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Arctic warming, increasing snow cover and widespread boreal winter cooling.

J. Cohen (1), J. Furtado (1), M. Barlow (2), V. Alexeev (3), and J. Cherry (3)

(1) AER, Inc., Lexington, MA, United States (jcohen@aer.com), (2) Environmental, Earth, and Atmospheric Sciences, University of Massachusetts, Lowell, MA, USA., (3) International Arctic Research Center, University of Alaska Fairbanks, Fairbanks, AK, USA

The global climate models predict that temperatures will warm the greatest in winter due to a positive feedback of increased greenhouse gases (GHGs) and a diminished and darker cryosphere. Furthermore, current consensus on global climate change predicts warming trends over the NH continents during boreal winter. However, recent trends in Northern Hemisphere (NH) seasonal surface temperatures diverge from these projections. For the last two decades, NH landmasses have experienced significant warming trends for all seasons except winter, when large-scale cooling trends exist instead. We propose a mechanism linking Arctic warming and winter continental cooling. Evidence suggests that summer and autumn Arctic warming trends are concurrent with increases in high-latitude moisture and an increase in autumnal Eurasian snow cover, which dynamically induces large-scale wintertime cooling. Understanding this counterintuitive response to radiative warming of the climate system has the potential to improve climate predictions at seasonal and longer timescales. We will also compare the trend analysis with the NAM to trend analysis with varying sea surface temperatures associated with El Nino/Southern Oscillation, the Pacific Decadal Oscillation, the Atlantic Multidecadal Oscillation, solar variability and diminishing Arctic sea ice.