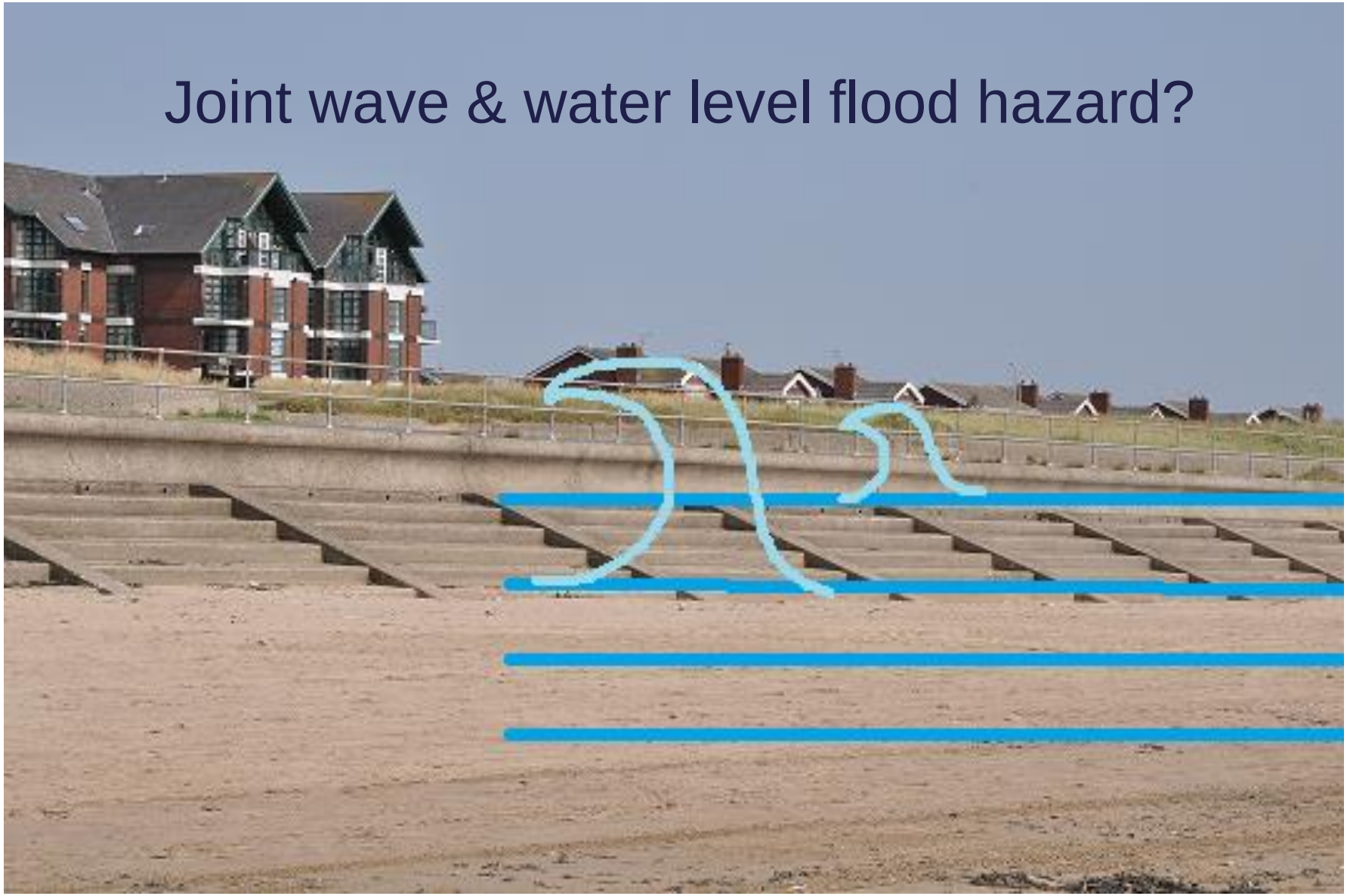
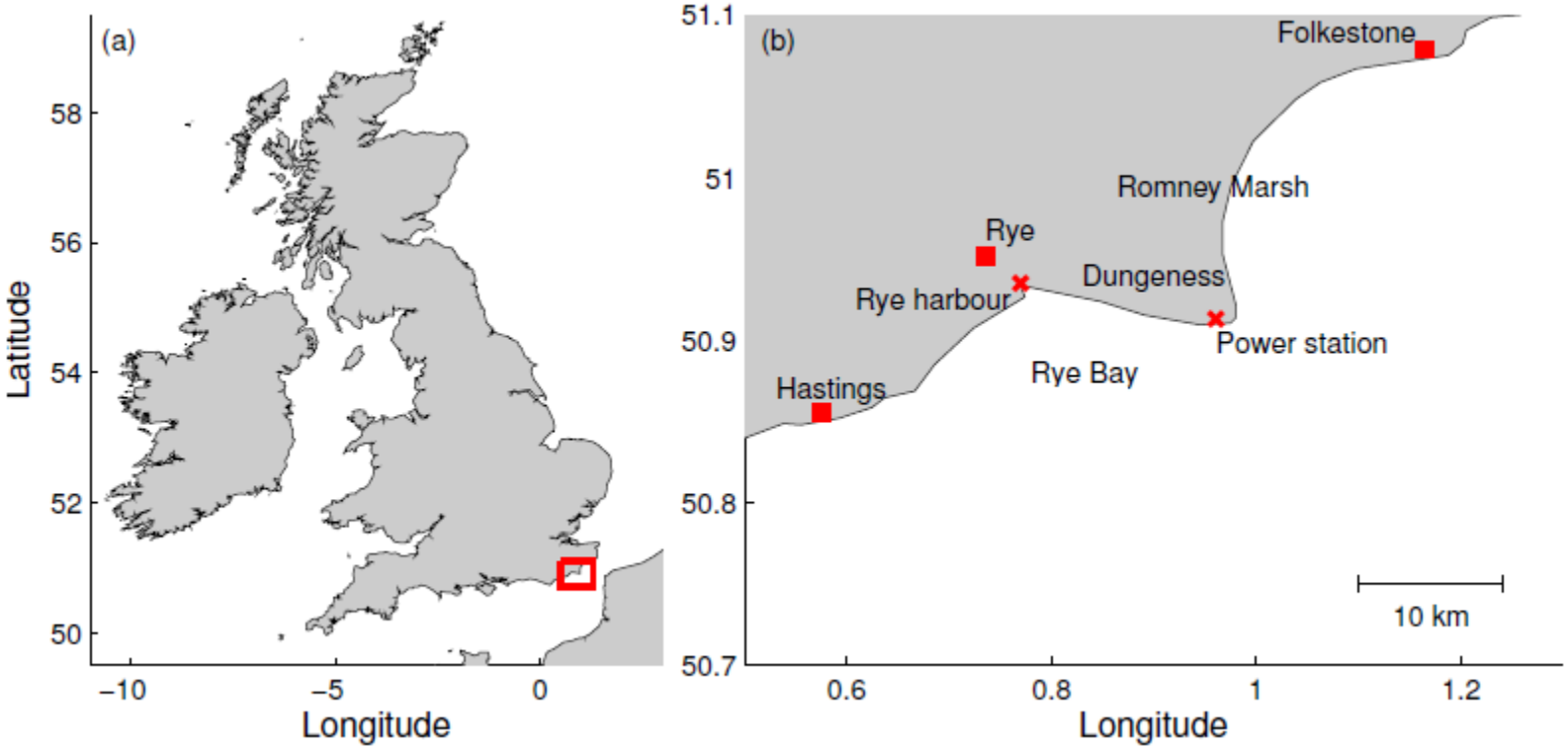
Flood risk uncertainty surrounding a 0.5% annual probability event

By Jenny Brown, Tom Prime and Andy Plater

Joint wave & water level flood hazard?

