

DMI Report 22-17

Extreme wind statistics in climate scenario ensemble, and Wadden Sea compound event system analysis

Final scientific report of the 2021 National Centre for Climate Research, Work Package 1.3.1, Ekstrem stormflod

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Kolofon

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1. Scientific summary

Brief description

This work package is split into two, fully separate ones:

1. Analysis of extreme winds in a 50-member regional climate model multi-ensemble in the context of assessing future storm surge occurrences over Denmark.
2. A systematic description of components relevant for compound event risk assessment. In this context, a compound event is narrowly defined as inland flooding due to cloud burst or persistent rain being exacerbated by the closure of flood gates, temporarily inhibiting outlet to open sea.

Results

[Due to a number of external factors this work package was late to kick off, and has not yet produced final results. Work is still on-going.]

First sub-package:

The analysis is based upon data derived from the CLIMEX regional climate modelling effort, with 50 ensemble members covering the period 1950-2099. A 30 year control period (1990-2020) is analysed for the locations of Esbjerg, Hornbæk and Gedser, representing westerly, northerly, and easterly storms, respectively. High wind criteria for selection of high water events have been defined for the first two of these, while the third one (Gedser) seems to be more complex. A methodology for and a preliminary calculation of the change in return periods of wind conditions leading to such events has been carried out.

Second sub-package:

The systems description has taken focus on the Danish Wadden Sea area in general, and the Esbjerg municipality, Ribe Å and tributaries in particular. A preliminary description of the factors critical for water management has been worked out, and the four municipalities in the region have provided their modus operandi in relation to flood management, the change in concern of compound events in the future being taken into consideration. This focuses on several points, the most important ones being: Rising sea level leading to more frequent flood gate closure, change in precipitation regime, and land use.

Status

First sub-package:

The work is broadened out to include the full set of scenarios, solidifying the preliminary results. This is to result in a scientific paper.

Second sub-package:

This work will be summarized in a report, intended to be relevant for municipalities concerned with simultaneous flooding from sea and land, and who are considering either with building up flood defenses or with management of existing ones.