



A Annual Report for the year 2011:

SOLAS France

compiled by Rémi Losno, Véronique Garçon and Cécile Guieu

Notes:

Reporting Period is January 2011 – December 2011

Information will be used for: reporting, fundraising, networking, strategic development & outreach

1. Key scientific SOLAS-relevant highlights/findings (you may include figures and references)

Two meetings for SOLAS in France

SOLAS-IGAC France joint meeting: "Chemistry, Transport and Biogeochemistry feedback: Frontiers in Chemistry, Physics and Biology" (29-30 June 2011, Paris)

Year 2011 was a SOLAS-IGAC joint meeting held in June (29th and 30th) in Paris (web site is: <http://www.lisa.u-pec.fr/SOLAS/2011/>). Why a joint SOLAS-IGAC meeting? 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.

International EUR-OCEANS Conference "Ocean deoxygenation and implications for the marine biogeochemical cycles and ecosystems" (24-26 October 2011, Toulouse):

The International EUR-OCEANS Conference "Ocean deoxygenation and implications for the marine biogeochemical cycles and ecosystems" (24-26 October 2011, Toulouse, France) has been organized by the LEGOS (Véronique GARCON, Aurélien PAULMIER, Boris DEWITTE). This Gordon-like Conference (>90 scientists from 19 different countries) has been supported by EUR-OCEANS, IRD, CNRS-INSU, Académie des Sciences, LEGOS, OMP, the French Embassy in Washington DC (USA), IMBER and SOLAS. The conference brought together biological, biogeochemical and physical oceanographers to discuss the very relevant "hot" topic issue of deoxygenation in the world ocean and its implications for ocean productivity, nutrient cycling, carbon cycling, and marine habitats. In particular, OMZs are key regions in the climatic gases budgets. The conference (3 days) provided a science arena (plenary and posters sessions; round table) where to discuss the state of the art of our knowledge on all topics: description and control mechanisms of the deoxygenation and of the OMZ and hypoxia sites; deoxygenation impacts on the biogeochemical cycles, climatic gases, microbial activity and ecosystems; deoxygenation in the past ocean; inter-comparisons of OMZs systems; efforts towards new parameterizations for addressing regional and global modeling challenges. In perspective, the "ocean deoxygenation" community wishes to keep the ball rolling in maintaining tight scientific exchanges (e.g. Special Issue, E-lecture), with the idea of international coordination

(objective, approach) for observations (e.g. O₂), experiments (e.g. protocols) and modeling efforts (e.g. numerical tools) and inter-comparisons of the major OMZs systems. More details about the conference can be found at: <http://www.eur-oceans.eu/conf-oxygen>. An e-Lectures series from the American Limnology and Oceanography is underway on the deoxygenation topic.

Research orientation and SOLAS lobbying

- Two sessions were held at the ASLO Puerto Rico Aquatic Sciences Meeting (“Limnology and Oceanography in a changing world”) during the week of 13-18 February 2011: (1) Session S28 on “*Biogeochemical, Ecological and Physical Dynamics of Eastern Boundary Upwelling Systems*” with Carol Robinson and Véronique Garçon as chairmen. (2) Session S49, entitled ‘*Atmospheric Control of Nutrient Cycling and Production in the Surface Ocean*’ was convened by Cecile Guieu, Doug Wallace, Cliff Law and chaired by Cécile Guieu and Julie La Roche. This session was directly related to the Mid Term Strategy initiative and its objective was to discuss new results on key aspects such as the bioavailability of atmospheric inorganic and organic nutrients, impact on marine community structure, future variation of atmospheric nutrient deposition and its impact on carbon and nitrogen fixation at different time scales. The session consisted of 13 oral presentations and was indeed the occasion to learn from recent research from field work to modeling approaches. (more details in SOLAS Special Reports, Issue 11, SOLAS News, 2011).
- Following up the last SOLAS OSC Conference in Barcelona and the COST Action 735 meeting in Toulouse in March 2010, an ESA call entitled Support to Science Element OceanFlux (ESRIN/AO/1- 6668/11/I-AM) on SOLAS Science was launched early this year. Among the 3 themes selected by ESA, Theme 3 was on upwelling. A proposal on this theme was submitted early April and approved in fall with a KickOff starting date as of November 1st, 2011 with the following PIs and co-PIs: Christoph Garbe, Véronique Garçon, André Butz, Boris Dewitte, Aurélien Paulmier, Joël Sudre, Isabelle Dadou and Hussein Yahia.
- A EUR-OCEANS Flagship on Ocean deoxygenation in Eastern Boundary Upwelling Systems has been awarded to IFM-GEOMAR, Kiel, Germany, LEGOS CNRS and IRD, Toulouse and LOCEAN, Paris, France; with IMARPE, IGP, Lima, Peru as co-partners. A two year post-doctorate, between Toulouse, Lima and Kiel, has been recruited and has started on 1 September 2011.
- 5th International Summer School, 29 August-10 September 2011 in Cargese, France (see <http://www.solas-int.org/summerschool/>), Director : Véronique Garçon

