

# Sea Ice Index Baseline Period Change

## 1 WHAT HAS CHANGED AND WHAT HAS NOT CHANGED

Prior to June 2013, the base period used for the Sea Ice Index was a 22-year period of 1979 to 2000. Beginning in July 2013, Sea Ice Index products were changed to use a 30-year base period of 1981 to 2010.

Monthly and daily ice extent and area data values have not changed, but data and image products that are based on the mean or median have changed. For example, the trend plots may have a different scale, and the value of the slope, expressed as change in percent per decade, has changed, because this value is relative to the mean period.

Data that have changed:

- Position of the median line (pink) on the Monthly Extent Images
- Monthly Sea Ice Concentration Anomaly Images (The color bar has also been changed in this image to one that is higher contrast to more easily discern anomalies).
- Monthly Sea Ice Concentration Trend Images (The color bar has also been changed in this image to one that is higher contrast to more easily discern anomalies).
- The slope of the Monthly Extent Anomalies Graph
- The median line (orange) on the Daily Extent Images
- The average line on the Daily Time Series Graph
- The values in the Daily Climatology Data File

Data that have not changed:

- Sea ice extent values
- Sea ice concentration values
- Sea ice area values

### 1.1 Significance of this change

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Some of the information users get by looking at the Sea Ice Index is now different in degree and kind. The overall loss of sea ice in the Arctic looks somewhat less, as does the slight gain in sea ice in the Antarctic, now that each month's most recent extent is compared to the average over a base period that ends ten years later than did the earlier 1979-2000 base period (Figure 1). This is because the new baseline range includes a period that has seen dramatic reductions in ice extent in the Arctic and slight gains in ice extent in Antarctica. These changes have moved the averages, as shown in Table 1. Table 2 compares the sea ice extent trends between the 22-year and 30-year base periods.

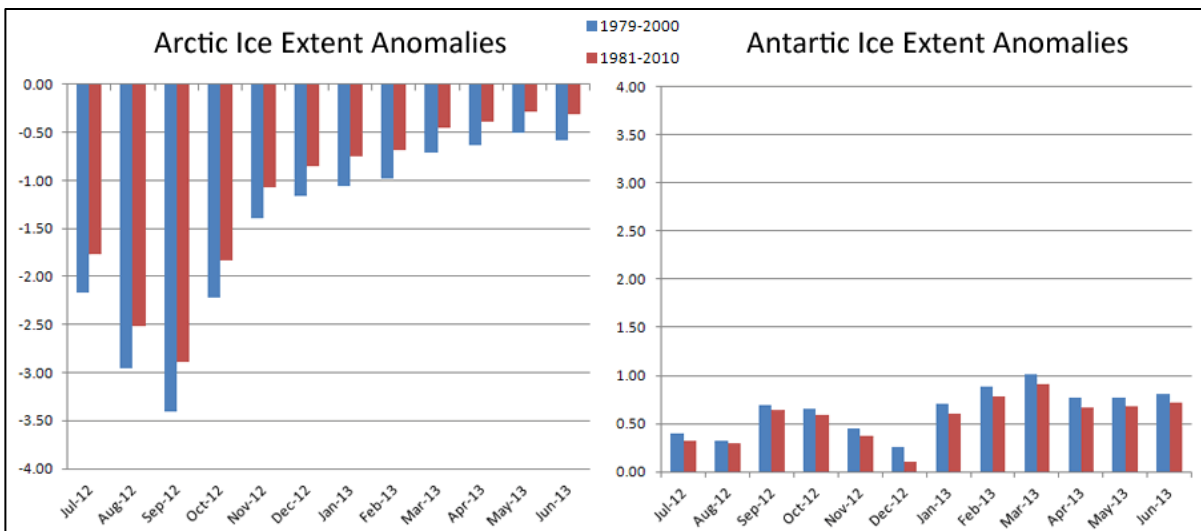


Figure 1. The most recent monthly extent values as of May 2013 minus the mean extent for new and old base periods (in millions of sq km), for Arctic (left) and Antarctic (right) oceans.

Table 1. The mean extent for new and old base periods and their difference, Arctic (left) and Antarctic (right).

