This is the print version of the Skeptical Science article 'Arctic sea ice has recovered', which can be found at http://sks.to/arctic.

Has Arctic sea ice returned to normal?

What The Science Says:
Arctic sea ice has been steadily thinning, even in the last few years while the surface ice (eg - sea ice extent) increased slightly. Consequently, the total amount of Arctic sea ice in 2008 and 2009 are the lowest on record.

Climate Myth: Arctic sea ice has recovered
"Those who have been following NSIDC and JAXA sea ice plots have noted that this has been an extraordinary year so far, with Arctic sea ice hitting the “normal” line on some datasets. ...

As of today, JAXA shows that we have more ice than any time on this date for the past 8 years of Aqua satellite measurement for this AMSRE dataset." (Anthony Watts, 22 April 2010)

When people talk about the state of Arctic sea ice, they most commonly refer to sea ice extent. This is the area of ocean where there is at least some sea ice (the most common cut-off is 15%). Sea ice extent shows a strong seasonal cycle as Arctic ice melts in the summer, reaching a minimum in September, then refreezes in the winter, peaking in March. Temperature is the main factor driving changes in sea ice extent, although other factors like wind patterns and cloudiness play a part. While sea ice extent has been steadily declining in recent decades, it fell to a record low in 2007 due to a combination of factors.

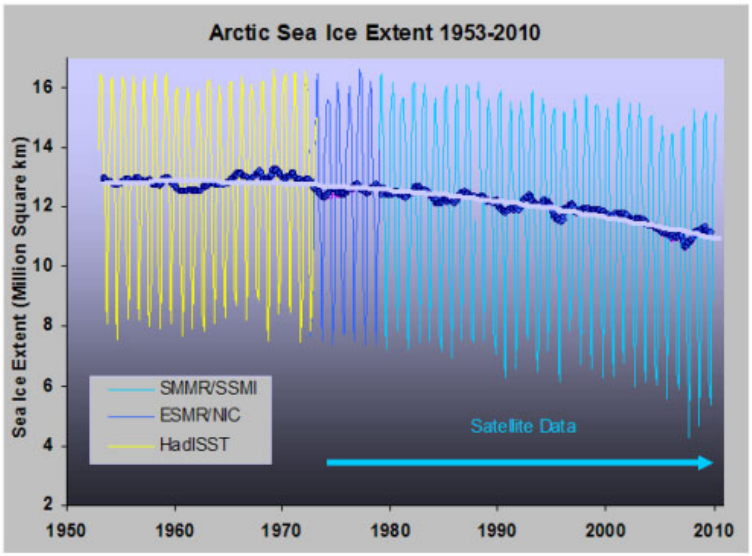

Figure 1: Sea ice extent with trend from 1953 onwards.

Sea ice extent gives us a reasonable indication of the amount of Arctic sea ice but does have its limitations. Extent tells us about the state of the sea ice at the ocean's surface, not what's happening below. A better metric for the total amount of sea ice is, well, the actual total amount of sea ice, measured by sea ice volume. Satellite radar altimetry (Giles et al. 2008) and satellite laser altimetry (Kwok et al. 2009) find that Arctic sea ice has been thinning, even in 2008 and 2009 when sea ice extent showed a slight recovery from the 2007 minimum. So while some claimed Arctic sea ice was recovering after 2007, the total volume of Arctic Sea ice through 2008 and 2009 were the lowest on record (Maslowski et al. 2010, Tschudi et al. 2010).

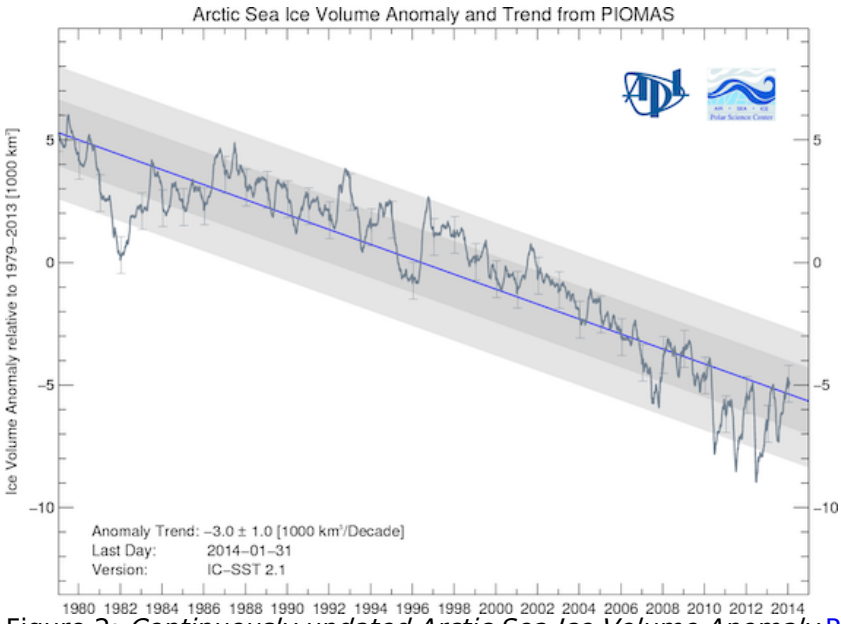

Figure 2: *Continuously updated Arctic Sea Ice Volume Anomaly* Polar Ice Center.

Currently, websites such as Watts Up With That are using sea ice extent in 2010 to claim Arctic sea ice has returned back to normal. A few days ago, Watts claimed that we had "more ice than any time on this date for the past 8 years". On the contrary, in March 2010, the total Arctic sea ice volume was 20,300 km^3 - the lowest March value for total sea ice volume over the 1979-2009 period. Those who claim Arctic sea ice has returned to normal are focussing at the thin shell at the top and neglecting the steadily thinning sea ice below.

Intermediate rebuttal written by Daniel Bailey

Update July 2015:

Here is a related lecture-video from Denial101x - Making Sense of Climate Science Denial

[*see video at **this link**.*]

This rebuttal was updated by Judith Matz on September 13, 2021 to replace broken links. The updates are a result of our call for help published in May 2021.

The Skeptical Science website by Skeptical Science is licensed under a Creative Commons Attribution 3.0 Unported License.

Skeptical Science explains the science of global warming and examines climate misinformation through the lens of peer-reviewed research. The website won the Australian Museum 2011 Eureka Prize for the Advancement of Climate Change Knowledge. Members of the Skeptical Science team have authored peer-reviewed papers, a college textbook on climate change and the book Climate Change Denial: Heads in the Sand. Skeptical Science content has been used in university courses, textbooks, government reports on climate change, television documentaries and numerous books.

The Skeptical Science website by Skeptical Science is licensed under a Creative CommonsAttribution 3.0 Unported License.