



ED 398 Géosciences, Ressources Naturelles et Environnement

Proposition de sujet de thèse pour la rentrée universitaire 2018-2019

1. Titre/Title

Alboran Sea submarine landslides: links between tectonic activity, seismicity and sedimentation and their impact in hazard assessment

2. Adresse courriel du contact scientifique/ Coordinators

sara.lafuerza@upmc.fr
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3. Description du projet de thèse/ Proposal description

Mediterranean coasts are prone to many natural hazards such as earthquakes, submarine landslides, tsunamis and sea level rise. The Alboran Sea, where the interaction takes place between the Eurasia and Nubia plates, represents a biogeographic boundary due to its confined location between the active Betic and Rif orogenic belts and the strong influence of water masses exchanges between the Atlantic and the Mediterranean which influences contourite sedimentation. This part of the Mediterranean is affected by strong seismic activity (earthquakes of $M_w > 6$). Numerous submarine landslides, up to several km³ in volume have been mapped. Both processes may generate tsunamis with run-up values > 1 m, which would flood densely populated coastal cities in Spain and Morocco, and represent a significant geological hazard. Understanding the causal factors of submarine landslides is a major challenge not only for Earth scientists but also for coastal management and civil protection agencies. The PhD project will address the occurrence and frequency of submarine landslides and the probability of future slope failures in the southern part of the Alboran Sea to better assess potential tsunami hazards. The project target area in the southern Alboran Sea area exhibits a variability of slope instabilities and landslides certainly related to deep and superficial tectonic and sedimentary processes. Improve our understanding of the interactions between surface processes, such as sedimentation and bottom circulation, and deep dynamic processes related to the convergence of tectonic plates, is one of the aims of this project.

4. Compétences et connaissances requises/ Required skills

Mandatory:

- MSc in Geology or Earth Sciences
- Background in soil mechanics (consolidation and strength properties, seepage)
- Interpretation of geophysical data: multibeam bathymetry, seismic reflection and refraction data
- GIS data (raster and vector) manipulation, spatial analysis

Other recommended skills:

- 2D Slope stability analysis (Plaxis, Talren or similar)
- Geotechnical laboratory testing

5. Modalités d'encadrement/ *Project coordination*

Unité(s) de recherche au sein de laquelle le doctorat est réalisé :

ISTEP, UMR 7193, 4 Place Jussieu, 75

Directeur de l'unité :

Leroy, Sylvie, DR

Directeur(s)* de thèse (HDR ou équivalent) :

d'Acremont, Elia, MdC, ISTEP (HDR September 2018)

Co-directeur* de thèse (HDR ou équivalent) :

Gorini, Christian, Professeur (ISTEP)

Co-encadrant (non HDR) :

Lafuerza, Sara, MdC, ISTEP

Rabaute, Alain, PR, ISTEP

Responsabilités spécifiques de chaque encadrant :

Elia d'Acremont: géologie structural, tectonique active

Gorini, Christian : stratigraphie sismique

Lafuerza, Sara : caractérisation géotechnique, modélisation glissements sous-marins

Rabaute, Alain : intégration SIG, interprétation et traitement des données géophysiques

6. Conditions matérielles de réalisation du projet de recherche/ *Funding environnement*

Financement spécifiques obtenus pour le projet : **oui**

ANR JCJC Albamar (the project will fund the PhD contract and missions)

Financement des missions nécessaires pour la réalisation du projet : **oui**, ANRJCJC funding for participation in the Coring cruise Albacore (led by ISTEP) in the Alboran Sea in 2019

Accès à des bases de données spécifiques : **oui**

Bathymetry datan seismic reflexion, core samples and in situ geotechnical tests from ISTEP and Spanish datasets

Accès à des ressources documentaires spécifiques : **no**

Accès à des plateformes : **oui**

Geotechnical laboratory of the ICM-CSIC (Spain)

Accès à des grands instruments : **no**

Autres : -

7. Précisions sur les objectifs de valorisation des travaux issus du projet de recherche/ *Publications and outreach*

Two publications illustrating geotechnical characterization and modelling of submarine landslides in the Alboran Sea on thematic international scientific journals. Data and interpretations will be presented at international congress (EGU, AGU and the UNESCO Symposium on Submarine Mass Movements and their Consequences).

With the results of the PhD research project, the student will contribute to the creation of a blog (wordpress) that will be created within the framework of the ANR JCJC Albamar project.

Moreover, the student will present the results of the Albacore cruise and PhD results to the scientific community and stakeholders on the marine geohazard workshop organised by the ANR JCJC Albamar project. This workshop will take the form of a scientific meeting between ISTEP, external collaborators involved in the Albamar project (CSIC, Spain; Ifremer, ENS); colleagues from other public research institutions interested in the Alboran Sea, in particular, colleagues from Morocco; and other actors representing stakeholders, such as industry and civil protection agencies interested in the Alboran Sea.

8. Candidature/Application

Candidates will send their motivation letter and resume to Sara Lafuerza and Elia d'Acremont (cf. Coordinators) **no later than June 15th 2018**. The PhD project will start in November 2018 and will end at the end of November 2021.