



## The legacy of extreme sea levels for the assessment of future coastal flood risk – A review of methods applied in Denmark, Germany and Norway

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*Publication date:*  
2016

*Document Version*  
Peer reviewed version

[Link back to DTU Orbit](#)

### *Citation (APA):*

Nilsen, J. E., Sørensen, C. S., Dangendore, S., Simpson, M. J. R. , Ravndal, O., Sande, H., Knudsen, P., Arns, A., Jensen, J., & Sørensen, P. . (2016). The legacy of extreme sea levels for the assessment of future coastal flood risk – A review of methods applied in Denmark, Germany and Norway. Abstract from 4th Nordic Conference on Climate Change Adaptation, Bergen, Norway.

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*Paper 95*

**Title:**

**The legacy of extreme sea levels for the assessment of future coastal flood risk – A review of methods applied in Denmark, Germany and Norway**

**Author keywords:**

storm surges, sea level rise, extreme value analysis, flood hazard, risk, methods' comparison

**Abstract:** The coasts of Denmark, Germany and Norway face similar hazards from storm surges governed by eastward propagating atmospheric lows. Surge and tide levels, as well as their corresponding impacts, vary between storms and location. The exposure and physical vulnerability of the coastline is also not evenly distributed. National methodologies for assessing extreme events generally differ in some way. For example, the statistical methods applied in extreme value analysis, projections of future changes in extremes, and/or approaches for dealing with coastal flood risks. This includes local to regional climate change projections for future sea extremes, and, for instance, variations due to location, morphodynamic change, and glacio-isostatic adjustment. Next, the transformation of this knowledge to concrete impact and design measures and its use in national and local governance adaptation schemes in the three countries is discussed. Here, national approaches to deal with risk, risk acceptance and uncertainty vary, among other factors, as a result of the different assessments of extreme events. In hazard and vulnerability assessments, for instance, where results are highly dependent on the quality of the underlying observational data and statistical methods in use, it is necessary to gain a deeper understanding of the physical processes (i.e. the atmospheric and oceanographic genesis of storms) in order to make robust strategies for adaptation and risk reduction. Inasmuch as the countries bordering the northeast Atlantic Ocean and the North Sea deal with similar coastal hazards and climate change challenges, the development of enhanced scientific transnational collaboration to share knowledge and views regarding future impact from storm surges is suggested. This will provide more robust measures of mitigation and adaptation and it will secure a wider dissemination of results across levels of governance and between the northern European countries.

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