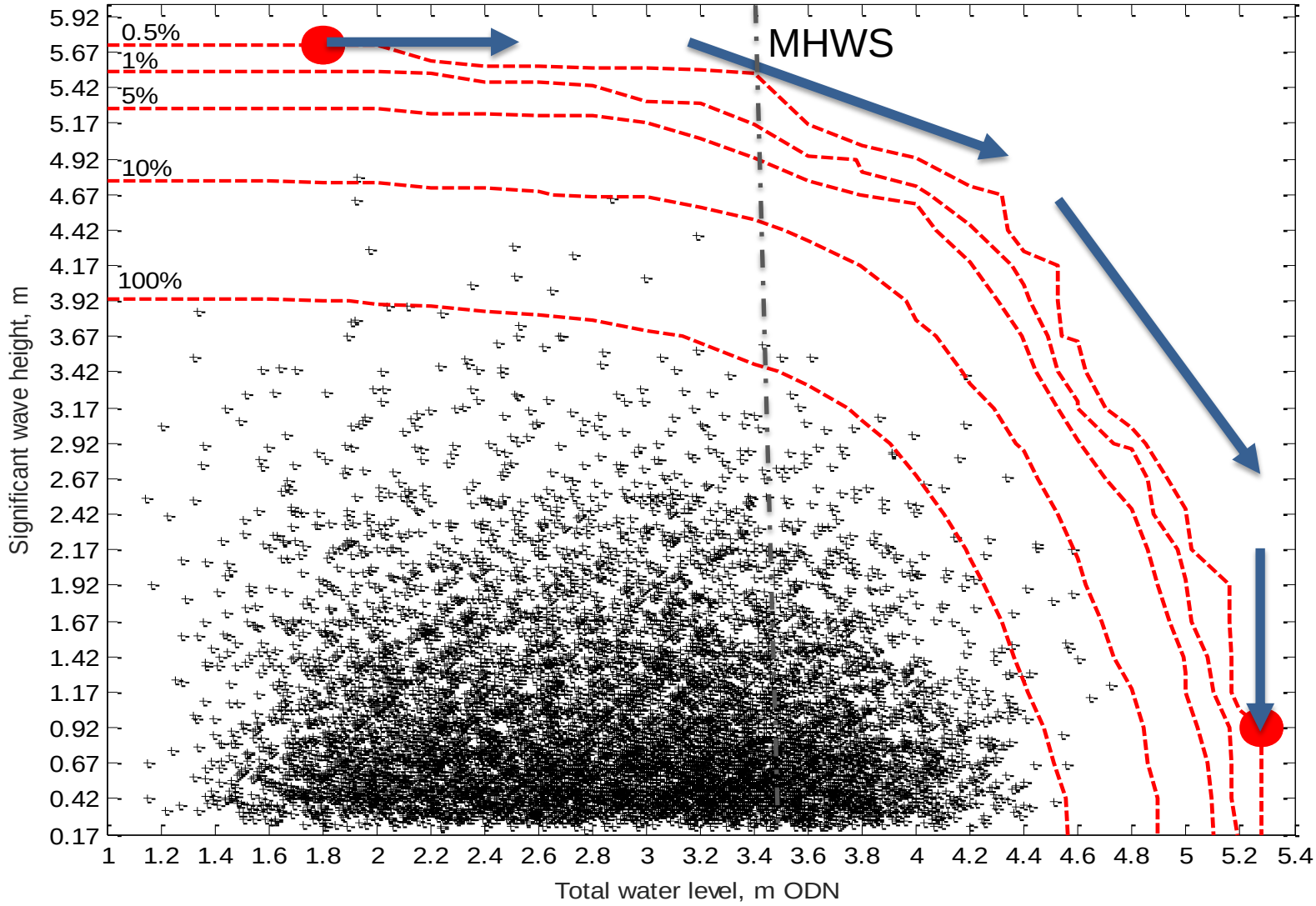


Rye Bay, Southeast UK

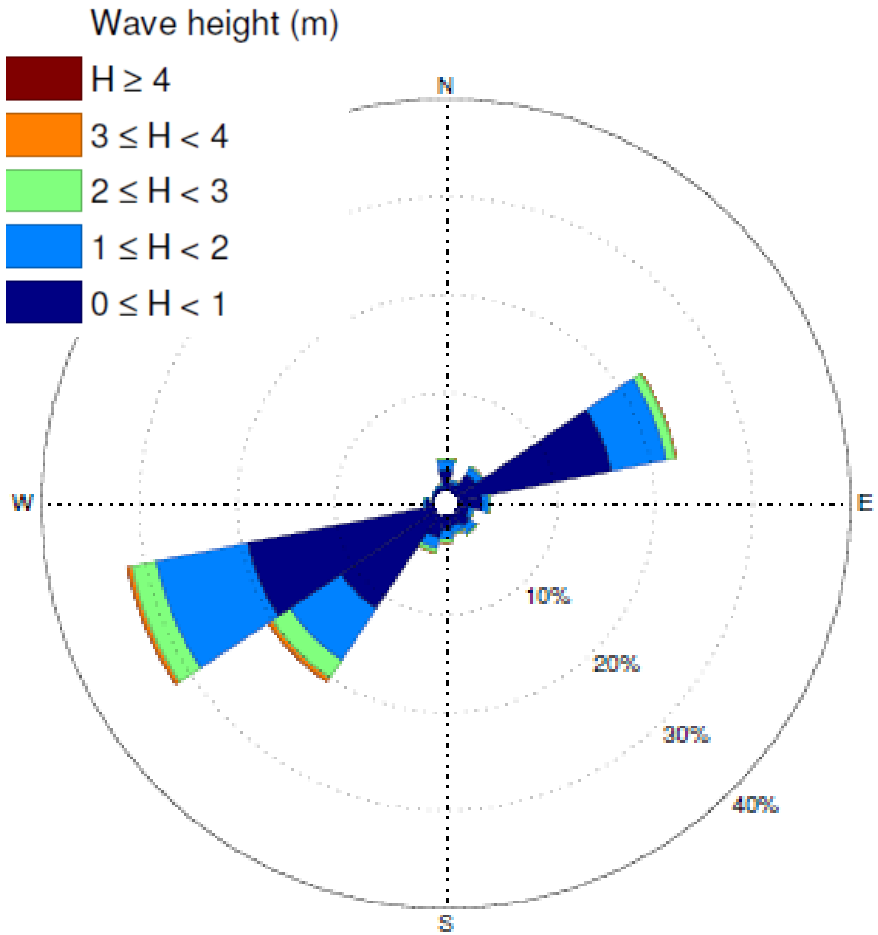


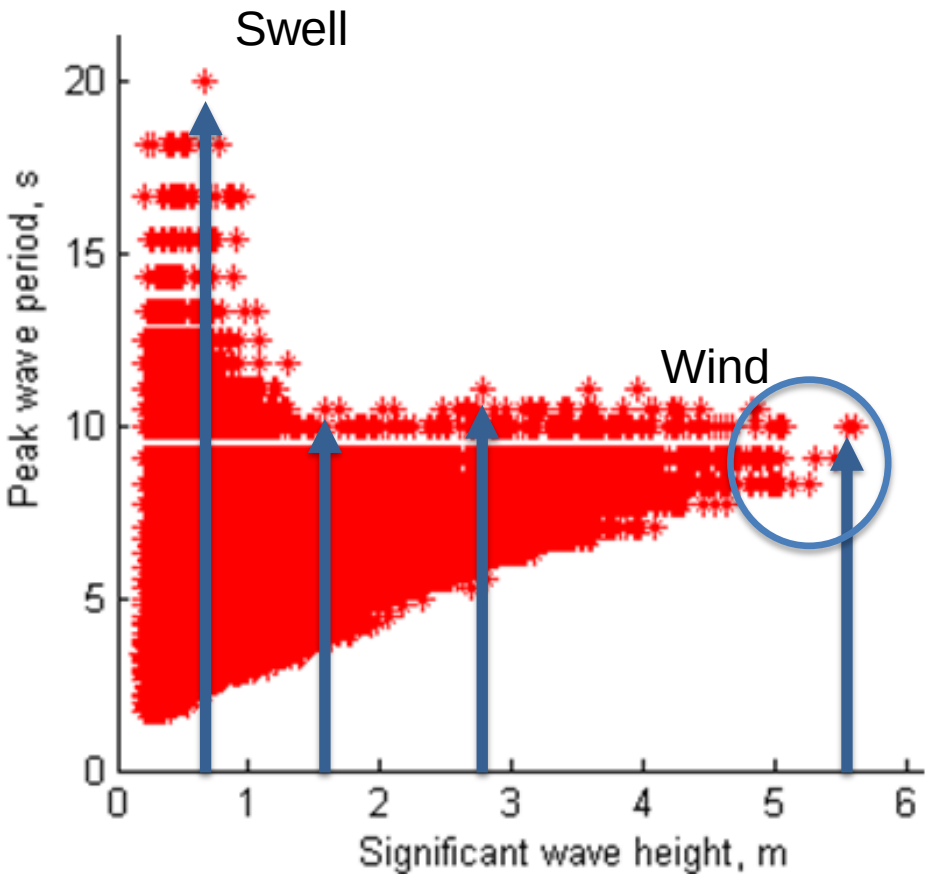
National Oceanography Centre
NATURAL ENVIRONMENT RESEARCH COUNCIL

