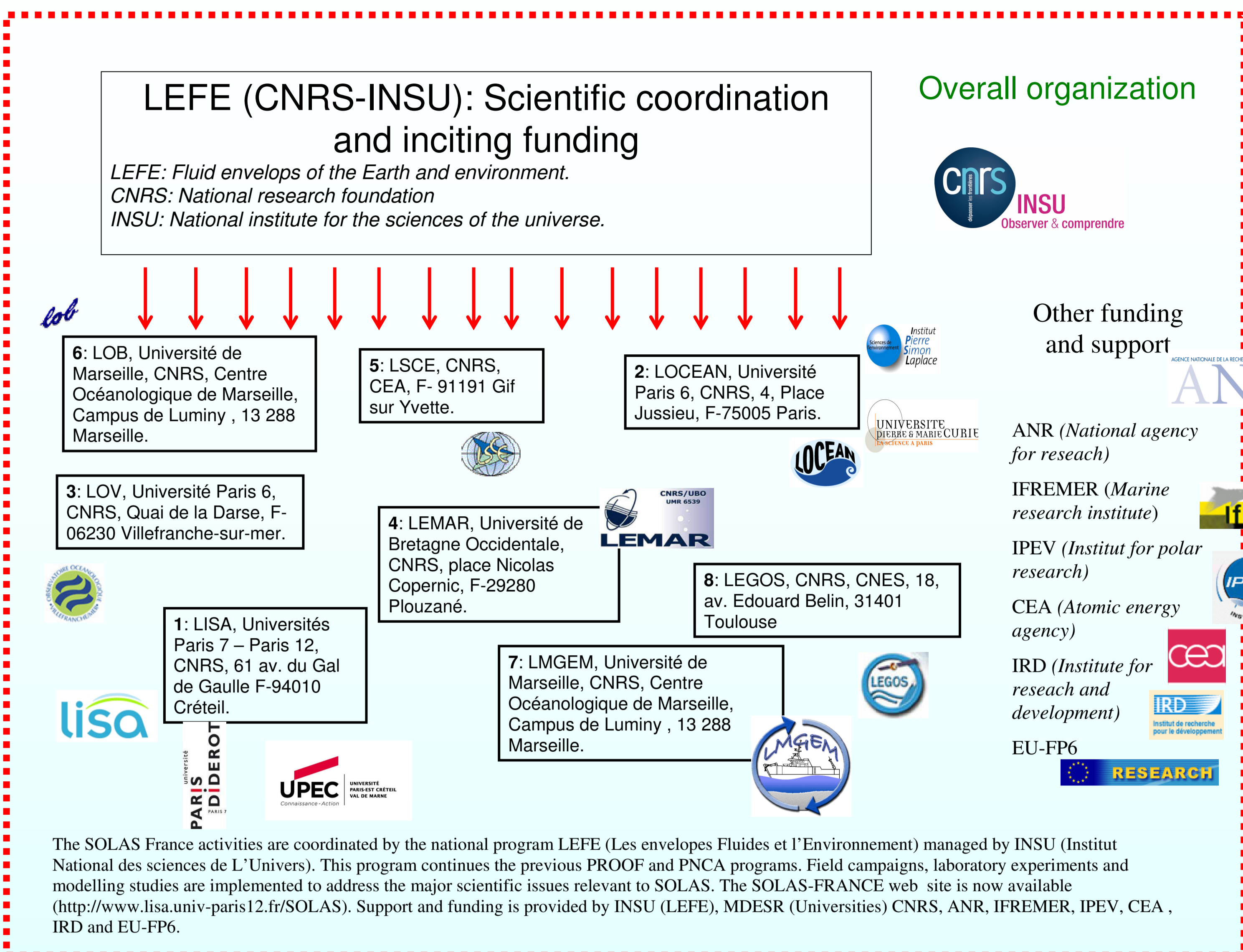
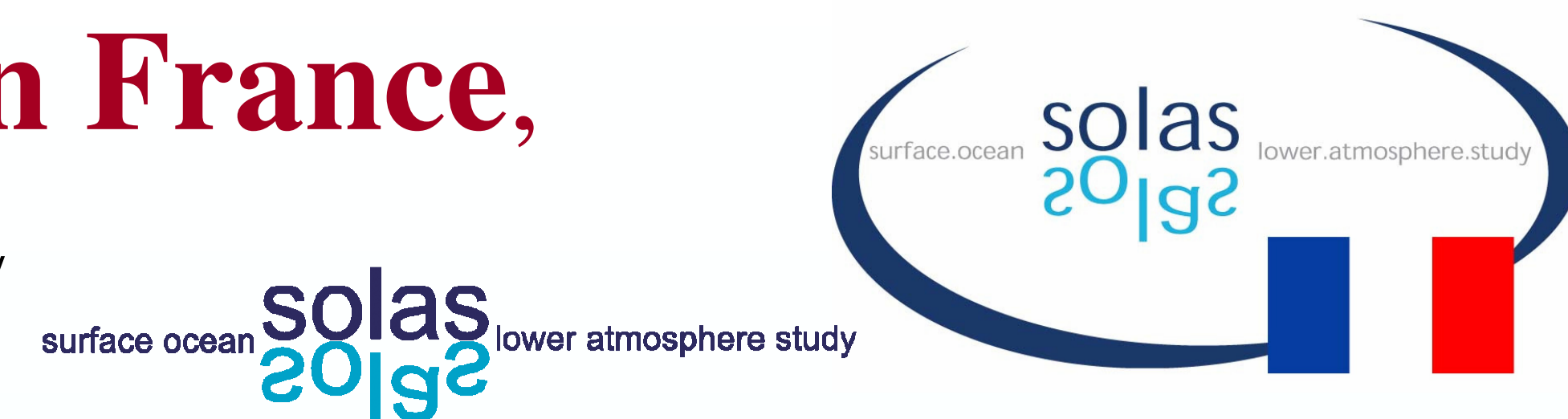


