Offre de thèse financée / Ph.D. Opportunity

in Earth Sciences at LIENSS, La Rochelle, France

Relative sea level rise and coastal flood vulnerability in deltaic regions

General Information

A **3-year Ph.D.** position in Earth Sciences is currently open at the LIttoral, ENvironment and Societies (LIENSs) - UMR 7266, CNRS, La Rochelle University, La Rochelle, France.

Localization: France, La Rochelle.
Application deadline: May 31, 2019.
Earliest starting date: September 2019.
Contract period: 36 months
Salary: ~1768 € gross monthly.
Keywords: sea level; vulnerability; coastal flooding; delta; tide gauge; altimetry; extreme.

Director(s) and team

Thesis director(s): Melanie Becker (LIENSs) and Alexandre K. Magnan (IDDRI)
Research team: Physical Dynamics of the Littoral zone (DPL)
Research department: UMR7266 – Earth Sciences

Description of the PhD thesis project

Deltas are dynamic systems driven by constantly changing interactions between land-based fluvial and ocean processes. Composed of huge bodies of nutrient-rich sediments deposited at mouth of major rivers, the deltas are among the most fertile regions in the world. These flat agricultural lands, accounting for less than 2% of the Earth's land, are vital for food security of more than half a billion people. The combination of sea level rise and extreme meteorological events with rapidly growing populations and increasing impact of human activities on river basins and natural resources, threatens the delta communities as a whole. This makes these latter particularly vulnerable to rising sea level and intensifying extreme meteorological events. As a result, the vulnerability of such socio-ecological systems is becoming a subject of growing concern for sustainable development and environmental policies, and public health.

The extreme coastal flood events result from extreme sea levels (ESL) as the conjunction of storm surges and tides that are amplified, on the one hand, by interactions with waves and, on the other, by low-frequency decadal-sea level variability and secular mean sea level changes. These extremes come together with ongoing relative sea level rise (RSLR, defined as a combination of vertical land motions, fluvial sediment deposition and eustatic sea level rise) and rapid population growth, increasing future risks in the delta regions. Despite the importance of the RSLR-ESL impacts on the deltas , and particularly on those situated in the tropical regions, only a handful of studies has been conducted on this subject. This PhD thesis aims at filling this gap at the crossroad of Earth Sciences and Geography.

The thesis focuses on two to three case studies, including the Ganges-Brahmaputra delta. Its objectives are to : i) Adapt the statistical framework of ESL events as a time-varying analysis, ii) Analyze the interactions between RSLR-ESL and its impact in term of coastal inundation, and iii) Assess actual and future vulnerability to coastal flooding induced by the RSLR-ESL events and including some human dimensions of vulnerability. During the PhD time, strong interaction is expected with the members of the ANR project "Deltas undEr gLobal impacT of chAnge (DELTA)", of which this PhD project is a part.

Profile and skills required

Master's degree in Earth Sciences or in Applied Mathematics by the start date.
Willingness to work in collaboration within the framework of an interdisciplinary project.
Good skills in both French and English languages are required.
Experience in statistics/data analysis is indispensable and a knowledge of oceanography and GIS will be appreciated.
Prior knowledge and experience in computer programming and/or languages such as Fortran, Python, Matlab and/or R will by an asset.

Applicants are invited to submit a letter of motivation, their CV, a description of the academic curriculum and details of two referees to Melanie Becker (melanie.becker@univ-lr.fr) and Alexandre K. Magnan (alexandre.magnan@iddri.org).

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