2. Activities/main accomplishments (research projects, cruises, special events, workshops, remote sensing used, model and data intercomparisons etc)

Here is a list of talks given at the SOLAS-IGAC joint meeting. All details, abstracts and some presentations are on the web site (<http://www.lisa.u-pec.fr/SOLAS/2011/>).

Speaker	Title
Emilie Journet	A new mineralogical database for atmospheric dust to estimate soluble iron fluxes to surface ocean.
Cécile Guieu	Atmospheric deposition onto oligotrophic marine systems: new insights from mesocosm studies
Alexie Heimburger	Dust deposition over South Ocean measured at Crozet an Kerguelen Island
Rémi Losno	Mercury total deposition at Kerguelen Island

Véronique Garçon	Climatically-active gases in the Eastern Boundary Upwelling and Oxygen Minimum Zone (OMZ) systems
Anna Laurantou	Variability of CO ₂ fluxes in the NE part of the Kerguelen Plateau (Indian sector of the Southern Ocean) at a seasonal to decadal scale
Joelle Tassel	Presentation of SHOM
Aurélie Colomb	Impact on OCEANIC Frontal ZONES on atmospheric TRACE GASES composition
Sophie Tran	Influences of biology and water masses on the variability of the marine source of CO and NMHC in the Arctic Ocean in summer 2010.
Raluca Ciuranu	Heterogeneous reactivity of atomic chlorine with aerosol particles of atmospheric interest in the marine boundary layer
Barbara Nozière	Biosurfactants on aerosols: a link between biogenic activity and cloud formation?
Karine Sellegri	Sources of marine aerosol from the Mediterranean sea as a function of the sea water biochemical composition and photochemical conditions: the SAM project
Marc Mallet	Impact of sea-surface aerosol radiative forcing on the oceanic primary production
Elvira Pulido	Dust pulses enhance bacterial mineralization of dissolved organic matter in P-depleted waters : results from mesocosm experiments in the Mediterranean Sea (DUNE project)
Thibaud Wagener	Temporal Changes in trace metal concentrations during an artificial dust deposition to Large Mesocosms (DUNE-2 Experiment)
Virginie Racapé	Anthropogenic carbon changes in the North Atlantic Subpolar Gyre: what do we learn from $\delta^{13}C$?
Nathalie Lefèvre	The role of the salinity on the CO ₂ variability in the western tropical Atlantic
Jacqueline Boutin	High frequency variability observed by CARIOCA drifters in Winter - A starting point for future studies
Lilliane Merlivat	Biological net community production (NCP) of carbon and oxygen based on high frequency measurements of fCO ₂ and O ₂ on a Pirata mooring in the tropical Atlantic

Many research projects relevant to SOLAS science are running in 2011:

