



Polar ice cap

Posted by [Stuart Staniford](#) on March 14, 2006 - 2:53am

Topic: [Environment/Sustainability](#)

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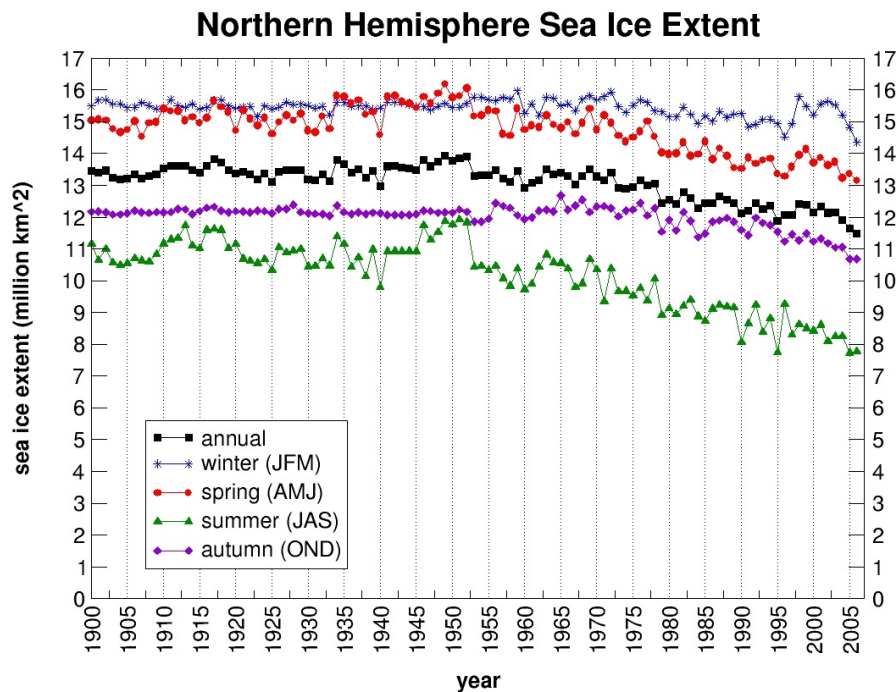
After seeing this [incredibly depressing piece](#) in the Independent,

Sea ice in the Arctic has failed to re-form for the second consecutive winter, raising fears that global warming may have tipped the polar regions in to irreversible climate change far sooner than predicted.

Satellite measurements of the area of the Arctic covered by sea ice show that for every month this winter, the ice failed to return even to its long-term average rate of decline. It is the second consecutive winter that the sea ice has not managed to re-form enough to compensate for the unprecedented melting seen during the past few summers.

I wanted to check out the data for myself (not trusting the spin of headline writers), and I found the absolutely incredible website [The Cryosphere Today](#) at the University of Illinois at Urbana-Champaign. They already made all the graphs I needed, and have animated GIFS of the icecaps to boot.

For example, this picture seems to address what the Independent is talking about, but I'm inclined to say that while the situation is clearly bad and getting worse, the Independent's spin is a little overdone.



Seasonal extent of Arctic sea ice, 1900-present. Source: [Cryosphere Today](#).

You can see that the summer (green) line has been heading pretty steadily down since the middle of the last century. However, the trend in the winter (blue) line only started clearly down in the 1970s, and experienced a bit of a reprieve in the late 1990s (for reasons I don't know). It is really the apparent rapid end of that reprieve since 2000 that the Independent is highlighting.

You can also pretty clearly see why folks think the Arctic will be ice free in the summer by the end of the 21st century or so. If you go down from 12 to 8 from 1950 to 2000 in more-or-less a straight line, you'd hit zero in about 2100.

This obviously is behind the major warming of the Arctic - as the Independent puts it:

Scientists are now convinced that Arctic sea ice is showing signs of both a winter and a summer decline that could indicate a major acceleration in its long-term rate of disappearance. The greatest fear is that an environmental "positive feedback" has kicked in, where global warming melts ice which in itself causes the seas to warm still further as more sunlight is absorbed by a dark ocean rather than being reflected by white ice.

Well, this positive feedback would have been operating ever since the ice started shrinking around 1950. So far, it hasn't succeeded in bending the summer trend away from its rough straight line, so it's not clear there's really any evidence of some new threshold being crossed. It's also worth noticing that winter ice cover is almost completely irrelevant to the albedo feedback since the Arctic gets no sunshine in the winter. However, in high summer the Arctic gets nearly the same insolation as the tropics (the lower angle in the sky is largely offset by getting 24 hours of insolation instead of 12). So summer ice cover is extremely relevant to the Arctic heat budget.

