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Improving flood prediction by using water level observations in the floodplain

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Changing climate conditions have undeniably affected the extremity of weather events, of which flash floods is just one out of many. In a constant search for better flood warning systems, model predictions can be improved by integrating observational information, a technique known as Data Assimilation (DA).

Whereas multiple studies have focused on improving flood forecasts by means of river flow observations, reports on the potential of using floodplain observations remain rare. In this study, the river Dee flood event of December 2006 (Wales, UK) is simulated by means of a coupled 1D/2D flood inundation model (LISFLOOD-FP). Whenever an observation becomes available, the model is updated in order to advance in a more realistic direction.

This study will include a rigorous analysis on three main aspects concerning the assimilation of observations. First, the observation frequency is varied, ranging from approximately 2 days to an hourly monitoring. Secondly, different scenarios for model and observational uncertainty are evaluated, the latter being water level observations ranging from $\pm$ 1 cm to $\pm$ 20 cm. Lastly, the implementation of different spatial coverages will indicate to what extent additional information from different sources is helpful. All three aspects aim at identifying the trade-off between in-situ and remotely sensed observations.