

MERMEX

compiled by Cecile Guieu, Xavier Durieu de Madron and Richard Sempéré

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)

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 is focusing 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 (figure 1). 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.

Mermex Group, F., 2011 Marine Ecosystems Responses to climatic and anthropogenic forcings in the Mediterranean. Progress in Oceanography, 2, 91: 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 currently funded or submitted for fundings through different funding agencies [MISTRALS, ANR, UE...].

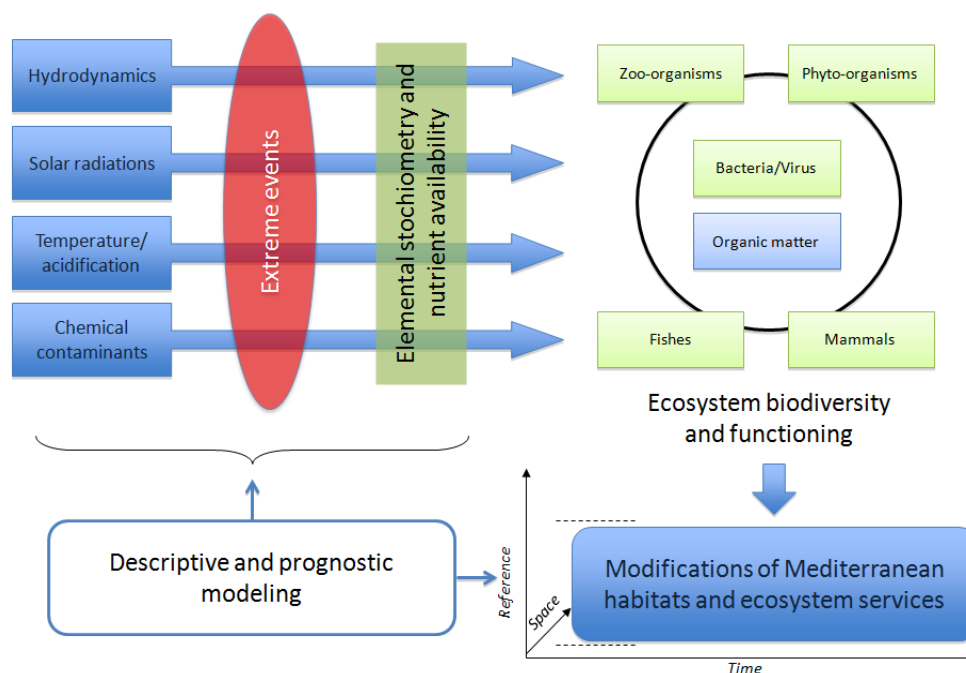


Figure 1. Schematic of the key forcing variables influencing the marine ecosystems' diversity and functioning, and use of modeling as an integrative tool at the intersection of the different objects considered in MERMEX.

From MERMEX Group, 2011.

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

The activities of MERMEX deal in part with natural and anthropogenic air-sea interactions (those activities being the WP4 coordinated by Frédéric Gazeau (gazeau@obs-vlfr.fr), LOV/OSU Villefranche/Mer, Karine Desboeufs (Karine.Desboeufs@lisa.univ-paris12.fr), LISA/IPSL Paris and Marc Mallet (Marc.Mallet@aero.obs-mip.fr), LA/OMP Toulouse. Those projects are strongly connected to IGBP-SOLAS programs and operationally connected to CharMex (The Chemistry-Aerosol Mediterranean Experiment; <http://charmex.lsce.ipsl.fr>) and MOOSE (Mediterranean ocean observing system on environment. <http://www.insu.cnrs.fr/co/expeditions-et-campagnes/moose-mediterranean-ocean-observing-system-on-environment>)