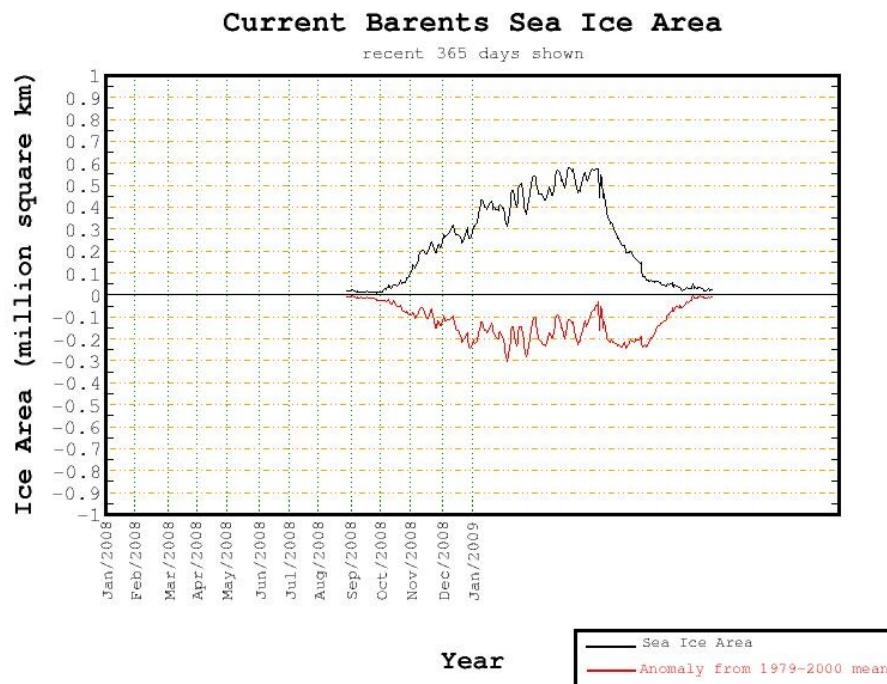
All in all, I don't see any evidence here for the Independent's sudden crossing of some threshold of

irreversibility. Rather, just the linear continuation of what is certainly a very worrying trend. Overall this can't be good for [Greenland and sea level](#).

One thing that does seem a little more solid in the Independent's story is this:

Professor Peter Wadhams, of Cambridge University, who was the first Briton to monitor Arctic sea ice from nuclear submarines, said: "One of the big changes this winter is that a large area of the Barents Sea has remained ice-free for the first time. This is part of Europe's 'back yard'. Climate models did predict a retreat of sea ice in the Barents Sea but not for a few decades yet, so it is a sign that the changes that were predicted are indeed happening, but much faster than predicted."

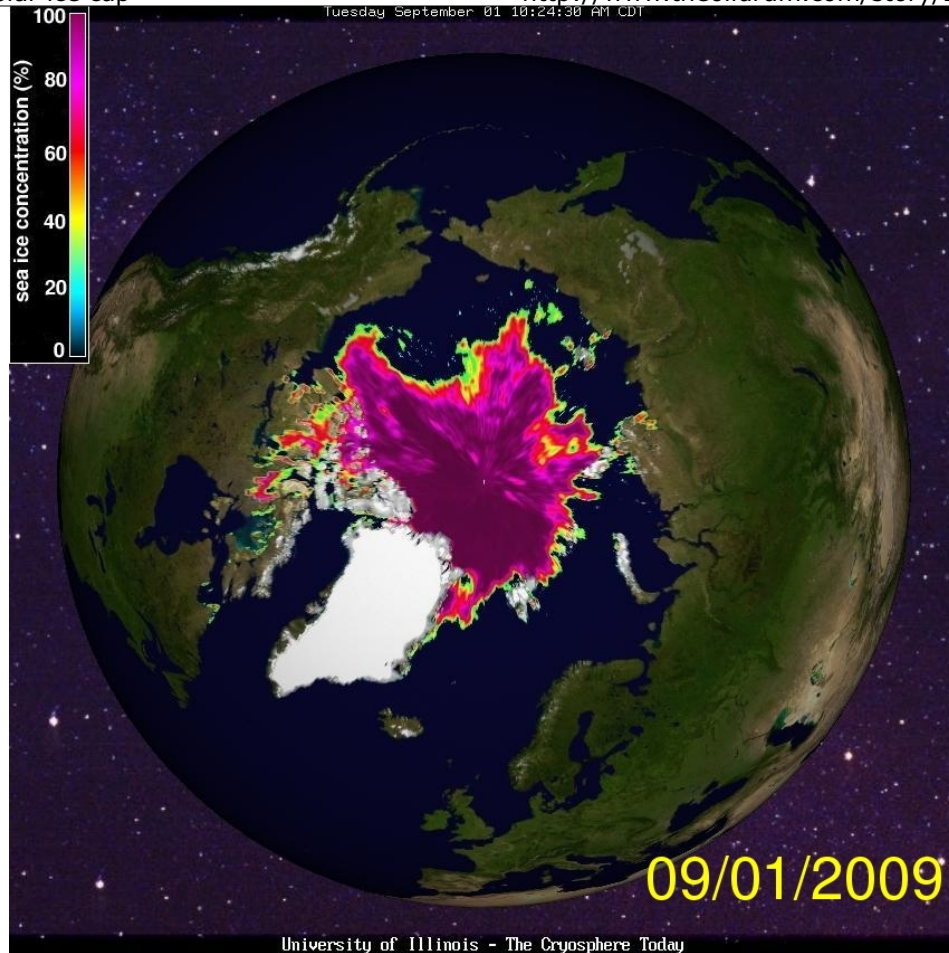
Sure enough that does look like a pretty big anomaly:



Barents sea ice extent for last 365 days, together with anomaly from mean. Source: [Cryosphere Today](#).

Perhaps there's hope after all for completing [Prirazlomnoye](#) sometime [this decade?](#)

Here's the situation across the Arctic right now:



Current Arctic sea ice conditions. Source: [Cryosphere Today](#).

Sure does seem like as the thin ribbons of sea ice down either side of Greenland retreat, it can't possibly help the stability of the glacier ends.



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