

Postdoctoral Position in Physical Oceanography  
Ocean Modelling and data synthesis in the Southern Ocean  
*Laboratoire de Physique des Océans*  
UMR 6523 CNRS-IFREMER-IRD-UBO, Brest, France

We invite applications from talented and motivated candidates interested in pursuing their research in physical oceanography, with focus in Southern Ocean Dynamics, Meridional Overturning, turbulent mixing and climate. The successful applicants will participate in the International CLIVAR GoodHope project and IPY focussed BONUS-GoodHope action. The salary will be funded by the French CNRS.

The scarcity of in situ observations has long hampered our understanding of the Southern Ocean (SO) dynamics. Because of its geographical extent, its annular geometry that allows all ocean basins to interconnect, and its influence on global heat, fresh-water and biogeochemical budgets, the SO is particularly important for the Earth climate. Hence, the detailed understanding of the physical processes ruling the dynamics of this ocean is a major challenge for climate issues. Nevertheless, this challenge is extremely arduous as the SO dynamics is particularly intense and turbulent.

Passages separating Antarctica from the continents are privileged regions for understanding and monitoring the SO. Indeed, besides obvious logistical reasons, these passages are the essential links for the global ocean circulation and hence for climate teleconnections. The understanding and monitoring of volume transport and water masses variability in these oceanic chokepoints represent one of the main recommendations of the international "Climate Variability" (CLIVAR) program.

The GoodHope project, which is coordinated by the *Laboratoire de Physique des Océans* in Brest, aims at quantifying the exchanges of water (in terms of volume and properties) south of Africa, between the Southern, Indian, and Atlantic oceans, as well as understanding the dynamical processes responsible for these transfers. These processes are complex and still poorly reproduced in numerical models. They take place in contrasted oceanic domains such as the various intense frontal regions in the subtropics and the Antarctic Circumpolar Current, and in areas influenced by eddies and intense heat transfers to the atmosphere.

Built on a strong international cooperation (University of Cape Town, Shirshov Institute of Moscow, NOAA, AWI), and endorsed by the CLIVAR program, the core of the project lies on repeated observations (hydrology, Doppler Current sampling, expandable temperature probes, geochemistry) along a cross-section south of Africa. Regular deployments of ARGO profilers along the same line (more than 50 floats launched since the beginning of the project in 2004) further provide a year-round hydrological sampling of this area difficult to access due to the extreme weather conditions.

South of Africa mesoscale dynamics play a key role in interocean exchanges. Transfer of upper layer water from the Indian to the Atlantic ocean is carried out by Agulhas rings. These intense eddies are ejected from the Agulhas Current Retroflexion and inflow into the South Atlantic Ocean through the Cape Basin. Meridional exchanges between the subtropical, subantarctic and polar regions themselves result from instabilities and eddy generation in the frontal areas.

Water exchanges are influenced by sharp topography features, local instabilities and submesoscale dynamics. The extreme and unique nature of fluxes

makes this region an essential link of the global oceanic circulation. Strong winds and intense temperature variations cause significant transformations of deep and bottom water masses. They lead to the formation of Antarctic Mode and Intermediate waters which spread equatorward through mesoscale processes and feed the lower thermocline of all oceanic basins affecting the global heat, fresh-water and biogeochemical cycles. All this in a Southern Ocean environment that is particularly affected by the ongoing climate change/

Some of the questions we would like to address in the framework of this postdoctoral research are:

- What are the key regions and dynamical processes that are responsible of mass and properties exchanges between the subtropics, subantarctic and polar Southern Ocean regions, with a particular focus on the Atlantic sector of the Southern Ocean?
- What are the consequences of the climate changes on the properties of the Southern Ocean waters and their dynamics within these exchanges?
- What are the possible impacts on the biogeochemical cycles and regional ecosystem ?

These questions will be addressed with both a modelling framework (regional with an already developed ROMS platform, and global within the NEMO DRAKKAR project) as well as using the rich *in situ* GoodHope and remote sensing data sets.

A recent PhD in physical oceanography or a related field is required. The applicant should have a strong background in geophysical fluid dynamics and possibly in numerical modelling.

Letters of application, a C.V., a short statement of research interests and the name of two referees should be sent by January 15, 2009 to [sabrina.speich@univ-brest.fr](mailto:sabrina.speich@univ-brest.fr) (S. Speich, Laboratoire de Physique des Oceans (LPO), UMR6523 CNRS/IFREMER/IRD/UBO, <http://www.ifremer.fr/lpo/speich>, Universite de Bretagne Occidentale - UFR Sciences, 6, av Le Gorgeu C.S. 93837, 29238 Brest Cedex 3 France).

Appointment will be for a 15-month duration and may start February 1st, 2009 or later. Annual income will be 24,000 Euros.