

## Project Endorsement Form

### 1. PROJECT TITLE

Full title	Physical study of the Northwestern Indian Ocean and of the adjacent seas / etude PHYSique de l'océan INDIEN nord-ouest et des mers adjacentes
Acronym	PHYSINDIEN
Website	<a href="https://www.researchgate.net/project/Persian-Gulf-and-Red-Sea-outflows-into-the-Arabian-Sea-and-Indian-Ocean">https://www.researchgate.net/project/Persian-Gulf-and-Red-Sea-outflows-into-the-Arabian-Sea-and-Indian-Ocean</a>
Keywords (up to 10, describing the project research)	in situ and satellite data, regional model, theoretical models, dynamics of outflows, Persian Gulf, Red Sea, Arabian Sea
New initiative or continuing programme?	Continuing programme

### 2. APPLICANTS

#### Lead applicant / Project Leader / key research contact person:

First name	Xavier
Last name	Carton
Affiliation	Laboratory of Ocean Physics and Remote Sensing, European Institute of Marine Science, University of Western Brittany, Brest, France
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Institutional or personal website	<a href="https://www-iuem.univ-brest.fr/fr/home">https://www-iuem.univ-brest.fr/fr/home</a> <a href="http://www.ums-lops.fr/">http://www.ums-lops.fr/</a> <a href="https://www.univ-brest.fr/menu/recherche-innovation/pages-chercheurs/CARTON-Xavier/">https://www.univ-brest.fr/menu/recherche-innovation/pages-chercheurs/CARTON-Xavier/</a>

*Other scientists involved are mentioned in the PHYSINDIEN description on ResearchGate (see above) so that they can be easily reached via information on this site.*

### 3. ABSTRACT- Brief description of the project: (1/4 page maximum)

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*This will be placed on the IIOE-2 Website after endorsement.*

The Physindien program was started in 2011 and is going on. It focuses on the Arabian Sea (AS) and on the adjacent seas and gulfs: Red Sea (RS), Gulf of Aden (GA), Sea of Oman (SO), Persian Gulf (PG). It is comprised of experiments at sea (Physindien 2011-1/2 and Physindien 2014-1/2), of data analysis, of process studies and of realistic, regional, numerical modeling. It is carried out by IUEM/LOPS and by SHOM/HOM (Brest and Toulouse, France).

Its aims are to:

- 1) determine the main processes by which mesoscale vortices, currents and other dynamical features are generated, maintained, interact or decay in this region;
- 2) study how the warm and salty water outflows from the RS and PG spread out and evolve in the GA, SO and AS; study how the mesoscale features influence this spreading and evolution;
- 3) determine the submesoscale features resulting from these interactions, or instabilities, their 3D structure, their dynamics and interactions;
- 4) determine the diffusivity associated with these motions for the decay of RSW and PGW from their source.
- 5) study the interaction between these outflows, the wind induced currents and the upper ocean layers (e.g. the upwelling currents and filaments)
- 6) devise, test and run a high resolution, primitive equation model on the area, with nested subdomains modeled at very high resolution
- 7) use this (scientifically validated) model as a basis for a regional forecast model, constrained by data assimilation.

#### **4. LINKS TO IIOE-2 SCIENCE PLAN: (1/2 page maximum)**

How do you anticipate your project to contribute to the IIOE-2 strategy and science delivery, with reference to which (either one or more) of the six IIOE-2 Science Plan themes that your project responds. Please state the specific issues and questions addressed by your project in the context of the IIOE-2 Science Plan themes and key issues.

We propose that Physindien contributes to Science Theme 2 : Boundary current dynamics, upwelling variability and ecosystem impacts, and to a lesser degree to Science Themes 3, 4 and 5.

Indeed, the experiments at sea, focused on the areas around the Arabian Peninsula, the Somali coast and inside the marginal seas, are designed to provide high resolution dynamical (currents) and hydrological data to evaluate the mesoscale and submesoscale variability of the boundary currents, of the marginal sea outflows and of the upwelling regions.



These in-situ data are complemented by satellite data and by theoretical models, to study the mechanisms by which these mesoscale and submesoscale boundary and upwelling currents are formed and vary. In particular, the ROMS model is run in idealized configurations to study the impact of bathymetry on these dynamical features and on their interactions.

