FICHE DE POSTE

Fonctions :	**Make Our Planet Great Again Post doc to uncover ocean deoxygenation impacts on zooplankton and particle dynamics in the tropical Atlantic**
Emploi-type :	Post-doc
Catégorie :	A

Les activités qui composent la fiche de poste sont appelées à évoluer en fonction des connaissances du métier et des nécessités de service

Présentation de Sorbonne Université

Sorbonne Université est une université pluridisciplinaire et de recherche intensive. Poursuivant la tradition humaniste de la Sorbonne, elle s'attache à répondre aux enjeux scientifiques du 21e siècle et à transmettre les connaissances issues de ses laboratoires et de ses équipes de recherche à ses étudiantes et étudiants et à la société tout entière.

Déployant ses formations auprès de 54 000 étudiantes et étudiants dont 4 700 doctorantes et doctorants et 10 200 étudiantes et étudiants étrangers, elle emploie 6 300 enseignantes et enseignants, enseignantes-chercheuses et enseignants-chercheurs, chercheuses et chercheurs et 4 900 personnels de bibliothèque, administratifs, technique, sociaux et de santé. Son budget est de 670 M€.

Sorbonne Université, principalement située au cœur de Paris, dispose d'un potentiel de premier plan et étend sa présence dans plus de vingt sites en Ile-de-France et en régions.

Sorbonne Université présente une organisation originale en trois facultés de « Lettres », « Médecine » et « Sciences et Ingénierie » qui disposent d'une importante autonomie de mise en œuvre de la stratégie de l'université dans leur périmètre sur la base d'un contrat d'objectifs et de moyens. La gouvernance universitaire se consacre prioritairement à la promotion de la stratégie de l'université, au pilotage, au développement des partenariats et à la diversification des ressources.

Présentation de la structure

Ce poste est à pourvoir au sein de la faculté des sciences et ingénierie • http://sciences.sorbonne-universite.fr
Au sein de Sorbonne Université, la Faculté des Sciences et Ingénierie couvre un large éventail de disciplines scientifiques.

Elle est composée de 79 laboratoires de recherche, 22 départements de formation et 6 UFR (Unité de Formation et de Recherche) en chimie, ingénierie, mathématiques, physique, sciences de la vie ainsi que Terre, Environnement et Biodiversité. Elle compte également l'École Polytechnique universitaire - Polytech Sorbonne -, l'Institut d'Astrophysique de Paris, l'Institut Henri Poincaré, trois stations marines localisées à Banyuls-sur-Mer, Roscoff et Villefranche-sur-Mer ces trois dernières ayant, avec la structure ECCE-TERRA, le statut d'observatoire des sciences de l'Univers.

Elle accueille 20 800 étudiants dont 2 700 doctorants et compte 4 800 personnels - enseignants, enseignants-chercheurs, chercheurs et 3 252 personnels administratifs ou techniques.

Localisation (Direction/service) :

The Laboratoire d'Océanographie de Villefranche (LOV ; http://lov.obs-vlfr.fr/) is located close to Nice, on the French Riviera. It belongs to one of the three marine stations of Sorbonne Université. With about 90 permanent staff, the LOV generates and analyses a large quantity of marine data, including imaging, genomic, and satellite data to study the ocean.

The COMPLEx (COMPutational PLAnkton Ecology) team gathers ~30 members studying marine plankton by collecting data with quantitative imaging instruments and high throughput genomics that informs advanced numerical analysis methods (modeling, statistics, machine learning). Plankton encompasses all organisms roaming with marine currents. Those organisms are responsible for producing some of the oxygen we breathe, storing the carbon we emit, feeding the fish we eat; plankton is therefore a major building block of Earth's ecosystem. COMPLEx strongly interacts with the Quantitative Imaging Platform of Villefranche (PIQv; https://sites.google.com/view/piqv), which oversees the operation of the tools that the team develops. Those tools include imaging sensors, such as the Underwater Vision Profiler or the ZooScan, and software packages, such as ZooProcess or the EcoTaxa web application (https://ecotaxa.obs-vlfr.fr/) that uses machine learning to assist taxonomists into sorting plankton images. We also have a long experience in interacting with private companies for instruments development and computer scientists, in academia (e.g. LS2N in Nantes, I3S in Nice, ENSTA in Paris, MIP in Kiel) and the private sector (e.g. Google Brain lab in Paris).

Missions and main activities

Mission : The post-doc will be recruited by SU at the LOV to participate in the Make Our Planet Great Again project "Tropical Atlantic Deoxygenation: Gateway dynamics, ecosystem impacts and feedback mechanisms" (MOPGA-TAD) led by Dr. Rainer Kiko. This project has started in December 2019 and will continue until end of November 2024.

