Northern Eurasian snowpack could be a predictor of winter weather in US

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Every winter, weather forecasters talk about the snow cover in the northern U.S. and into Canada as a factor in how deep the deep-freeze will be in the states. A new study by researchers at the University of Georgia indicates they may be looking, at least partially, in the wrong place.

It turns out that snow piling up over a band of frozen tundra from Siberia to far-northern Europe may have as much effect on the climate of the U.S. as the much-better-known El Niño and La Niña.

The new work, just published in the *International Journal of Climatology*, reports that to understand how cold (or warm) the winter season will be in the U.S., researchers and weather forecasters should also take a closer look at snowpack in northern Eurasia laid down the previous October and November.

"To date, there had been no thorough examination of how snow cover from various regions of Eurasia influences North American winter temperatures," said climatologist Thomas Mote of UGA's department of geography and leader of the research. "The goal of this research was to determine whether there is a significant relationship between autumn snow extent in specific regions of Eurasia and temperatures across North America during the subsequent winter."

Co-author of the paper was Emily Kutney, a former graduate student in Mote's lab who has since earned her master's degree and left UGA.

While other scientists have postulated that snow cover on the Eurasian landmass has a strong effect on winters in North America, the new study is the first to narrow down the location of the area that causes the most direct effect on U.S. winters—an area in northwest Eurasia that includes part of Siberia—though the entire effective area extends as far west as northern Scandinavia.

"One difficulty in comparing previous studies is that they have used multiple definitions of Eurasian snow cover," said Mote. "Our work looked at the role of various key areas of Eurasian snow cover on atmospheric circulation, including the systems called the Arctic Oscillation and the Pacific/North American teleconnection."

The findings have new significance for seasonal climate outlooks, which predict whether upcoming seasons will be colder or warmer, or wetter or drier than normal. Years with extensive autumn snow in northwest Eurasia were associated with subsequent winter temperatures as much as seven degrees (Fahrenheit) lower near the center of North America. This difference is roughly the same as a one-month shift in climate.

Such information can be crucial for everything from agricultural to daily life in areas that normally have brutal winters. The crucial time to look at the snow cover in Eurasia is during October and November in order to understand the upcoming winters in North America, said Mote.

Even more complexity enters the system of interrelated climate phenomena when looking at the possibility that sea ice in the Atlantic and Arctic Oceans might affect Eurasian snow cover and thus winters in North America.

"It's interesting, because it implies to us that the potential impact of this new idea could be as large or larger than El Niño and La Niña events," said Mote.

The new study is more about seasonal climate predictions than short-term modeling for weather.

Mote also led a team that reported in 2008 a dramatic rise in the rate of melt in the ice sheet of Greenland. He and colleagues found that it was 60 percent higher in 2007 than ever before recorded. Mote used a nearly 40-year record of satellite data to discover the dramatic melting.

Provided by University of Georgia