Further, a non hydrostatic model will be used to specifically assess the dynamics of submesoscale features and their relation to fine-scale topographic anomalies.

The HYCOM model is run with 5 km resolution over the whole Arabian Sea and marginal seas, with nested zooms at 1.5 km resolution. It provides a testbed for all process studies.

Further studies should evaluate the impact of extreme events on these dynamics and also their inter-annual variations.

## 5. INTERNATIONAL COLLABORATION(S):

Is the project part of a related multi-national activity?

**NO (not yet)**

If No, would you welcome international collaboration in your project?

**YES (inasmuch as possible)**

## 6. REGION(S) OF STUDY

Provide a description of 'where' the research is to be conducted (for field based activities) and/or the region or regions to which the research pertains (you are encouraged to consider providing either the coordinates of the area of studies or the coordinates of the planned cruise tracks, as well as a figure as an addendum to your proposal).

The region of study is the Arabian Sea (AS) and the adjacent seas and gulfs: Red Sea (RS), Gulf of Aden (GA), Sea of Oman (SO), Persian Gulf (PG). Future experiments at sea should concentrate on the Red Sea, the Gulf of Aden and the southern Arabian Sea. Indeed, previous measurement efforts have concentrated on the northern Arabian Sea, on the Sea of Oman and on the Persian Gulf.

## 6. TIMETABLE OF THE PROJECT

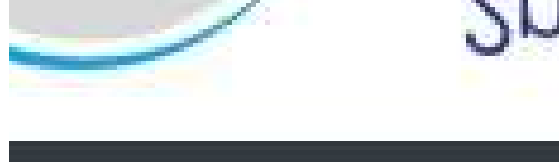
Start date: 01/01/2011

End date: 01/01/2021

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## 7. LINKAGES WITH OTHER PROJECTS / PROGRAMMES / INITIATIVES

Is the project part of a related national or multi-national activity?

If yes, provide the related activity title and website for reference, if available:

Essentially the national collaboration is stated at the website  
<https://www.researchgate.net/project/Persian-Gulf-and-Red-Sea-outflows-into-the-Arabian-Sea-and-Indian-Ocean>

Is your project part of, or affiliated to, another SCOR, IOC or IOGOOS activity or project?  
 No

If "yes", please indicate which activity or project:

## 8. DATA MANAGEMENT AND SHARING

1. Will new data be collected as part of this project (yes or no?)

Yes, depending on ship availability (see above)

2. Contact information if any, of the person in charge of the data management from whom the metadata can be accessed by interested IIOE-2 stakeholders.

*Please note that for all IIOE-2-endorsed projects, IIOE-2 will have developed its own metadata portal. Once the project is endorsed, the project leader will be asked to provide the metadata information of the project.*

For the moment, the data are held by SHOM and are made public. when declassified and scientifically exploited

3. Recognizing the need for an initial period of exclusive data use, would you be willing to provide timely access to all data generated under this project and associated metadata in accordance with relevant national and funding agency data sharing policies?

**This will depend on the policy decided by the Institutes which collect the data**

## 9. FUNDING

*Please note that IIOE-2 strongly encourages funded/resourced projects. However, IIOE-2 may endorse projects yet to receive funding/resourcing if IIOE-2 endorsement can be clearly shown to significantly aid in prospects for funding/resourcing.*

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Has funding and resources to successfully achieve and undertake the project been obtained? Indicate the sources of funding and resources that have been approached and/or secured.

Funding has been obtained from SHOM, from DGA and from UBO for the studies.

**10. BENEFITS FROM IIOE-2 ENDORSEMENT** (1/4 page maximum)

Specify why you are seeking endorsement and how the activity would benefit from endorsement, and how the IIOE-2 SC could assist in the implementation of your project.

The benefits are international scientific collaboration.

**11. OPTIONAL: OTHER COMMENTS/INFORMATION/MATERIAL** (length and detail may be at the discretion of and as deemed necessary by the applicant)

Please feel free to provide any other comments, information or materials that you feel relevant to your proposal for the IIOE-2 Steering Committee's information and benefit. You may provide this as general information or provide the additional comments/information/materials as relevant to any of the specific Sections above.

No other comment

(Signature of the PI)

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