Position Profile for Chinese Applicants running for 2019 Helmholtz – OCPC – Program

PART A (Info about the Position)

Helmholtz Centre and institute: Helmholtz Centre Potsdam GFZ German Research centre for Geosciences; www.gfz-potsdam.de

Title of the project: Tsunami hazard assessment using sediment transport modeling and Ensemble Kalman Filtering method

Project leader:

1. Prof. Dr. Jean Braun,
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Description of the project (max. half page)**:**

The 2018 Palu tsunami and Krakatau tsunami in Indonesia generated massive waves and cost thousands of lives in part due to poor tsunami hazard assessments in this area, These events also highlighted necessary research on novel methods for tsunami hazard assessment in the future. The traditional approach to perform tsunami hazard assessment is based on seismic source inversion using data from onshore seismometer or wave gauge networks. However, this method highly depends on the availability and quality of such data. Furthermore, this approach usually ignores uncertainties in the source parameters and in tsunami forecast modelling, underestimates the effects of sediment transport and overlooks tsunamis caused by other possible causes (such as landslides and volcanic eruptions).

The goal of this project is to develop a framework that can couple deterministic numerical modeling with Ensemble Kalman Filtering (EnKF) method to produce more certain hazard assessments in areas exposed to tsunamis. GeoClaw, part of the open source Clawpack software (http://depts.washington.edu/clawpack/geoclaw/), has been under development since 1994 by Randall LeVeque. It has been widely validated and verified in various tests. GeoClaw-STRICHE refers to the sediment transport model implemented in the GeoClaw framework. The Ensemble Kalman Filtering method is an extension of the Kalman Filtering method for solving nonlinear problems and widely used in weather prediction.

The candidate will develop a framework to combine GeoClaw-STRICHE with EnKF method and apply this novel method to answer the following questions: (1) What are fundamental mechanisms of sediment transport during tsunamis? (2) Can tsunami magnitude be inferred from tsunami deposits? (3) Can we combine different types of tsunami source in a single tsunami hazard assessment? (4) What role do uncertainties in the tsunami source play in hazard assessment? (5) How will a tsunami hazard assessment change under sea level rising situations?

Description of existing or sought Chinese collaboration partner institute (max. half page)**:**

With this project, we seek to collaborate with coastal/ocean research experts and computational scientists who have developed the processes-based models for coastal hazard. We have existing connections with several ocean research institutions in China, including State Key Laboratory of ocean engineering, Tongji University, and Shanghai Jiao Tong University. Postdocs of these and other organizations with a strong background in coastal hazard, geomorphology, and surface processes modeling are invited to apply.

Required qualification of the post-doc:

- PhD degree in geology, geophysics, and mathematics or related areas;
- With a background in earth surface processes modelling;
- Strong programming skills;
- Excellent communication skills in English in an international environment;

PART B (Materials and Procedures)

The applicants shall submit the following documents to a Chinese postdoc station affiliated to a research institution or a university, after passing through the internal selection, the qualified application shall be forwarded to OCPC, and then to Helmholtz for evaluation:

- Detailed description of the interest in joining the project (motivation letter)
- Curriculum vitae, copies of degrees
- List of publications
- 2 letters of recommendation
- Proof of command of English language

PART C (General Conditions)

Additional requirements on the postdoctoral fellows:

- Chinese citizenship from Mainland China (allows application while staying abroad)
- Max. age of 35 years, PhD degree not more than 5 years by submission of application
- Very good command of English language
- Strong ability to work independently and in a team