International Doctorate in Civil and Environmental Engineering

Flood risk assessment at different spatial and temporal scales

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Abstract

Floods still represent one of the natural hazards with the largest damages to human lives, activities, and infrastructure. Floods can occur in different ways depending on the river basin characteristics, as well as on the rainfall event intensity and duration that precedes the flood. Flash floods often occur on small basins with low concentration times, which give little time for early warning. On large basins, floods often occur due to storms of at least daily duration. Despite the huge amount of literature regarding flash flood warning systems and climate change influence on floods, the objective of this thesis is to further analyse the effect of the spatial distribution of the rainfall events on the rainfall alert thresholds and to find a methodology to summarize all the information of the various climate models in a single hydraulic risk analysis. The first part involves the implementation of the Flash Flood Guidance (FFG) method with the Real time Interactive Basin Simulator (RIBS) model as a tool to forecast flash floods on small river basins. The second part involves a flood risk assessment at the river basin scale under climate change scenarios with design rainfall events modified with delta changes for a set of climate models and emission scenarios.