

EGU21-15322

<https://doi.org/10.5194/egusphere-egu21-15322>

EGU General Assembly 2021

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A state-based and optimal path dependant short-term flood planning

Mengke Ni and Tohid Erfani

University College London, Civil, Environmental and Geomatic Engineering, London, United Kingdom of Great Britain – England, Scotland, Wales (mengke.ni.16@ucl.ac.uk)

Temporary flood protective defences (TFPD) are supplementary to permanent engineering solutions. In a flood event, asset managers are faced with a challenging task of deploying large-scale temporary defences at multiple locations. As the performance of temporary defences is sensitive to various uncertain weather condition factors, it is difficult to fix a single specific deployment plan as the optimal solution. This, moreover, leads to insufficient and/or underused defences on flood-affected locations. This paper describes a state-based (SB) mathematical modelling approach to deal with above challenge by adapting TFPD strategies consistently to short-term future as they unfold. We employ multistage stochastic and scenario tree to identify a set of alternative SB optimal paths for deployment planning. The proposed model is applied to nine flood-affected locations in Carlisle, northwest England. The results indicate that the inclusion of SB path-dependant solution strategy are beneficial for the flood asset manager faced with making short-term deployment planning decisions.