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

The AMOP project “Activities of research dedicated to the Minimum of Oxygen in the eastern Pacific (Peru)” aims to carry out a complete O₂ budget taking into account physical (advection/diffusion) and biological (O₂ consumption/production through bacteria, phytoplankton and zooplankton) contributions. The transdisciplinary approach is based on: i) a 30-day cruise with two ships in simultaneous (L’Atalante from IFREMER and the Olaya from IMARPE), associated with gliders and Argo floats experiments; ii) a mooring (> 3-yr) coupling water column and sediments; iii) a modeling platform in order to assist the interpretation of our full data set (from *in vitro* to *in situ* and satellite observations) at different spatio-temporal scales. AMOP, led by the LEGOS (PI: A. PAULMIER), involves 13 research units in France, 2 Institutes (7 units) in Peru and 6 other countries acting as an international consortium (90 participants). Presently, the AMOP project is approved and labelled by LEFE-CYBER and LEFE-GMMC (INSU), considered as a priority for Fleet (CNFH) and Glider commissions, and submitted to the ANR (01/2012). Contact: Aurélien Paulmier, LEGOS, Toulouse.

MedSea: Mediterranean Sea Acidification under changing climate

The European Mediterranean Sea Acidification in a changing climate (MedSea) initiative is a project

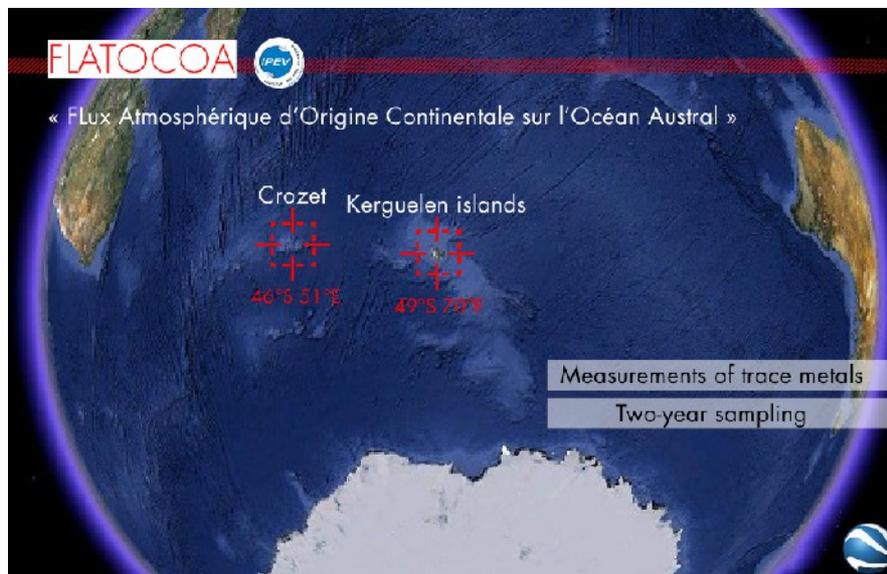
funded by the European Commission under Framework Program 7 (<http://medsea-project.eu/>). It involves 16 institutions from 10 countries. MedSeA assesses uncertainties, risks and thresholds related to Mediterranean acidification at organismal, ecosystem and economical scales. It also emphasizes conveying the acquired scientific knowledge to a wider audience of reference users, while suggesting policy measures for adaptation and mitigation that will vary from one region to another.

MedSeA project objectives: i) identify where the impacts of acidification on Mediterranean waters will be more significant taking into account the sequence of causes and effects, from ocean chemistry through marine biology to socio- economic costs, ii) generate new observational and experimental data on Mediterranean organism and ecosystem responses to acidification and fed into existing fine-scale models of the Mediterranean Sea that are modified to better represent key processes, and then used to project future changes. The MedSeA focuses on a selected set of key ecosystem and socio-economic variables that are likely to be affected by both acidification and warming, studying the combination of both effects through ship-based observations, laboratory and mesocosm experiments, physical-biogeochemical-ecosystem modeling, and economical analyses, and iii) provide best estimates and related uncertainties of future changes in Mediterranean Sea pH, CaCO_3 saturation states, and other biogeochemical-ecosystem variables, assessing the changes in habitat suitability of relevant ecological and economically-important species.