Activités principales : Ocean "deoxygenation disrupts marine ecosystems, affects fish stocks and aquaculture and leads to loss of habitat and biodiversity." (Kiel Declaration; Oschlies et al. 2019). Ocean deoxygenation in the recent past was to a large extent caused by global warming, but residual effects might be linked to enhanced oxygen demand in deeper water layers. Ocean deoxygenation affects the highly dynamic upwelling ecosystems of the Eastern Tropical Atlantic (ETA). These ecosystems are regions of intense oceanic productivity and critical for food supply to millions of people. Ocean deoxygenation in these regions might continue due to increased stratification, feedbacks in plankton dynamics, increased respiratory demand and a slowing-down of oxygen supply via the equatorial current system. A sustained observation system for plankton and particle dynamics in the ETA and particularly at the equatorial gateway to the ETA was set up via the MOPGA-TAD project, activities of the TRIATLAS project and international partners. In particular, Underwater Vision Profiler data, but also Multinet sample data analyzed using the Zooscan-approach were obtained at high spatial and temporal resolution and this particle and zooplankton data are now available via the EcoTaxa (https://ecotaxa.obs-vlfr.fr) and Ecopart (https://ecopart.obs-vlfr.fr/) platforms. These data collection efforts now enable us to elucidate how equatorial current dynamics and biological oxygen demand impact atmospheric carbon uptake, oxygen distribution and available habitat for fish in the ETA.
The post-doc will now have the chance to conduct a synoptic analysis of all gathered data using classic biological oceanographic techniques (transect analysis, lagrangian statistics), but also machine learning and/or biogeochemical model-data comparison approaches to assess plankton and particle impacts on the oxygen distribution in the tropical Atlantic. He/She will analyze how oxygen content and demand in the tropical Atlantic are driven by primary productivity, particle and plankton abundance and particle flux. The spatial and temporal analysis of all data will aim to elucidate feedback mechanisms between wind forcing, current dynamics, upwelling activity, plankton and particle dynamics on the oxygen content of the tropical Atlantic. To this end, machine learning approaches to generate gridded plankton and particle distribution data will be co-developed in our team. The resulting products will be used to estimate biogeochemical rates, also under future ocean conditions and to assess current biogeochemical models to better understand expected global change impacts on the carbon cycle and oxygen distribution of the tropical Atlantic upwelling systems.
The post-doc will work in close interaction with the marine ecologists and biogeochemists of the LOV in Villefranche-sur-mer, as well as with biological and physical oceanographers and biogeochemical model developers at the GEOMAR Helmholtz Center for Ocean Research Kiel. Further international collaborations will also be supported and the post-doc will benefit from our large network of collaborators in Europe and beyond.

Related bibliography

Clements DJ, Yang S, Weber T, McDonnell AMP, Kiko R, Stemmann L, Bianchi D (2022) Constraining the Particle Size Distribution of Large Marine Particles in the Global Ocean With In Situ Optical Observations and Supervised Learning. Global Biogeochemical Cycles 36:e2021GB007276.

Drago L, Panaïotis T, Irisson J-O, Babin M, Biard T, Carlotti F, Coppola L, Guidi L, Hauss H, Karp-Boss L, Lombard F, McDonnell AMP, Picheral M, Rogge A, Waite AM, Stemmann L, Kiko R (2022) Global Distribution of Zooplankton Biomass

Estimated by In Situ Imaging and Machine Learning. Frontiers in Marine Science 9.

Kiko R, Biastoch A, Brandt P, Cravatte S, Hauss H, Hummels R, Kriest I, Marin F, McDonnell AMP, Oschlies A, Picheral M, Schwarzkopf FU, Thurnherr AM, Stemmann L (2017) Biological and physical influences on marine snowfall at the equator. Nature Geoscience 10:852.

Kiko R, Brandt P, Christiansen S, Faustmann J, Kriest I, Rodrigues E, Schütte F, Hauss H (2020) Zooplankton-Mediated Fluxes in the Eastern Tropical North Atlantic. Front Mar Sci 7.

