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Skillful Decadal Prediction of German Bight Storm Activity

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Can a decadal prediction system be used to generate skillful forecasts of small-scale climate extremes? For large-ensemble probabilistic predictions of German Bight storm activity (GBSA), the answer is yes. In this study, we show that the prediction skill of the Max-Planck-Institute Earth System Model (MPI-ESM) decadal hindcast system for GBSA is higher than the skill of persistence-based forecasts. We define GBSA every year via the most extreme three-hourly geostrophic wind speeds, which are derived from mean sea-level pressure (MSLP) data. Our 64-member ensemble of yearly decadal hindcast simulations spans the time period 1960-2018. For this period, we compare deterministically and probabilistically predicted MSLP anomalies and GBSA with a lead time of up to ten years against observations. The model shows limited deterministic skill for single forecast years, but significant positive skill for long averaging periods. For probabilistic predictions of high and low storm activity, the model is skillful over the entire forecast period, and outperforms persistence-based forecasts. For short lead years, the skill of the probabilistic prediction for high and low activity notably exceeds the deterministic skill.