SOLAS France: some aspects of today's research work in France,

Cle Elum (WA, USA) 7 – 10 May 2012 Rémi Losno¹ (losno@lisa.u-pec.fr), Véronique Garçon⁸, Cécile Guieu⁹ and all the french SOLAS community



Tagged event: SOLAS-IGAC France joint meeting: "Chemistry, Transport and Biogeochemistry feedback: Frontiers in Chemistry, Physics and Biology" (29-30 June 2011, Paris) <http://www.lisa.u-pec.fr/SOLAS/2011/>

IGAC (<http://igac.jisao.washington.edu/>) is an international action which can have a common interest with SOLAS: Atmosphere. IGAC is dedicated to studying the chemical composition of the atmosphere and its impact on climate and air quality. The research conducted in SOLAS extends from the physical transport of matter and energy in ocean, water and air, atmospheric chemistry and photochemistry at the interface of these two systems. SOLAS program covers the study of biogeochemical cycles in the ocean-atmosphere interface, which includes: Emissions and the processes of chemical transformation and deposition of gases and aerosols species, Characterization of exchange between the two reservoirs integrating layer processes in Oceanic and Atmospheric boundary, Study the flux of CO₂ and other gases and their radiative link with climate. These themes feed directly on the issues of atmospheric chemistry community in terms of stress sources and sinks of reactive species to short or long life. Improved parameterizations of emissions and deposition of halogenated species, sulfur and nitrogen and aerosols (DMS, marine aerosols, ...) is such a major challenge for both communities to an understanding of the coupled climate pollution in the Earth system. The attendance of the meeting was between 30 and 50 people during the 7 sessions and the guest lecture was given by Alex Baker: "Climatological estimates of atmospheric nutrient deposition to the Atlantic Ocean - problems and potential". Abstract, extended abstracts and some full text presentations are available on SOLAS-France web pages.

