**Topic:** Simulation and analysis for flood inundation early warning in small catchments caused by rainfall-induced disaster - application to community disaster prevention

**(致災性降雨對小集水區積淹水災害預警報模擬分析 - 應用於社區防災)**

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**Introduction**

Providing flood forecasting is a part of flood management planning and development strategies. Flooding is a phenomenon subject to the wide variability of scale and severity. Flood inundation early warning system is essentially designed to forecast extreme events. Every catchment has its flood characteristics and behaviors. According to temporal and spatial responses to a hydro-meteorological event, forecasting service is primarily dependent on the types of flooding occurring in the basin. Urban floods are the most common natural hazard impacting urban cities because of extreme rainfall intensity within a short duration. Due to the complex interaction between rainfall intensity, drainage system, and overland flow, the flood inundation warning poses a challenge for many dense-populated metropolises.

The strategies address occupied flood plain areas where non-structural measures can be useful, for example, temporary defenses such as flood gates or movable barriers, or domestic protection such as sandbagging, as well as local evacuation to flood shelters. Flood management requires engaging water management agencies and local or municipal authorities, along with transport and communications operations and emergency services. Flood forecasting has to provide information to these users (such as local community people), so they can prepare and respond. However, since there is no perfect precipitation forecast in the present day, the various quantitative precipitation forecast (QPF) products were developed in recent year. Thus, how to evaluate the appropriate QPF methods for flood forecasting in different scenarios, and what the information are provided (for different users) from these forecasts are the core issue in this topic.

**Goals**

1. Improving accuracy precipitation forecasting in temporal and spatial resolution in a hydro-meteorological event.
2. To simulate the flood inundation in small catchments at the urban area, based on the characteristics of rainfall intensity, drainage system, overland flow, …etc.
3. To evaluate the strategies for flood management by using effective non-structural measures, i.e., early warning system.
4. Evaluating or calculating appropriate precipitation forecast from various QPE products (e.g., QPF by radar, regional models, or global models) for flood forecasting in different time scale and space scale.

**Requirements**

1. Knowledge and interests in hydrology and meteorology.
2. Skills in the programming language (such as Python, MATLAB, or Fortran)