Assessing model uncertainties in climate projections of severe extra-tropical windstorms using a seamless approach

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Despite the enormous advances made in climate change research, robust projections of the position and the strength of the North Atlantic stormtrack are not yet possible. In particular with respect to damaging windstorms, this incertitude bears enormous risks to European societies and the (re-)insurance industry.

Previous studies have addressed the problem of climate model uncertainty through statistical comparisons of simulations of the current climate with (re-)analysis data and found considerable disagreement between different models, ensemble members of the same model and observed climatologies of intense cyclones. The use of different horizontal and vertical resolutions, as well as different measures of storminess, further complicate comparison between the results from different studies. Additionally, the influences of the models' basic states and fast processes on the development of the most intense storms are difficult to separate from each other and could conceal compensation effects and suggest higher reliability than there really is.

A possible way to address the above problems is through a "seamless" approach of hindcasting historical severe storms on the time-scale of several days with climate models started from predefined initial conditions and run in Numerical Weather Prediction (NWP) mode. Such a cost-effective case-study approach, which draws from and expands on the concepts from the Transpose-AMIP initiative, is currently undertaken in a project funded by the AXA Research Fund. Main aspects of interest are the overall quality of the climate model hindcasts, as compared to operational forecasts and reanalysis data, and the identification of systematic biases, which could aid interpretation of climate projections and guide improvements in future model generations. The general concept of the numerical experiments conducted in this project and results from the analysis of the available Transpose-AMIP data set and from the in-house simulation runs will be presented at the conference.