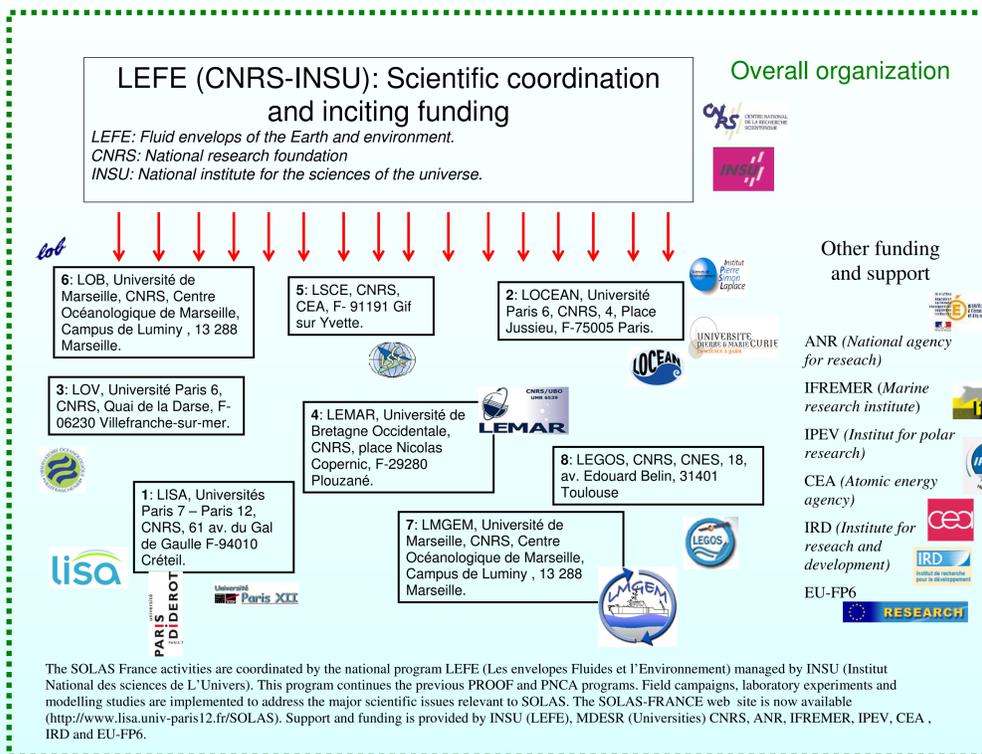
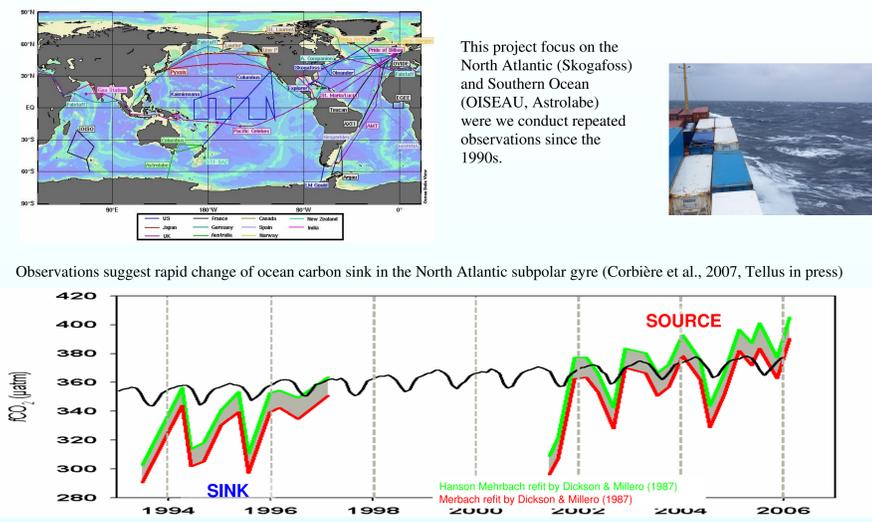


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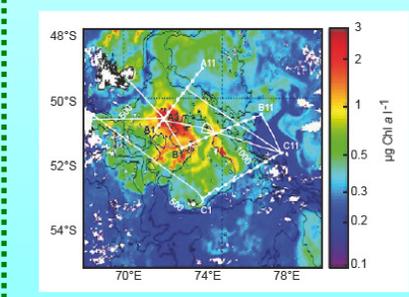
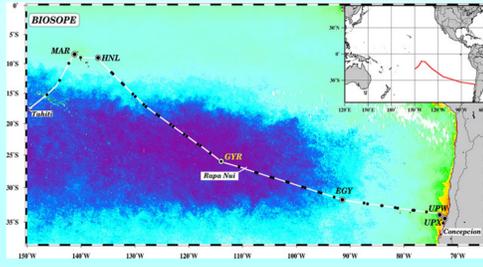
FLAMENCO2: Analyses of the decadal variability of air-sea CO2 fluxes.



