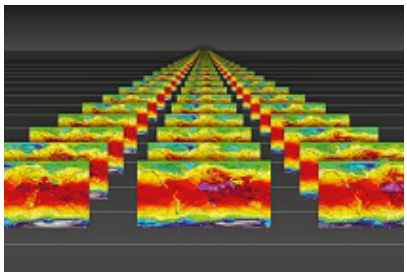

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Weakening of the teleconnection of El Ni˜no-Southern Oscillation to the Arctic stratosphere over the past few decades: What can be learned from subseasonal forecast models

While a connection between the El Ni˜no-Southern Oscillation (ENSO) and the Northern Hemisphere wintertime stratospheric polar vortex appears robust in observational studies focusing on the period before 1979 and in many modeling studies, the strength of this connection has weakened in the past few decades. In this study, the factors that have led to this decline are assessed by comparing the ENSO-vortex relationship in observational data and in operational subseasonal forecasting models over the past few decades. For reforecasts initialized in December, the models simulate a significantly weaker vortex during El Ni˜no (EN) than La Ni˜na (LN) as occurred before 1979, but no such effect was observed to have occurred. The apparent cause of this are the Eastern European and Western Siberian height anomalies present during ENSO: observed LN events were associated with persistent ridging over Eastern Europe as compared to EN, and while the S2S models are initialized with this ridge, the ridge quickly dissipates. As ridging over this region enhances wave flux entering the stratosphere, the net effect is no robust stratospheric response to ENSO in the observations despite a North Pacific teleconnection that would, in isolation, lead to less wave flux for LN. The anomalies in the Eastern European sector in response to ENSO likely reflect unforced internal atmospheric variability.

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