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A hybrid methodology for the creation of stochastic sets of extreme storms using numerical models and observations over the North American continent

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Extreme synoptic storms are of significant importance partly due to their destructive potential for insured property. Various hazards linked to high wind gusts, very cold temperatures, and frozen or freezing precipitation (snow and ice) can cause considerable damage.
We describe a methodology to create a collection of synoptic storms (a stochastic set) which is representative of the present state of the atmosphere, and may be used to quantify the impact of extreme weather to insured property. Output from GCM runs is utilized and calibrated using observed statistics of storm tracks. Downscaling of storms produced by the GCM is also implemented to capture the fine scale of peril needed to accurately quantify its impacts.
We present results for the North American continent, where a series of GCM runs have been performed, their storm tracks extracted and calibrated using reanalysis storm tracks. Finally, their large-scale fields were downscaled using a mesoscale model to produce the winter storm peril at necessary high resolution. The hazards of wind gust, freezing (very cold temperatures), snow and freezing rain (ice) were considered.