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What's Going on at the North Pole?

The plight of polar bears heralded to the world that the Arctic sea ice is shrinking. Seen through satellite imaging it's hard to discredit this indicator of climate change.

The National Snow and Ice Data Center (NSIDC) manages and distributes scientific data, creates tools for data access, supports data users, performs scientific research, and educates the public about the cryosphere, with NASA whose vision is: "To reach for new heights and reveal the unknown so that what we do and learn will benefit all humankind", provides weekly data on the melting Arctic sea ice.

Arctic sea ice is simply layers of frozen seawater, which cap the Arctic Ocean. This ice grows dramatically each winter, usually reaching its maximum in March. It melts just as dramatically each summer, generally reaching its minimum in September.

Since 1978, satellites have monitored sea ice growth and retreat, and they have detected an overall decline in Arctic sea ice. The rate of decline steepened after the turn of the twenty-first century. In September 2002, the summer minimum ice extent was the lowest it had been since 1979. Although the September 2002 low was only slightly below previous lows (from the 1990s), it was the beginning of a series of record or near-record lows in the Arctic.

The new lows, combined with poor wintertime recoveries from 2004 to 2007, signaled a sharpening in the rate of decline in Arctic sea ice. Since 2002, ice extent at the summer minimum has not returned to anything approaching the long-term average (1979-2000). Though winter ice extent has fluctuated, satellite and in situ observations have shown that there is less multiyear ice and more annual ice. Multiyear ice is a denser ice than annual.

On September 16, 2012, Arctic sea ice spread across just 3.41 million square kilometers (1.32 million square miles)—the smallest extent ever recorded by satellites and about half the average minimum from 1981 to 2010.

According to the NSIDC, Arctic sea ice extent reached 14.91 million square kilometers (5.76 million square miles) on March 21, 2014 (maximum winter ice). Extent is defined as the total area in which the sea ice concentration is at least 15 percent. The season had been looking significantly worse until a strong Arctic Oscillation weather pattern dispersed and extended the ice in some regions.

And while the year was not extraordinary—the fifth lowest extent in 36 years of satellite records—the trend continues. The seven smallest ice extents in the Arctic have all

occurred during the past seven years. And the extent of Arctic sea ice has decreased in every season of the year since 1979. There is strong evidence that the trend will continue.

According to NASA and NSIDC, the length of the melt season for Arctic sea ice is growing by several days each decade, and an earlier start to the melt season is allowing the Arctic Ocean to absorb enough additional solar radiation in some places to melt as much as four feet of the Arctic ice cap's thickness. The Arctic melt season has lengthened on average by five days per decade from 1979 to 2013.

Satellite imagery, submarine sonar measurements, and data collected from NASA indicate that the sea ice thickness is as much as 50 percent thinner than in previous decades, going from an average thickness of 3.8 meters (12.5 feet) in 1980 to 1.9 meters (6.2 feet) in recent years. Older, denser ice is being replaced by thinner, seasonal ice.

Researchers have found that the ice pack and ocean waters are absorbing more and more sunlight due both to an earlier opening of the waters and a darkening of the sea ice. The sea ice cover is becoming less reflective because it now mostly consists of thinner, younger ice, which is less reflective than the older ice that previously dominated the ice pack.

As sea ice melts in the summer, instead of reflecting 80 percent of the sunlight, the ocean absorbs 90 percent of the sunlight. The oceans heat up, and Arctic temperatures rise further, accelerating to the Earth's warming trend.

http://nsidc.org/arcticseaicenews/
http://earthobservatory.nasa.gov/IOTD/view.php?id=83451

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