Month	Arctic			Antarctic		
	Average Extent (millions of sq. km)					
	1979-2000 (22-year avg)	1981-2010 (30-year avg)	Difference (30yr - 22yr)	1979-2000 (22-year avg)	1981-2010 (30-year avg)	Difference (30yr - 22yr)
Jan	14.84	14.53	-0.31	5.06	5.16	0.10
Feb	15.64	15.35	-0.29	2.94	3.04	0.10
Mar	15.75	15.49	-0.26	4.31	4.41	0.10
Apr	15.00	14.75	-0.25	7.30	7.40	0.10
May	13.60	13.39	-0.21	10.70	10.79	0.09
Jun	12.16	11.89	-0.27	13.84	13.93	0.09
Jul	10.10	9.70	-0.40	16.37	16.44	0.07
Aug	7.67	7.22	-0.44	18.08	18.11	0.03
Sep	7.04	6.52	-0.52	18.73	18.79	0.05
Oct	9.29	8.91	-0.38	18.27	18.33	0.07
Nov	11.31	10.99	-0.32	16.24	16.30	0.07
Dec	13.36	13.06	-0.30	11.11	11.27	0.16

Table 2. Comparison of trends for the two base periods, Arctic (left) and Antarctic (right).

Note: The absolute trend does not change no matter which base period is used.

Month	Arctic			Antarctic		
	Absolute Trend (sq km/year)	%/decade (1979-2000)	%/decade (1981-2010)	Absolute Trend (sq km/year)	%/decade (1979-2000)	%/decade (1981-2010)
Jul 2012	-72000	-7.1	-7.4	14300	2.6	2.5
Aug 2012	-78000	-10.2	-10.8	11000	3.7	3.6
Sep 2012	-91400	-13.0	-14.0	16400	4.0	3.9
Oct 2012	-65300	-7.0	-7.3	16900	2.7	2.6
Nov 2012	-54600	-4.8	-5.0	10400	2.2	2.2
Dec 2012	-46800	-3.5	-3.6	19200	1.4	1.4
Jan 2013	-47600	-3.2	-3.3	13100	0.9	0.9
Feb 2013	-45500	-2.9	-3.0	11000	0.6	0.6
Mar 2013	-39600	-2.5	-2.6	17200	0.9	0.9
Apr 2013	-35200	-2.3	-2.4	19500	0.9	0.9
May 2013	-30500	-2.2	-2.3	24000	0.6	0.6
Jun 2013	-43400	-3.6	-3.7	19200	1.7	1.7

One significant feature is now lost from the median line representation of ice extent: the Odden, a tongue of ice off Greenland that would form quickly and persist for a few weeks in the winter (Figure 2). Associated with outbreaks of cold air temperatures along with the interplay of bathymetric features and ocean currents, the Odden has not formed frequently enough in the first decade of the 21st century to show up in the new monthly median extent line at all. You can see this time history by going to the Compare Anomalies link in the navigation above, then choosing February Northern Extent from the page that comes up, and finally choosing the maximum number of years (rows) in the dropdowns at top and upper left.

Formation of the Odden has been linked to the occurrence of convective chimneys that contribute to the deep-water formation that drives the oceanic heat "conveyer belt." Deep-water formation occurs in other areas as well; formation of the Odden is not thought to be the primary driver. The

recent absence of the Odden illustrates an important change in the sea ice system, however. In the coming months, we plan to provide more information about the loss of the distinctive Odden shape from the winter median extent line.

