

**LabexMER- Axis 1**  
**Exceptional Call for Proposal 2017**  
(deadline of submission : Nov. 13th)



**Cover page form**

**LabexMER Applicants (add as necessary)**

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**International/other Collaborators (add as necessary):**

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**Proposal Information**

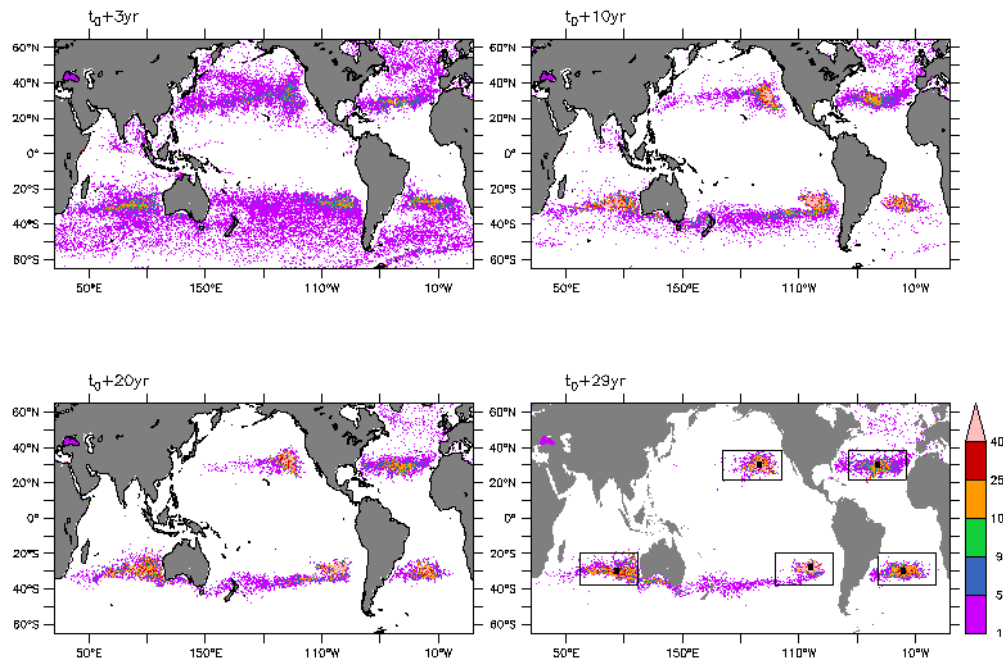
Proposal Title: Processes of Convergence and Dispersion at the Ocean  
Surface affecting marine floating debris  
Proposal Acronym: CONDIOS

**Project Description (1 Page Maximum)**

Plastics are used in growing quantities in our societies and end up in the environment, accumulating in the oceans. The most visible part is the floating debris that slowly break down in microplastics and, most probably, finally sink through biofouling. In-situ measurements have been carried out for years now and show their concentration in the center of subtropical gyres (great garbage patch). Counteracting this well-understood convergence process through Ekman currents (Maximenko et al. 2012), there are several dispersion processes that maintain statistical steady-state concentrations of debris. It is the aim of this project to investigate some of these processes, namely the turbulent ocean dynamics (mesoscale eddies, submesoscale instabilities), tidal currents and surface waves Stokes drift.

The numerical protocol is based on massive Lagrangian trajectories computations with the Ariane software (<https://stockage.univ-brest.fr/~grima/Ariane/> maintained at LOPS by Bruno Blanke and Nicolas Grima), used in 2-dimensions at the ocean surface.

We will use surface currents from ocean models at various horizontal resolution ( $1/4^\circ$ ,  $1/12^\circ$ ,  $1/36^\circ$ ), with and without data assimilation, forced and coupled, from the modelling projects CGLORS ( $1/4^\circ$  global, 1985-2015), Drakkar ( $1/12^\circ$  global, 1980-2015), et PULSATION (couplés  $45^\circ\text{S}$ - $45^\circ\text{N}$  au  $1/4^\circ$  et  $1/12^\circ$ ), and data analysis (GECKO2, Sudre et al. 2013; GlobCurrents). The sea-state database IOWAGA (<http://cersat.ifremer.fr/about-us/projects/item/403-iowaga>) will provide Stokes drifts ( $1/2^\circ$  global since 1990,  $1/4^\circ$  in project).



*Particules concentration resulting from an initially homogeneous distribution (equal to unity at the start) after 3, 10, 20 and 29 yr of Ariane integration with the 1985-2013 CGLORS surface currents. The lower-right-panel small black thick boxes indicate the center of mass position at the end of the experiment, whereas large black boxes indicate the subtropical convergent areas. Note the increments in colorbar are not uniform.*

In 2017, within the framework of the LabexMER axis 1 Miniproject subSODA (C. Maes et al.) and Thomas Paviet-Salomon Master 2 internship, we have built up an expertise on the large-scale convergence-dispersion balance at the ocean surface: starting from uniform initial distribution of particles we obtain almost stationary concentrations at the large-scale (i.e. ocean basin scale) within 20-30 years, except for specific regions (see Figure). Results have shown an interesting “super-convergence” pathway connecting the South Indian Ocean to the subtropical South Pacific gyre, that has been submitted to GRL (Maes et al.). “Twin-experiments” lagrangian analyses taking into account different spatial scales and processes (mesoscale, submesoscale, tides, Stokes drift) for the same time period will allow the identification and quantification of their role in the convergence-dispersion balance of surface particles, and in the inter-basin connectivity.

## Budget and budget justification

	Total cost	Funding already acquired (specify source)	Other sources of funding being sought (e.g. from other LabexMER axes, external agencies)	Funding requested to Axis 1
Supplies				1000
Equipment				1500
Other costs				
Travel				1250
Salary				2250
Total				6000

### Calendar:

Phase I. Ariane simulations with different velocity fields at different resolutions, at different depth, with or without Stokes drift, including technical aspects like data retrieval, interpolation on model grid... (Dec. 2017-March 2018).

Phase II. Analysis of Ariane simulations (Delphine Dobler M2 internship, 5 months from April 1<sup>st</sup> to August 31<sup>st</sup>, 2018) > first results on processes quantification, refinement of the simulations strategy.

Phase III. Analysis of the final results, publication and diffusion (second half of 2018).

### How to apply ? :

Please send proposal by e-mail to axis 1 coordinators before Nov. 13th:

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