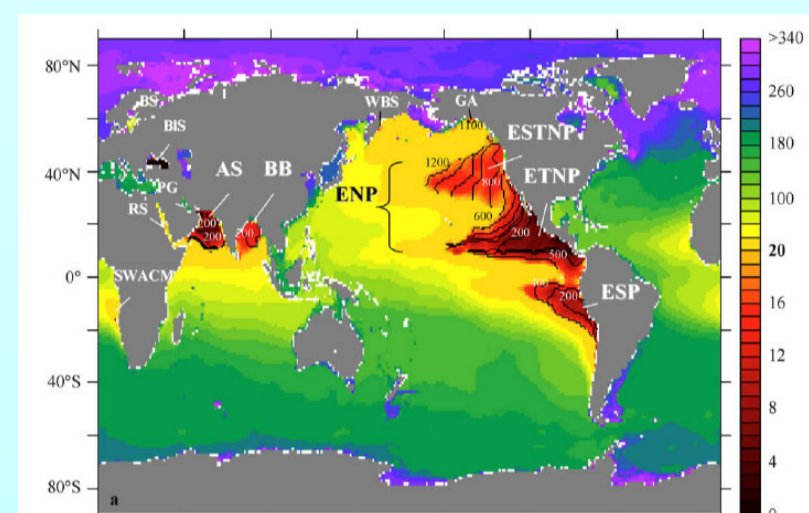
FUTURE Work

AMOP: Activities of research dedicated to the Minimum of Oxygen in the eastern Pacific

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AMOP is a trans-disciplinary project of cruise, gliders deployment, mooring and modeling, associated with an effort of experimental development (instrumentation, sensors), which aims at better understanding the Oxygen Minimum Zones (OMZs) and the ocean deoxygenation. The objective is to carry out a complete O₂ budget taking into account physical (advection/diffusion) and biological (e.g. O₂ consumption/production through bacteria and zooplankton) contributions. The focus is set on the specific OMZ off Peru. See poster session A. Paulmier.



O₂ minimum concentration (in μmol/kg), from Paulmier and Ruiz-Pino (2008).

Joint experiment in 2012: In order to assess the Mediterranean pelagic ecosystem's response to ocean acidification, the Laboratoire d'Océanographie de Villefranche (LOV, UPMC; <http://www.obs-vlfr.fr/LOV/>) will organize two in situ large pelagic mesocosm joint experiments. A first experiment will be conducted in June/July 2012 in Corsica (Stareso station; <http://www.stareso.com/>; Bay of Calvi). Nine in situ mesocosms (54 m³) will be deployed: i.e. 3 controls and 6 high pCO₂ levels (450, 550, 650, 750, 1000, 1250 μatm), for a period of 1 month. The acidification of the mesocosms will be achieved by addition of various amounts of CO₂ saturated seawater using a diffusing system designed and constructed at LOV. A nutrient (N, P and Si) enrichment will be performed approximately at the middle of the experiment in order to stimulate the production of the community. The nine mesocosms will be sampled on a regular basis using several integrating water samplers. An important list of parameters and processes among which primary production, community respiration, bacterial production, calcification, nitrogen fixation etc... will be measured on a regular basis. Contacts: Amélie Sallon (sallon@obs-vlfr.fr), Cécile Guieu (guieu@obs-vlfr.fr) and/or Frédéric Gazeau (f.gazeau@obs-vlfr.fr). Web site of the project: <http://medsea-project.eu/>

South Hemisphere: Dust cycle is only poorly known in the South Hemisphere, and particularly in the Austral sub-antarctic region. East Patagonia seems to be a major source of dust. Sampling and measurements, including chemical properties, of dust will be performed in Patagonia. Aerosol Lidar measurements will contribute to better know the vertical distribution of aerosol from the Patagonian emission areas (Dust From Patagonia).

Red-ox speciation and mixing state of iron in individual African dust particles (Deboudt et al., 2012)

Dark-Field picture and EELS Fe Spectrum Images (Fe SPIM) of a typical Fe containing aluminosilicate particle (Fe SPIM = one EELS Fe spectra acquired per pixel). At the top, the extraction of some EELS Fe L_{2,3} edges of a line acquisition from pixel A to pixel B demonstrates the variation of Fe valence inside the Fe micro-aggregate (diameter ≈ 20 nm) presented in the right Fe SPIM.

MedSea: Mediterranean Sea Acidification under changing climate. The European Mediterranean Sea Acidification in a changing climate (MedSea) initiative is a project funded by the European Commission under Framework Program 7 (<http://medsea-project.eu/>). It involves 16 institutions from 10 countries. MedSea assesses uncertainties, risks and thresholds related to Mediterranean acidification at organismal, ecosystem and economical scales.

FLATOCOA: Atmospheric flux of continental origin over the Southern Ocean.