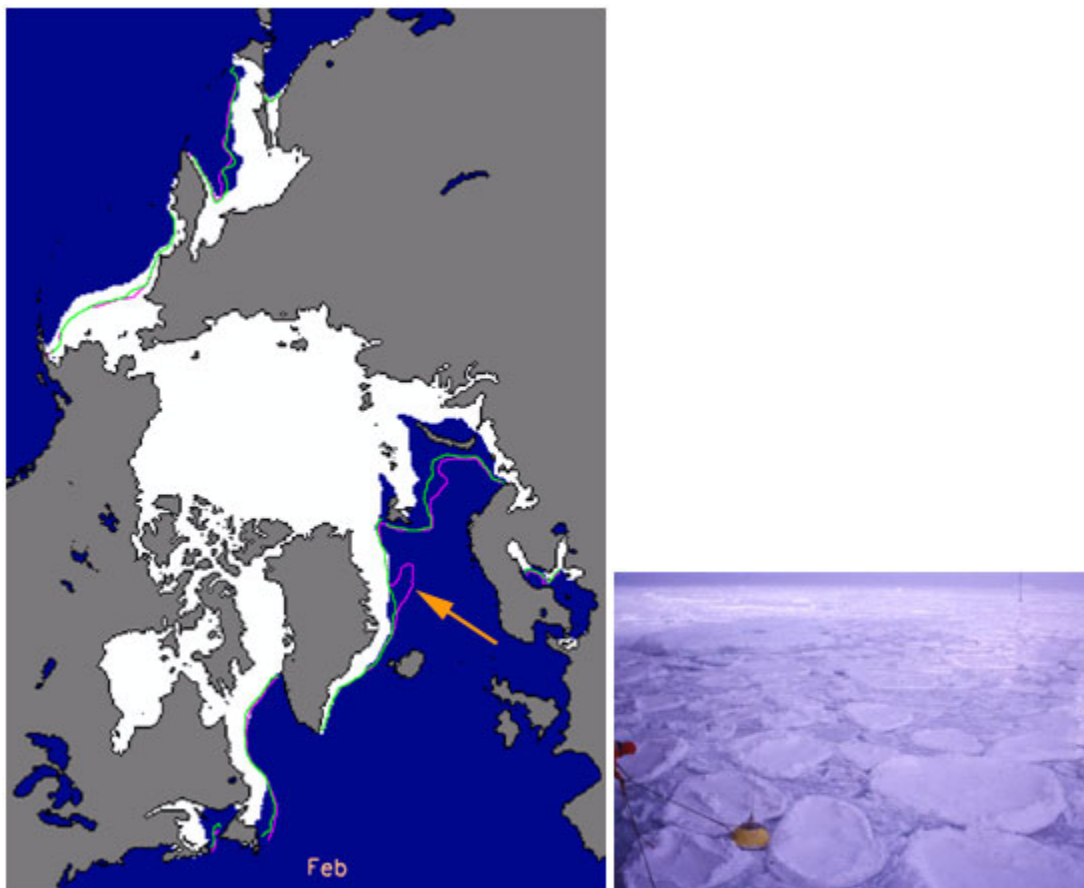


Figure 2. Left: February 2013 ice extent with the 1981-2010 median extent and 1979-2000 median extent lines overlain in green and pink respectively. The Odden feature in the 1979-2000 median is marked by the arrow. Right: Pancake ice within the Odden. Credit: Peter Wadhams

## 2 THE REASON FOR THE CHANGE TO A 30-YEAR CLIMATOLOGY

The base period has been changed for two reasons. A 30-year period is typically used for climatologies because it averages out short-term variability. Now that 30 years of satellite data exist, the Sea Ice Index can use the longer period and align with NOAA and World Meteorological Organization standards. Also, NSIDC's User Services Office has received many requests for a 30-year base period for this product.

NOAA@NSIDC makes this change with some concern, however. An average baseline period, or normal, is used as a convenient reference to compare trends and anomalies. If the baseline range includes periods of significant change, the resulting climatology does not necessarily represent

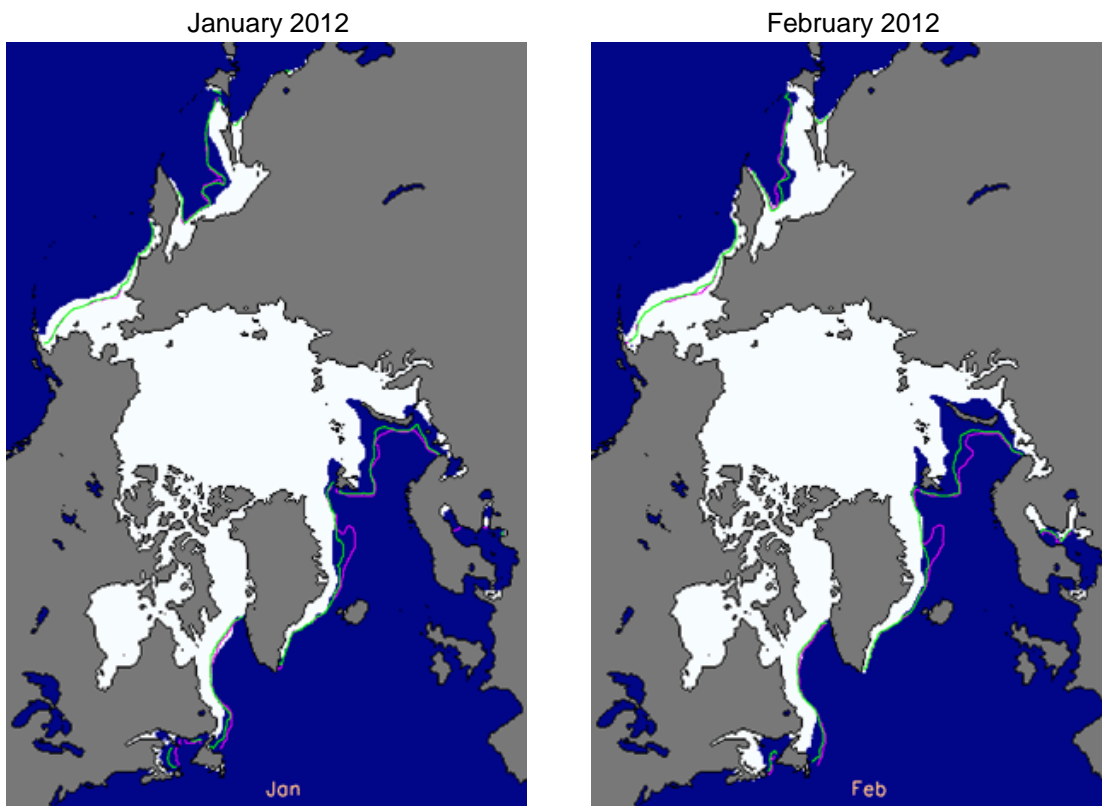
"normal" conditions for comparisons. In other words, ideally the baseline period should be relatively stable with small or no trend. This is not the case for sea ice in the Arctic, particularly since 2000.

