



## 18-month PostDoc “Biophysical Coupling in the Ocean”

### JOB DESCRIPTION

**Title:** Role of changes in the marine biomass on the coupled ocean-atmosphere system

**Location:** LOCEAN, Unité mixte IRD-CNRS-MNHN-Paris6, Paris, France.

**Team:** climate and biogeochemistry modelling groups

**Type of contract:** 18 months post-doctoral position funded by French National Research Agency

**Compensation:** Annual salary from 28k to 42 k euros depending on past experience

**Start date:** When position filled

**Contacts:** Matthieu Lengaigne (lengaign@locean-ipsl.upmc.fr) or Gurvan Madec ( gm@locean-ipsl.upmc.fr)

**Dead line for application:** send CV and letter of motivation before 15 Feb 2012.

### PROJECT DESCRIPTION

The main objective of **MACROES** is to better understand and predict the end-to-end dynamics of marine ecosystems in a context of generalized overfishing and planetary environmental changes (climate change, acidification, ...) by integrating the complex synergies and feedbacks (« top-down » and « bottom-up ») which propagate through the oceanic earth system. The project gives a particular emphasis to tunas and the associated fisheries, as they represent the dominant exploited species in the global open ocean both in term of the volume and the spatial coverage of the catches. A particular emphasis will be given to the identification and characterization of the feedbacks between the different systems considered (climate, ocean, biogeochemical cycles, ecosystems, economics,) and their potential consequences on the existence of regime shifts between alternative stable states. Eventually, the different stressors and feedbacks will be considered simultaneously in order to assess how their complex interactions and potentially cumulative effects might shape the marine world over the coming years and decades.

### TASKS

The specific task of this position is to use the fully coupled system (physics/biogeochemistry/trophic food web/focus species) in the context of the next 100 years to **evaluate the importance of retroactions from changes in biomass to ocean physics (biophysical coupling)**. Indeed, the heat trapping in the surface layers by phytoplankton in the present climate has been shown to modify ocean mean state and variability. In addition, because vertically migrating layers of swimming organisms are found in much of the ocean, biologically generated turbulence may have a significant effect not only on local physics but also on the chemistry and biology of the ocean

Investigating how these feedbacks will evolve under anthropogenic forcing and their impact on a changing climate is necessary to understand and account for the retroactions in the fully coupled system. The candidate will use the **coupled model IPSLCM/PISCES/APECOSM** and run simulations forced by the global warming scenarios. A comparison of these simulations with the existing “offline” ones will enable to evaluate the importance of retroactions in governing the response of marine ecosystems to climate change/ocean acidification. The different tasks correspond to workpackage 4 of the project that focuses on climate change an ocean acidification.

### REQUIREMENTS

**Level:** PhD in physical sciences or biochemistry **Necessary skills:** data analysis **Desired skills:** climate and biochemistry modelling

### WORKING ENVIRONMENT

**Computing environment:** local linux servers, computing centre, data in NetCDF format.

**Programming:** fortran 90, shell, IDL, Matlab