

Proposal for a post-doctoral position

OUT OF EQUILIBRIUM STATISTICAL MECHANICS OF GEOPHYSICAL FLOWS WITH APPLICATIONS TO SIMPLE MODELS OF THE KUROSHIO CURRENT BISTABILITY

Where: *Ecole Normale Supérieure de Lyon - Laboratoire de physique* (ENSL-CNRS, Lyon, France)

Directed by: Freddy BOUCHET. ANR STATOCEAN, in collaboration with Joël SOMMERIA, Eric SIMONNET and X. CARTON

Description: The self organization of the large scales is a common feature of all geophysical flows. Up to a certain extent, this can be understood using equilibrium statistical mechanics. There is a big impulse nowadays to develop out of equilibrium theories related to the previously existing equilibrium theories. This would be especially relevant to bistability situations in geophysics, for example the Kuroshio current bistability in the Pacific Ocean, but also to experimentally observed bistability.

A post-doc position will be hired during two years to work theoretically and use numerical simulations in order to develop the out of equilibrium statistical mechanics of geophysical flows, in the context of ocean dynamics. The candidate will use existing numerical codes (few layers Quasi-Geostrophic or primitive equation dynamics) in order to perform direct numerical simulations of basin scale dynamics, for instance of the Kuroshio current. These models are the simplest ones that describe the bistability of the Kuroshio current. They will be designed for specific ocean situations in collaboration with the *Laboratoire de la Physique des Océans (LPO-Brest)*.

He/she will develop new algorithms to compute modern out of equilibrium statistical mechanics tools, like for instance the linear response operator or large deviation rate functions in these simple ocean models. These algorithms will be used to discuss the dynamics and the variability of several ocean problems, in relation with groups working in ocean dynamics (*LPO-Brest*) and to discuss the experiment related to this project, performed in the *Laboratoire des Écoulements Géophysiques (LEGI-Plaque Coriolis-Grenoble)*.

The requested skills are a good knowledge and experience in fluid dynamics numerical computation or in ocean dynamics. A good training in statistical physics and/or in ocean dynamics and/or in mathematics would also be appreciated, even if not necessary.

More on the STATOCEAN project: <http://perso.ens-lyon.fr/freddy.bouchet/Statocean.html>

- PhD. in physics or in mathematics or in geophysical fluid dynamics required. Either very good theoretical background or good numerical skills are required. Experience with turbulence, hydrodynamic instability and/or nonlinear dynamics and/or statistical mechanics will be acknowledged.
- This position provides a two years appointment.
- The position can start any time in 2010, with a preference for a start on fall 2010.
- Applicants should send a CV with two recommendation letters to Freddy Bouchet : Freddy.Bouchet@inln.cnrs.fr
- Web: <http://perso.ens-lyon.fr/freddy.bouchet/>