When the NOAA National Climatic Data Center (NCDC) released its 1981-2010 climate normals on July 1, 2011, it provided a site, [NOAA's 1981-2010 Climate Normals](#), with quick answers to questions like "What are normals?" and "What do climate normals tell us about global warming or climate change?" While this web site is specifically for meteorological or weather normals, it does provide useful background that is relevant for the sea ice data.

### 3 DIFFERENCES IN 22-YEAR VERSUS 30-YEAR MONTHLY MEDIAN EXTENT LINES

These images show the difference between the 22-year monthly median extent line (pink in the images below) versus the new 30-year monthly median extent line (green in the images below) for all 12 months for the Arctic and Antarctic. The monthly extent images for 2012 were used as the base layer to show the two median lines.

#### Arctic Images



March 2012



April 2012



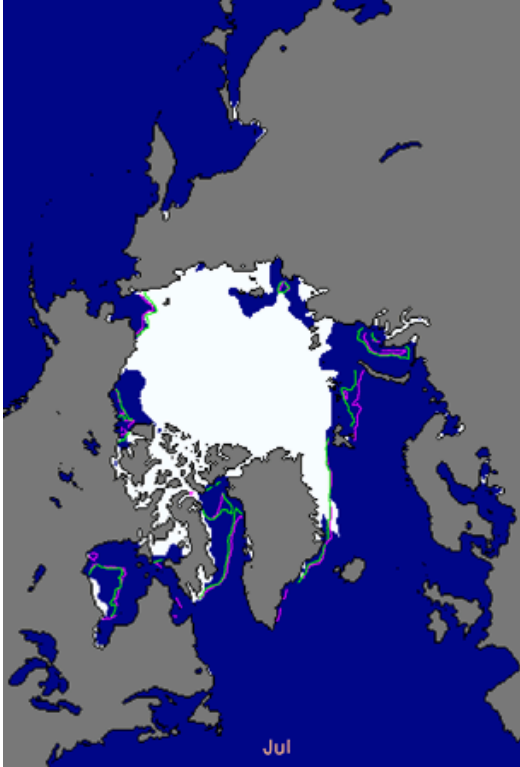
