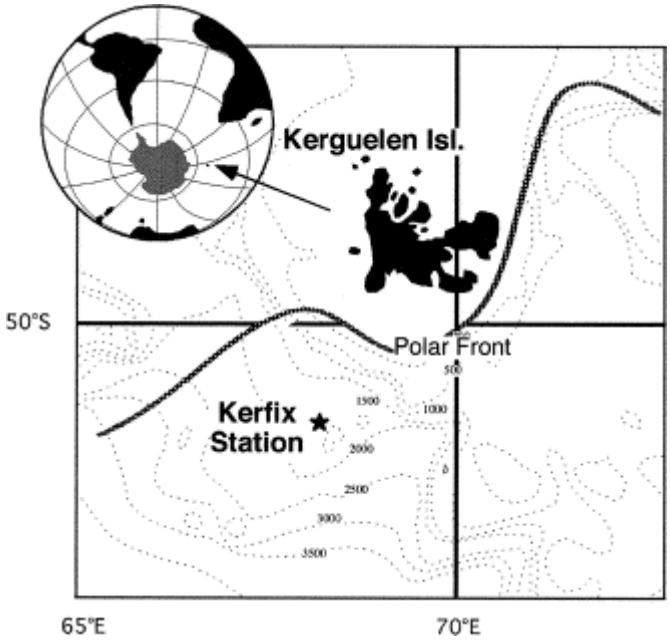

KERFIX, a fixed time-series station in the Southern Ocean near the Kerguelen Islands

The KERFIX station was located at 50°40'S, 68°25'E, approximately 100 km southwest of Kerguelen Islands in 1700 m of water, characteristic of the Permanently Open Ocean Zone (POOZ), south of the polar front of the Southern Ocean. One of the main motivation of KERFIX is to contribute to the understanding of the physical, biogeochemical, sedimentological and paleo-oceanographic processes that control the primary production, which paradoxically is very weak in this nutrient-rich region. KERFIX field sampling took place from January 1990 to March 1995, with the objectives to parameterize the air-sea flux of CO_2 and O_2, to better understand the physical and biological processes that control these exchanges and to observe and interpret the seasonal and interannual variability in production, flux and decomposition of carbon and associated elements. Approximately monthly field observations were conducted by several French teams and locally supported by staff from the Biologie Marine (BIOMAR) and the French Polar Institute (IFRTP) based on Kerguelen Island. From April 1993 to March 1995, a mooring was also deployed for the measurements of the downward flux of particulate matter and current velocity and direction.

The KERFIX programme, initiated in January 1990 by Alain Poisson (LPCM, Paris), was driven by C. Jeandel (LEGOS, Toulouse) from 1993 until its completion in March 1995. This multi-year acquisition study focused on one location was complementary to the ANTARES programme covering a larger geographical area of the Southern Ocean but with a lower time resolution. After 1993, a second site (BioStation) located 24 km south-east of Kerguelen was also used for zooplankton inventory and selected biological rate measurements (especially grazing and respiration). Since the end of KERFIX, the CLIOKER (CLImat Océanique à KERguelen; P.I: Y. Park) hydrographic (temperature and salinity) programme has emerged at the KERFIX site as a component of CLIVAR. The OISO project (Océan Indien Service d'Observation; P.I: N. Metzl), has conducted biogeochemical studies in the same region, with a special focus on CO_2 gas exchange.

The Southern Ocean, defined as the ocean within the Sub-Tropical Convergence (*e.g.*, South of the Subtropical Front) accounts for more than 20% of the area of the World Ocean. It is characterized by very low surface temperatures and an area of deep water formation. Thus, the study of its role in the air–sea exchange of CO_2 is of primary importance. The implementation of a scientific program called KERFIX, which consists of a continuous survey of physical, biological and chemical parameters on a selected location, characteristic of the southern part of the Polar Front Zone (PFZ) in the Southern Ocean. The exact location of the sampling station has been selected to satisfy the following constraints: not disturbed by topographic effects, presenting enough depth to sample offshore conditions and a relatively flat bathymetry for a mooring line equipped with sediment traps. On the other hand, the site had to be close enough from the island to reduce the transit time to a maximum of 12 h, for a small-sized research vessel.

The KERFIX programme was the first "offshore" exercise for regular, multi-year acquisition of parameters in the Southern Ocean. Irregularly, between 1969 and 1983 and then weekly since 1989, biologists from UK have undertaken coastal observations of the temperature, chlorophyll and macronutrients at Signy Island, South Orkney Islands. Since 1991, another long-term research project has been developed in the Southern Ocean in the framework of the Palmer LTER program, which mostly focused, in an area closer to the Antarctic continent, on the spatial and temporal variability of the primary production in this area and their link with the annual advance and retreat of sea ice.