Major cruises (2004-2005)

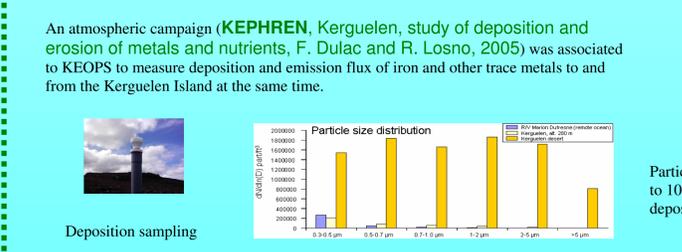
BIOCOPE (Biogeochemistry and Optics South Pacific Experiment)

took place in the South Pacific gyre in November 2004. The main objective of the BIOCOPE project is to study, during austral summer (likely in 2004), the biological, biogeochemical and optical characteristics of different trophic regimes in the South East Pacific, and especially the oligotrophic area associated to the central part of the South Pacific Gyre (SPG). This area has been one of the less studied major oceanic entities of the world ocean and presents the interesting particularity of being far away from any desert dust (iron) source. The second objective of the project, which is an important prerequisite for the success of this South Pacific cruise, is to develop or adapt methods in order to be able to quantify stocks or fluxes at levels close to detection limits, which are expected to be encountered in the highly oligotrophic conditions associated to the SPG. These developments will be undertaken during the first two years of the project (2002 and 2003). The third objective of the project deals with a synthesis on the (biological, biogeochemical and optical) characteristics of various oligotrophic regime that have been studied (and will be studied here in the Pacific) as part of various JGOFS projects which were carried out during the last decade, in particular by the French community. See: <http://www.obs-uhp.fr/proof/vt/keops/keops.htm> 61 papers are going to be published including 35 for a special issue of Biogeochemistry.

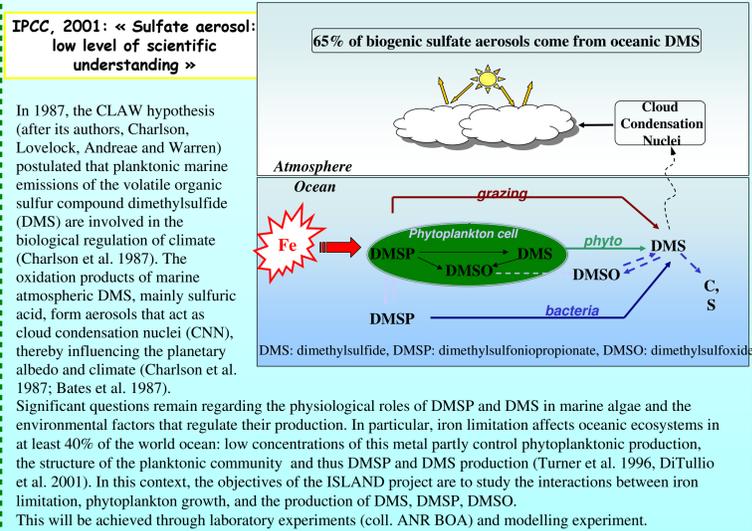


KEOPS (Kerguelen Ocean and Plateau compared Study)

is a multidisciplinary and international project which, aims to improve our understanding of the response of the Southern Ocean to climate change. Particularly, KEOPS is studying the impact of the natural iron fertilisation on the biological pump of CO2 and on the cycles of other chemical compounds relevant for climate. The campaign took place in January/February 2005 above the Kerguelen Plateau. The results show that substantial differences in key biogeochemical cycles exist above and outside the plateau. This was the case for carbon cycling and particularly carbon export, the relative nitrate and silicic acid utilization and the production of DMS. For all these issues the results of KEOPS differ from previous findings of artificial iron fertilization experiments in the Southern Ocean and shed new light on the impact of long term iron fertilisation of the Southern Ocean (<http://www.obs-uhp.fr/proof/vt/keops/keops.htm>). 41 papers are about to be published including 25 in a special issue of DSR.



ISLAND: Iron / Sulfur : how iron Limitation Affects the production of DMS (LEFE 2006-2009).



GRABISU (Biogeochemical gradients in the sub-surface and their effect on the air-sea interface)

The sub-surface ocean layer is today poorly known because the general sampling policy often ignores the very first meters of the ocean. We suspect that organic particulate matter with a positive buoyancy enriches the surface layer and affects the sea colour. This can interfere with air-sea fluxes and with satellite measurements of chlorophyll, especially in frontal zones. A continuous automatic sampling system will be operating underway from research vessels.