May 2012



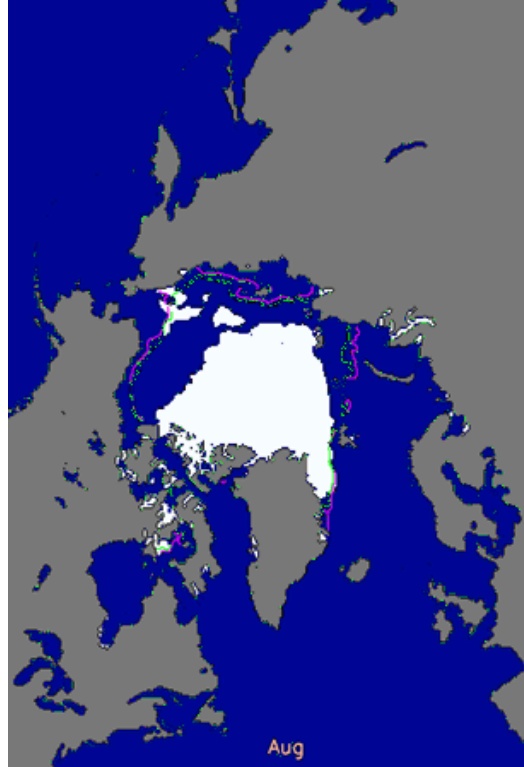
June 2012



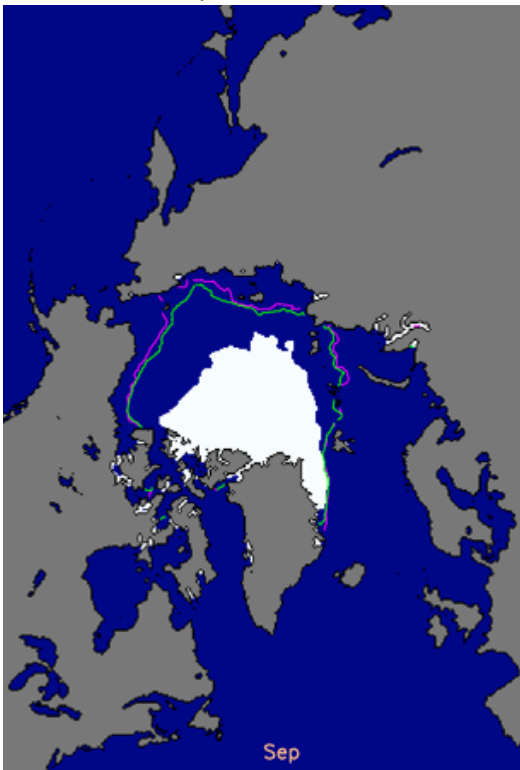
July 2012



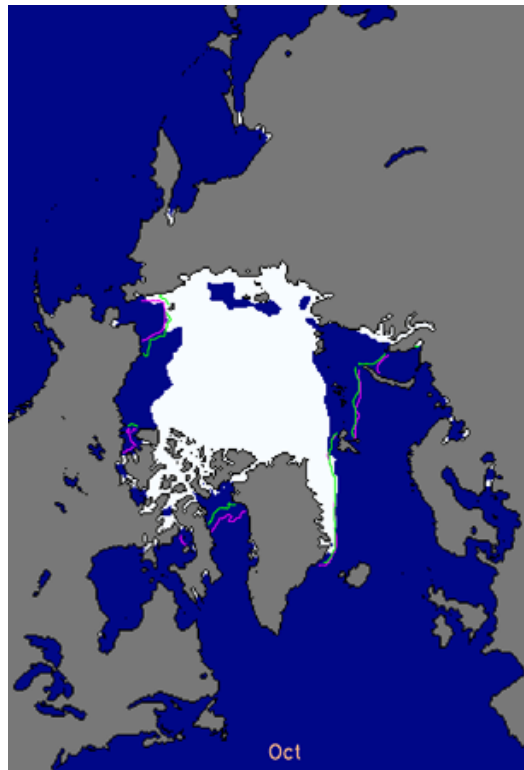
August 2012



September 2012



October 2012





November 2012

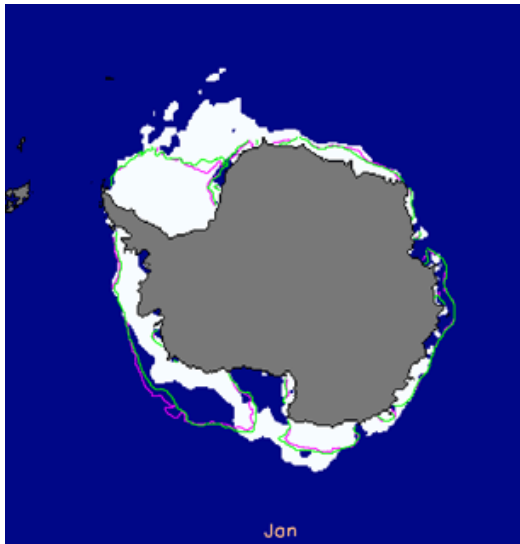


December 2012

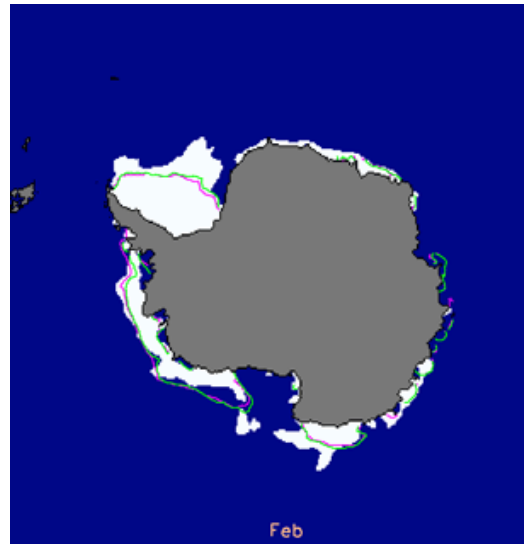


Antarctic Images

January 2012



February 2012

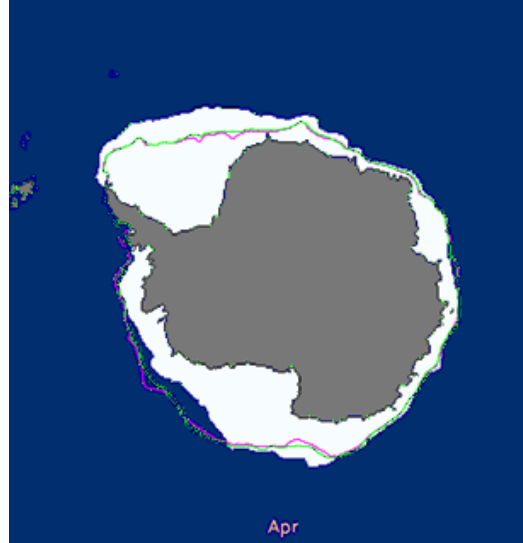




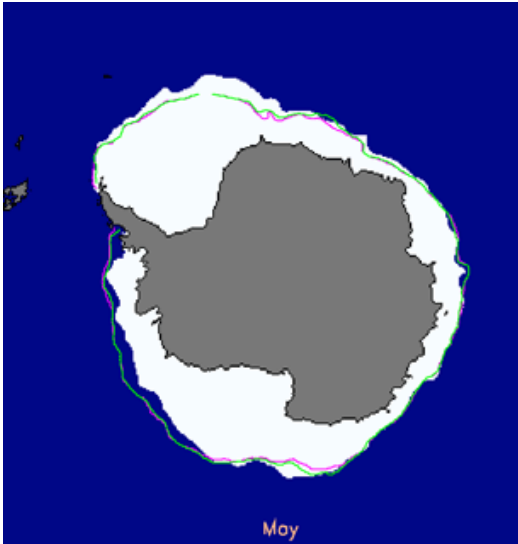
