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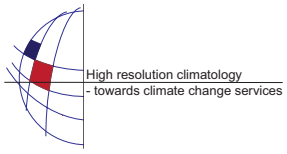

Assessment of Future Storm Losses in Germany: Probabilistic Extension of the Statistical-Dynamical Downscaling Approach

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Future loss estimation is an important planning tool for insurance companies. In particular, good estimates of ranges of uncertainty are necessary for the assessment of climate change impacts and its implications. In this study, the probabilistic aspect of loss estimation is considered by prediction of loss distributions instead of best estimates for average values. For this purpose, downscaling of global climate model data is combined with regional modelling and a probabilistic loss function, which describes the relation between wind speeds and losses. The statistical-dynamical downscaling (SDD) approach is applied to reanalysis data and ECHAM5 climate scenarios for 1960-2100. The SDD consists of a cluster classification of storm relevant weather episodes, referred to as weather types (WT), dynamical downscaling for WT episodes and a recombination of wind speed distributions on the regional scale using frequencies of WT occurrences. Changes in wind distributions for different time periods are divided into external changes due to variability of WT frequencies and internal changes due to wind speed distributions within WT classes. The losses are estimated using generalized loss functions, which fit wind speeds locally to observed loss frequencies via quantile regression. The results corroborate earlier findings, which describe an enhancement of loss potentials for Germany associated with winter storms under future climate conditions. In addition, uncertainty ranges in terms of quantile functions allow for a discussion of loss potential changes with respect to the relative sizes of events.