Joint probability analysis

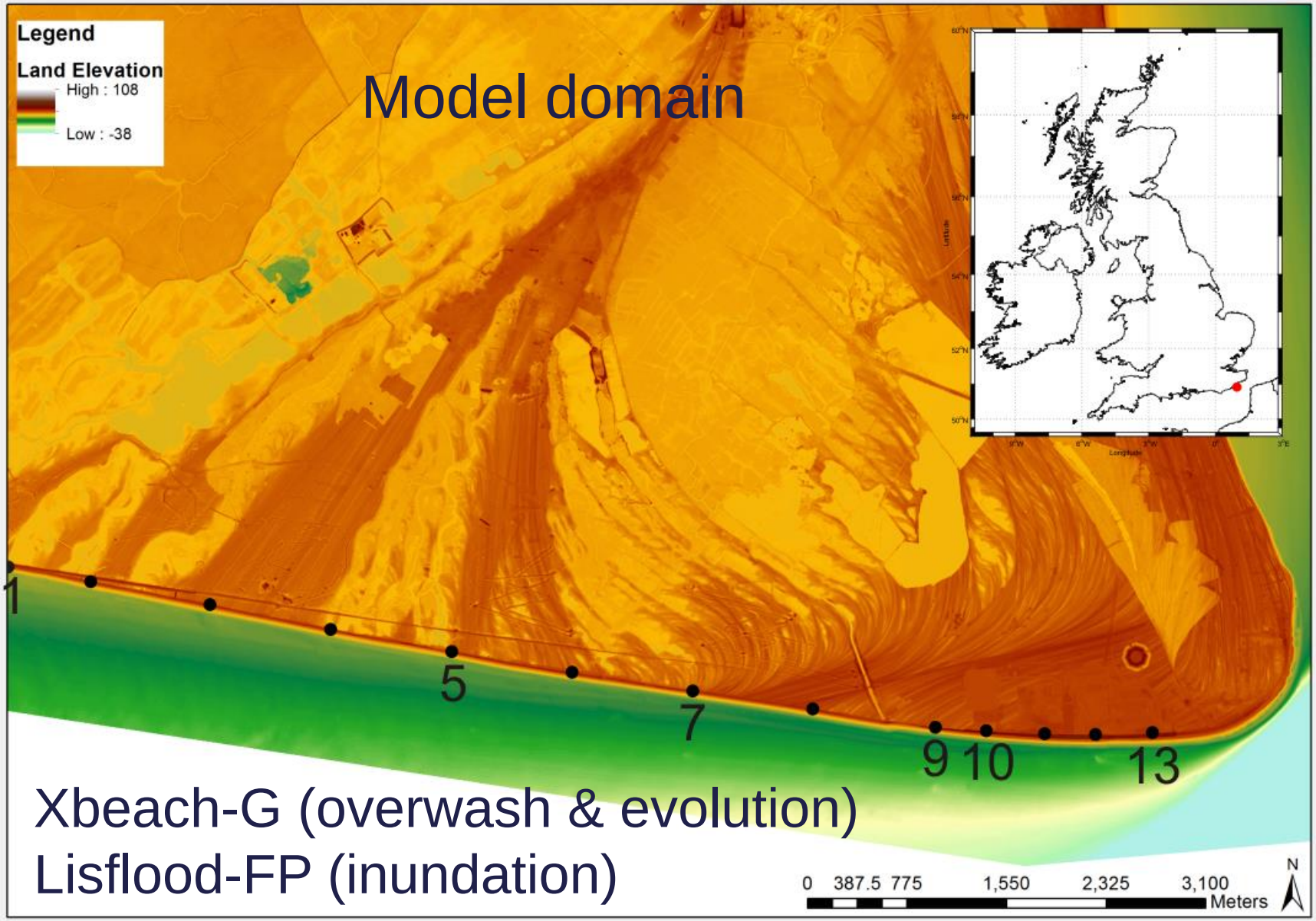


Rye Bay wave climate



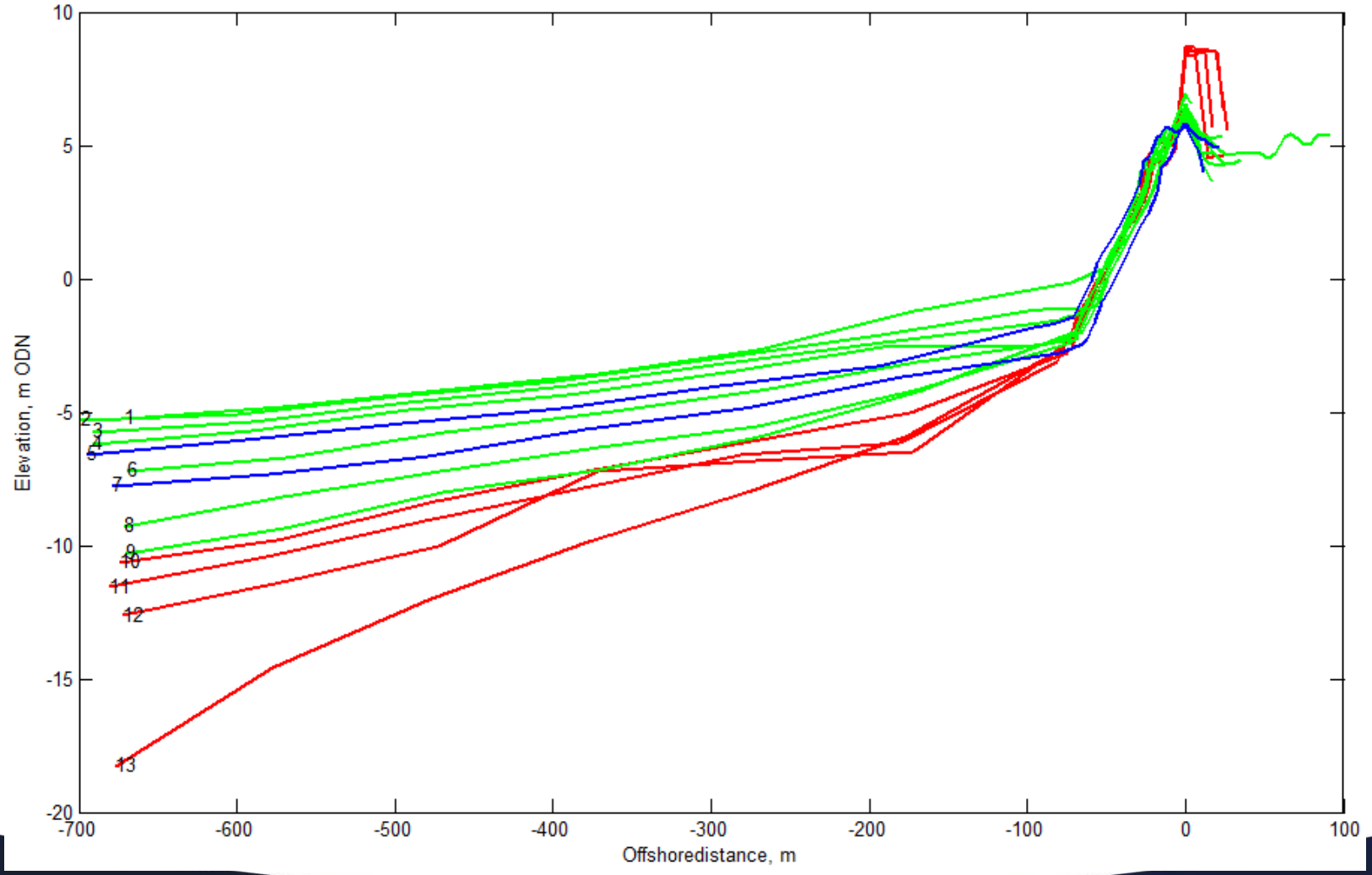


Model domain

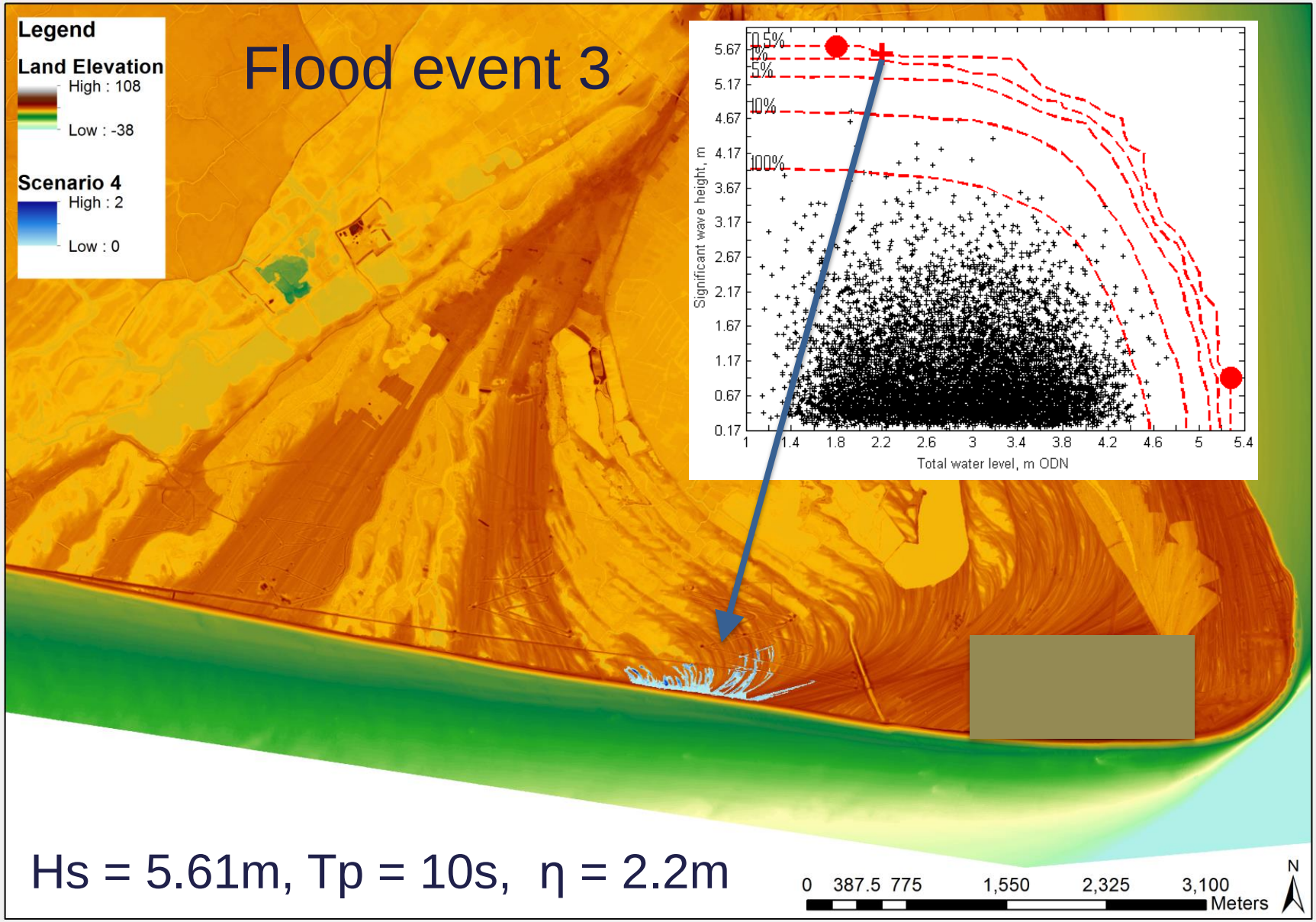


Xbeach-G (overwash & evolution)
Lisflood-FP (inundation)

