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

PART A

Title of the project: Data Science Application in Natural Hazards and Surface Processes Modeling

Name of the offering Helmholtz Centre: Helmholtz Centre Potsdam GFZ German Research centre for Geosciences; www.gfz-potsdam.de

Project leader/supervisor:

1. Dr. Hui Tang,
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Description of the scientific topic (max.1 page):

Smart monitoring and observing system for natural hazards, including satellites, global networks, unmanned vehicles, and other linked devices, have become increasingly abundant. This diversity of systems and methods gives natural hazards scientists unprecedented amounts of data before, during, and after events. In parallel, new machine learning techniques are constantly being developed that allow us to mine these large datasets. Such data and methods not only bring a better understanding of the processes that govern the natural hazards processes, and allow monitoring of natural hazards, but also results in a better understanding of how hazard impacts can compound and cause cascading consequences. Hence, data science and machine learning methods are dramatically changing natural hazard science. We invite applicants from all aspects of natural-hazards research, especially these hazards involving earth surface processes, applying data science to understand natural hazard events and hazards over both short time and long time scale.

The goal of this project is to develop frameworks that can combine existed dataset at the GFZ (such as remote sensing, seismic data, and geochemical data), deterministic numerical modeling, and machine learning approaches. We propose to develop a machine learning approach for figuring out the surface processes, the controlling factors, and thresholds for different hazards such as landslide, debris flow, flood, tsunami, and storm surges. We will use this proposed modeling framework to test the hypothesis that natural patterns exist such that geospatial, climate and tectonic characteristics can be correlated with this kind of natural hazard frequency utilizing a machine learning approach combined with a physically-based numerical model. We will use this approach to study and predict given natural hazard frequency at both local and global scale under climate changing condition. Applying these newly-developed techniques at the global scale also has the broader impact of leading to improved hazard assessment of critical regions.

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

We have existing collaborations with several institutions in China, including State Key Laboratory of Geohazard Prevention and Geoenvironmental Protection, Chengdu University of Technology, Jilin University, and Southwest Jiaotong University. With this application, we also seek to bring together groups with unique expertise in natural hazards research and earth surface processes, who have developed or are willing to develop machine learning models for natural hazard. Postdocs of these and other organizations with a strong background in natural hazard, surface processes modeling, or machine learning are invited to apply.

Qualifications required by the applicant:

- PhD degree in geology, geophysics, mathematics or related areas;
- Background in earth surface processes modelling and/or natural hazards;
- Strong programming skills;
- Excellent communication skills in English in an international environment;

PART B

Documents to be provided by the post-doc, necessary for an application to OCPC via a postdoc-station:

- Detailed description of the interest in joining the project (motivation letter);
- Curriculum vitae;
- Copies of degrees;
- List of publications;
- Two letters of recommendation;

PART C

Additional requirements to be fulfilled by the post-doc:

- Chinese citizenship from Mainland China (allows application while staying abroad)
- Max. age of 35 years ; Degree not older than 5 years;
- Very good command of the English language;
- Strong ability to work independently and in a team;