Call for expression of interest to apply for a MSCA Postdoctoral Fellowship 2023

Project title	TIDal Influence on LOngshore current in the surf zone participates to beach resilience **TIDILO**
Call for expression of interest description	The Marie S. Curie Postdoctoral Fellowship (MSCA-PF) programme is a highly prestigious renowned EU-funded scheme. It offers talented scientists a unique chance to set up 2-year research and training projects with the support of a supervising team. Besides providing an attractive grant, it represents a major opportunity to boost the career of promising researchers. **The** Geo-Ocean lab (Coastal Dynamics team) **is thus looking for excellent postdoctoral researchers** with an international profile to write a persuasive proposal to apply for a **Marie S. Curie Postdoctoral Fellowship grant in 2023** (deadline of the EU call set **on 13 September 2023).** The topic and research team presented below have been identified in this regard.
Main Research Field	Environment and Geosciences (ENV)
Research sub-field(s)	Coastal dynamics
Keywords	Longshore current, surf zone, tide, wave, complex bathymetry
Research project description	Longshore current in the surf zone on sandy beaches is generated by oblique incident waves at breaking leading to a longshore sediment transport predicted by empirical formulas using offshore wave parameters. Currently, the CERC formula is the most widely used by coastal engineers. This formula failed on most beaches in macrotidal environment or rocky coastal environment (whereas such environment represents 80% of the world's coastline). So we ask: is macrotidal beach morphodynamics near complex bathymetry predictable using offshore hydrodynamics parameters (wave and tides)? In coastal environments with complex topo-bathymetry, the offshore wave conditions can be very different from those at the wave breaking point due to the refraction and diffraction processes. The shape of the coastline exerts a significant influence on the distribution of the longshore current along the coast. So first, we need to precisely know the wave direction at breaking in order to predict longshore current and transport. Besides, in macrotidal environment with tidal current of a m/s magnitude, how tides influences the longshore current? Three hypothesis were made: 1/ offshore wave direction is modulated by tidal current ; 2/ water level modifies the morphology in the surf zone ; 3/ tidal current contributes to longshore current in the surf zone. Recent field measurements have been conducted in collaboration with Kiel University (Christian Winter and Pushpa Dissanayake) in the framework of a SeaEU project (https://sea-eu.org/) coordinated by Serge Suanez on the Vougot beach. The multi-year evolution (since 2004) shows a long-term erosion trend on the eastern part of the beach, while the western part is accreting (SUANEZ et al., 2015). These morphosedimentary changes suggest longshore sediment transport linked to the littoral drift, oriented from east to west whereas the offshore wave climate is directed Eastward (SUANEZ et al., 2015). The aim of the intensive field measurements