BONUS (2007-2009)

BONUS- GOODHOPE
Biogeochemistry of the southern Ocean : interactions between Nutrients, dynamics, and ecosystem structure
IPY, Eol # 584
Sabina Speich (LPO-Brest) & Marie Boyé (LEMAR-Brest)

OCEANOGRAPHIC CRUISE (NOV. 2007-JAN. 2008) WITH BIOGEOCHEMISTRY

- COUPLING PHYSICAL OCEANOGRAPHY
- MASS, HEAT AND FRESH WATER EXCHANGES WITH THE SO.
- BIODIVERSITY CONNECTIONS
- PHYSICAL STUDIES AND RELATED BIOGEOCHEMICAL TRACKING
- DISTRIBUTIONS AND CYCLES OF TRACE METALS AND TRACERS.
- ECOSYSTEM STRUCTURE/PRODUCTIVITY AND EXPORT (SELECTED TRACERS) UNDER THE INFLUENCE OF METALS, NUTRIENTS AND PHYSICAL STRAINING

TO UNDERSTAND HOW THE SOUTHERN HEMISPHERE INFLUENCES THE CLIMATE

Submitted and incubating projects

FLATOCOA (Flux over South Ocean)

Is a project to measure atmospheric deposition on Kerguelen Island during two years in order to evaluate atmospheric flux from continent to ocean over South Oceans. MOPITT pictures of CO (mopitt.mov on <http://earth.rice.edu>) suggest pulsed inputs from South America and South Africa to the South Ocean Atmosphere.

AERO-PATAGONIA

is a project coupled to FLATOCOA to sample atmospheric aerosol blowing from Patagonia to Austral Ocean.

DUNE (a DUst experiment in a low Nutrient, low chlorophyll Ecosystem)

is an emerging project that aim at studying the vulnerability and the fate of oligotrophic ecosystems to climatic change and the consequent increase in natural and anthropogenic atmospheric input of nutrients, using mesocosm experiments. Answers to the atmospheric particles migration and dissolution in the surface mixed layer, are expected on i) the marine ecosystem reactions to those inputs, ii) the evolution of the biological response with increasing atmospheric forcing, iii) the role of natural/anthropogenic mixed/combined events and, iv) the intensity of the biological pump induced by atmospheric deposition to oligotrophic waters. Carbon export will be compared to carbon budget in such oligotrophic area.

Large parts for laboratory experiments

The UVECO project (<http://www.com.univ-mrs.fr/LMGEM/uveco/Uvecoanglais/index.htm>) evaluates the effect of UVR on bacterial and phytoplanktonic communities and on photochemical transformations of dissolved organic matter with a special emphasis on the Mediterranean Sea. Experimental work has been undertaken after coastal seawater collection in the Banyuls/mer Institute and at the Center of Oceanology of Marseille France. In these two institutes, atmospheric UV-R are now continuously monitored whereas UV-R penetration in the coastal Sea are regularly measured and freely available. This research also help for a better understanding of the impact of UV light in marine biogeochemical cycles, such as for example, the acclimation of phycoisosomes of *cyanobacterium Synechococcus* to high light (Six et al., *Journal of Bacteriology*, 187, 1685-1694, 2005), or the capability of heterotrophic bacteria to degrade dissolved organic compounds. Furthermore, UVECO allowed to identify new dissolved organic compounds i.e. dicarboxylic acids which are abundantly produced by UV effects on fatty acids (Tedetti et al., *Analytical Chemistry*, 78, 6012-6018, 2006).

BOA (Biogeochemistry of iron at the Ocean-Atmosphere interface; Interactions between atmospheric iron inputs and food web, ANR 2005-2008)

Involves both laboratory experiments and modeling on the iron chemistry at the ocean/atmosphere interface, with a special emphasis on the bioavailability of this metal. It includes a complete characterization of this element in the atmospheric phase and impact studies on the carbon cycle through biological activity (http://www.univ-brest.fr/IUEM/UMR6539/prog_scientif/boa/boa.htm).

General objective: to better understand and quantify how the coupling between the Ocean and the Atmosphere will influence the chemical, physical, and biological processes that govern the biogeochemical cycle of iron and their interactions with food web.

PIs: G. Sarthou (LEMAR/UMR6539) and K. Desboeufs (LISA/UMR7583). Other team members: C. Ridame (LOCEAN), E. Bucciarelli (LEMAR), P. Pondaven (LEMAR), C. Guieu (LOV), O. Aumont (LOCEAN).

Oxygen Minimum Zone (OMZ). The OMZ off Chile induces CO2 and N2O sources, up to 10 times stronger than all previously reported for OMZs.

Assuming that the total ESP OMZ area has a similar behavior than the OMZ off Chile, the potential greenhouse gases (GHG: CO2 + N2O) effect will produce 1.3 GtCeq, equivalent to 20% of the total anthropogenic release; Thus, OMZs should be one of the key feedback mechanism to take into account for the understanding of the GHG variations in the atmosphere; The known expansion of OMZs from glacial to interglacial and predicted for the next decades in response to the climate change could drive to produce a positive feedback increasing both CO2 and N2O in the atmosphere.

Sampling in the OMZ off Chile:
- First simultaneous low CO2, increased Windstress, CO2 (perturbations) and N2O concentrations measurements (high reproducibility) (1998-2000)

