Post-doctoral position (H/F, 24 mois)

Description of the offer

A researcher postdoc position is available at the Laboratoire d'Océanographie Physique et Spatiale (LOPS-UMR6523) at University of Western Brittany (UBO) in Brest, in the framework of the European Space Agency (ESA) ARCFRESH project (see project description below). The starting date can be as soon as early 2025. The appointment is a full-time position, for **two year period.**

The project will mainly focus on evaluating and validating the Arctic freshwater budget and flux combining satellite L-Band Sea Surface Salinity (SSS) and in situ measurements, examining the mechanisms driving the freshwater content changes, occurring on seasonal, interannual and longer timescales, at regional to pan-Arctic scale. In this context, the project also aims at examining the freshwater ocean flux variability at the main Arctic gates (Fram, Davis, …). Extended time series of ocean freshwater flux at the gates will be obtained by combining SSS, sea level and in situ measurements.

The project is conducted in collaboration with scientists at national and international levels from the ARCFRESH consortium. At LOPS, the postdoc will work closely with Nicolas Kolodziejczyk (nicolas.kolodziejczyk@univ-brest.fr) and Camille Lique (camille.lique@ifremer.fr). The postdoc will be part of the group 'Ocean and Climate' at LOPS and will benefit from the strong expertise at LOPS regarding in situ and satellite observations and their processing. The successful postdoc is expected to present their results in national and international conferences/workshops and publish paper in scientific peer-reviewed journals. The postdoc is also expected to contribute the ARCFRESH project's deliverables in the form of reports or progress meetings

ESA ARCFRECH project

ARCFRECH Context

Understanding and monitoring the Arctic Ocean freshwater budget is crucial for predicting and adapting to climate change, as the Arctic region is highly sensitive and serves as a flagship area of the Earth's climate system. The freshwater fluxes in the Arctic Ocean contribute to the global thermohaline circulation, also known as the ocean conveyor belt. Changes in the freshwater budget can disrupt this circulation, which plays a crucial role in redistributing heat around the planet and can have cascading effects on regional and global climate patterns.

The Arctic Ocean freshwater budget is linked to climate feedback mechanisms, such as the melting of Arctic ice releasing freshwater into the ocean, affecting local and global climate. This process can contribute to positive feedback loops, amplifying the warming trend in the Arctic. Freshwater input, mainly from rivers and precipitation, affects the salinity of the Arctic Ocean, impacting the extent and thickness of sea ice. The Arctic climate system is transitioning into a new regime characterized by less sea ice, allowing for more interaction

between the atmosphere and the ocean. A changing freshwater budget also influences the transport of organic matter and nutrients in the Arctic Ocean, impacting carbon cycling and the absorption and release of greenhouse gases, which, in turn, influence global climate dynamics. Changes in the freshwater fluxes may also have local ecological impacts, affecting the distribution and abundance of marine species in the Arctic Ocean. Altered sea ice conditions and ocean circulation patterns can impact ecosystems, including the food web, with potential consequence for fisheries and other marine resources.

Addressing scientific knowledge gaps in the Arctic Ocean is crucial for understanding global climate dynamics, as the Arctic plays a pivotal role in the Earth's climate system. In the Arctic, there is still need to better understand freshwater input including from melting glaciers, ice caps, and permafrost into the Arctic Ocean, which affect its salinity, circulation, and, consequently, global climate patterns. Particularly, significant uncertainties persist in accurately determining regional patterns, variations, and distinct contributions to the variability of freshwater content. It is highlighted that, despite advancements in long-term water cycle monitoring, significant gaps remain in closing the water budget and ensuring consistent assessments across various scales. To address this gap, need has been identified in expanding observation systems to monitor long-term trends in the water cycle and to ensure consistency between climate data records of different Essential Climate Variables (ECVs), in order to close the hydrological cycle at shorter timescales and over regional spatial domain.

ARCFRECH Objectives

The overall objective of ESA ARCFRESH is to advance the current state of knowledge on the freshwater fluxes and freshwater budget in the Arctic Ocean, maximizing the use of Earth Observation (EO)-derived ECV datasets generated in the CCI program. ARCFRECH project stands as a truly cross-ECV (Essential Climate Variable) project, integrating seven CCI (Climate Change Initiative) ECV projects and one existing X-ECV (Sea Level Budget Closure) to comprehensively study Arctic Ocean's freshwater fluxes and budget. Within the project's scope, data from seven ESA CCI ECVs projects (River discharge, Snow, Ice sheet, glacier, Sea Surface Salinity, Sea Level...), will be utilized to quantify input fluxes essential for determining the Arctic freshwater budget. To achieve the main scientific objectives of advancing the current state of understanding of freshwater fluxes and the freshwater budget in the Arctic Ocean, ARCFRECH propose to concentrate on three overarching scientific topics :

- Improve current estimates of lateral freshwater fluxes between land, sea ice, and ocean in the Arctic. This topic focuses on refining our understanding and quantification of freshwater movements, critical for accurate modeling and predictions.
- Determine the pan-Arctic and Sub-regional Freshwater Budget in the Arctic Ocean and its evolution in the context of a changing climate. This involves a detailed analysis of the inputs, storage, and outputs of freshwater within the Arctic system, vital for assessing global climate impacts.
- Investigate Extreme Freshwater Change Events, such as an extreme Greenland or sea ice melt season, and their impact on the Arctic Ocean. This topic aims to understand the ramifications of such events on Arctic freshwater balance and broader climate implications.

Qualification requirements

- Applicants must hold a PhD degree in physical oceanography, climate science or related field.
- Programming skills (Python, Matlab or another scientific language), with demonstrated proficiency in data processing methods.
- Strong written and oral communication skills in English, and the ability to work in a large team.
- Previous experience on polar research would be an asset
  .

We offer

- A scientific professionally stimulating working environment
- An attractive place to live (Brest) with many cultural and outdoor activities especially sea oriented

How to apply

The application must include

- A cover letter (statement of motivation, summarizing scientific work and research interest)
- A detailed CV including a complete list of publications
- Names and contact details of 2 references (name, relation to candidate, e-mail and telephone number)
- Deadline for application: **15 Januray 2025**
- **Please sent your application to nicolas.Kolodziejczyk@univ-brest.fr**