Exploring hydro-meteorological uncertainties in urban drainage systems

Keywords: flood forecasting, Precipitation nowcasting, uncertainties

Background
Short-time precipitation forecasts, known as nowcasting, are mainly used to issue urban pluvial flood warnings. These warnings are affected by important sources of uncertainty, which are related to precipitation estimation and forecasting and to uncertainties associated with urban flooding hydrodynamic simulations. This thesis aims to investigate the various sources of uncertainty when simulating urban pluvial flooding in real-time. The thesis will be developed in collaboration with the Chair of Hydrology and Water Resources Management at ETH Zurich.

Objectives of the suggested topic
The main goal of this thesis is to investigate the urban pluvial flood forecasting uncertainties emerging from precipitation estimation, and to study the influence of flood warning time on urban pluvial flood forecasting accuracy. The results of such study will contribute to generate urban flood risk maps in real-time taking into account uncertainty.

Suggested tasks (to be discussed)
1. Literature review on state-of-the-art high-resolution precipitation forecasting and on fast urban flood modelling;
2. Identify the main sources of uncertainty on precipitation measurement and forecasting and urban flood modelling;
3. Develop a real-time flood forecasting prototype tool based on precipitation data;
4. Analyse and discuss the obtained results, with a special focus on the main uncertainties and usefulness of real-time flood mapping;
5. Write the thesis report.
Specific information / Requirements
- Interest in urban water, from precipitation to urban drainage;
- Interest in risk assessment and management (mainly flood risk);
- Willingness to travel within Switzerland to conduct interviews;
- Good knowledge of English;
- Good communication and interpersonal skills;
- A good amount of motivation and initiative

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