Defence variability

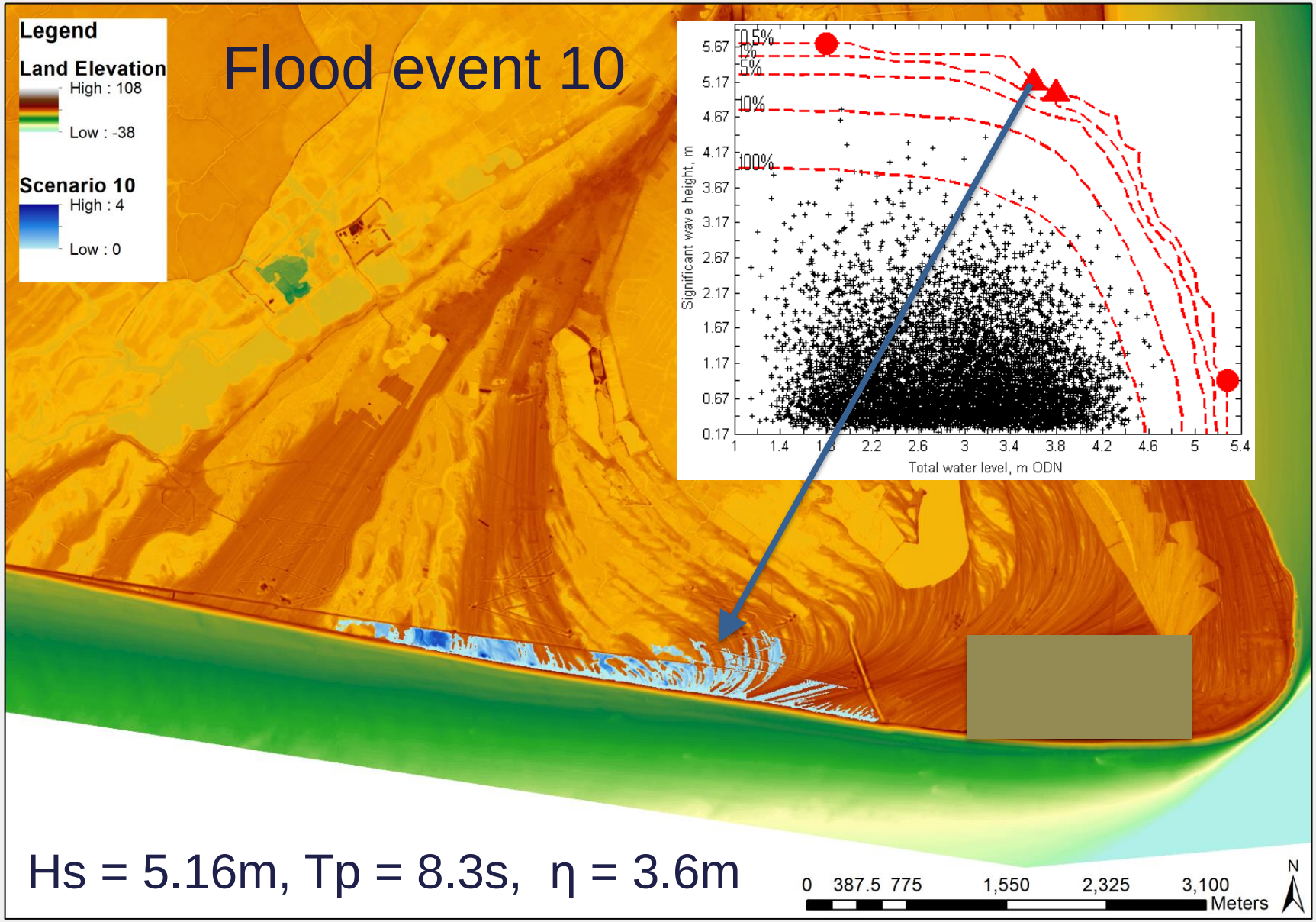


Flood event 3



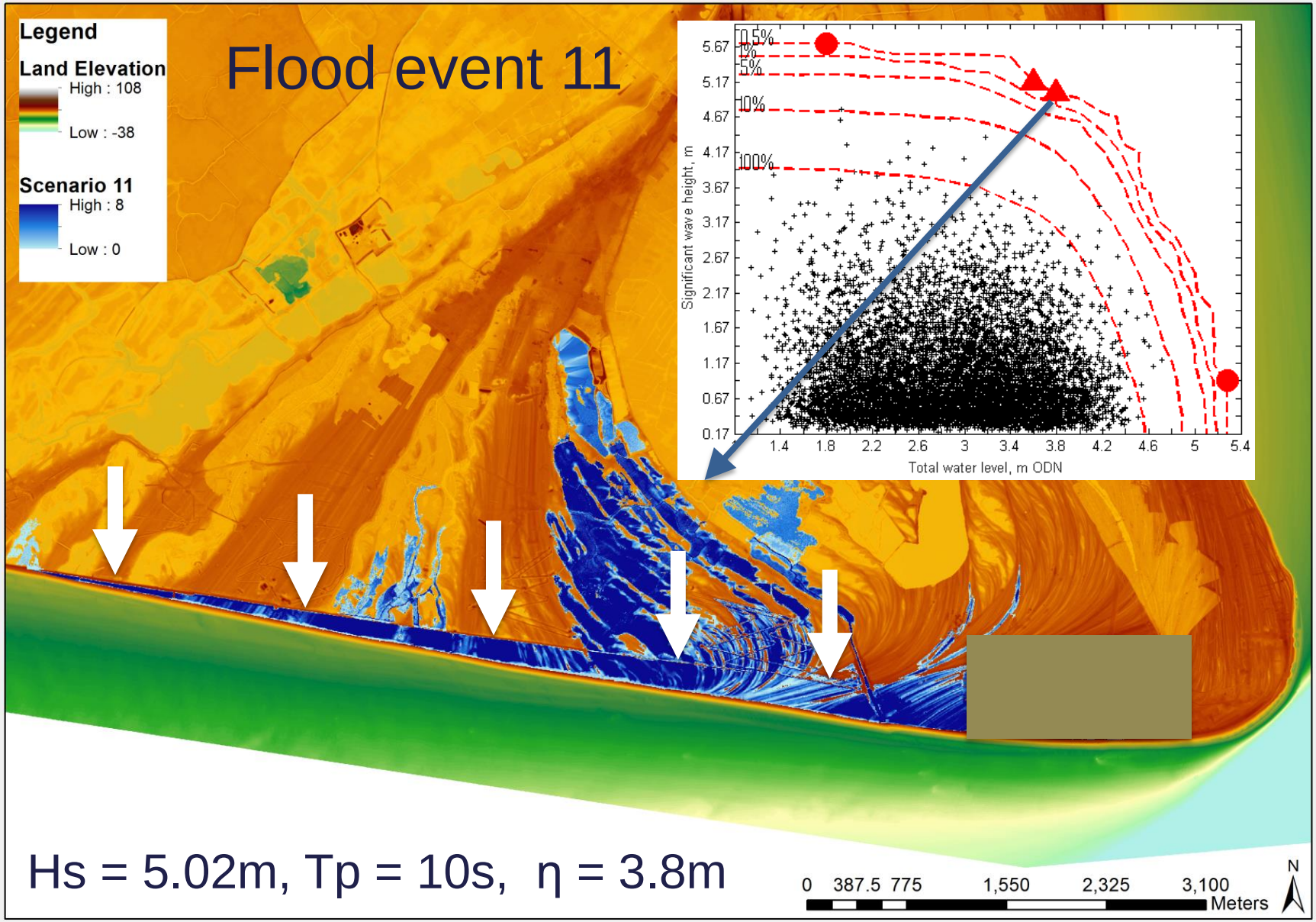
Hs = 5.61m, Tp = 10s, η = 2.2m

Flood event 10



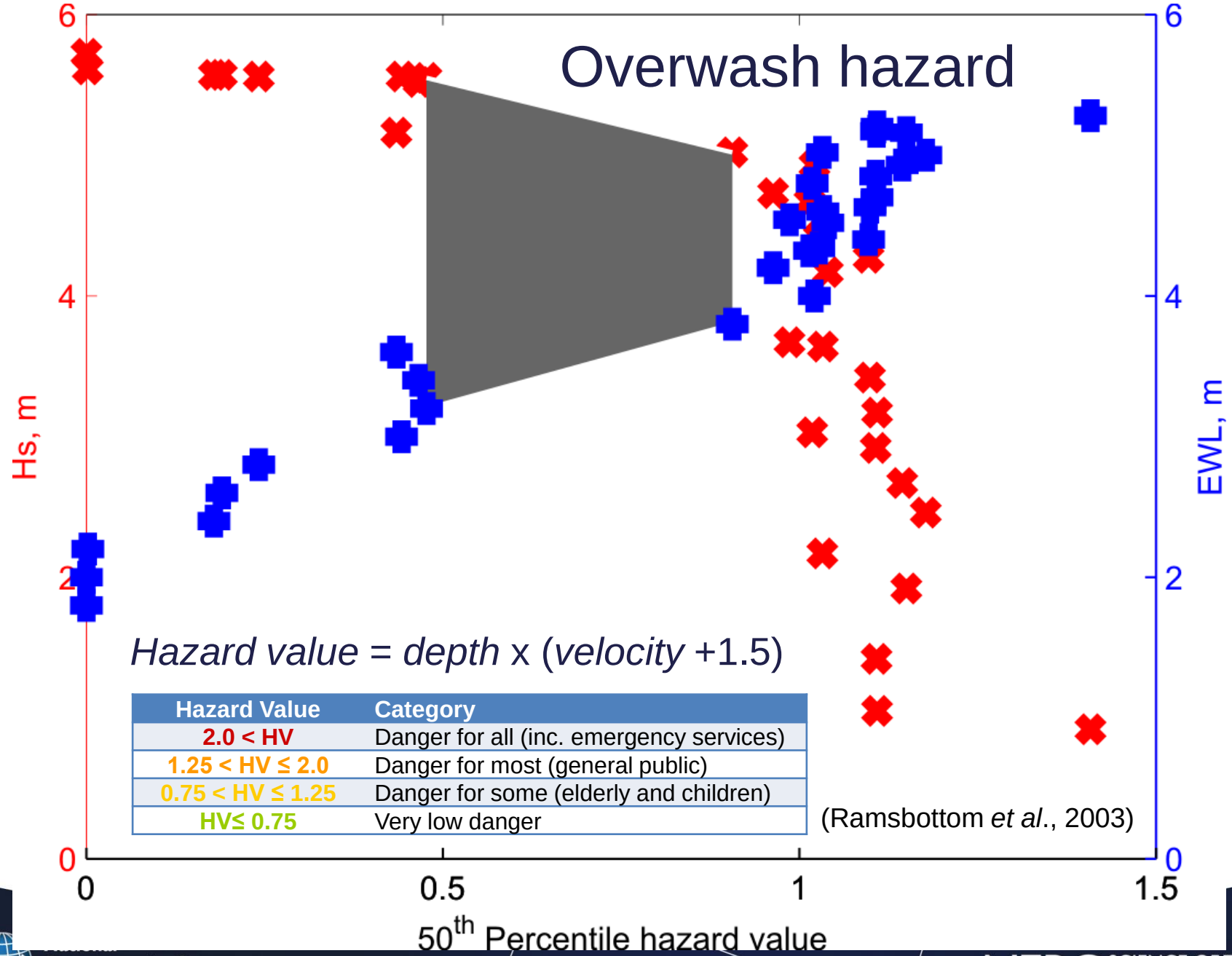
