

Submitting your research for SOLAS endorsement (* required fields)

1. Summary

Title of the research project* Marine Ecosystems Response in the Mediterranean Experiment (MerMex) <http://mERMEX.com.univ-mrs.fr/>

Status* Funded Submitted Proposed

Is your project part of a larger national/regional programme?

If yes, please give details and outline any relation to other IGBP, SCOR, WCRP or iCACGP projects

MerMex is a component of the MISTRALS French national program (Mediterranean Integrated Studies at Regional And Local Scales, <http://www.mistrals-home.org/>)

2. Contact Information

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3. Details of the Project

Summary / Abstract of Project* The Mediterranean Sea is unique and evolves rapidly, with large interannual to decadal variability and abrupt fluctuations. The semi-enclosed nature of the Mediterranean, together with its smaller inertia compared to large oceans, makes it more sensitive to natural variations in fluxes (between, e.g., the air and sea, freshwater and the sea) and water flows. These natural pressures interact with the trend of increasing human activities in the coastal regions, making the sea even more sensitive. French biogeochemical oceanographers have raised the issue of Mediterranean marine ecosystems response to changes in physical, chemical and socio-economical forcings induced by climate change and by growing anthropogenic pressures. This debate has focused on the current understanding of the effects of key natural and anthropogenic forcings on ecosystems (from coastal zones to open-ocean, from pelagos to benthos) and organisms (from viruses to fishes and mammals). It has further aimed to identify knowledge gaps and to contribute to the emergence of a large integrated research project, the Marine Ecosystems' Response in the Mediterranean Experiment (MerMex). There are still considerable uncertainties in our understanding of the complex interactions between the different forcings and their impacts on Mediterranean ecosystems. There is therefore a strong need to reach a mechanistic understanding of the relevant processes in order to predict changes in ecosystems. These changes clearly influence the cycles of major biogenic elements, biodiversity, fisheries, invasive species and ultimately have socio-economic impacts. There is a need to develop a comprehensive and holistic approach to address particular questions at the proper spatial and temporal scales. The most relevant issues for the future of marine ecosystems in the Mediterranean are listed here and constitute the main research axes that MERMEX propose to tackle in the next 10 years:

- How would changes in stratification and destratification mechanisms and in the overall thermohaline

circulation alter the spatio-temporal distribution of nutrients and their budgets? More specifically, what is the influence of dense water formation on the spatial and temporal variability of biogenic elements, the triggering of planktonic blooms, and the sequestration of biogenic elements, particularly carbon)?

- How would likely changes in nutrient inputs from physical transport, rivers, the atmosphere (including extreme events) and straits affect the nutrient availability in the photic layer of the Mediterranean Sea, the relative abundance of primary producers, and the higher trophic levels?
- What are the typical concentrations of chemical contaminants in the various water masses of the Mediterranean? What are their sources and sinks (e.g., atmosphere versus rivers, especially for organic contaminants) and seasonal variations?
- What is the role of the land-sea boundary (rivers, large cities, groundwater discharge) in the material balance of the Mediterranean Sea (carbon, nutrient, contaminants)?
- Will changes in the frequency or magnitude of extreme events lead to the dispersion or dilution of carbon, nutrients, and pollutants or, in contrast, to their accumulation in specific compartments?

- What will be the impact of changes in light radiation on biogeochemical processes, including primary production, POC-degradation processes, and degradation of DOM and pollutants?
- What is the actual rate of change of both temperature and pH in the Mediterranean Sea? How will these variables evolve and impact the Mediterranean solubility pump? What impacts will they have on the functioning of pelagic and benthic Mediterranean ecosystems?
- Will the functioning of mesopelagic and deep sea Mediterranean ecosystems be strongly affected by changes originating from surface ecosystem production and vertical fluxes or by changes in the hydrodynamics of the intermediate and deep waters?
- As the surface seawater warms, will the planktonic community of the pelagic ecosystem become dominated by nanophytoplankton and jellyfish, as suggested by several recent studies?

Key words of project* Mediterranean Sea, climate change, anthropogenic pressure, atmosphere-ocean-continent coupled system, land-sea interactions, natural and anthropogenic air-sea interactions, gas fluxes, solar radiation, warming, acidification, hydrodynamics, chemical contaminants, trace elements, groundwater discharges, atmospheric deposition, extreme events, Saharan dust, heat waves, nutrients, stoichiometry, ecological processes, coastal and shelf ecosystems, pelagic realm ecosystems, meso and deep sea pelagic ecosystems, biodiversity, modeling, ecoregionalisation, multidisciplinary research, laboratory and in situ experiments, long-term observations.

Relevant SOLAS Activities (*tick all that apply*)*

FOCUS 1	FOCUS 2	FOCUS 3	CROSS-CUTTING ACTIVITIES
1.1 Marine Particle Emissions <input type="checkbox"/>	2.1 Air-Sea Interface <input checked="" type="checkbox"/>	3.1 Air-Sea CO ₂ Fluxes <input checked="" type="checkbox"/>	Modelling <input checked="" type="checkbox"/>
1.2 Trace Gas Emissions <input type="checkbox"/>	2.2 Oceanic Boundary Layer <input type="checkbox"/>	3.2 Surface Layer Carbon <input checked="" type="checkbox"/>	Remote Sensing <input checked="" type="checkbox"/>
1.3 Dimethylsulphide & climate <input type="checkbox"/>	2.3 Atmospheric Boundary Layer <input checked="" type="checkbox"/>	3.3 Air-Sea Flux of N ₂ O and CH ₄ <input type="checkbox"/>	Time Series <input checked="" type="checkbox"/>
1.4 Iron & Marine Productivity <input checked="" type="checkbox"/>			Palaeo-SOLAS <input type="checkbox"/>
1.5 Nitrogen cycling <input checked="" type="checkbox"/>			

4. Data

Will new data be collected as part of this project?* Yes No

Where will this data be reported / archived?* specific actions within the Mermex project will have their own database but we will ensure a common portal on the MerMEX website: <http://mermex.com.univ-mrs.fr/>

When will your data be submitted?* starting 2012

5. Budget

Start date and end date of funding* 2010 until 2020

Total funding secured to date* 3.1 Meuros for 2011-2013

Total proposed funding* 2.6 M euros/year

Sources of funding* Agence Nationale de la Recherche, European Commission Framework Programme, INSU, Mistrals, Regional programs

6. Submission

Please indicated whether you have contacted your national representative?

Yes No

If no, are you happy for us to send the details that you submit to your national representative?

Yes No

If not, please clarify why

If you do not have a national representative, please tick this box

Please email this document with the 'Subject' as 'SOLAS Project Endorsement' to solas@uea.ac.uk