Probabilistic skill in seasonal forecasts of stratospheric extreme events

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Deterministic forecasts of major mid-winter sudden stratospheric warmings are generally thought to be reliable about two weeks prior to the wind reversal at 60 N, 10 hPa. However, the probability of their occurrence in a given year is thought to be influenced by various slowly-evolving components of the climate system, including the phase of the QBO or of ENSO. This suggests the potential for some predictability in the system at seasonal timescales. Given the importance of such extreme events for surface weather and climate, particularly the subset of sudden warmings known as Polar-night Jet Oscillation events that are associated with extended recovery periods, accurately identifying and exploiting any such predictability would be of value. We report here on the study of a 30-ensemble set of seasonal forecasts from the MPI-ESM seasonal prediction model, initialized each November 1st. This ensemble provides clear statistical evidence that information does exist in the initial conditions of the combined atmosphere, ocean, land-surface system regarding the likelihood of PJO events during the upcoming winter. Moreover, this information is skillful, in that years which were forecast to have an increased likelihood of a stratospheric extreme event are in fact more likely to have exhibited such an event. This skill in forecasting stratospheric events can also be demonstrated to lead to enhanced skill at the surface.

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