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Development of a New Database of Extreme European Winter Windstorms Derived from Multiple Data Sets

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European winter windstorms can pose significant risks for the safety and lives of people living in their paths as well as to infrastructure and the natural environment. Several storms in the recent past have caused substantial damages, and risks from extreme winter windstorms may increase with climate change. Characterizing the risks and potential losses from such storms and assessing our ability to predict storm economic losses are therefore an utmost priority. To that end, we have developed a new database of extreme European winter windstorm footprints for the extended winter season (ONDJFM) for the period 1995-2015, and have made it publicly available to both the scientific community and industry. In contrast to previously compiled databases, our database includes storm footprints derived from four different data sets and not from a single source: the ERA5 reanalysis, the COSMO-REA6 reanalysis for Europe, simulation output from a regional climate model driven by ERA5 on the EURO-CORDEX domain, and simulation output from the regional climate model COSMO-CLM on an enlarged Germany domain. We included both the footprints themselves, expressed as the relative daily maximum wind gusts associated with a storm event, and the absolute daily maximum wind gusts associated with that footprint. We derived and included the storm footprints associated with the 50 most extreme storms, or Top50 storms, identified within each of the four input data sets. We applied a consistent methodology for identifying storm footprints and assessing their severity across input data sets that does not require downscaling or adjustment with the assistance of an atmospheric or statistical model. This provides for greater comparability among the footprints derived from the different input sources. Lastly, we derived the Top50 storms from each input on its native horizontal resolution, allowing us to characterize the impact that horizontal resolution can have on footprint identification and severity assessment. Our database thus allows for assessment of extreme storms and their impacts from several perspectives, particularly the impacts from use of wind gust data derived on different horizontal resolutions. This complements the existing extreme European winter storm databases, and facilitates scientific research on extreme storms and industry catastrophe modelling assessments.