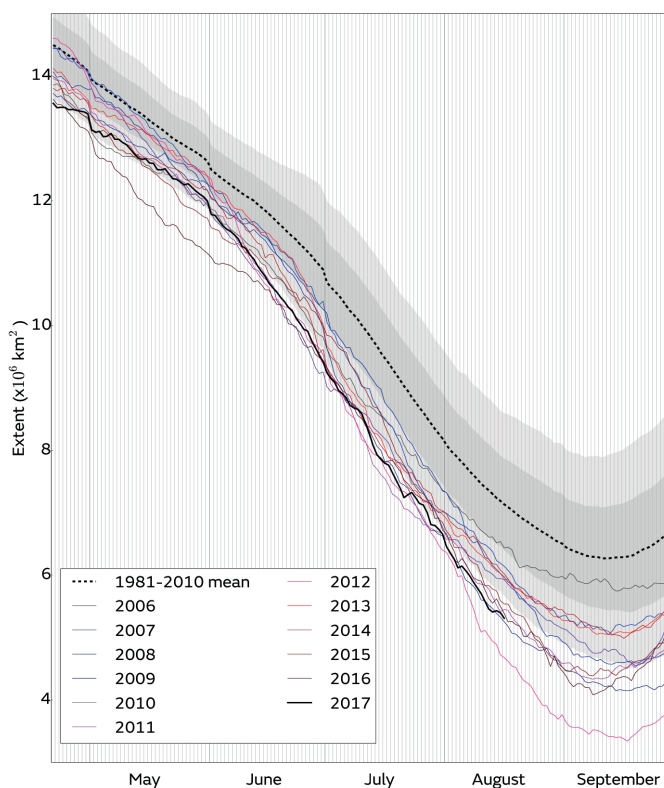


Arctic Sea Ice

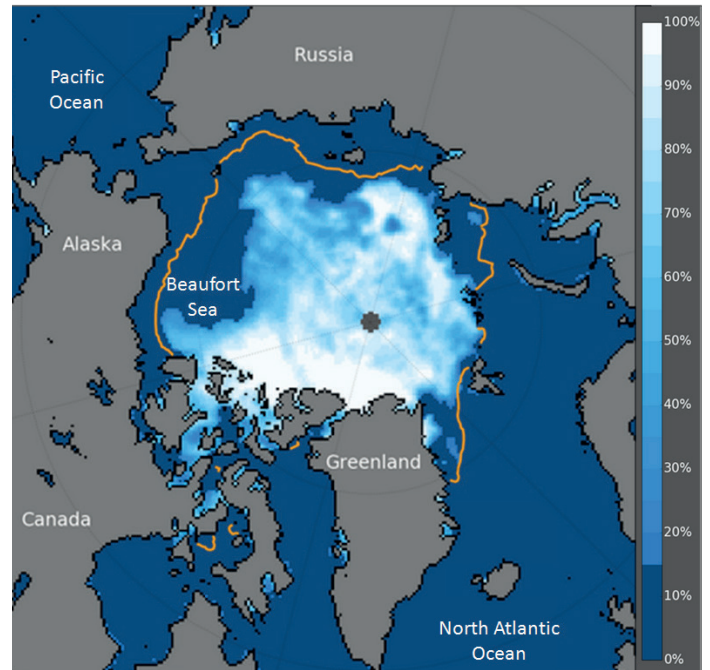
Current Arctic sea ice extent

Arctic sea ice extent on 16th August 2017 was 5.31 million square km (Figure 1) – the joint second lowest on record for this date, according to data from the National Snow and Ice Data Center (NSIDC).



▲ **Figure 1:** Daily Arctic sea ice extent for 2017, compared with recent years and the 1981-2010 average with +/- 1 and 2 standard deviation intervals indicated by the shaded areas. Data are from the National Snow and Ice Data Center (NSIDC).

Extent is 1.82 million square km below the 1981-2010 average for this date and 0.69 million square km above the record low for the time of year, which occurred in 2012. Extent is particularly low throughout the marginal seas on the Pacific side of the Arctic, and exceptionally low in the Beaufort Sea north of Alaska (Figure 2).

