Internship position – Feb.-July 2016

From dynamic vulnerability assessment to human impacts forecasting: Case study of the Austin (Texas) 2010 flash-flooding event

Context

Nowdays, flash floods are still responsible for a majority of natural disaster fatalities in the USA and Europe. In fact, in such fast-evolving events, impacts depend not only on the magnitude of the natural hazard and the vulnerability of those affected, but also on how these factors evolve and intersect in space and time. These contextual factors can alter the scale, distribution, and magnitude of social impacts.

In order to integrate those contextual factors in the prediction of catastrophic human impacts, a Probabilistic Flash Flood Impacts Prediction (PFFIP) model is currently being developed in the context of a interdisciplinary collaboration between the National Severe Storms Laboratory (NSSL) at the National Weather Center (NWC) in Norman (Oklahoma, U.S.A.) and the LTHE, a laboratory of Grenoble (France) dealing with hydro-climatological risks and social impacts. The PFFIP model, developed by Galateia Terti in the context of her PhD, incorporates three levels of information considering i) the hydro-meteorological conditions, ii) the exposed natural and built environment, and iii) the spatial distribution and socio-demographics of the exposed population.

This internship position proposes to apply this integrated hazard-vulnerability model on past catastrophic flash flood events to test the efficacy of the model to reproduce observed human impacts related to specific life-threatening circumstances. This work will contribute to the adjustment and development of impact-specific FF forecasting products that will be implemented at first in the U.S. Such modeling, based on publicly available national datasets, can support a nationwide operational prediction tool for forecasters of the National Weather Services and emergency managers in charge of civil protection.

Work program

The case study will be based on flash flood events related to the tropical storm Hermine (September 6-8, 2010) in U.S.A. Especially, the study will focus on the Austin (Texas) flash flooding. Detailed information on the hydro-meteorological event and the observed impacts, including georeferenced flooding complains for property, road closures, rescues and evacuation needs, are available for the Austin case study from multiple sources such as the Flood Early Warning System, the Watershed Engineering Division, the Watershed Protection Department, the City of Austin, and the Travis County Emergency Management Coordinator.

The 5-months work is composed of four steps:
1. GIS-based data preparation for the case study area (i.e., Austin area in Texas, U.S.A.).
2. Application of the PFFIP model on the Austin event case study in order to reproduce the occurrence of distinct fatal circumstances (i.e., probability of specific life-threatening circumstances with respect to the rainfall and flooding dynamics)
3. Construction of impact-explicit space-time representations and maps showing the likelihood of human impacts.
4. Comparison of the model outputs with independent impact observations and evaluation of the impacts assessment approach.

Requested skills

- Master or engineering degree in geography, geomatics, statistics or environmental sciences

- Good skills in GIS use and statistical analysis (R software)

- Rigorousness and sense of organization is needed as the candidate will manipulate important volume of data,

- Very good English level (written and spoken) as most of the scientific discussions and supervision will be in english

- Interest for interdisciplinary approaches and collaborations

Supervision: Galatia Terti (PhD LTHE-NSSL); Isabelle Ruin (CNRS researcher, LTHE)

Dates: 02/2016 – 07/2016

Working environment:

Laboratoire d'étude des Transferts en Hydrologie et Environnement (LTHE), HMCIS team

Campus Universitaire, Grenoble, France

Application:

Please send a CV and cover letter by mid-december 2015 to:

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References

Terti, G., Ruin, I., Anquetin, S., Gourley, J.J., 2015. Dynamic vulnerability factors for impact-based flash flood prediction. Published online in Nat. Hazards. DOI 10.1007/s11069-015-1910-8.

Terti, G., Ruin, I., Anquetin, S., Gourley, J.J., 2015. A Situation-based Analysis of Flash Flood Fatalities in the United States. (under preparation).