The endorsed FLATOCOA project ends its experimental milestone on the deposition fields at Kerguelen and Crozet (South Indian ocean, ~50°S). Numerous elemental analyses were made to calculate and validate deposition data of trace metals, especially micronutrients as Fe, Co, Zn, First results show deposition flux do not vary significantly from Crozet to Kerguelen but may exhibit seasonal variability. Average deposition flux over South Indian Southern Ocean is 500 nmol/m²/day of iron, well predicted by models but much larger than those calculated from dry aerosol concentration. The major deposited flux is wet deposition (>90%) and the dry aerosol remaining near ground or sea level is not representative of the scavenged aerosol flying at higher altitude. See poster session A. Heimbürger. Next step of the program is to collect aerosols at source regions to measure its chemical properties and especially solubility. A sampling station was set up at Rio Gallegos (Argentina, 51°S 69°W) to collect new emitted aerosol from Patagonia. See poster session R. Losno

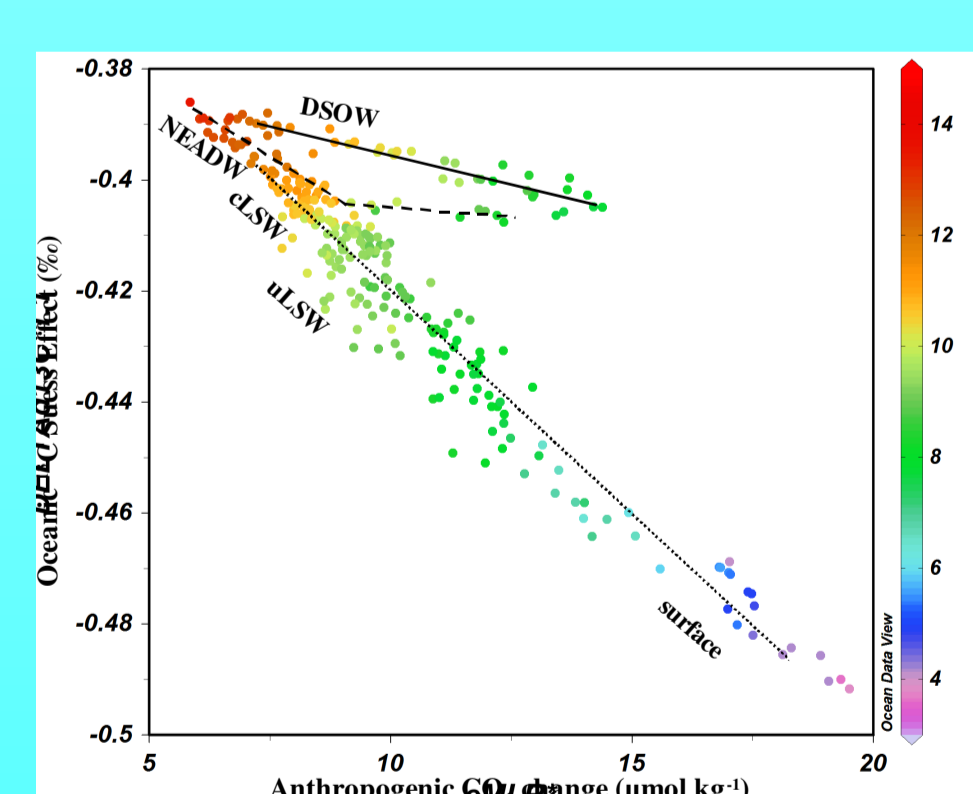
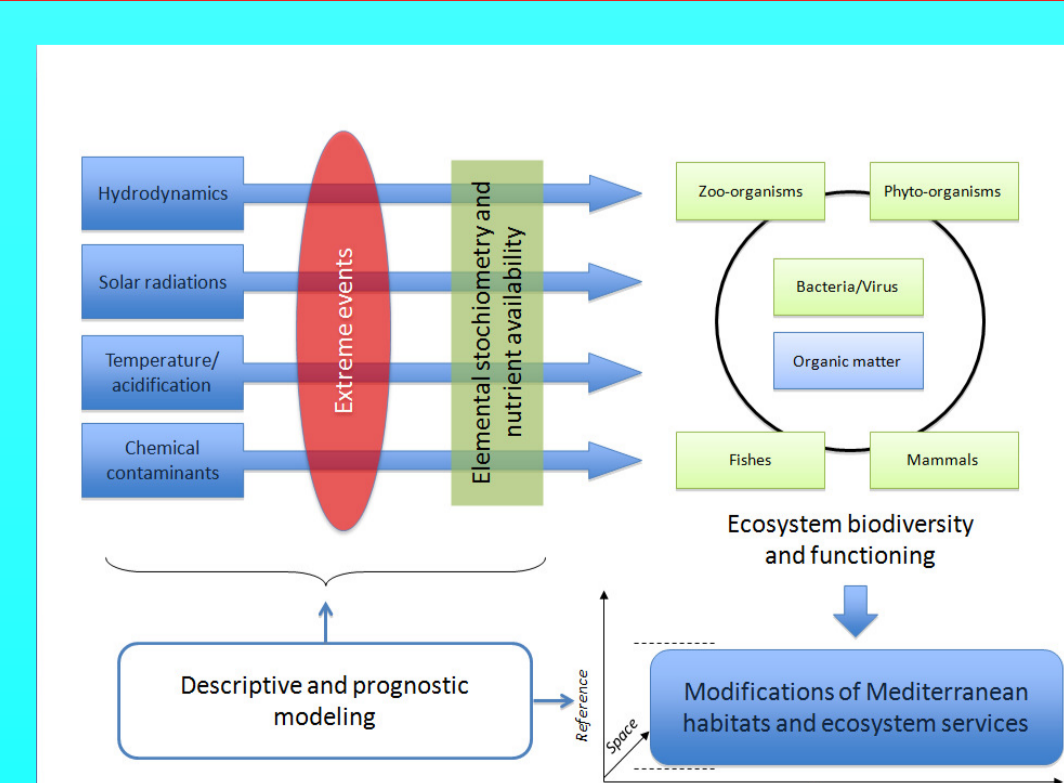
OCEANS¹³C: observe and model δ¹³C variability in the oceans. This program, funded by LEFE/CYBER (CNRS/INSU) will synthesize and analyze all ¹³C data of DIC in the global ocean to provide additional constraints in studies dealing with the oceanic carbon cycle variability and its anthropic component. Web pages are: <http://www.locean-ipsl.upmc.fr/OCEANS13C/>

