Offer #2022-05475

Post-Doctoral Research Visit F/M Ocean internal tide dynamics

Contract type : Fixed-term contract

Level of qualifications required : PhD or equivalent

Fonction : Post-Doctoral Research Visit

Level of experience : Up to 3 years

About the research centre or Inria department

The Inria Rennes - Bretagne Atlantique Centre is one of Inria's eight centres and has more than thirty research teams. The Inria Center is a major and recognized player in the field of digital sciences. It is at the heart of a rich R&D and innovation ecosystem: highly innovative PMEs, large industrial groups, competitiveness clusters, research and higher education players, laboratories of excellence, technological research institute, etc.

Context

Odyssey (for Ocean DYnamicS obSErvation analYsis) is a recently created team involving researchers from Inria (Rennes, France), Ifremer (Brest) and IMT Atlantique (Brest).
The team expertise encompasses mathematical (stochastic) and numerical modelling of ocean flows, observational and physical oceanography, data assimilation and machine learning. Gathering this large panel of skills, the team aims at improving our understanding, reconstruction and forecasting of ocean dynamics, and more specifically to bridge model-driven and observation-driven paradigms to develop and learn novel representations of the coupled ocean-atmosphere dynamics ocean models. The postdoctoral researcher will work with Noé Lahaye (Inria, Rennes), but close collaborations with other members of the team, in particular with Aurélien Ponte (Ifremer), are expected. The postdoc will be based either at Inria (Rennes, France) or at Ifremer (Brest, France) -- as he/she pleases.

The postdoc position is funded by the French National Research Agency (ANR JCJC), as part of the **ModITO** project (Modelling the Internal Tide in the Ocean)

Funding for usual expenses (travelling, computer...) has been secured, including 1 international conference per year.

The call is open starting now and until the position is filled.

Assignment

The Odyssey team (Inria, Ifremer & IMT Atlantique, France) is seeking a postodctoral researcher to work on ocean internal tide dynamics. The postdoc will work in the ModITO project (Modelling the Internal Tide in the Ocean), which aims at improving our understanding of ocean internal tides and its mapping from satellite altimeter data, in particular in the context of the forthcoming SWOT mission. The main objective of the project is to develop and exploit a simplified dynamical model of internal tides dedicated to the assimilation of data from satellite altimeter and other sources of observations (e.g. surface drifters). The work is expected to have a great impact in the physical oceanography community: on the one hand, mapping the internal tide field -- and more precisely separating the internal waves from the balanced motions -- is of critical importance in the context of the SWOT mission. On the other hand, a better quantification of the internal tides and the related dynamical processes are key to better understand the ocean circulation and improve parametrizations of ocean models.

The ModITO project will consistently leverage a dynamical framework based on vertical mode decomposition of the primitive equations [e.g. Kelly et al 2016] for analysing outputs from state-of-the-art high-resolution realistic simulations, formulating theoretical expectations and developing a simplified model for the assimilation of internal tides, following recent efforts on the subject [Le Guillou et al 2022].

References:
- Kelly, S.M., Lermusiaux, P.F.J., Duda, T.F., Haley, P.J., 2016: "A Coupled-Mode Shallow-Water Model for Tidal Analysis: Internal Tide Reflection and Refraction by the Gulf Stream". J. Phys. Oceanogr. 46, 3661–3679. https://doi.org/10.1175/JPO-D-16-0018.1
- Le Guillou, F., Lahaye, N., Ubelmann, C., Metref, S., Cosme, E., Ponte, A., Le Sommer, J., Blayo, E., Vidard, A., 2021: "Joint Estimation of Balanced Motions and Internal Tides From Future Wide-Swath Altimetry". JAMES 13, e2021MS002613. https://doi.org/10.1029/2021MS002613

Main activities

Depending of the skills and aspiration of the postdoc, his concrete implication into the project can range from theoretical developments on internal wave propagations in the ocean, to the analysis of state-of-the-art high-resolution realistic simulations, to the actual formulation and implementation of a data-assimilation model of the internal tide.

The recruited postdoc is expected to report the results through the publication of scientific articles in top-rank international journals and conferences.

Skills

The precise workload assigned to the postdoc can be adjusted depending on his skills and affinities. Therefore, not all of the following skills are expected to be fulfilled.

Required skills (at least 2 of the following)

- Ocean dynamics, (geophysical) fluid dynamics, or physics
- Coding (python with a decent knowledge of scientific libraries)
- data assimilation

Optional skills

- Applied maths
- Internal wave dynamics
- Pangeo environment (xarray & dask), pytorch/jax
- data analysis (mostly applied to outputs from numerical simulations)
- Various numerical skills: versionning tools (git), code documentation (e.g. Sphinx, Doxygen)

Languages : English is required.

Benefits package

-
    - Subsidized meals
    - Partial reimbursement of public transport costs
    - Possibility of teleworking (90 days per year) and flexible organization of working hours
    - partial payment of insurance costs

Remuneration

Monthly gross salary amounting to 2746 euros.

General Information

- **Theme/Domain :** Optimization, machine learning and statistical methods
  Scientific computing (BAP E)
- **Town/city :** Rennes
- **Inria Center :** Centre Inria de l'Université de Rennes
- **Starting date :** 2022-12-01
- **Duration of contract :** 2 years
- **Deadline to apply :** 2023-04-30

Contacts

- **Inria Team :** ODYSSEY
- **Recruiter :**
  Lahaye Noe / noe.lahaye@inria.fr

About Inria

Inria is the French national research institute dedicated to digital science and technology. It employs 2,600 people. Its 200 agile project teams, generally run jointly with academic partners, include more than 3,500 scientists and engineers working to meet the challenges of digital technology, often at the interface with other disciplines. The Institute also employs numerous talents in over forty different professions. 900 research support staff contribute to the preparation and development of scientific and entrepreneurial projects that have a worldwide impact.

The keys to success

Autonomy and ability to interact with researchers from within and outside the team.

Warning : you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is

not guaranteed.

Instruction to apply

Please submit online : your resume, cover letter and letters of recommendation eventually

For more information, please contact noe.lahaye@inria.fr

Defence Security :
This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST).Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

Recruitment Policy :
As part of its diversity policy, all Inria positions are accessible to people with disabilities.