20 months post-doc position in landslide and tsunami simulation at

Institut de Physique du Globe de Paris

Project title: Numerical simulation of landslides and generated tsunamis for hazard assessment

Description and objectives: Various models and numerical methods have been developed to simulate sub-aerial and submarine landslides as well as the tsunami waves they can generate. Despite huge work in this domain, there is still a lack of understanding and quantification of the physical processes involved in landslides and of accurate mathematical and numerical approximations for landslide and tsunami propagation. In particular, the challenge is to simulate landslides and tsunamis at a reasonable computational cost while accounting properly of topography and dispersive effects. The objective in this post-doc is to gather recent improvements in these directions in a common tool to be integrated in a prototype for Digital Twin (DT-GEO) simulating extreme hazards (volcanic, seismic, tsunami) from the source process to the impacted areas. We will benefit from the other work packages of the DT-GEO European project that will establish probabilistic scenarios for the targeted field application with the ultimate goal to perform Probabilistic Tsunami Forecasts (PTF). We will in particular take advantage of the unique description of topography effects in the landslide model SHALTOP and of the different versions of the wave propagation codes with the HySEA family, making it possible to significantly improve the description of dispersive effects. These codes are based on finite volume methods and hybrid finite-volume-finite-difference numerical scheme on GPU architectures, respectively. We will incorporate different types of rheologies (granular and cohesive) in the landslide model for the simulation to be applicable to different field targets.

European context: This research will be performed within a unique European project DT-GEO (https://dtgeo.eu/) involving 19 world-class European laboratories dealing with High Performance Computing, research in geophysics, and operational monitoring networks are involved. This work will be at the interface between mathematics and geophysics involving University Paris Cité (Anne Mangeney), University Gustave Eiffel (Francois Bouchut), University of Seville (Enrique Fernandez-Nieto and Gladys Narbona-Reina), and University of Malaga (Manuel Castro-Diaz and Jorge Macias). It will benefit from collaborations with Finn Løvholt from NGI (Norway) and with the research groups from LMU (Munich), GFZ (Postdam), UHAM (Hamburg), and INGV (Roma) involved in this project.

Position: 20 months post-doc position at Institut de Physique du Globe de Paris, a world-class laboratory in geophysics and natural hazards. **The position is open now**. Please send your CV, reference and motivation letters to mangeney@ipgp.fr and edofer@us.es.

Candidate skills: The candidates should have a PhD in computational fluid dynamics, software development, scientific computing, or applied mathematics. Experience in geophysics or physics will be much appreciated.
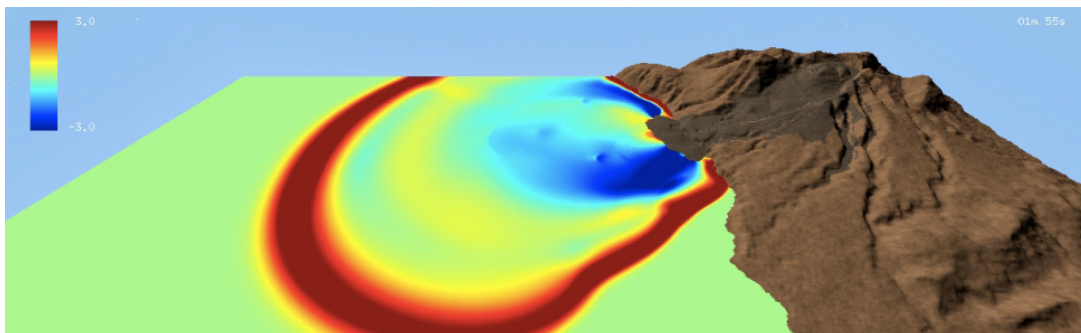

Figure: Simulation of a landslide and of the generated tsunami wave.