Hs = 5.16m, Tp = 8.3s, η = 3.6m

Flood event 11



Hs = 5.02m, Tp = 10s, η = 3.8m

Overwash hazard

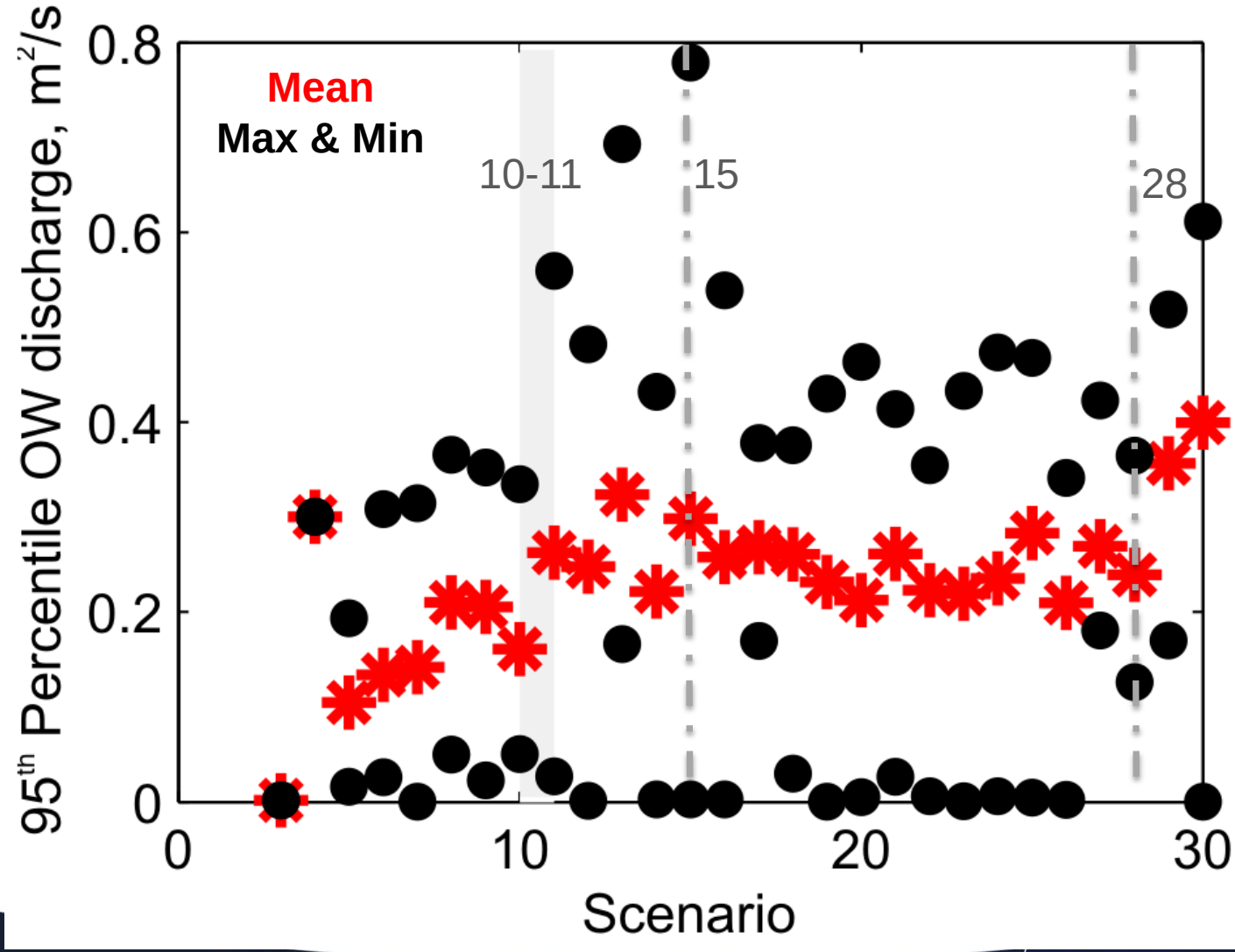


Hazard value = *depth* x (*velocity* +1.5)

