Rising CO2 signals wetter storms for Northern Hemisphere

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While two new studies by researchers at the University of Colorado at Boulder's Cooperative Institute for Research in Environmental Sciences predict wetter storms for the Arctic and for the Northern Hemisphere because of global warming, whether or not this means more net precipitation depends on the latitude.

"Global climate model predictions for the 21st century indicate an increase in the frequency of storms in the Arctic with no clear trend in the mid-latitudes but an increase in the amount of precipitation associated with individual storms in both regions," said Assistant Professor John Cassano of the CU-Boulder atmospheric and oceanic sciences department and lead author of one of the studies.

Both studies will be published on Dec. 28 in a special edition of the *Journal of Geophysical Research-Biogeosciences* titled "Changes in the Arctic Freshwater System: Identification, Attribution and Impacts at Local and Global Scales." Cassano also will give a poster presentation on the work Dec. 13 during the fall meeting of the American Geophysical Union in San Francisco.

According to Cassano, higher precipitation at high latitudes over the next century could influence important climate factors, such as seasonal snow cover, ice sheet growth and freshwater dilution of the Arctic Ocean. Enhancing freshwater sources to the ocean could, if substantial, affect the Atlantic's thermohaline circulation -- the ocean conveyor belt that helps maintain Western Europe's warm temperatures and plays a

dominant role in global climate, he said.

"Already scientists have observed higher river runoff into the Arctic Ocean, but the source of this additional runoff was unclear," Cassano said. "These studies provide one piece of the puzzle to understand this observed change."

In contrast, mid-latitudes, like the continental United States, will see wetter storms but also a drop in storm frequency, effectively canceling out any change in net precipitation, he said.

Joel Finnis, a CU-Boulder doctoral student and lead author of the second study, analyzed the effects of rising CO_2 levels on both the frequency and moisture content of storms over the entire Northern Hemisphere. He found that in mid-latitudes, higher storm moisture content will be offset, and in some cases exceeded, by decreases in storm frequency.

"We're likely to see fewer storms carrying more water," said Finnis. "This could mean an increased chance that individual events will produce severe weather, but a decrease in overall water resources." Finnis also believes that these changes in storm frequency and moisture content will be most pronounced during the fall.

As for why storms will be wetter as CO_2 rises, more than 75 percent of the predicted increase in storm moisture content will be the result of the warming and moistening of the atmosphere as the global climate warms, the researchers said.

"The wetter storms and higher precipitation over the Arctic are best explained by the heating of the atmosphere as greenhouse gases increase," said Cassano. "As the atmosphere warms it can hold more water and this change is largely responsible for the increase in Artic precipitation that is predicted over the next 100 years."

Both Cassano and Finnis used data sets from the Intergovernmental Panel on Climate Change's Fourth Assessment Report and analyzed projected storm tracks and precipitation changes under a doubling of present-day CO_2 levels during the 21st century.

Source: University of Colorado at Boulder