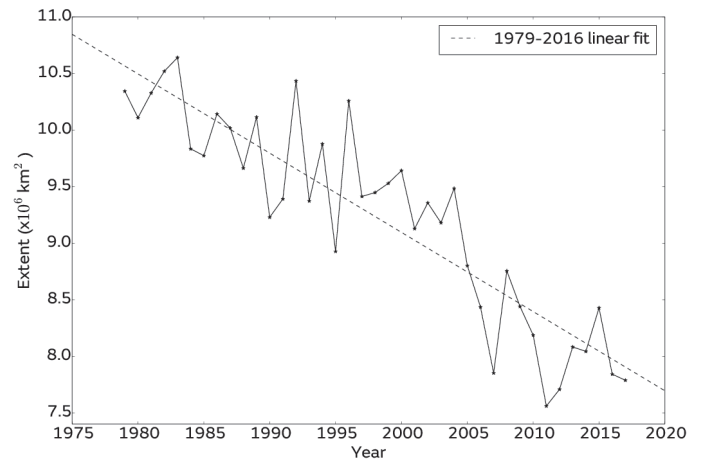


▲ **Figure 2:** Sea ice concentration on 16th August 2017, with 1981-2010 extent for this date indicated in orange. Underlying map and data courtesy of NSIDC.

Atmospheric conditions during July and early August do not appear to have been especially conducive to sea ice loss; air temperatures have not, in general, been unusually high for the time of year. One notable exception is the Beaufort Sea, where temperatures have been up to 2 degrees higher than normal since the start of July, explaining to some degree the particularly low ice extent here. The present low sea ice extents are more likely to result from preconditioning; the previous winter was very mild in the Arctic, and ice thickness at the end of winter was likely to have been correspondingly low. Measurements from the CryoSat-2 sensor during March showed large areas of ice thinner than 2m, a level below which ice is thought to be particularly vulnerable to melting out during summer (Keen et al, 2013).

July 2017 in context

The average July Arctic sea ice extent was 7.79 million square km according to the HadISST1.2 dataset (Rayner et al, 2003). This is 1.68 million square km below the 1981-2010 average, and is quite close to the 1979-2016 linear trend. It was the 3rd lowest July extent on record (Figure 3). The average rate of ice loss for July was 89,000 square km per day, slightly higher than the 1981-2010 average of 86,000 square km per day.



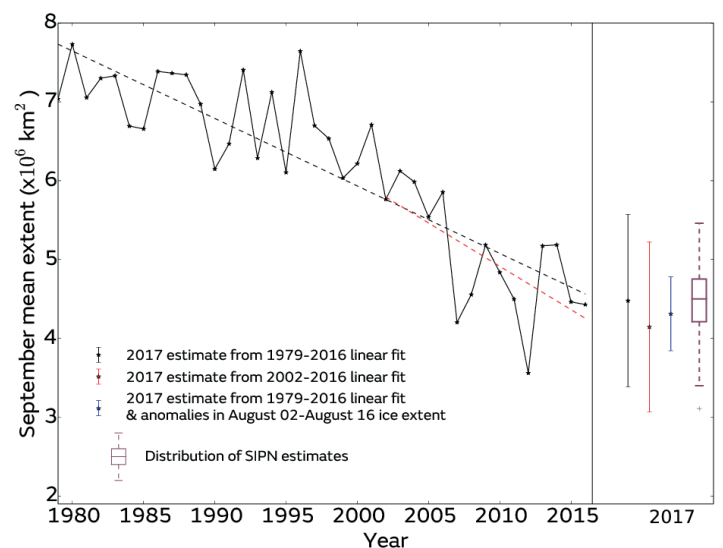
▲ **Figure 3:** Average July Arctic sea ice extent according to the Hadley Centre Sea Ice and Sea Surface Temperature (HadISST) 1.2 dataset (Rayner et al, 2003)

Outlook for September 2017

A number of projections of this year's seasonal minimum (September) ice extent are displayed in Figure 4, and described below:

- The Sea Ice Prediction Network (SIPN) July Outlook includes 36 predictions of mean September ice extent based on a variety of methods and from centres around the world. The predictions range from 3.11 to 5.46 million square km, with a median estimate of 4.5 million sq km; only two predictions are suggestive of a new record low. The median, inter-quartile range and max/min projections are shown on the right-hand-side of Figure 4.
- Statistical predictions based on an extrapolation of the linear trend for the entire satellite period from 1979-2016 (black), and most recent 15 years (red) suggest a mean September sea ice extent of 4.48 (± 1.09) and 4.14 (± 1.07) million square km respectively.
- There is a good correlation between mean September ice extent and the extent for 2nd – 16th August (the most recent 15 days of data available at the time of writing). Applying simple statistical methods to figures for these dates gives a September mean extent prediction of 4.31 (± 0.47) million square km, indicated in blue on Figure 4.

