A cascade modelling approach to flood extent estimation

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Recent efforts dedicated to the generation of new flood risk management strategies, have pointed out that a possible way forward for an improvement in this field relies on the reduction and quantification of uncertainties associated to the prediction system. With the purpose of reducing these uncertainties, this investigation follows a cascade modelling approach (meteorological - hydrological - 2D hydrodynamic) in combination with high-quality data (LiDAR, satellite imagery, precipitation), to study an extreme event registered last year in Mexico. The presented approach is useful for both, the characterisation of epistemic uncertainties and the generation of flood management strategies through probabilistic flood maps.

Uncertainty is considered in both meteorological and hydrological models, and is propagated to a given flood extent as determined with a hydrodynamic model. Despite the methodology does not consider all the uncertainties that may be involved in the determination of a flooded area, it enables better understanding of the interaction between errors in the set-up of models and their propagation to a given result.