EGU24-8391, updated on 22 Jul 2024
https://doi.org/10.5194/egusphere-egu24-8391
EGU General Assembly 2024
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Urban hydrogeologic uncertainty characterisation to evaluate risk of groundwater flooding

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Groundwater flooding within the urban infrastructure can play a major role in determining the resilience of urban environments. Urban groundwater models can be used to simulate the complex interactions between surface water and groundwater within the urban system and can be developed to jointly account for groundwater-surface water processes and subsurface characterization. They can be used to simulate potential groundwater flooding and help understand the role of groundwater in urban resilience to climate change. However, urban groundwater is a component of the wider urban water system that has traditionally been overlooked, and the complex interactions between surface water and groundwater may obscured by urban infrastructure and its influence on groundwater flow. Furthermore, the subsurface characterisation is an integral part of any groundwater model, however it's influence on model performance is not yet fully understood. Therefore, the inherent complexities of the urban environment, combined with the scarcity of appropriate groundwater and subsurface data, can lead to increased model uncertainty. It is argued that robust urban groundwater modelling depends on a strong conceptual understanding of the groundwater system, and constraining the uncertainty in the subsurface characterisation.

This project aims to assess model sensitivity to the geological interpretation in simulating groundwater dynamics that represent regions of groundwater flooding. It accounts for uncertainty in the subsurface information to develop an ensemble of different geological interpretations and evaluate the influence of the subsurface characterisation on groundwater flow model performance, within the Ouseburn watershed in the greater Newcastle upon Tyne area.