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Research trio suggest correlation exists between Arctic ice melt and extreme weather

December 9 2013, by Bob Yirka

A giant panda was playing with ice cubes in Chengdu, China to cool off from the summer heat in August 2011. Credit: Zhongjun Liu

(Phys.org) —A trio of researchers from the Chinese Academy of Sciences and Rutgers University has concluded that there is a correlation between extreme weather in the mid-northern latitudes and warmer weather in the Arctic. In their paper published in *Nature Climate Change*, Qiuhong Tang, Xuejun Zhang and Jennifer Francis describe a study they undertook that involved analyzing both weather data and Arctic ice and snow cover over the past 30 years, which showed, they claim, that there were coinciding periods of reduced ice and snow cover in the Arctic and extreme weather in the U.S., Europe and Asia. In the same journal James Overland suggests the evidence presented by Tang, Zhang and Francis isn't likely strong enough to change the minds of those who believe there are too many factors at play to attribute extreme weather events to any one of them in particular. He does suggest that the potential for extreme weather events occurring in the future appears to be high, however, perhaps due, to Arctic influence.

Trying to pin down why weather behaves as it does, is of course, one of the more tricky sciences. There are simply too many things that cause change to the system. On the other hand, common sense suggests that a 75% reduction in sea ice volume over just ten years likely portends some sort of dramatic impact.

Tang, Zhang and Francis suggest that less ice and snow in the Arctic means more heat is absorbed from the sun and rereleased into the atmosphere. That in turn impacts the jet stream, which they note, really only exists because of the large difference in air temperatures between the Arctic and the mid-northern latitudes. Increasing heat in the Arctic will mean less difference, and hence a less strong jet stream. A weaker jet stream, will by nature, they say, move more slowly and also implies a more haphazard path (more curves). That in turn, they say, means weather systems taking longer to move—explaining long heat waves, droughts or periods of rainfall.

The trio say that comparing mid-northern latitude weather trends over the past 30 years with changes in snow and ice cover in the Arctic shows a correlation between the two, and because of that warn that due to snow melt trends continuing, they expect even more severe weather in the future.

They do acknowledge, as Overland (and other climate scientists) point out, that a data set of just 30 years is not sufficient to prove anything—more data and research are needed. In the meantime, however, a little human intuition might stand in its stead—offering a foreboding forecast of dangerous weather for many parts of the globe over the next several years.

More information: Extreme summer weather in northern mid-latitudes linked to a vanishing cryosphere, *Nature Climate Change* (2013) DOI: 10.1038/nclimate2065

Abstract
The past decade has seen an exceptional number of unprecedented summer extreme weather events in northern mid-latitudes, along with record declines in both summer Arctic sea ice and snow cover on high-latitude land. The underlying mechanisms that link the shrinking cryosphere with summer extreme weather, however, remain unclear. Here, we combine satellite observations of early summer snow cover and summer sea-ice extent with atmospheric reanalysis data to demonstrate associations between summer weather patterns in mid-latitudes and losses of snow and sea ice. Results suggest that the atmospheric circulation responds differently to changes in the ice and snow extents, with a stronger response to sea-ice loss, even though its reduction is half as large as that for the snow cover. Atmospheric changes associated with the combined snow/ice reductions reveal widespread upper-level height increases, weaker upper-level zonal winds at high latitudes, a more amplified upper-level pattern, and a general northward shift in the jet stream. More frequent extreme summer heat events over mid-latitude continents are linked with reduced sea ice and snow through these circulation changes.

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