



2-year Postdoctoral Research position (OCCIPUT project): Probabilistic Physical Oceanography. Grenoble, France.

Study of the stochastic low-frequency ocean intrinsic variability from a large ensemble of global ocean/sea-ice simulations (MEOM team, LGGE, Grenoble, France).

The OCCIPUT project

The interannual-to-multidecadal ocean variability exhibits a chaotic behavior (i.e. is sensitive to initial conditions) in global ocean circulation models that explicitly include mesoscale turbulence; this chaotic character is almost absent in coarser-resolution (laminar) ocean models. Future coupled climate prediction experiments, which are currently being implemented for the Sixth Assessment Report (AR6) of the IPCC, will use eddy-permitting ($1/4^\circ$) instead of laminar (2° - 1° class) ocean models, hence will likely be influenced by this poorly-known but strong low-frequency (LF) oceanic stochasticity.

The OCCIPUT (*Oceanic Chaos - ImPacts, strUcture, predicTability*) project¹ aims at characterizing this phenomenon in a realistic global context from a large ensemble of ocean/ sea-ice simulations forced over the period 1960-present by the same atmospheric fields with perturbed initial states. The ORCA025 $1/4^\circ$ NEMO-based model configuration is currently being adapted to perform this 30/50-member ensemble, which will allow the 1st probabilistic characterization of the global oceanic 3D variability, and help anticipate the influence of eddying oceans on climate variability in AR6 experiments.

Our interests include [i] the description (strength, spatio-temporal patterns) of this LF stochastic variability (circulation, tracer/mass fields, etc), with a focus on physical quantities² and regions³ that are most relevant for climate; [ii] the physical processes that influence this stochastic character (e.g. mesoscale turbulence, atmospheric forcing); [iii] the assessment of the oceanic predictability in the eddying regime, and of the actual constraint exerted by the atmospheric variability on the ocean. The ensemble simulation will be made available to the scientific community to foster collaborative investigations.

The context, objectives and expected outcomes of the project are further described in the [Clivar Exchanges](#) Newsletter (number 65, pages 25-29), on the project's ANR [website](#), and in <http://alturl.com/nrjr4>.

1: ANR project (2014-2017, coordinated by T. Penduff) involving researchers and engineers from [LGGE/MEOM](#) and [CERFACS](#), and cooperations with the [DRAKKAR](#) ocean modelling group.

2: e.g. heat content, sea-surface height/temperature, MOC, meridional heat transports, etc.

3: Where the ocean's LF variability is found to be most stochastic and/or potentially important in driving the atmospheric variability (as expected in western boundary currents, Antarctic circumpolar belt, etc). Observational sites and observed quantities are also of particular interest.

Mission

This position is an opportunity for a strongly motivated scientist to get involved in a novel approach in ocean science with various potential outcomes (e.g. attribution of climate-related ocean variability, observational studies, physical processes, chaos-related dynamical system studies, etc).

The postdoctoral fellow will contribute to the scientific analysis of the ensemble simulation⁴ along the general interests outlined in the previous section. The applicant may choose to write an additional (1-2 page) proposal presenting specific science questions to address from this experiment. The successful applicant will join the MEOM-LGGE team, with interactions with CERFACS scientists, DRAKKAR members, and possible collaborations at the international level.

Required qualifications and abilities

A PhD, possibly with additional research experience. An excellent background in at least one of the following topics and a strong interest in the other one:

- Physical oceanography, geophysical/atmospheric fluid dynamics, numerical modelling.
- Science-driven statistical analyses of ensemble or large geophysical model outputs.

The postdoctoral fellow should be able to conduct creative research independently within an international context, to work in collaboration within a research team, and to publish in major peer-reviewed journals.

Good written and oral communication skills, substantial experience in computer-based analysis techniques (Unix, F90, post-processing/statistical /filtering/graphical tools, parallel computing) are highly desirable.

Applying

Applications are now open until the position is fulfilled; the position should be fulfilled no later than Spring 2015. The [net salary](#) will be in the range 1850-2150 €/month depending on experience.

We ask candidates to read the documents mentioned above, to send a complete CV with a full list of publications and communications, and a letter presenting their experience and motivation for the project. Short scientific proposals are also welcome, but are not mandatory.

Please send your application by email with your dates of availability, the names and contact details of three reference persons, to both:

Thierry Penduff (OCCIPUT coordinator, co-head of the MEOM team)
email: Thierry.Penduff at legi.grenoble-inp.fr

Laurent Terray (head of the CERFACS Climate Group)
email: terray at cerfacs.fr

4: Two 8-year 10-member North Atlantic ensemble simulations are currently available for scientific investigations. The OCCIPUT research engineers will perform the global 50-year 30/50-member ensemble simulation in 2015.