

A large, faint watermark of the United States Environmental Protection Agency (EPA) logo is centered in the background. The logo consists of a circular emblem with a stylized flower or leaf design in the center, surrounded by the text "UNITED STATES ENVIRONMENTAL PROTECTION AGENCY".

Importance of Arctic Linkages for Policy and Communication

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NRC Workshop: Linkages Between Arctic Sea Ice Loss and Mid-Latitude Weather Patterns

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Arctic Sea Ice Loss as a Climate Indicator

- Arctic sea ice loss can serve as an iconic communication tool to advertise our climate trajectory, i.e., performance of mitigation
- Arctic sea ice already used in EPA's "Climate Change Indicators" report
 - Further "linkages" could add to the Arctic story

Arctic Sea Ice
This indicator tracks the extent and age of sea ice in the Arctic Ocean.

Background

Sea ice is an integral part of the Arctic Ocean. During the dark winter months, sea ice essentially covers the entire Arctic Ocean. In summer, some of this ice melts because of warmer temperatures and long hours of sunlight. Sea ice typically reaches its minimum thickness and extent in mid-September, when the area covered by ice is roughly half the size of the winter maximum. The ice then begins expanding again.

The extent of area covered by Arctic sea ice is an important indicator of change in global climate because warmer air and water temperatures are reducing the amount of sea ice present. Because sea ice is more reflective than liquid water, it plays a significant role in the Earth's energy balance and keeping solar regions cool. (For more information on the effects of surface color on reflecting sunlight, see the Snow Cover indicator on p. 26.) Sea ice also keeps the air cool by forming a barrier between the air above and the warmer water below. As the amount of sea ice decreases, the Arctic region's ability to stabilize the Earth's climate is reduced, potentially leading to a "feedback loop" of more absorption of solar energy, higher air temperatures, and even greater loss of sea ice.

The age of sea ice is also an important indicator of Arctic conditions because older ice is generally thicker and stronger than younger ice. A loss of older ice suggests that the Arctic is losing ice faster than it is accumulating it.

Changes in sea ice can directly affect the health of Arctic ecosystems. Mammals such as polar bears and walrus rely on the presence of sea ice to preserve their hunting, breeding, and migrating habits. These animals face the threat of declining birth rates and restricted access to food sources because of reduced sea ice coverage and thickness. Impacts on Arctic wildlife, as well as the loss of ice itself, are already restricting the traditional subsistence hunting lifestyle of indigenous Arctic populations such as the Yupik, Inuit, and Gwich'in.

While diminished sea ice can have negative ecological effects, it can also present commercial opportunities. For instance, reduced sea ice opens shipping lanes and increases access to natural resources in the Arctic region.

Dwindling Arctic Sea Ice

September 1979

September 2012

Source: NASA, 2012

Key Points

- September 2012 had the lowest sea ice extent on record, 49 percent below the 1979–2000 average for that month.
- The September 2012 record low sea ice extent was 1.3 million square miles (an area five times the size of Texas) less than the historical 1979–2000 average (see Figure 1).
- Although the annual maximum of sea ice extent typically occurs in September, all months have shown a decreasing trend in sea ice extent over the past several decades. The largest decreases have occurred in the summer and fall.¹⁴
- Evidence of the age of Arctic sea ice suggests an overall loss of multi-year ice. The proportion of sea ice five years or older has declined dramatically over the recorded time period, from more than 30 percent of September ice in the 1980s to 4 percent in 2012. A growing percentage of Arctic sea ice is only one or two years old. This thawing of Arctic ice makes it more vulnerable to further melting.

Climate Change Indicators in the United States, 2012

2ND EDITION



Focus of the Arctic Council and other Forums on the Role of “Short-Lived Climate Forcers”

- To what extent are anthropogenic emissions of black carbon and methane responsible for Arctic sea ice loss to date, in the future?
- Arctic Council has asked its science group (AMAP) and a policy group (Task Force) to focus on SLCFs
- Last Arctic Council ministerial agreed task force would “develop arrangements on actions” – next high-level meeting May 2015
- Questions will remain about importance of SLCFs in near-term mitigation (alongside CO₂), and benefits of avoiding/slowing down some degree of sea ice loss