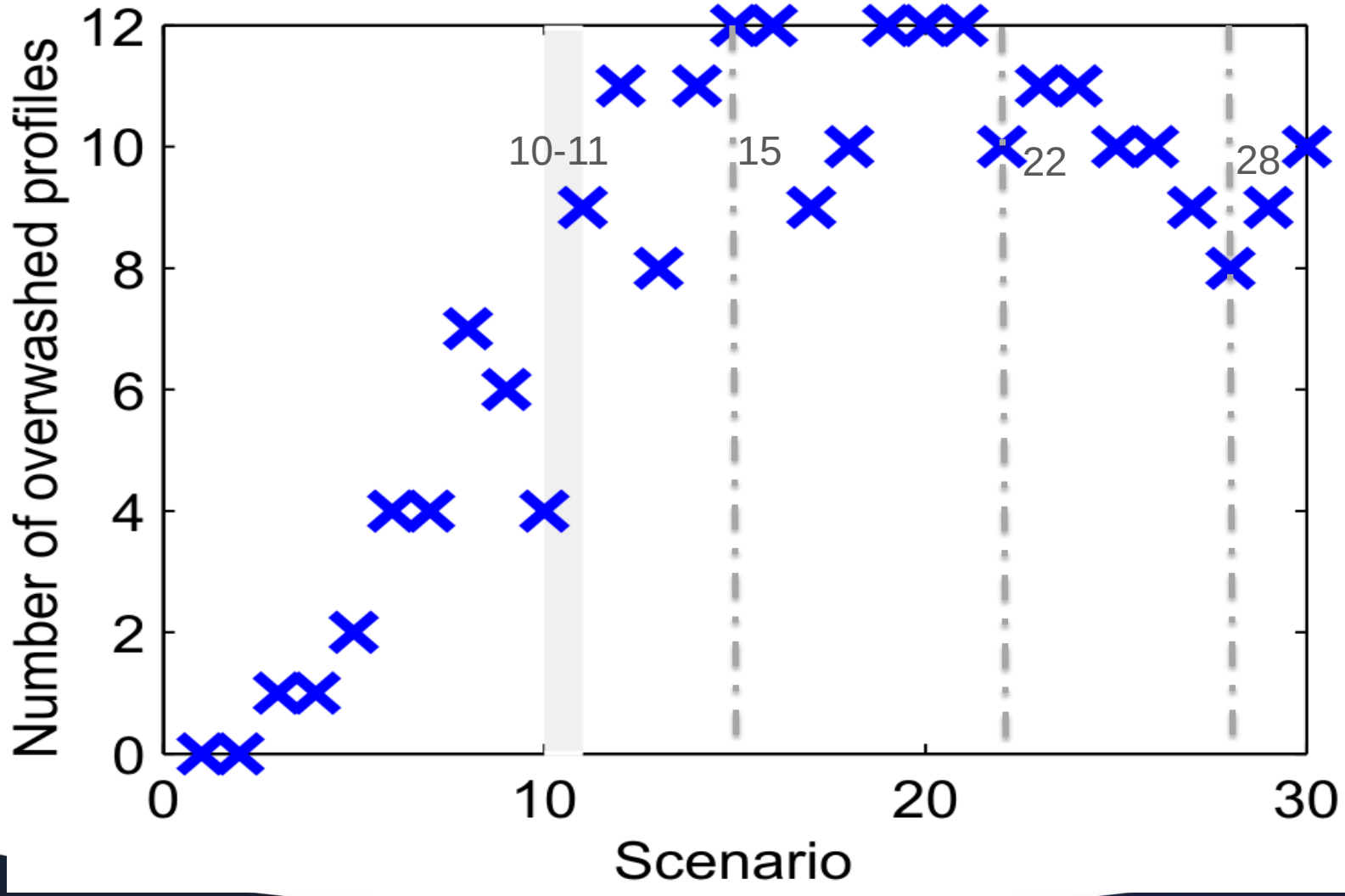
Hazard Value	Category
2.0 < HV	Danger for all (inc. emergency services)
1.25 < HV ≤ 2.0	Danger for most (general public)
0.75 < HV ≤ 1.25	Danger for some (elderly and children)
HV≤ 0.75	Very low danger

(Ramsbottom *et al*., 2003)

