

EGU22-12938

<https://doi.org/10.5194/egusphere-egu22-12938>

EGU General Assembly 2022

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Using historic records of compound flood events to identify site-specific thresholds for flooding in UK estuaries

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Estuarine flooding is driven by extreme sea-levels and river discharge, either occurring independently or at the same time, or in close succession to exacerbate the hazard, known as compound events. There is a need to identify site-specific thresholds for flooding in estuaries, which represent the magnitude of key drivers over which flooding occurs. Site-specific thresholds for flooding can be used to support forecasts and warnings, emergency response and long-term management plans. This research uses historic records of flooding in estuaries around the UK combined with 40 years of historical 15-minute frequency sea-level and river discharge data to establish the magnitude and relative timing of the drivers of flooding in 11 estuaries. The results identify estuaries which are more likely to experience flooding due to extreme compound events, e.g. Conwy, N-Wales, or independent extreme events e.g. Humber, E-England. The key limitation of using historic records of flooding is that not all flooding events have been documented, and there are gaps in the record. Therefore, this research also identified the top 50 extreme sea-level and river discharge events in the historic gauge measurements at each estuary, and cross-checked these against online sources (news reports and academic literature), to establish if these events also led to flooding. A more comprehensive historic record of flooding allows more accurate thresholds for flooding to set in each estuary. Future work will utilise numerical modelling tools in 4 estuaries to simulate flooding under different sea-level and river discharge conditions to further isolate accurate thresholds.