



## Northeast Winters Heading South

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DURHAM, N.H. - After conducting the most rigorous analysis to date of wintertime climate data in the northeastern United States from 1965 to 2005, University of New Hampshire researchers Elizabeth Burakowski and Cameron Wake of the Institute for the Study of Earth, Oceans, and Space have shown that the region's signature wintertime conditions are disappearing at an ever-increasing rate.

The study, which was recently published in the peer-reviewed *Journal of Geophysical Research-Atmospheres*, shows regional temperatures over the past four decades are rising at a rate of 0.42 to 0.46 degrees Celsius per decade and that the number of snow-covered days has been reduced at a rate of 8.9 days per decade. The study also shows that temperature trends are most pronounced in the region's coldest months - January and February.

"Winter is warming faster than any other season and what we're seeing over time is an intensification of this warming trend," says Burakowski, who conducted her research while completing her master's degree in the department of Earth sciences at UNH.

Burakowski says that the warming trend may be partly driven by a "snow-albedo feedback loop" whereby the decreased snow cover means less reflected sunlight (albedo) and warmer ground surfaces, which in turn eat away at more snow cover.

"That's the hypothesis right now and in order to test it further we will need to run a series of regional climate models to simulate the temperature response to a decrease in snow cover area in the region," she says.

The study of 40 years of meteorological data also shows that snowfall has decreased by about 1.8 inches per decade, with the greatest decreases occurring in December and February. However, some locations downwind of the Great Lakes are experiencing increases in winter snowfall that may be related to warmer lake surface temperatures and decreased lake ice cover.

Burakowski notes that last winter's exceptionally high snowfall in the region was not contrary to this long-term trend, and that the heavy, wet snow wasn't the result of a cooling effect.

"Just because we had a snowy winter doesn't mean that winters aren't warming, they are and, in fact, last winter temperatures were similar to the 1900 average," she says.

"The trend toward warmer winters does not mean that we will not have cold winters in the future. It means that the odds of a warm winter are greater now than they were four decades ago," adds Wake, who is a research associate professor in the Climate Change Research Center.

The study used extensive quality assurance and quality control measures to ensure that only the best available meteorological data were used to document trends in wintertime climate in the northeastern U.S. over the last forty years.

The warming trend in the northeast coincides with a period during which global and northern hemisphere surface air temperature increases are being driven primarily by enhanced levels of manmade greenhouse gases in the atmosphere, and also a period over which there has been a significant decline in the extent of Arctic sea ice. The 11 warmest years in the global instrumental temperature record (since 1850) have occurred since 1995.

The University of New Hampshire, founded in 1866, is a New England liberal arts college and a major research university with a strong focus on undergraduate-oriented research. A land, sea and space-grant university, UNH is the state's flagship public institution, enrolling 11,800 undergraduate and 2,400 graduate students.

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