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, $\sim 50^\circ\text{S}$). 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 $500 \text{ nmol/m}^2/\text{day}$ 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.

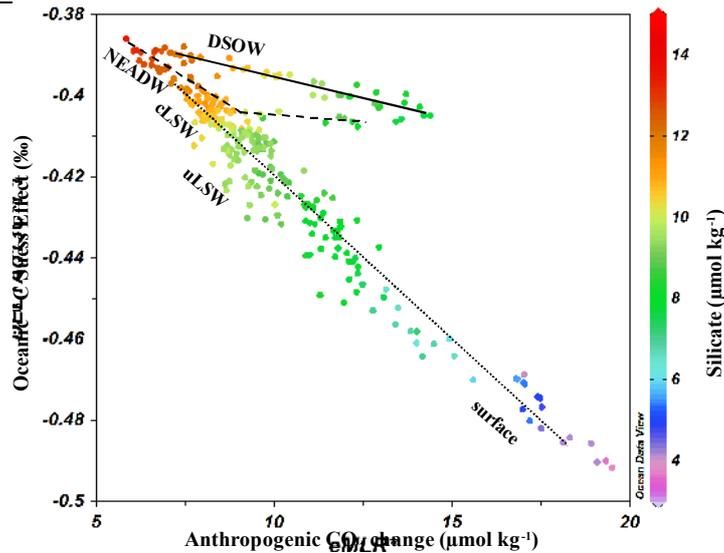
Next step of the program is to collect aerosols at source regions to measure its chemical properties and especially solubility. A sampling station was set up at Rio Gallegos (Argentina, 51°S 69°W) to collect new emitted aerosol from Patagonia. Contact: Rémi Losno, LISA, Paris.



Total deposition measurement sites for FLATOCOA program.

OCEANS¹³C: observe and model $\delta^{13}\text{C}$ variability in the oceans.

This program, funded by LEFE/CYBER (CNRS/INSU) will synthesize and analyze all ^{13}C 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/>



$\Delta\delta^{13}\text{C}_{\text{DIC}}^{\text{eMLR}}$ (Oceanic ¹³C Suess effect, ‰) versus $\Delta\text{C}^{\text{O eMLR}}$ (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 $\delta^{13}\text{C}_{\text{DIC}}$. Journal of Marine System, GEOTRACE special issue. In review

MaCloud (Marine Aerosol Cloud Interactions): aims to build on recent advances in marine aerosol formation processes. In addition to coastal iodine-driven nucleation and growth events, it has been recently established that open ocean particle production and growth is quite frequent over the NE Atlantic and appears to be driven by organics. This project aims to better characterize these coastal and open ocean events. Further, aerosol mass spectrometry has revealed unique marine aerosol organic characteristics with effective cloud nucleating properties despite low growth factors. The project aims to characterize the growth factor and CCN activity of varying enrichments of sea-spray aerosol. Particularly, LaMP has contributed to a better quantification of hygroscopic and CCN properties of marine aerosols by using a novel VT-CCN instrument. The VT-CCN instrument was used to infer the ability of marine particles to form cloud droplets, with a focus on their volatile organic fraction during an intensive field campaign at Mace Head, Ireland, in May 2011. During the campaign, open ocean nucleation events and primary organic formation events occurred regularly. The measured marine aerosol hygroscopicity parameter “kappa” was relatively high: average values between 0.5 and 0.7 were defined, depending on the method of analysis and the particle size. The more volatile fraction of the aerosol is typically less CCN-active and tends to hinders aerosol CCN-activation. The dependence of this property on the origin of the organics emitted from the ocean surface (primary during bubble bursting processes or secondary during nucleation) is still to be determined.