MaCloud (Marine Aerosol Cloud Interactions)

Marine Ecosystems Response in the Mediterranean Experiment (MERMEX).

MERMEX is dedicated to study the response of Mediterranean ecosystems and biodiversity to climate changes and anthropogenic pressure. MERMEX aims to deepen the current understanding of the Mediterranean marine ecosystems to better anticipate their upcoming evolution. It will focus on the response of ecosystems to modifications of physico-chemical forcing at various scales, both in time and space, linked to changing environmental conditions and increasing human pressure.

Schematic of the key forcing variables influencing the marine ecosystems' diversity and functioning, and use of modeling as an integrative tool at the intersection of the different objects considered in MERMEX. From MERMEX Group, 2011.



Δδ¹³CDICeMLR (Oceanic ¹³C Suess effect, ‰) versus ΔCO₂ eMLR (Anthropogenic CO₂ change calculated from extended MultiLinear Regression, μmol kg⁻¹) and the silicate concentration (μmol kg⁻¹) in the Irminger Basin. The black line symbolize the Denmark Strait Overflow Water (DSOW), the black dashed line show the North East Atlantic Deep Water (NEADW) and the black dotted line point out the classical Labrador Sea Water (cLSW), the upper LSW and the surface. Figure extracted from Racapé et al. 2011. Anthropogenic carbon changes in the Irminger Basin: What do we learn from δ¹³CDIC. Journal of Marine System, GEOTRACE special issue. In review

4 Endorsed projects



DUNE (ANR), ended 2011. In the frame of the DUNE project, two original methods (1- reproducing a real atmospheric deposition event necessary for the controlled seeding in seawater and 2-conception of seeding experiments in large clean mesocosms) have been developed, validated and published and can be used in the frame of other projects

EPOCA (FP7)

FLATOCOA (IPEV)

MERMEX

Publications:

13 in year 2010, 18 in year 2011