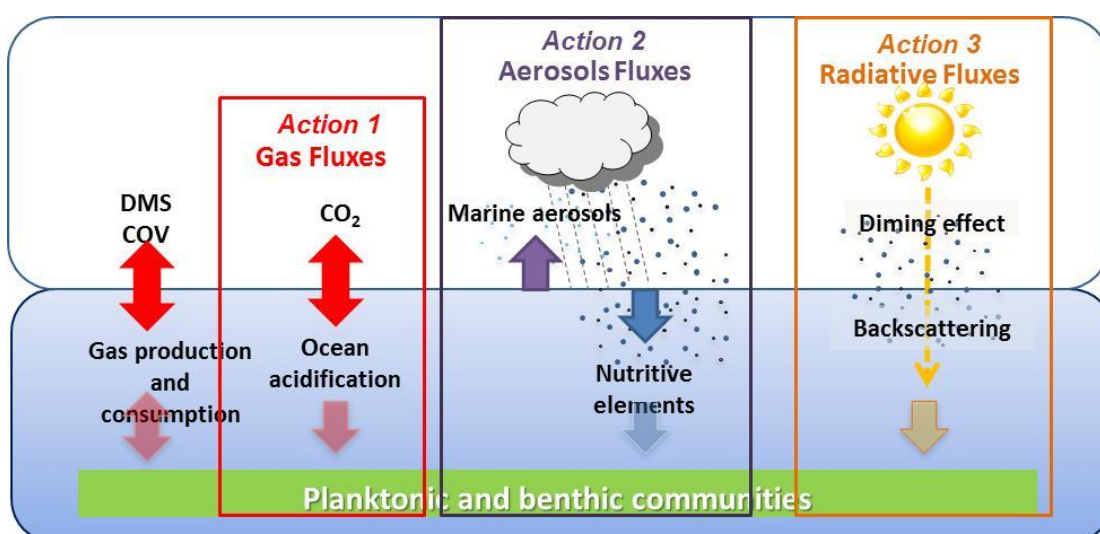


Figure 2. Main MERMEX activities relevant to SOLAS : several actions concern the assessment of gas fluxes (CO₂) and acidification and the impacts on ecosystems and biogeochemical cycles and strongly connected with the FP7-MedSea project. A large project on the assessment of fluxes of atmospheric particles to the air-sea interface and their impact on biogeochemical cycles have been recently submitted for funding (Collaboration with CHARME). The influence of solar radiations on biogeochemical cycles is studied in MERMEX and includes the potential effect of aerosol and tropospheric ozone attenuation on marine ecosystems.

MERMEX projects related to actions 1, 2 and 3 in figure 2:

- **CALIBORON**: past pH reconstructions in the Mediterranean Sea based on the boron isotopic signature in biogenic carbonates – calibration using Mediterranean mussels and corals (started in 2011)
- **CARBORHONE**: pCO₂ and DIC dynamics in the Rhone estuary and the Gulf of Lions (started in 2011)
 - 2 field cruises in spring and fall 2011
 - 2 field cruises planned in summer and winter 2012
- **PHOTOMED**: Metabolic and structural changes of the bacterial community in response to the phototransformations of dissolved and particulate organic matter in Mediterranean Sea

Other relevant projects with strong links with Mermex

- **MedSeA** (EU FP7, started in February 2011): Mediterranean Sea Acidification in a changing climate

- Joint experiment using large pelagic mesocosms in Corsica (summer 2012) and in Crete (summer 2013) – Effects of ocean acidification on planktonic communities in oligotrophic areas.
- Effects of ocean acidification and warming on the development and physiology of the Mediterranean mussel (collaboration with project CALIBORON).
- Effects of ocean acidification and warming on the development of Mediterranean pteropods and foraminifera.

• **eFOCE** (BNP-Paribas, started in September 2011): European Free-Ocean Carbon dioxide Enrichment experiments

- Development of benthic experimental systems to study the effects of ocean acidification of benthic communities in the field (Bay of Villefranche, Mediterranean Sea)

• **ANR Blanc SAM (Mermex-Charmer)**, started in 2012): Quantification and determination of marine organic aerosol fluxes as a function of trophic conditions

• **Site Frioul**: Radiative measurements in the air and in the sea

- 2011: Installation of the instrumented buoy and first measurements

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

The actions mentioned above represented an activity of 58 man month in 2011, including several PhD students and undergraduate students.

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

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

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

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/>

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

In 2012, the SOLAS-related projects detailed above will be continued and some new one will start. Among those, a proposal was recently submitted to ANR:

ANR FARE (blanc, Mermex-Charmer, submitted in 2012): Study of the relation between atmospheric deposition fluxes and the pool of seawater nutrients - anticipate the future impact of dust deposition on nutrient cycles.

Another action will concern the setting up of a proposal concerning a field cruise entitled PEAcEtIME “ProcEss studies at the Air-sEa Interface: a Mediterranean Experiment” (joint experiment between MERMEX and ChArMEX was discussed in 2011 and planned in 2015. This project will be submitted for presentation at the 2012 OSC to call for international collaboration on that “SOLAS cruise” in the Mediterranean.

7. Other comments

MERMEX is part of the French MISTRALS program initiated in 2008 and internationally launched in Malta meeting in March 2011. MISTRALS is a decennial meta-program for systematic observations and research dedicated to the understanding of the Mediterranean Basin environmental process under the planet global change. Its aim is to anticipate the behavior of this system over a century, from an interdisciplinary analysis conducted over the 2010-2020 decade. The underlined ultimate goal of this meta-program is to predict the evolution of habitable conditions in this large eco-anthropo-system and to propose policies and adaptative measures that would mitigate and optimize them. MISTRALS is bringing together the main French research organizations and is destined to be shared by co-construction and aggregation of new topics and issues with all Mediterranean countries. Indeed, it is now stretching to other countries in Europe and throughout the Mediterranean Basin, according to a bottom-up approach.

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