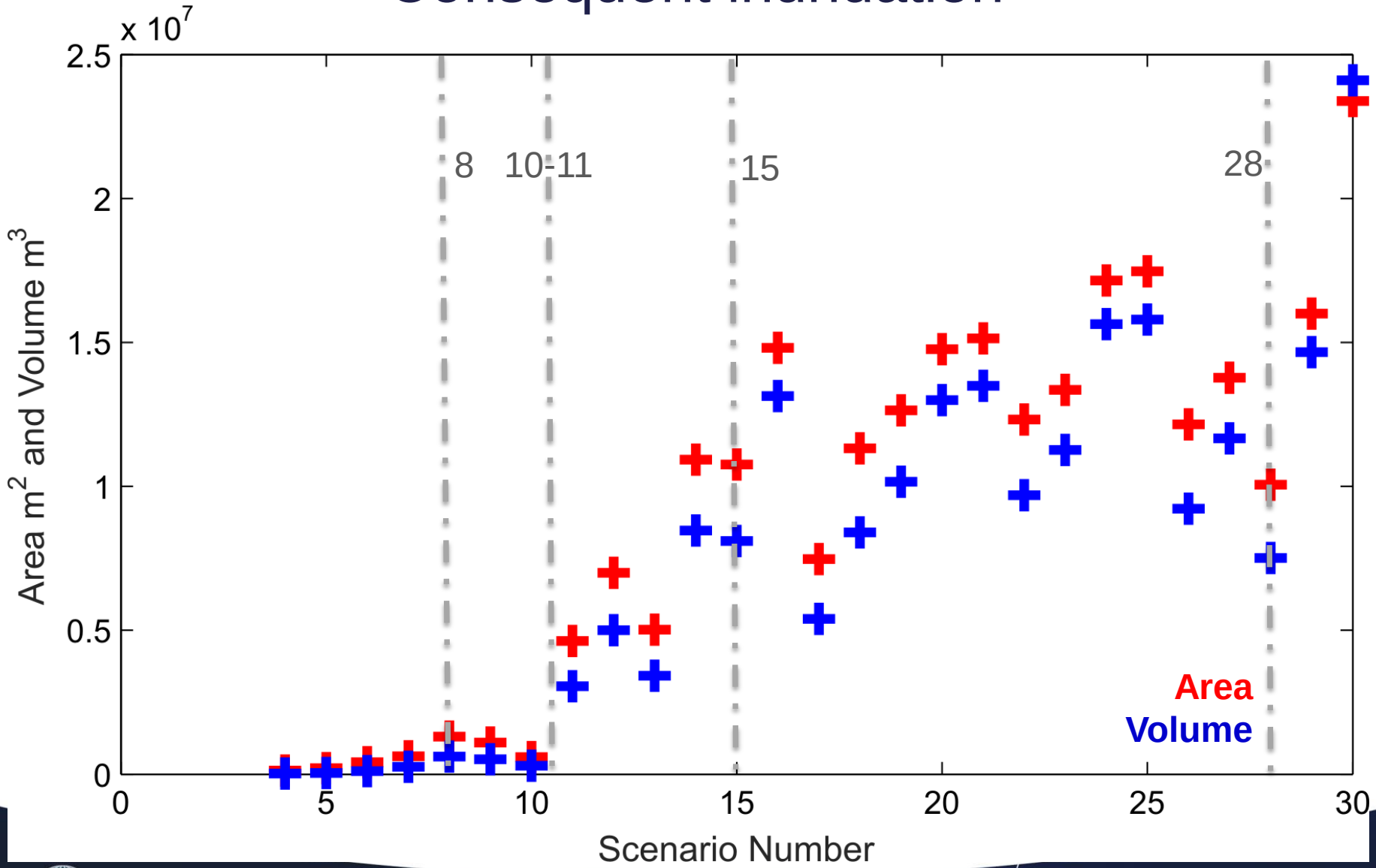
Overwash discharge



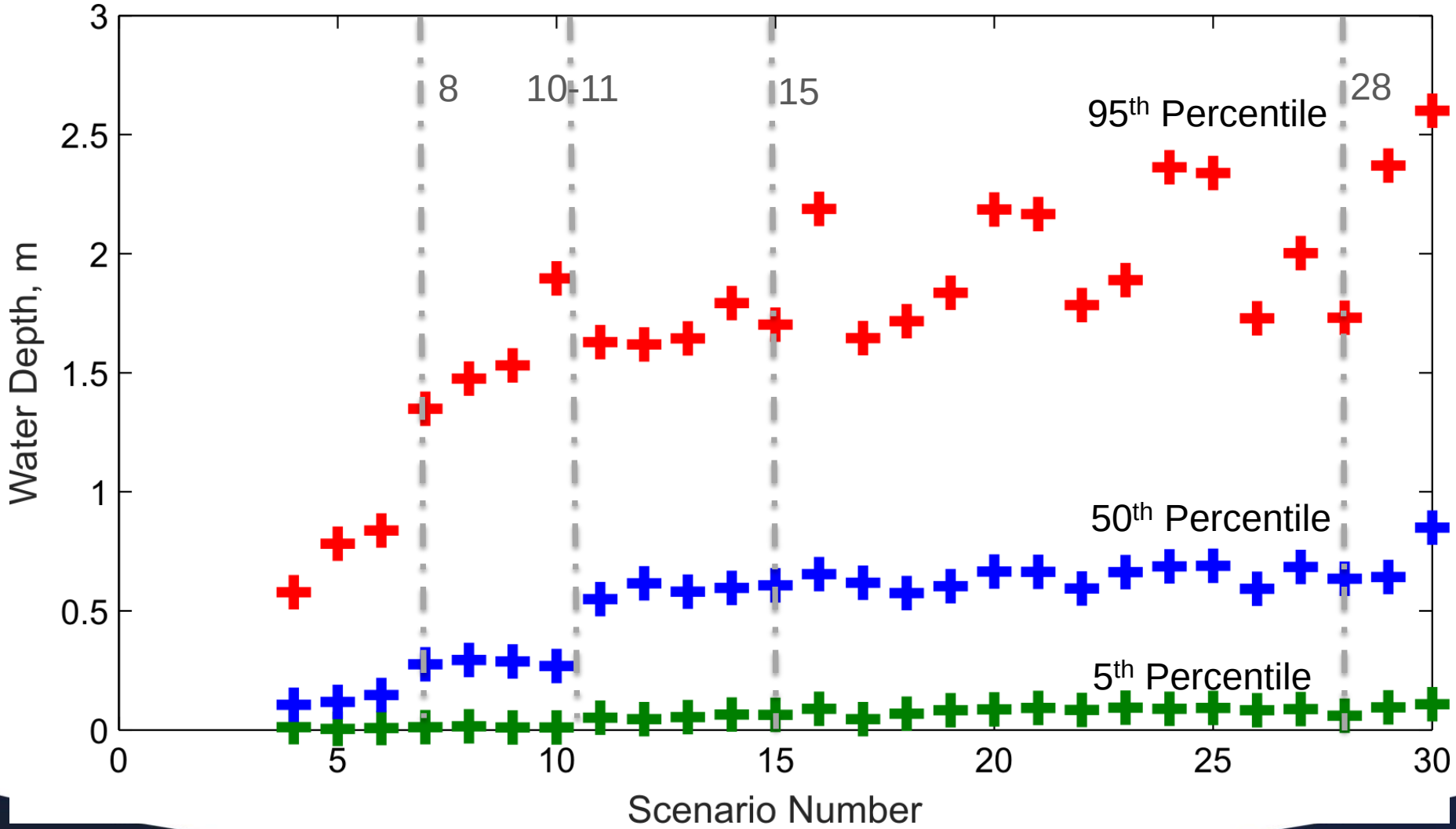
Overwash instances



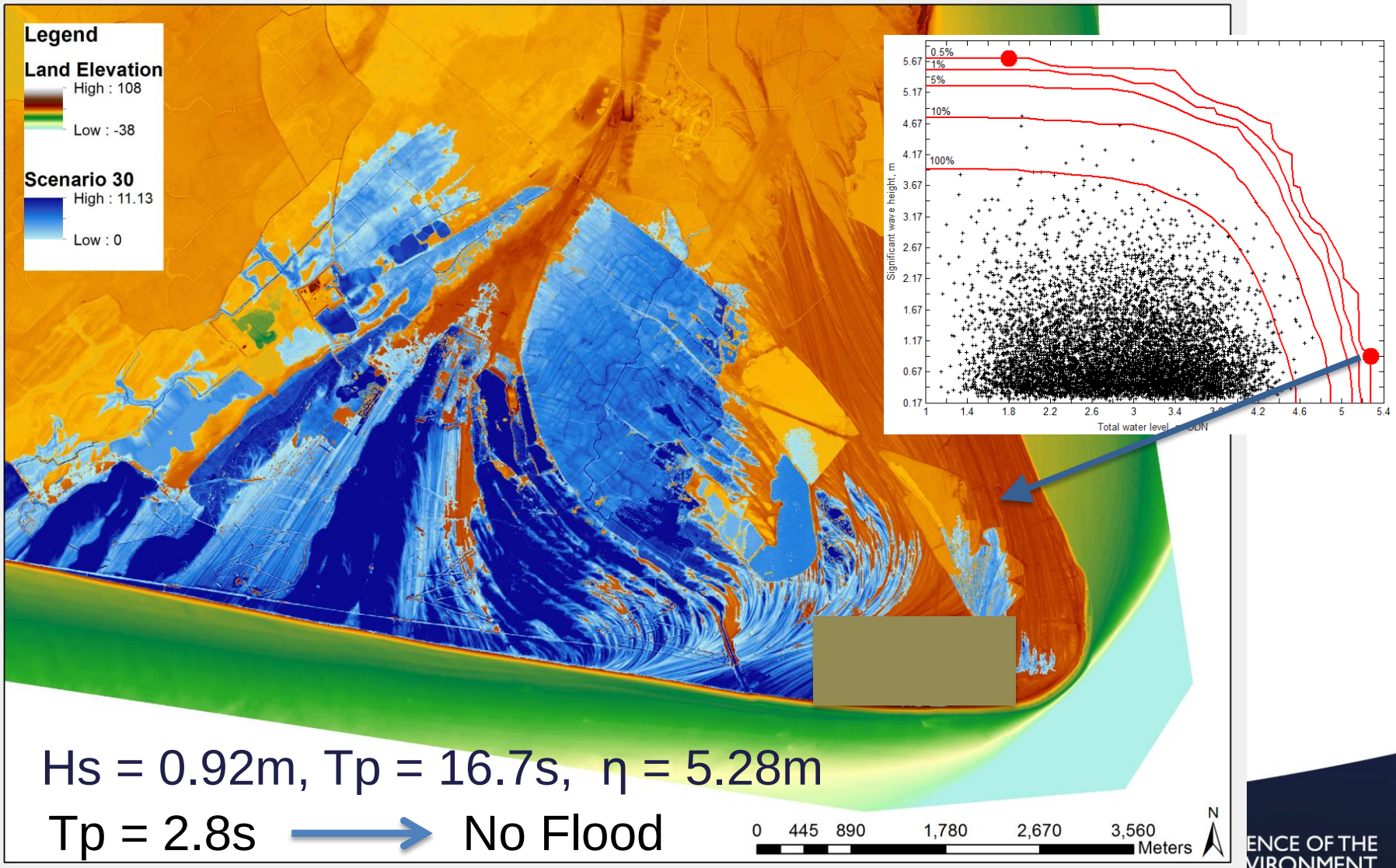
Consequent inundation



Consequent inundation



Flood event 30 swell vs. wind waves



Hs = 0.92m, Tp = 16.7s, η = 5.28m

Tp = 2.8s → No Flood

Summary

- The water level enabling wave impact seems more important than wave size when considering the potential for extreme events to overwash.
- Wave period needs to be considered within the combinations of waves height & water levels to assess flood hazard uncertainty.
- Here, high water levels and low, long swells are a greater hazard than lower water levels and large wind waves with the same probability of occurrence.
- Tipping points in the hazard rating occur, in this case due to the overwash of a secondary defence.
- The choice of wave & water levels matters when identifying the flood hazards of a joint probability event.

Thanks for listening

Jenny Brown, jebro@noc.ac.uk