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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Identification of storm surge events over the German Bight from atmospheric reanalysis and climate model data" *by* D. J. Befort et al.

Anonymous Referee #2

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Summary This paper uses outputs from climate models to identify potentially damaging storm surges in the Southern North Sea / German Bight. By using a statistical downscaling type approach, large volumes of data can be assessed quickly. The ERA-40 data are used to 'train' the method, which is then used to assess the potential changes in storm surge frequency in future (when applied to climate models).

Major comments:

Why is only wind speed used? How about the effects of atmospheric pressure? The combined water level will be a combination of the tide, pressure, wind and wave effects.

Section 4.1. "neglecting the influences of the water depths" This is crucial to storms surges, as they are generated in regions of shallow water, where they become the most dangerous!

In some places the English is unclear and needs re-wording.

The low frequency (6 hourly) of the atmospheric data is worrying and you are likely to miss fast moving storms On page 9 line 29 - page 10 line 2 you suggest increasing this window to be even longer. I don't see how this will help capture extreme events without leading to false positives?

As you say in your conclusions, it would be difficult to detect small, fast moving storms with this method - but these mid-latitude cyclones are exactly the type of event which is prevalent in the North Sea.

You mention several times that the tides are not included, perhaps you could linearly combine and astronomical tide to evaluate the importance of the tide-surge interactions?

Minor comments:

page 2, line 5: "high wind speed" please quantify

page 2, line 20: replace metropolitan with urban?

page 3, line 5: "heavy storm" surge => "heavy storm surge"

page 3, line 25: "The optional.." do you mean "The optimal"?

page 3, line 25: "The raise to the water level..." replace with rise

page 5, line 10: again you say "the astronomical tide and the wind surge'. Really you're considering the total atmospheric surge generated by winds and low pressures. See major comments

page 5, line 10: replace 'gain' with 'advantage'

page 7, line 9: replace Eventually with Finally

page 7, line 11: replace 'whereof 82 occur..' with '82 of which...'

page 7 lines 17-19 needs rewording

page 8, line 4: 'As a first step'

page 8, line 6: reword: solely over the German Bight.

page 8, line 15 'are applied'

page 8, line 24: 'deviated' do you mean 'derived'?

page 9, line 1: replace Afterwards with Next

page 9, lines 6-7: "we take for the height.." I don't understand this sentence - please rephrase.

page 9, lines 7-11. What is this ratio that you calculate? Are you saying it's stormy for 3.7% of the time? 13.5 days per year?

page 10, line 25: The storm surge is *always* independent of the astronomical tide.

e.g. similar study done for the British Isles = UKCP09. They're findings are also inconclusive - it is not clear whether the frequency of storm events is likely to increase under future climate.

Lowe, J. A., Howard, T., Pardaens, A., Tinker, J., Holt, J., Wakelin, S., Milne, G., Leake, J., Wolf, J., Horsburgh, K., Reeder, T., Jenkins, G., Ridley, J., Dye, S., Bradley, S. (2009), UK Climate Projections science report: Marine and coastal projections. Met Office Hadley Centre, Exeter, UK.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 2, 3935, 2014.