FICHE DE POSTE

Vacant position	**Post-doctoral Research in imagery data processing**
Job description	Underwater hyperspectral imagery for detection and mapping of seafloor features
Discipline **Speciality**	Earth Sciences Remote sensing, signal processing, mapping
Contrat type	Fixed-term contract, 12 months renewable 6 months
Research team	ODE Department DYNECO research unit/ Coastal Benthic Ecology Laboratory (LEBCO)
Location	Centre de Bretagne, Plouzané
Starting date	01/08/2021

The Institute and the recruiting department

Ifremer, through its research work and expert advice, contributes to knowledge of the oceans and their resources, to monitoring of marine and coastal environments and to the sustainable development of marine activities. To these ends, Ifremer conceives and operates tools for observation, experimentation and monitoring, and manage the oceanographic databases. Created in 1984, Ifremer is a public institute of an industrial and commercial nature (EPIC). It is supervised jointly by the Ministry of Higher Education and Research and the Ministry of Ecology, Sustainable Development and Energy.

- **Presentation of the department/direction, research unit or laboratory**

The DYNECO (Dynamics of Coastal Ecosystems) research unit is one component of the « Oceanography and Ecosystems Dynamic » department and has for main objective to study how coastal ecosystems respond to anthropogenic or natural pressures. DYNECO conducts scientific and expert assessment activities in this field. The global approach rests on the analysis of physical and biogeochemical processes and is based on experimentations, in-situ observations and modeling. The main research areas concern : i) dissolved and particulate matter fluxes within marine coastal ecosystems , ii) diversity, functioning and future of communities and of their habitats, iii) perturbation at population scale.

Within DYNECO Research Unit, the candidate will join the Coastal Benthic Ecology Laboratory (LEBCO) focuses its researches on the explanation of the structures and the associated functionalities of benthic coastal ecosystems in relation with environmental pressures. Research in benthic ecology and public policy support require an increasing use of spatial analysis to understand habitat structure and evolution. Acquisition methods and analysis of airborne hyperspectral data have been successfully developed in recent years at LEBCO. LEBCO seeks to extend these applications to:

- characterize subtidal benthic habitat structure, their spatio-temporal evolution scales, their fragmentation and the role of these spatial structures on their functioning (seascape ecology concepts) and health status.

- assess the area of structuring species and the automatic or semi-automatic estimation of benthic biodiversity on the basis of image processing in order to understand the spatiotemporal variations related to natural or anthropogenic pressures.

- **Introducing the job description:**

The iAtlantic consortium has formed in response to a European Commission Blue Growth call for projects assessing the status of Atlantic marine area. The aim is to enhance the knowledge on the status and dynamics of Atlantic marine ecosystems, quantify the main drivers of short and long-term changes, examine the interactions between different stressors, including climate change, and the role of cumulative impacts on ecosystem functioning and associated ecosystem services. They shall also contribute to improve the sustainability of the exploitation of marine resources through extending climate based predictions as well as testing for so-called tipping points, regimes shifts or more advanced assessments of ecosystem stability.

As a partner of iAtlantic project, Ifremer proposes to address several objectives to understand the distribution of coral communities and how anthropogenic impacts (climate change and trawling) will affect them.

General areas of responsibility

As part of the work package 2 “Mapping ecosystems”, the task 2.4. “Trial of hyperspectral imaging” aims to assess the feasibility and advantages of using the underwater hyperspectral imagery (UHI) technology to achieve accurate deep-sea environmental mapping and monitoring as well as increase our ability to detect changes in the health status of marine organisms. In this perspective, a site in the Lampaul Canyon was selected as an Area of interest.

Main activities

Within this framework, we are seeking a highly motivated post-doctoral researcher in optical signal and image processing to (i) participate to the Hyperspectral Image acquisition during the cruise, (ii) develop and implement Image analysis and processing for seabed type discrimination and mapping that enable extraction of key biological metrics useful for habitat conservation status assessment (e.g. faunal densities), (iii) perform accuracy assessment using ground truthing data acquired by video observation and physical sampling, and (iv) contribute to the project technical reports. The Ifremer Datarmor supercomputer will provide the storage capacities and computing power required for hyperspectral data processing.. This research work will be promoted through methodological and applied publications in international conferences and scientific journals in the field.

Partnership

Internal partners: With proven experience in the implementation of hyperspectral technology, LEBCO shares its expertise with other Ifremer teams. In this context, the applicant will collaborate with researchers in the DYNECO Unit working on spatial ecology but also those in the coastal stations of the Littoral Unit of ODE Department, the Deep Ecosystems Study Unit (EEP) of the Physical Resources and Seabed Ecosystems Department (REM) and the Positioning, Robotics, Acoustics and Optics team (SM-PRAO).

External partners: The post-doc will collaborate with both iAtlantic Partners (NOC (UK), GEOMAR (DE) and the LEBCO external collaborations with the main laboratories specialising in signal processing.

Skills

- Technical skills and knowledge:
Required Qualifications are related to:

- Machine Learning, Signal and Image Processing, Applied Mathematics
- Previous experience in image processing software (ENVI) is appreciate
- Programming in Python
- Experience in deep learning methods, and associated libraries in Python (Keras, Tensorow, Pytorch)

- Interest in Underwater Imagery and environmental application
- Knowledge of the marine environment desirable

- Personal qualities:
• autonomous and dynamic
• Ability to interact with researchers working on numerous and varied research topics.
• Interest in marine ecology

Qualification

The successful candidate must have (1) a PhD in image or signal processing, machine learning or related fields, or equivalent experience; (2) a publication record; (3) excellent writing communication skills and (4) strong organizational and skills.

Conditions de travail (modalité d'exercices : embarquement, taux d'activité,...)

Full time

How to apply

Applicants should provide:

1) A letter of interest detailing qualifications for the position,

2) A *curriculum vitae* or resume that shows the applicant's educational background, research and work experiences, publications and other scholarly activities

3) Contact information for professional references (name, institution, title, email address, phone number; to be contacted after the interview process)

Closing date for receipt of applications:
To ensure consideration, please apply no later than **May 15, 2021**. This position will remain open until filled

All our applications are processed via our career site. For more information on the position, send your email to **touria.bajjouk@ifremer.fr**