	carried out in february 2022 was to measure this longshore current and the offshore hydrodynamics parameters to better understand how the forcings influence the current in the surf zone and also to validate a numerical modelling to better forecast the influence of global change on such coastal areas. For the first time, the tidal current was shown to primary influence the longshore current in the surf zone, being able to invert its direction under certain conditions. The third hypothesis was shown having a major contribution compared to the two others. So the Postdoctoral fellow will work on: using a validated numerical configuration including tides and tidal currents (Delft 3D), to investigate the influence of tidal current on the longshore current in the surf zone and evaluate the potential of sediment transport, in order to demonstrate the role played by the tides in the resilience of such beaches, and the possible scenarios for future (DISSANAYAKE et al., 2021). Field measurements focusing on sediment transport (thanks to the expertise of Geo-Ocean team in such measurements using acoustic techniques) will be carried out during the postdoc fellow stay. New longshore sediment transport formulas will be proposed at the end of the post-doc, adapted to such environments. DISSANAYAKE P., YATES M.L., SUANEZ S., FLOC'H F., KR MER K. (2021). Climate change impacts on coastal wave dynamics at Vougot Beach, France. Journal of Marine Science and Engineering, 9 (9), 1009. doi : 10.3390/jmse9091009. SUANEZ S., CANCOUËT R., FLOC'H F., BLAISE E., ARDHUIN F., FILIPOT J.-F., CARIOLET J.-M., DELACOURT C. (2015) Observations and predictions of wave runup, extreme water levels, and medium-term dune erosion during storm conditions. Journal of Marine Science and Engineering, 3 (3), 674–698. doi.org/10.3390/jmse3030674
Supervisor(s)	The Postdoctoral Fellow will be supervised by France Floc'h and Pushpa Dissanayake (and included in the project team composed by Serge Suanez, Marissa Yates and Nicolas Le Dantec). France Floc'h has been assistant professor at the University of Brest since Sep. 2012. She is now an expert in **nearshore hydro-sedimentary processes**, including experimental work (laboratory and field) and numerical modeling, with specialist expertise in the development of innovative acoustic techniques for sediment concentration measurement. She has a strong experience of coordination (more than 10 projects) and supervision (30 master students, 6 PhD, 3 post-docs and 2 engineers over 10 years), She has conducted the field measurement in February 2022 at Vougot beach. Pushpa Dissanayake, after some years at Kiel University in coastal dynamics team, is senior researcher in a German governmental agency dealing with environmental issues (NLWKN). His interest are the morphodynamic processes of coastal systems and their forecast via numerical models (especially Delft 3D). During his career, he has simulated a wide range of coastal environments (estuaries, inlet/basin, barrier islands, beach/dune etc.) using different forcing scenarios (extreme events, Climate Change and anthropogenic impacts etc.). He has conducted the numerical modelling of Vougot Beach (Dissanayake et al, 2021). *https://univ-brest.fr/fr/membre/france-floch* *https://www.researchgate.net/profile/Pushpa-Dissanayake* Daly C., **Floc'h F**., Almeida L. P., Almar R., Jaud M. (2021) Morphodynamic modelling of beach cusp formation: the role of wave forcing and sediment composition, Geomorphology, 107798 Moskalski S., **Floc'h F**., Verney R. (2020) Suspended sediment fluxes in a shallow macrotidal estuary, Marine Geology, Vol. 419, 106050, ISSN 0025-3227, https://doi.org/10.1016/j.margeo.2019.106050.

	Fromant G., **Floc'h F**., Lebourges-Dhaussy A., Jourdin F., Perrot Y., Le Dantec N., Delacourt C. (2017) In situ quantification of the suspended load of estuarine aggregates from multifrequency acoustic inversion, Journal of Atmospheric and Oceanic Technology, 34(8), 1625-1643. **Dissanayake**, P., Brown, J., & Yates, M. (2022). Morphodynamic evolution and sustainable development of coastal systems. *Journal of Marine Science and Engineering*, *10*(5), 647. **DISSANAYAKE P**., YATES M.L., SUANEZ S., **FLOC'H F.,** KR MER K. (2021). Climate change impacts on coastal wave dynamics at Vougot Beach, France. Journal of Marine Science and Engineering, 9 (9), 1009. doi : 10.3390/jmse9091009. **Dissanayake,** D. M. P. K., Ranasinghe, R. W. M. R. J. B., & Roelvink, J. A. (2012). The morphological response of large tidal inlet/basin systems to relative sea level rise. *Climatic change*, *113*(2), 253-276.
Department/ Research	Geo-Ocean is a multidisciplinary research unit, specialized in the study of the earth and the oceans and their interactions. This joint research unit (UMR) is the result of the merge of the Marine Geosciences unit of Ifremer and the Oceanic Geosciences Laboratory. Geo-Ocean has 130 permanent staff (researchers, researchers, engineers and technicians) and nearly 220 people in total (including non-permanent staff - post-docs, PhD students, Master students…). Geo-Ocean is divided in 6 research teams, the post-doctoral fellow will be integrated in ODYSC team. The objective of this team is to observe and model the physical, geomorphological and morpho-sedimentary variability and dynamics of the nearshore-coastal domain in relation to the biological environment and anthropogenic activities: from high-frequency hydro-sedimentary processes under mild and extreme conditions, to mesoscale morpho-sedimentary dynamics and to the impacts of cumulative impacts related to anthropogenic and natural forcing on scales ranging from the instantaneous to several hundred years. Geo-Ocean operates and benefits from numerous analytical, informatic and instrumental platforms of the institute of marine studies of UBO (IUEM) and Ifremer, in particular: the Pôle Image & Instrumentation (P2I) pooling more than 50 scientific instruments dedicated to marine and coastal sciences (current meters, sediment profilers, multibeam echosounder, DGPS…), the coastal observation dataset from the National Observation Service (SNO) DYNALIT and the cluster Datarmor, one of the world's top 500 supercomputers, and the only one 100% dedicated to the sea. This environment will ensure for the post-doctoral fellow the availability of all the tools required to run numerical model such as Delft 3D and to deploy relevant instruments to validate the hypothesis. Moreover, Geo-Ocean is a very dynamic lab, with two ERC project leaders and several in competition, two Interreg European projects, more than 10 national projects such as PEPR, PPR and ANRs. Coastal Dynamics team has strong international collaborations with Delft Univ, Scripps Insitute, WHOI, Madere Univ, Dublin Univ, Kiel Univ… ensuring an international recognition of the post-doctoral fellow work. *https://www.geo-ocean.fr/en*
Location	Technopôle de Plouzané IUEM Geo-Ocean UMR6538 rue Dumont D'Urville 29280 Plouzané France

