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Extreme events in the coastal zone – a multidisciplinary approach for better preparedness

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Costs of natural disasters and weather-related accidents can be enormous, both in terms of death toll and economic costs. According to the European Environment Agency (EEA), increases in the frequency and/or magnitude of extreme events such as floods, droughts, windstorms or heatwaves will be among the most important consequences of climate change. While climate change has received considerable attention, the knowledge on changing extremes and their impacts is fragmented, the confidence level of the relation between climate change and extremes ranges from low to medium and reduces when approaching the local scale. The coastal zone is a focus area for human activities, high population densities, large urban areas, transport and critical infrastructure. It is a complex area in the climate system, a dynamic interaction between land, sea and atmosphere takes place, e.g., large gradients in time and space of geophysical parameters result in mesoscale circulation systems in the atmosphere and ocean that interact with the dynamics of the larger scales. In a new project we will develop a multidisciplinary approach for better preparedness in the coastal zone. The overarching scientific questions to be addressed in this project are: To what extent does climate change alter the occurrence of extreme events, including storms, storm surges as well as heavy precipitation, and the severity of their impacts in the coastal zone; how can improved modelling lead to better preparedness, help mitigate consequences to society, and to understand key uncertainties; and what is the most effective method of communicating these risks to society? Coastal activities include a wide range of features including renewable energy generation, infrastructure related to offshore activities and coastal cities we will address the increasing exposure of the coastal zone to extreme events in the near- and longer term future and aims to enhance the use of climate information in building preparedness. In the project, we will (together with the reference group) identify a subset of critical coastal activities to serve as case studies and to demonstrate the wider societal impact of the proposed research. By using a modelling chain comprised of a global Earth-system model, a regional Earth System model, a detailed physical impact model and a socio-economic impact model the uncertainties of the resulting risks will be estimated. Key aspects of each component in the modelling chain will be improved to better represent features that are relevant for coastal extremes.