Groundwater flooding in the River Pang Catchment

Sarah Collins, Vasileios Christelis, Chris Jackson, Majdi Mansour & David Macdonald
British Geological Survey

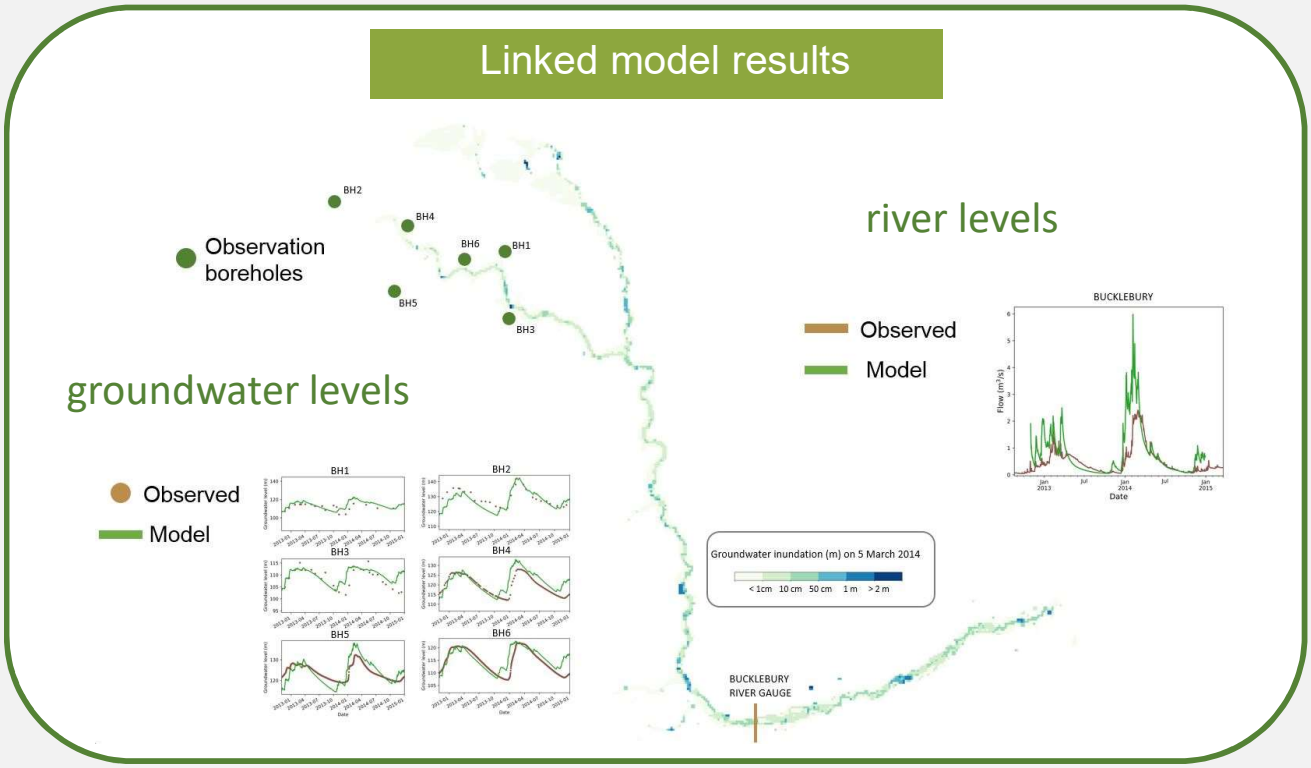
What is groundwater flooding?

Groundwater flooding is the emergence of groundwater at the ground surface away from perennial river channels or the rising of groundwater into man-made ground, under conditions where the 'normal' ranges of groundwater level and groundwater flow are exceeded. The areas of greatest risk in the UK are those underlain by Chalk, such as the River Pang Catchment. Groundwater flooding occurs after prolonged periods of high rainfall and can last much longer than river flooding, in some cases for months.

How do we model it?

Simulating groundwater flooding requires a system that can model both groundwater flow and the flow of water overland and in river channels. The British Geological Survey's model system consists of two linked components: a groundwater model (ZOOMQ3D) and a surface water model (LISFLOOD). The model system simulates groundwater discharge to the land surface when groundwater levels are high and the routing of this water over the land surface and through river channels, re-infiltrating where the ground is not saturated.

Linked model results



Model resolution

To allow long model runs that enable the extended period of groundwater floods to be captured, some compromise on the spatial resolution of the model is required. The digital terrain model used with the surface water model has a relatively coarse resolution (50 × 50 m grid). Therefore, although the predicted groundwater levels are a good fit to observations, the model struggles to predict surface water flows. This will be improved before we simulate the effects of NFM.

Advantages

The model provides a good fit to groundwater levels and observed flood inundation in the River Pang Catchment. The model is sufficiently quick to be able to run it over a number of years. This will enable the study of the effects of changes to the land surface, associated with NFM, on long-duration groundwater flooding events.

Contact Details:
Sarah Collins, British Geological Survey – Edinburgh Office
sarcol@bgs.ac.uk

British Geological Survey
Expert | Impartial | Innovative