Contact: K. Sellegri, (LaMP)

Coll. : C. O’Dowd (NUYG, Irland, G. Mc Figgans, UMIST, UK, T. Petaja”, Univ. Helsinki; J. Smith, U. Boulder)

New projects are rising:

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. It proposes a comprehensive, integrated approach considering the continuum between the coastal

zone and the open sea and its interfaces, including ocean-continent, ocean-atmosphere and water-sediment to precisely describe and model the current state of the Mediterranean ecosystems and the complex interactions existing between the environmental and human factors. MERMeX White Book was published in 2011 in *Progress in Oceanography* – 95 authors, 130 pages, 630 references.

The MERMeX group, 2011, Marine Ecosystems Responses to climatic and anthropogenic forcing in the Mediterranean, Progress In Oceanography, Volume 91, Issue 2, October 2011, Pages 97-166

The project is divided into several thematic approaches that were grouped into five work packages (WP): 1- Impact of hydrodynamic changes on Mediterranean biogeochemical budgets (WP1), 2- Ecological processes; biogeochemistry and food web interactions (WP2), 3-Land-ocean interactions including extreme events (WP3), 4-Natural and anthropogenic air-sea interactions (WP4), 5- Ecosystem based management (WP5). Each WP is led by 2-3 coordinators and includes several actions that should be funded through different funding agencies [MISTRALS, ANR, FRB, UE...]. In 2011 MERMeX was endorsed by SOLAS as mainly 2 WPs are directly relevant to SOLAS thematics (WP4 and WP2). Among other actions, in 2011, the MERMeX group has been working on setting up a special observation period (SOP) representing an unprecedented intensive effort in the observation in the NWM. This project is currently submitted for fundings. More details on activities in 2011 can be found in the special report (see SOLAS endorsed projects).

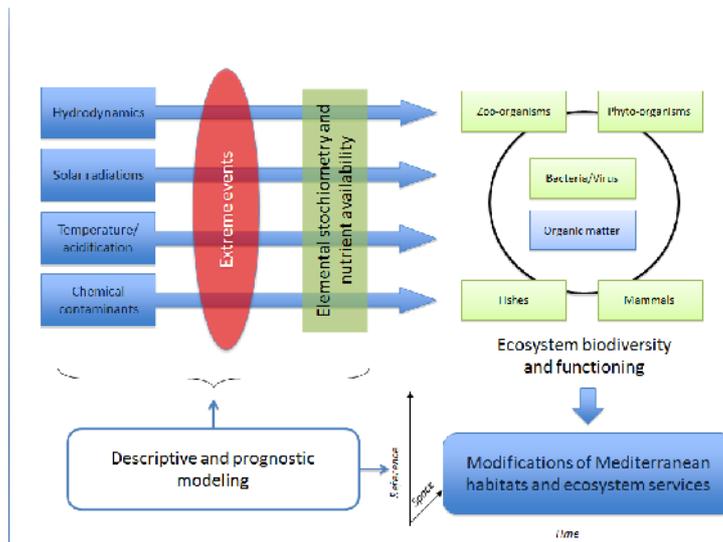


Figure 1. Schematic of the key forcing variables influencing the marine ecosystems' diversity and functioning, and use of modeling as an integrative tool at the intersection of the different objects considered in MERMeX. From MERMeX Group, 2011.

As part of the MISTRALS (Mediterranean Integrated Studies at Regional And Local Scales) French program (www.mistrals-home.org), MERMeX was presented during the International MISTRALS Workshop –Malta 30 March to 1st April 2011-, which brought together nearly 200 participants -by invitation- involved in the Mediterranean question, projects holders and potential developers, scientists and policy makers. Web site MERMeX: <http://mERMEX.com.univ-mrs.fr/>.

VAHINE which will study the fate of newly fixed N by *Trichodesmium* in the pelagic food web in the South West Pacific.

Former SOLAS projects are in their synthesis phase of data interpretation:

Saharan dust : more than a simple fertilizer for the clear waters of the Mediterranean Sea

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 (for example, the DUNE mesocosms are going to be used in the frame of the MedSea European project on Mediterranean acidification; other projects related to marine biogeochemistry at the atmosphere-ocean interface based on that tool are currently being submitted).