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<tr><td>Suggestion for interdisciplinary / intersectoral secondments and placements</td><td>A 3-month secondment can be envisioned at the beginning at Kiel university or at the German governemental agency NLWKN in order to test new Delft 3D numerical configurations requiring expertise on previous configurations made by Pushpa Dissanayake.</td></tr>
<tr><td>Skills Requirements</td><td>Knowledge in Coastal dynamics and experience in numerical modelling with DELFT3D are required.

English: spoken and written. Excellent redaction skills.

The candidate must justify a sustained publication activity during the last years.</td></tr>
<tr><td>Eligibility criteria for applicants</td><td>Academic qualification: By 13 September 2023, applicants must be in possession of a doctoral degree, defined as a successfully defended doctoral thesis, even if the doctoral degree has yet to be awarded.

Research experience: Applicants must have a maximum of 8 years full-time equivalent experience in research, measured from the date applicants were in possession of a doctoral degree. Years of experience outside research and career breaks (e.g. due to parental leave), will not be taken into account.

Nationality & Mobility rules: Applicants can be of any nationality but must not have resided in France more than 12 months between 13/09/2020 and 13/09/2023</td></tr>
<tr><td>Application process</td><td>We encourage all motivated and eligible postdoctoral researchers to send their expressions of interest through the EU Survey application form (link here), before 1st of May 2023. Your application shall include:

• a CV specifying: (i) the exact dates for each position and its location (country) and (ii) a list of publications;

• a cover letter including a research outline (up to 2 pages) identifying the research synergies with the project supervisor(s) and proposed research topics described above.

Estimated timetable

<table>
<tr><td>Deadline for sending an expression of interest</td><td>1st of May 2023</td></tr>
<tr><td>Selection of the most promising application(s)</td><td>May – June 2023</td></tr>
<tr><td>Writing the MSCA-PF proposal with the support of the above-mentioned supervisor(s)</td><td>June – September 2023</td></tr>
<tr><td>MSCA-PF 2023 call deadline</td><td>13 September 2023</td></tr>
<tr><td>Publication of the MSCA-PF evaluation results</td><td>February 2024</td></tr>
<tr><td>Start of the MSCA-PF project (if funded)</td><td>1st of May 2024 (at the earliest)</td></tr>
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