March 2012



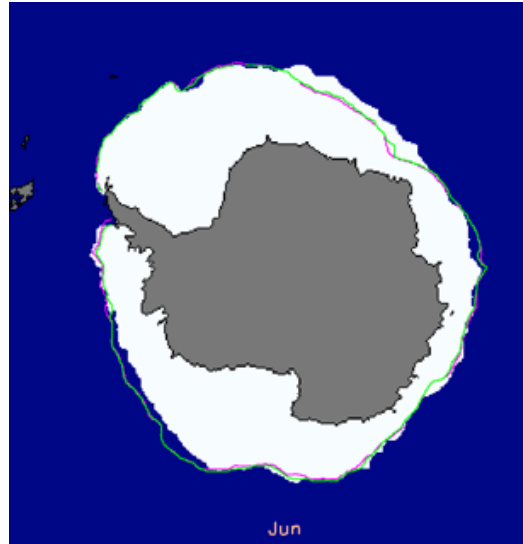
April 2012



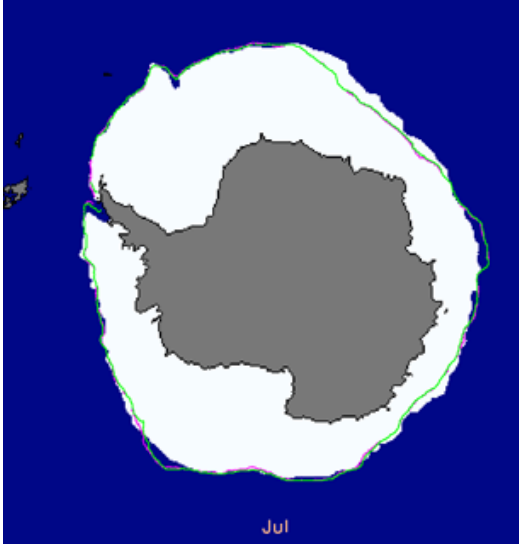
May 2012



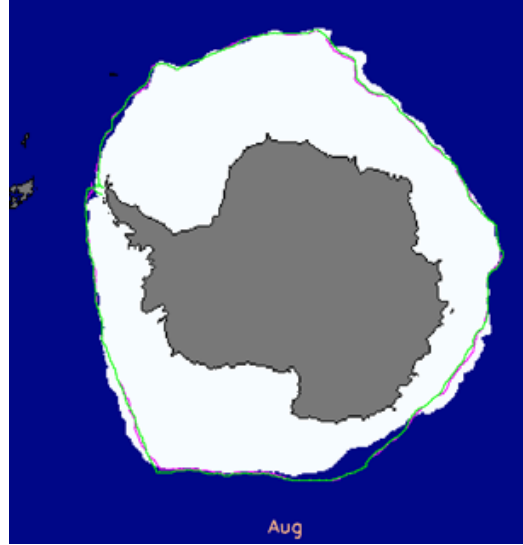
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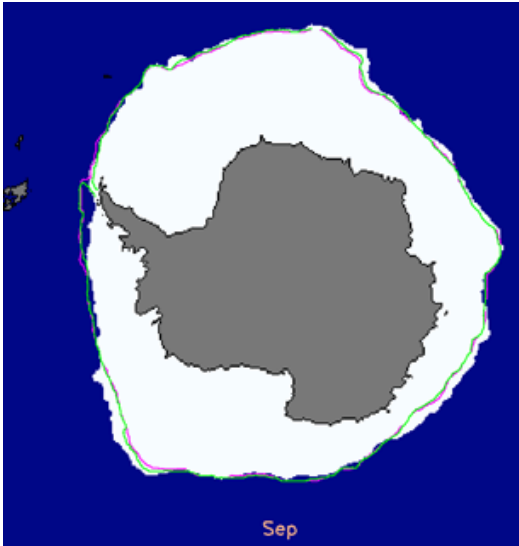
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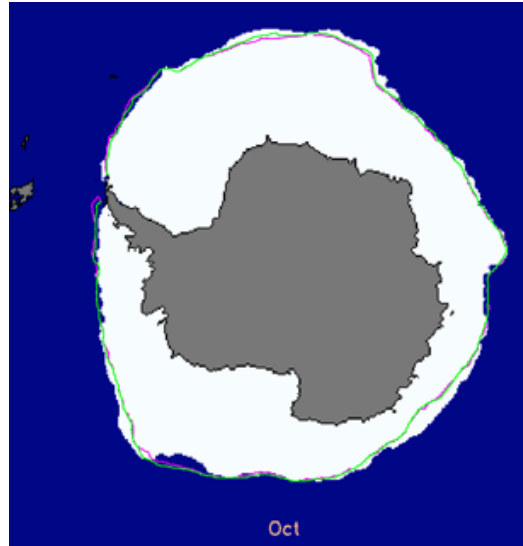
August 2012



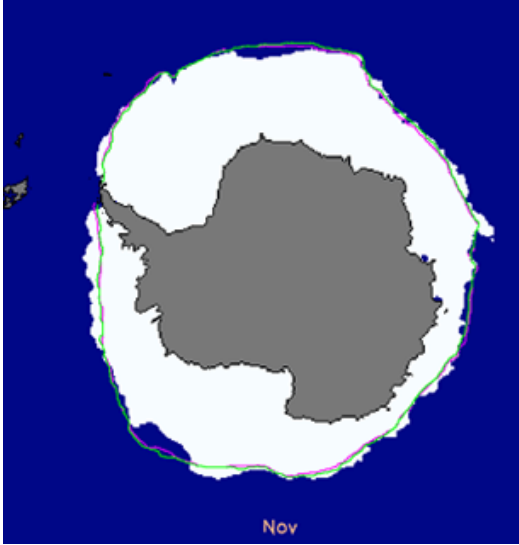
September 2012



October 2012



November 2012



December 2012