Main results: Chemical and biological changes, along with modification of the dynamic of particles following a dust event have been followed and the multidisciplinary results obtained are bringing new insights regarding the role of atmospheric deposition on oligotrophic ecosystem and carbon export. Among those results, we have shown that the cycles of elements of biogeochemical interest (nutrients, metals) are modified by the atmospheric deposition; that new nutrients introduced are uptake by biota very rapidly; that there is a competition for the new nutrients and that this competition is in favor for heterotrophic bacteria; that among phytoplankton, diazotrophs – although only responsible for few percent of the induced new production - are well stimulated by atmospheric input; that particulate carbon export is in part due to aggregation processes between organic matter and lithogenic particles. All those results indicate that the role of atmospheric deposition on oligotrophic area cannot be seen only like a simple fertilization effect but, induce also a significant export of particulate organic carbon to the deep ocean, through aggregation processes.

Scientific outputs. The DUNE project was officially ending recently (July 2011) and a large number of papers in international journals are already published, others are in preparation and the group decided during a meeting in october 2011 to write a Special Issue devoted to the DUNE project. A series of 14 papers was proposed. In 2011, several oral presentations specific to the DUNE project were done during the ASLO conference in Puerto Rico in Feb. 2011, during the SOLAS-IGAC France joint open meeting in Paris in June 2011 (see details in DUNE web site).

Web site of the project: <http://www.obs-vlfr.fr/LOV/DUNE/>

3. Human dimensions (outreach, capacity building, public engagement etc)

A short movie made by Alexie Heimburger and Fanny Mazoyer entitled "Qui sème la poussière récolte le phytoplancton", was awarded and available here for downloading or visualization:

<http://www.science.gouv.fr/fr/telescience/bdd/res/4336/qui-seme-la-poussiere-recolte-le-phytoplancton/>

This movie outreaches a large public to the methods in use to collect and analyze dust in remote oceanic areas.

4. Top 10 publications in 2011 (Reports, articles, models, datasets, products, website etc)

Alderkamp, A-C., Garçon, V., de Baar H.J.W., and Arrigo, K., 2011, Short-term photoacclimation effects on photoinhibition of phytoplankton in the Drake Passage (Southern Ocean), *Deep Sea Research Part I*, 9, 58, 943-955, doi:10.1016/j.dsr.2011.07.001.

Bressac M., C. Guieu, D. Doxaran, F. Bourrin, G. Obolensky and JM Grisoni, 2011, A mesocosm experiment coupled with optical measurements to observe the fate and sinking of atmospheric particles in clear oligotrophic waters, *Geo-Marine Letters*, DOI 10.1007/s00367-011-0269-4.

Raluca Ciuraru, Sylvie Gosselin, Nicolas Visez and Denis Petitprez, Heterogeneous reactivity of chlorine atoms with sodium chloride and synthetic sea salt particles, *Phys. Chem. Chem. Phys.*, 2011, 13, 19460–19470.

Fahrbach, E., H.J.W. de Baar, V.C. Garçon and C. Provost, 2011, Introduction to physics, carbon dioxide, trace elements and isotopes in the Southern Ocean: The Polarstern expeditions ANT-XXIV/3 (2008) and ANT-XXIII/3 (2006), *Deep Sea Research Part II*, 58, 25 – 26, 2501-2509, doi:10.1016/j.dsr2.2011.07.008.

Gattuso J.-P., Bijma J., Gehlen M., Riebesell U. & Turley C., 2011. Ocean acidification: knowns, unknowns and perspectives. In: Gattuso J.-P. & Hansson L. (Eds.), *Ocean acidification*, pp. 291-311. Oxford: Oxford University Press.

Gattuso J.-P. & Hansson L., 2011. Ocean acidification: history and background. In: Gattuso J.-P. & Hansson L. (Eds.), *Ocean acidification*, pp. 1-20. Oxford: Oxford University Press.

