Study explores atmospheric impact of declining Arctic sea ice

May 28 2013

There is growing recognition that reductions in Arctic sea ice levels will influence patterns of atmospheric circulation both within and beyond the Arctic. New research in the *International Journal of Climatology* explores the impact of 2007 ice conditions, the second lowest Arctic sea ice extent in the satellite era, on atmospheric circulation and surface temperatures.

Two 30-year simulations, one using the sea ice levels of 2007 and another using sea ice levels at the end of the 20th century, were used to access the impact of ice free seas. The results showed a significant response to the anomalous open water of 2007.

The results confirm that the atmospheric response to declining sea ice could have implications far beyond the Arctic such as a decrease in the pole to equator temperature gradient, given the increased temperatures associated with the increase in open water, leading to a weaker jet stream and less storminess in the mid-latitudes.

"In the context of decreasing Arctic sea ice extent, our experiments investigating the impacts of anomalous open water on the atmosphere showed increased heat transfer from the ocean to the atmosphere and warmer temperatures in areas of reduced sea ice. Comparing the model simulated circulation to the observed circulation for the summer of 2007 (the year of focus for the model experiments), we found the simulated circulation to be quite different than what was observed for spring and summer while more similar for autumn and fall," said Elizabeth Cassano

from the University of Colorado.

"This suggests the sea ice conditions in the months preceding and during the summer of 2007 were not responsible for contributing to a circulation pattern which favored the large observed sea ice loss in that year. The circulation during autumn and winter which was more similar between the model simulations and the observed circulation suggests that the reduced sea ice in 2007 was in part responsible for the observed atmospheric circulation during autumn and winter of that year."

More information: Elizabeth N. Cassano, John J. Cassano, Matthew E. Higgins and Mark C. Serrez, Atmospheric impacts of an Arctic sea ice minimum as seen in the Community Atmosphere Model, *International Journal of Climatology*, Wiley, DOI: 10.1002/joc.3723

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