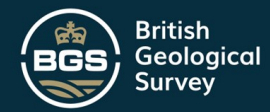


Understanding the influence of groundwater in compound flooding in UK estuaries

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What is Compound Flooding ?

- Estuaries are complex environmental systems, situated at the confluence of freshwater fluvial systems and saline, open-sea
- Flooding in estuaries arises from exceptionally high river levels following heavy rain or snow melt, or from exceptionally high sea levels caused by surge-tides, a combination of these events—**Compound Flooding**—presents the worst-case of flood risk

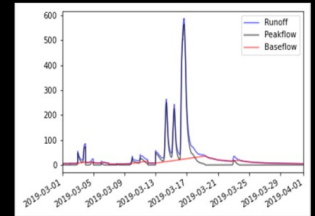
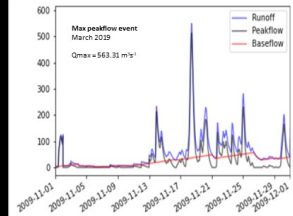
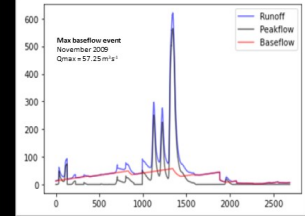


Why should we care?

- 600 Million People (Worldwide) at Risk from Coastal Flooding
- Average damage cost (UK) ~ 1.3 Billion pounds / 1 in 6 houses at risk
- By 2050 threat is expected to rise by 42 % due to Climate Change
- Risk of Flooding changing worldwide - Hotter, drier summers & warmer, wetter winters

Does groundwater influence Flooding in Conwy?

- Groundwater is a hidden, slow moving and vulnerable resource.
- The presence of shallow groundwater beneath coastal settlements exposes them to a threat from below.
- In the estuaries - when the sea level rises, groundwater rises and flood risk increases.
- Baseflow Index - Proportion of the river runoff that comes from permeable rocks (groundwater input)
- Baseflow Index of Conwy = 27 %



Combination of highest baseflow event (Max groundwater input) and highest peakflow event (Max rainfall input) = **Generated Maximum Event (106%)**

Next Steps

Caesar Lisflood for Conwy catchment – (in process)

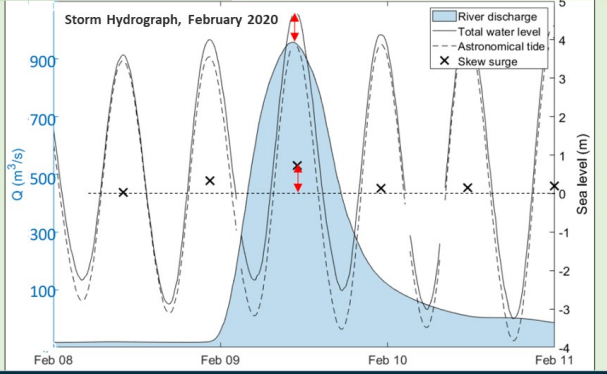
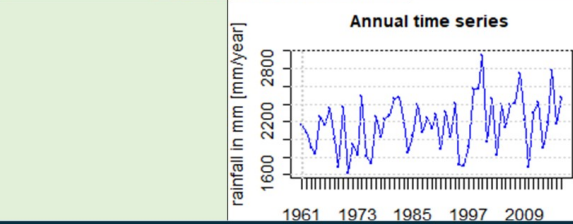
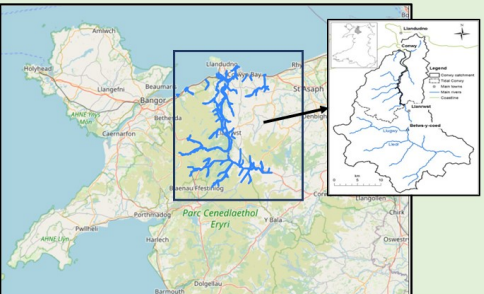
▪ **Coupled Catchment-Groundwater Model**

CAESAR-Lisflood-DESC (CLIDE)
(www.bgs.ac.uk)

Coupled Model will show how change in Groundwater Levels will affect Flooding

Study Area Conwy Catchment, North Wales

- Catchment area = 350 km²
- Flashy catchment with several flood events
- Most recent Flooding: Storm Clara, February 2020
- Catchment Geology: Thick sequence of mudstones
- Superficial deposits: Clay, Alluvium, Till
- Groundwater occurs in shallow weakly permeable aquifers



Expected Outcome

- Model simulations will be calibrated against past river and tide gauges and latest Climate Change Projections (UKCP18), to show how the groundwater and soil moisture drivers are likely to influence the magnitude, behaviour and timings of compound flooding in the future.
- Is coastal flood risk likely to change in a more warming climate ??

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 3. Data source – British Geological Survey / Natural Resources Wales / Met Office / UKCEH

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