InterDec: The potential of seasonal-to-decadal-scale inter-regional linkages to advance climate predictions

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Globally averaged surface air temperature (SAT) during the 20th and 21st centuries displays a gradual warming and superimposed year-to-year and decadal-scale fluctuations. The upward trend contains the climate response to an anthropogenic increase of heat trapping atmospheric greenhouse gases. The temperature ups and downs around the trend - that are particularly pronounced in the Arctic - mostly reflect natural variability. Decadal-scale variability is of large societal relevance. It is observed, for example, in Atlantic hurricane activity, Sahel rainfall, Indian and East Asian Monsoons, Eurasian winter coldness and in the Arctic SAT and sea ice. The understanding and skillful prediction of decadal-scale climate variability that modulates the regional occurrence of extreme weather events will be of enormous societal and economic benefit.

InterDec is an international initiative aiming at understanding the origin of decadal-scale climate variability in different regions of the world and the linkages between them by using observational data sets and through coordinated multi-model experiments. How can a decadal-scale climate anomaly in one region influence very distant areas of the planet? This can happen through atmospheric or oceanic teleconnections. Fast signal communication between different latitudinal belts within days or weeks is possible through atmospheric teleconnection, whereas communication through oceanic pathways is much slower requiring years to decades or even longer. Understanding these processes will enhance decadal climate prediction of both mean climate variations and associated trends in regional extreme events.

The presentation will highlight project results on several key topics: atmospheric, oceanic and cryospheric drivers of recent Eurasian and North American weather and climate extremes; the relative contribution of tropical and extratropical oceanic variability on the interannual-to-decadal variability of the midlatitude atmosphere and enhanced Arctic warming; interannual modulations of sub-seasonal inter-linkages and implications for S2S predictions; local and remote climate impacts of the recent unprecedented and projected Arctic Sea Ice loss; impact of systematic coupled model biases on the accuracy of inter-regional linkages and multiyear predictability.

Key words: Subseasonal-to-Decadal Predictions and Predictability; Eurasian Extreme Weather Events; Impacts of the unprecedented Sea Ice reduction; Global Warming Hiatus; Atmospheric and Oceanic Teleconnections.