

Title: Climate Hazards
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Tentative budget: The total 4-year budget (in 1000 NOK) is 7990 , with 1801 for salary at Uni (12 PMs), 1876 for salary at NERSC (16 PMs), 3313 for salary at UiB (PhD scholarship), 520 for field work costs and data analysis and 480 for other costs.
Short background / purpose: The backbone of impact and risk modelling is an in-depth knowledge of today's climate and its historical variability. Studying extreme events usually requires assumptions of stationarity, as well as extrapolation of short time series using extreme value theory or other stochastic time series modelling. By leveraging the BCCR's expertise in climate service and climate variability on different spatial and temporal scales, our main objective is to provide policy-relevant information through improved projections of climate-related geohazards, by integrating long-term time series from proxy records with numerical model output and Earth observation data.
Methodology: The work will be organised in the following work packages (WPs): WP1: Coordination, proposal development and integration with policy-makers. Team: Kolstad (lead) and Paasche. Tasks: (1) Ensure that the project runs according to plan and that information flows between WPs; (2) Develop new proposals for establishing new national and international networks; (3) Connect with policy- and decision-makers to secure that our expertise and insight are made relevant, and identify potential pathways for action. WP2: Storms and their hydrological impact. Team: Sorteberg (lead), Kolstad, Li, and NN (PhD). Task: Estimating return values for extreme precipitation events is challenging due to short time series. A novel approach is to use paleoclimatic reconstructions of floods and storm surges to investigate historical events and the amounts of rain needed to trigger them. We will map out the storm characteristics and antecedent conditions important for rain-induced floods to develop inverse modelling of catchment-averaged precipitation estimates (joint PhD with WP4). In addition, we will use reconstructions of floods (WP4) to constrain future hydrological scenarios (precipitation and discharge). The work will make use of bias-corrected downscaled data from the project R3. WP3: Sea-level rise and storm surges. Team: Nilsen (lead) and Raj. Task: Assess the effect of dynamic and steric ocean changes on the European Atlantic coastlines, with focus on decadal/internal variability and its importance for prediction, confidence in projections, and the analysis of extreme sea levels. The added impact of waves will be a new focus. Among the materials will be Earth observation data, numerical model output, as well as atmospheric and oceanic reanalyses. We will collaborate with all sea-level related activities at BCCR, and with WP2 and WP4 on storm surges. WP4: New time series of climate extremes. Team: Bakke (lead), Støren, and NN (PhD). Task: Produce new records of Norwegian floods and storm surges from lacustrine sediments that exceed the instrumental era. We will use available state-of-the-art laboratory and statistical tools that in combination can yield a more comprehensive understanding of the dynamics and the variability of precipitation extremes, and hence improve the reliability of drought and flood projections.
Deliverables: Our main deliverables are: improved methods for producing datasets of climatic variables relevant for impact and risk modelling; a strengthening of the science-policy interface profile of BCCR; new educational opportunities that address climate hazards.
Strategic considerations: Our work will benefit from and strengthen the collaboration between researchers in paleoclimatology, meteorology and oceanography, the pillars of the Bjerknes collaboration. We hope to be able to attract researchers from the wider Bjerknes community, as well as international researchers. In fact, our reason for adopting a global perspective instead of focusing on Northern Europe is to be able to attract interest and collaboration abroad. If we are successful in this, we believe that our focus on policy-relevant science will enable us to obtain funding from the RCN, EU and governmental sources, as global climate hazards, impacts and risk are themes of growing importance and increasingly draw interest from the science community and policy-makers. We have a good institutional balance and will strive to hire a female PhD candidate.