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Improved estimates of the European winter wind storm climate and the risk of reinsurance loss

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Current estimates of the European wind storm climate and their associated losses are often hampered by either relatively short, coarse resolution or inhomogeneous datasets. This study estimates the European wind storm climate using dynamical seasonal-to-decadal (s2d) climate forecasts from the European Centre for Medium-Range Weather Forecasts (ECMWF). The current s2d models have limited predictive skill of European storminess, making the ensemble forecasts ergodic samples on which to build pseudo climates of 310 to 396 years in length. Extended winter (ONDJFMA) wind storm climatologies are created using a scalar extreme wind index considering only data above a high threshold. The method identifes between 2331 and 2471 wind storms using s2d data and 380 wind storms in ERA-40. Classical extreme value analysis (EVA) techniques are used to determine the wind storm climatologies. We suggest that the ERA-40 climatology, by virtue of its length, limiting form, and the fitting method, overestimates the return period (RP) of wind storms with RPs between 10-300 years and underestimates the return period of wind storms with RPs greater than 300 years. A 50 year event in ERA-40 is approximately a 33 year event using s2d. The largest influence on ERA-40 RP uncertainties is the sampling variability associated with only 45 seasons of storms. The climatologies are linked to the Swiss Reinsurance Company (Swiss Re) European wind storm loss model. New estimates of the risk of loss are compared with those from historical and stochastically generated wind storm fields used by Swiss Re. The resulting loss-frequency relationship matches well with the two independently modelled estimates and clearly demonstrates the added value by using alternative data and methods, as proposed in this study, to estimate the RP of high RP losses.