



Calibrating flood inundation models: methods for assessing model performance

Liz Stephens (1), Paul Bates (1), and David Mason (2)

(1) University of Bristol, School of Geographical Sciences, Bristol, United Kingdom (liz.stephens@bristol.ac.uk), (2) University of Reading, Reading, United Kingdom, RG6 6AL (dcm@mail.nerc-essc.ac.uk)

Satellite observed data for flood events have been used to calibrate and validate flood inundation models, providing valuable information on the spatial extent of the flood. Improvements in the resolution of this satellite imagery have enabled indirect remote sensing of water levels by using an underlying LiDAR DEM to extract the water surface elevation at the flood margin. Further to comparison of the spatial extent, this now allows for direct comparison between modelled and observed water surface elevations.

Using a 12.5m ERS-1 image of a flood event in 2006 on the River Dee, North Wales, UK, both of these data types are extracted and each assessed for their value in the calibration of flood inundation models. A LiDAR guided snake algorithm is used to extract an outline of the flood from the satellite image. From the extracted outline a binary grid of wet / dry cells is created at the same resolution as the model, using this the spatial extent of the modelled and observed flood can be compared using a measure of fit between the two binary patterns of flooding. Water heights are extracted using points at intervals of approximately 100m along the extracted outline, and the students T-test is used to compare modelled and observed water surface elevations.

A LISFLOOD-FP model of the catchment is set up using LiDAR topographic data resampled to the 12.5m resolution of the satellite image, and calibration of the friction parameter in the model is undertaken using each of the two approaches. Comparison between the two approaches highlights the sensitivity of the spatial measure of fit to uncertainty in the observed data and the potential drawbacks of using the spatial extent when parts of the flood are contained by the topography.