# Spatial Risk Assessment for Flood Caused by Rivers: Part1 Analysis of Spatial Temporal Characteristic of Rainfall

○Xinyu JIANG, Hirokazu TATANO, Tomoharu HORI

In a river basin, if one area is only influenced by one river, the flood risk of this area can be calculated by analysis of storm or flood of this river. However, many areas in a basin are influenced by more than one river. How to asses flood risk cased by rivers become an important topic. There are mainly two ideas to solve this problem. Assuming one area is influenced by two rivers, to assess the flood risk of this area, we can directly use the river gauging station data (flow, stage) to build a joint distribution function which could reflect the spatial dependence structure of two rivers. Then based on it, joint flood events corresponding to certain return period could be simulated and the flood risk at this area could be calculated. This method is straightforward and explicit, but for many areas, continuous river gauging station data at each reach is not avail able. The other solution for this problem is that adopt rainfall data to estimate the spatial dependence structure of two rivers. If both of the two sub basins are small and the rainfall characteristics can be represented by one rainfall station, when driving a rainfall-runoff model, the spatial dependence structure of two rivers is implied. If more than one rainfall stations are considered, the analysis of spatial dependence structure among rainfall stations should be conducted. Then based on this spatial dependence structure, rainfall events corresponding to certain return period could be simulated and flood events also could be simulated by driving rainfall-runoff model. This method is indirect and has more uncertainties than the former one, but widely applicable. In this study, to achieve the goal that assesses flood risk cased by rivers, a case study in Maruyama river basin is implemented. We developed a procedure to assess flood risk at each point in a basin. 1, take the river upstream point of study area as outlet, divide sub basin by using DEM data.2, use spatial interpolation to generate rainfall datasets for each sub basin by using rainfall gauging data.3,for rainfall data of each sub basin, analyze its rainfall characteristics.4,estimate spatial dependent structure by adopting Copula function.5, base on step 3 and step 4, generate rainfall dataset which considering rainfall characteristics and spatial dependent structure.6, use this rainfall dataset drive a hydraulic or hydrological model to assess flood risk. Because of the time limitation, this presentation is up to step 5. This flood simulation will be forward in future work.