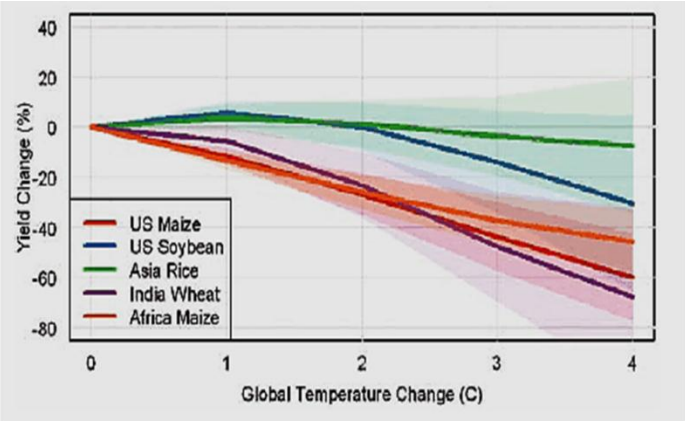
Disastrous risks to the best food producing regions in the world from the imminent loss of Arctic summer sea ice cooling albedo.

Make no mistake, the Arctic is the Northern Hemisphere's air conditioner. If the ice starts disappearing in the summer, it will have a significant impact on our climate. Dan Satterfield AGU blog Aug 2010

To protect the security of northern hemisphere and world food availability the Arctic sea ice should be secured year round.

*Mechanisms by which the atmosphere ''remembers'' a reduction in summer ice cover include warming and destabilization of the lower troposphere, increased cloudiness, and slackening of the poleward thickness gradient that weakens the polar jet stream. This ice atmosphere relationship suggests a potential long-range outlook for weather patterns in the northern hemisphere. (*Winter Northern Hemisphere weather patterns remember summer Arctic sea-ice extent Jennifer A. Francis.)



National Research Council Climate Stabilization Targets 2010

The developed world public, especially in North America, are dangerously naïve about the impacts and risk of global climate change to their food security. Even without feedbacks from the loss of Arctic sea ice and Arctic methane emissions agriculture in the northern hemisphere is vulnerable to committed levels of global warming .

http://www.arcticportal.org/effects-of-arctic-sea-ice-reduction

Effect on the jet stream and planetary weather patterns

Continued loss of Arctic sea ice may dramatically change global weather and precipitation patterns in the decades to come. The jet stream will probably move further north in response to warmer temperatures over the pole, which will bring more precipitation to the Arctic. More frequent and intense droughts over the U.S. and other regions of the mid-latitudes may result from this shift in the jet stream. Changes to the course of the jet stream affect weather patterns for the entire planet, and we can expect impacts on the strength of the monsoons and re-curvature likelihood of hurricanes.

Francis et al. (2009) found that during 1979 - 2006, years that had unusually low summertime Arctic sea had a 10 - 20% reduction in the temperature difference between the Equator and North Pole. This resulted in a weaker jet stream with slower winds that lasted a full six months, through Fall and Winter. The weaker jet caused a weaker Aleutian Low and Icelandic Low during the winter, resulting in reduced winter precipitation over all of the U.S., Alaska, and Northern Europe. In contrast, increased precipitation fell over Spain, Italy, and Japan during these winters. The authors noted that strong La Niña or El Niño events can have a much stronger influence on the wintertime atmospheric circulation, which will overshadow the circulation changes due to summertime Arctic sea ice loss.

Such as the strong La Niña event occurred during the winter of 2007 - 2008. In any case, reduced summertime Arctic sea ice should give most of the Northern Hemisphere a delayed start to winter during most years, for the foreseeable future.

NRDC: Global Warming Puts the Arctic on Thin Ice

www.nrdc.org/globalwarming/qthinice.asp

Why does the amount of summer sea ice matter?

Scientists are worried about declining Arctic sea ice because the ice plays an important role in global climate. The bright white sea ice reflects sunlight and heat back into space, so that the Arctic region remains cooler than it otherwise would. The cold temperatures in the Arctic in turn act as a sort of air conditioner for the rest of the world.

Will Arctic ice melt have any effects beyond the polar region?

ALASKA HEATS UP

The contraction of the Arctic ice cap is accelerating global warming. Snow and ice usually form a protective, cooling layer over the Arctic. When that covering melts, the earth absorbs more sunlight and gets hotter. And the latest scientific data confirm the far-reaching effects of climbing global temperatures.

Rising temperatures are already affecting Alaska, where the spruce bark beetle is breeding faster in the warmer weather.

A warmer Arctic will also affect weather patterns and thus food production around the world. Wheat farming in Kansas, for example, would be profoundly affected by the loss of ice cover in the Arctic. According to a NASA Goddard Institute of Space Studies computer model, Kansas would be 4 degrees warmer in the winter without Arctic ice, which normally creates cold air masses that frequently slide southward into the United States. Warmer winters are bad news for wheat farmers, who need freezing temperatures to grow winter wheat. And in summer, warmer days would rob Kansas soil of 10 percent of its moisture, drying out valuable cropland.

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Disappearing Arctic sea ice reduces available water in the American west

Jacob O. Sewall

Earth Sciences Department, University of California, Santa Cruz, California, USA

Lisa Cirbus Sloan

Earth Sciences Department, University of California, Santa Cruz, California, USA

Recent decreases in Arctic sea ice cover and the probability of continued decreases have raised the question of how reduced Arctic sea ice cover will influence extrapolar climate. Using a fully coupled earth system model, we generate one possible future Arctic sea ice distribution. We use this “future” sea ice

distribution and the corresponding sea surface temperatures (SSTs) to run a fixed SST and ice concentration experiment with the goal of determining direct climate responses to the reduction in Arctic sea ice that is projected to occur in the next 50 years. Our results indicate that future reductions in Arctic sea ice cover could significantly reduce available water in the American west and highlight the fact that the most severe impacts of future climate change will likely be at a regional scale.

WWF ARCTIC CLIMATE FEEDBACKS: GLOBAL IMPLICATIONS

ATMOSPHERIC CIRCULATION FEEDBACKS

Mark C. Serreze and Julienne Stroeve
Cooperative Institute for Research in Environment

Weather patterns are altered

The expected and observed decline of summer sea ice extent will affect heating in the lower atmosphere and, as a result, atmospheric circulation. These changes will influence temperature and precipitation patterns that affect transportation, agriculture, forestry and water supplies.

Observational evidence for responses of atmospheric circulation to declining ice extent is just beginning to emerge. Varying summer ice conditions can be associated with large-scale atmospheric anomalies (deviations from the average) during the following autumn and winter that extend beyond the boundaries of the Arctic.

The autumn sea level pressure fields following summers with less arctic sea ice extent exhibit higher pressures over much of the Arctic Ocean and North Atlantic, compensated by lower pressures in middle latitudes. The pattern in the North Atlantic is similar to what is known as the negative phase of the North Atlantic Oscillation (NAO)

Today, amplified atmospheric warming in autumn over the Arctic Ocean is already evident, and this warming extends through a through a considerable depth of the atmosphere. Changes in the temperature structure of the arctic atmosphere are expected to become more pronounced in coming decades as the Arctic Ocean continues to lose its summer sea ice cover. These include alterations in static stability (the change in the atmosphere's temperature with height), the poleward gradient in atmospheric thickness and the vertical change in wind speed (wind shear). These changes will invoke responses in atmospheric circulation. While there is no universal consensus regarding the spatial patterns of change that will emerge, a common thread between different modeling studies is that changes may be significant and affect areas well beyond the boundaries of the Arctic.