The Predictive Skill of Eurasian Snow Cover and Arctic Sea Ice on Mid-High Latitude Winter Weather

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The Northern Hemisphere (NH) polar jet stream, or eddy-driven jet, represents both the boundary between colder polar air and warmer lower-latitude air and the primary storm track for extratropical cyclones. Therefore, any vacillations in the jet stream can alter weather regimes regionally and hemispherically. The most active period for the NH polar jet stream is during boreal winter, when the jet is at its seasonal maximum because of the steepened meridional temperature gradient. Forecasting the position and strength of the jet stream is critical for accurate temperature and precipitation forecasts for the high to middle latitudes.

One major mode that describes the movements of the jet stream is the North Atlantic Oscillation or Arctic Oscillation (N/AO). Short-term and seasonal weather forecasters alike seek methods and mechanisms to extend predictability of an otherwise internal mode of variability in order to better prepare society for significant changes in precipitation and temperature during the winter. These changes may include short-lived but high-impact extreme weather events (e.g., cold air outbreaks, snowstorms) or season-long anomalies that can affect society for subsequent seasons (e.g., floods and droughts). Both snow cover and sea ice have been proposed as potentially modifying the N/AO model of variability. I will present some recent observational and modeling results on the hemispheric atmospheric response to snow cover and sea ice variability and the potential predictive skill of these high latitude boundary forcings. The expectation is that by the end of 2015 one of the strongest El Niño's in the observational record will be in full swing. Therefore I will also present some observational and modeling results on the possible influence of ENSO on extratropical climate variability for comparison with results from snow cover and sea ice.