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How well do Regional Climate Models simulate and parametrize surface wind speed and wind gust across Scandinavia? (Young Scientist Travel Award)

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Twenty-first century surface air temperatures keep rising globally, driving changes in regional extreme weather and climate events [1]. These hazards are becoming more frequent and severe and are impacting humans and ecosystems [2]. Due to their complex origins, extreme events are challenging to predict. Windstorms and extreme wind events cause more than half of the economic loss associated with natural disasters in Europe [3]. Especially in the North, regional planners, policy-makers and meteorological institutes require more comprehensive extreme wind analyses so that the society can cope with their destructive power. The novelty of this study is to get new insights into the extreme wind hazards in the Scandinavian Peninsula by assessing skills and limitations of Regional Climate Models (RCMs) in simulating wind speed and parametrizing wind gust variability. In particular, near-surface mean wind speed (WS) and daily peak wind gust (DPWG) observations and model outputs are investigated across Scandinavia.

WS and DPWG series are obtained from available anemometer observations for 1956-2016 across Sweden and for 1996-2016 across Finland, Sweden and Norway; these series are then quality controlled and homogenized by applying a robust homogenization protocol in CLIMATOL. WS and DPWG are also retrieved from different RCMs and parametrized techniques in the framework of the Coordinated Regional Climate Downscaling Experiment (CORDEX). After using observations to quantify the spatial scale of WS and wind gustiness, CORDEX datasets are compared against the observed ones to evaluate the performance of RCMs in representing wind extremes. Our particular analyses focus on investigating the ability of RCMs the spatial and temporal variability of observed WS and DPWG. RCMs show poor performance in simulating strong winds and are not able to reproduce temporal changes reflected by the observations. By looking at the discrepancies between observed and simulated datasets, the factors and physical processes (e.g., atmospheric circulation patterns) behind the origin and the changes of extreme wind events are explored.

References

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