Kiko R, Picheral M, Antoine D, Babin M, Berline L, Biard T, Boss E, Brandt P, Carlotti F, Christiansen S, Coppola L, de la Cruz L, Diamond-Riquier E, Durrieu de Madron X, Elineau A, Gorsky G, Guidi L, Hauss H, Irisson J-O, Karp-Boss L, Karstensen J, Kim D, Lekanoff RM, Lombard F, Lopes RM, Marec C, McDonnell AMP, Niemeyer D, Noyon M, O'Daly SH, Ohman MD, Pretty JL, Rogge A, Searson S, Shibata M, Tanaka Y, Tanhua T, Taucher J, Trudnowska E, Turner JS, Waite A, Stemmann L (2022) A global marine particle size distribution dataset obtained with the Underwater Vision Profiler 5. Earth System Science Data 14:4315–4337.

Matthes K, Biastoch A, Wahl S, Harlaß J, Martin T, Brücher T, Drews A, Ehlert D, Getzlaff K, Krüger F, Rath W, Scheinert M, Schwarzkopf FU, Bayr T, Schmidt H, Park W (2020) The Flexible Ocean and Climate Infrastructure version 1 (FOCI1): mean state and variability. Geoscientific Model Development 13:2533–2568.

Soviadan YD, Benedetti F, Brandão MC, Ayata S-D, Irisson J-O, Jamet JL, Kiko R, Lombard F, Gnandi K, Stemmann L (2022) Patterns of mesozooplankton community composition and vertical fluxes in the global ocean. Progress in Oceanography 200:102717.

Conduite de projets : Non
Encadrement : Non X A ; X B ; X C

Dans le cadre de ses fonctions, l'agent pourra être amené à partager ses connaissances, à animer des formations internes et à participer à des concours en tant que membre de jury.

Knowledge and skills*

Required Education Level

Expertise in biological or biogeochemical oceanography or limnology, including ecological data analysis and statistics, ideally using machine learning approaches.

Skills / Qualifications

- Applicants **must hold or be very close to completion of a Ph.D**. in Marine biogeochemistry, Marine Ecology, Biological Oceanography or a related field
- Proficiency in **biological oceanography, machine learning and/or biogeochemical modelling**
- Applicants should have **excellent writing and communication skills** necessary to write scientific publications, and deliver presentations, seminars, supervise meetings and/or teach lectures to a non-specialist audience. At least one publication in a relevant field as first author would be a plus.
- Applicants should **collaborate effectively with a team of scientists of diverse backgrounds**, and showcase good communication skills to closely interact with an interdisciplinary team (including computer scientists, biologists and oceanographers).
- Strong self-motivation and ability to work independently on pre-set tasks

Specific Requirements

- This position involves a significant amount of computer code development, at least at first. Therefore, the candidate will have prior scientific programming experience (e.g. Python programming) but also a certain enthusiasm for coding and a strong motivation to use this code to explore marine ecology/biogeochemistry question.

Required Languages

Scientific & technical English (B2 level for written and oral). French and/or German would be a plus, but not mandatory.

Required Research Experience

- Completed or almost completed PhD

Exposition aux risques professionnels, conditions particulières d'exercice et formations réglementaires

Exposition aux risques professionnels :

☒ Non

☐ Oui **:** *si oui, indiquer les informations relatives aux risques physiques (port de charge, machines dangereuses,*

vibrations...), biologiques, chimiques, rayonnements ionisants ou non ionisants. Si l'agent est exposé aux produits dangereux dont les CMR, il doit impérativement disposer d'une Fiche Individuelle d'Exposition téléchargeable sur intranet dans la rubrique « Prevention-des-risques-professionnels/fiche-individuelle-d-exposition-aux-agents-chimiques-dangereux ».

Conditions particulières d'exercice :
Contract for 22 months. Salary between 2133€ and 2579€ gross and before taxes per month.

Formations obligatoires :
☒ Non
☐ Oui **:** *si oui, indiquer les formations réglementaires obligatoires sur les risques santé et sécurité propres au poste de travail (radioprotection, expérimentation animale, risques CMR, risques biologiques, SSIAP 1, 2, 3, habilitation électrique, conduite des autoclaves, …)*

**Conformément à l'annexe de l'arrêté du 18 mars 2013 (NOR : MENH1305559A)*

Application Deadline / Timezone	2 December 2022 18:00 AM Paris (GMT+01 :00) Online interviews to be conducted on the 9.12. and 13.12. to 16.12. 2022
Envisaged Starting Date	01-02-2023

Required Application Materials

1. Cover letter with current and future research interests
2. Most recent curriculum vitae
3. Copy of up to three significant publications
4. Names and contact for two to three referees

How to submit

Interested candidates should:

- Contact for additional information about the offer: Rainer Kiko

Submit the required application materials as one PDF to: Rainer Kiko, rainer.kiko@imev-mer.fr