Jonca, J., V. Leon-Fernandez, D. Thouron, A. Paulmier, M. Graco, and V. Garçon, 2011, Phosphate determination in seawater: Toward an autonomous electrochemical method, *Talanta*, 87, 161-167, doi:10.1016/J.talanta.2011.09.056.

Laghass M., S. Blain, M. Besseling, P. Catala, C. Guieu, I. Obernosterer, 2011, Impact of Saharan dust deposition on the bacterial diversity and activity in the NW Mediterranean Sea. *Aquatic Microbial Ecology*, vol 62: 201-213, 2011.

Lourantou, A., and N. Metzl (2011), Decadal evolution of carbon sink within a strong bloom area in the subantarctic zone, *Geophys. Res. Lett.*, 38, L23608, doi:10.1029/2011GL049614

Monteiro, P.M.S., Dewitte, B., Scranton, M.I., Paulmier, A., van der Plas, A., 2011, The role of open ocean boundary forcing on seasonal to decadal-scale variability and long-term change of natural shelf hypoxia, *Environmental Research Letters*, 2011, 6, 18pp, doi:10.1088/1748-9326/6/2/025002.

Paulmier, A., Ruiz-Pino, D. and Garçon, V., 2011, CO₂ maximum in the oxygen minimum zone (OMZ), *Biogeosciences*, 8, pp.239-252, doi:10.5194/bg-8-239-2011

Raimund, S., Quack, B., Bozec, Y., Vernet, M., Rossi, V., Garçon, V., Morel, Y., and Morin, P., 2011, Sources of short-lived bromocarbons in the Iberian upwelling, *Biogeosciences*, 8, 1551-1564, doi:10.5194/bg-8-1551-2011.

Ridame, C., Le Moal, M., Guieu, C., Ternon, E., Biegala, I., L'Helguen, S. and Pujo-Pay, M., 2011, Nutrient control of N₂ fixation in the oligotrophic Mediterranean Sea and the impact of Saharan dust events, *Biogeosciences*, 8, 2773–2783, 2011

Smith S. V. & Gattuso J.-P., 2011. Balancing the oceanic calcium carbonate cycle: consequences of variable water column Ψ . *Aquatic Geochemistry* 17:327-337.

Ternon E. C. Guieu, C. Ridame, L'Helguen, S, Catala, P., 2011, Longitudinal variability of the biogeochemical role of Mediterranean aerosols in the Mediterranean Sea, *Biogeosciences*, 8, 1067–1080, 2011

The MERMEX group, 2011, Marine Ecosystems Responses to climatic and anthropogenic forcings in the Mediterranean, *Progress In Oceanography*, Volume 91, Issue 2, October 2011, Pages 97-166

Ye Y., Wagener T., Volker C., Guieu C., Dieter A. Wolf-Gladrow D.A., 2011, Dust deposition: iron source or sink? A case study, *Biogeosciences*, 8, 2107–2124, 2011

Zeebe R. E. & Gattuso J.-P., 2011. Chemistry of the seawater carbonate system. In: Gattuso J.-P. & Hansson L. (Eds.), *Ocean acidification*, pp. 2-3. Oxford: Oxford University Press.

5. International interactions and collaborations (including contributions to international assessments such as the IPCC, links with observation communities etc)

6. Goals, priorities and plans for future activities/events

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 μ atm), 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. A total of 25 persons, originating from 6 different European countries (Spain, Greece, Italy, UK, Belgium and France) will be involved in the Corsica experiment. 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.



A Annual Report for the year 2011:

Upwelling off Peru : AMOP Experiment

A 30-day cruise is planned in December 2012 or early 2013 with two ships in simultaneous (R/V L'Atalante from IFREMER and R/V the Olaya from IMARPE), associated with gliders and Argo floats experiments. A mooring deployment (> 3 yr) will also be performed which will allow to couple water column processes with the sediments. (Contact : aurelien.paulmier@legos.obs-mip.fr)

7. Other comments

Acknowledgements: University Paris7 Denis Diderot and CNRS/INSU to support the join SOLAS-IGAC meeting in june 2011.