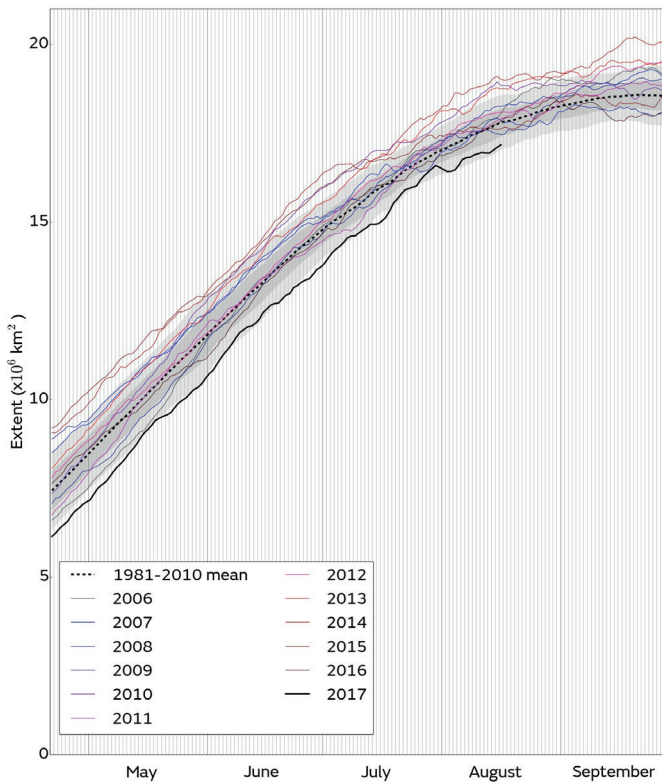
At this point in the season it is quite unlikely that September sea ice extent will fall below the record low minimum extent of 3.6 million square km set in 2012, as such an event would require ice loss well beyond record rates for the remainder of the season.



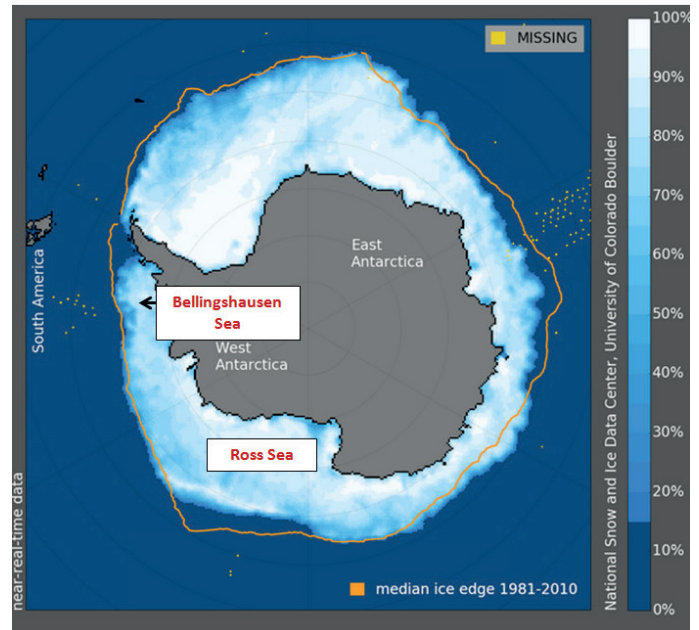
▲ **Figure 4:** September median Arctic sea ice extent since satellite records began in 1979 from the HadISST1.2 dataset (Rayner et al., 2003). September 2016 predictions from the SIPN Sea Ice Outlook predictions and statistical estimates are included. For the statistical estimates, error bars represent twice the standard deviation of September mean ice extent about the trend lines with respect to which the estimates are taken. The Sea Ice Outlook is shown as a boxplot indicating range, median and quartiles of the 33 estimates submitted.

Current Antarctic sea ice extent

Antarctic sea ice extent on 16th August was 17.17 million square km (Figure 5), according to data from NSIDC. Extent was 0.63 million square km below the 1981-2010 average for this date. It was 4th lowest on record for the time of year and the lowest since 2002. Extent remained well below average in the Bellingshausen and Ross Seas.



▲ **Figure 5:** Daily Antarctic sea ice extent for 2017, compared with recent years and the 1981-2010 average with +/- 1 and 2 standard deviation intervals indicated by the shaded areas. Data are from the National Snow and Ice Data Center (NSIDC).



▲ **Figure 6:** Sea ice concentration on 16th August 2017, with 1981-2010 extent for this date indicated in orange. Underlying map and data courtesy of NSIDC.

References

Keen, A. B., Hewitt, H. T., Ridley, J. K. (2013) A case study of a modelled episode of low Arctic sea ice. *Climate Dynamics*, Volume 41, Issue 5, pp 1229–1244. doi: 10.1007/s00382-013-1679-y

Rayner, N. A.; Parker, D. E.; Horton, E. B.; Folland, C. K.; Alexander, L. V.; Rowell, D. P.; Kent, E. C.; Kaplan, A. (2003) Global analyses of sea surface temperature, sea ice, and night marine air temperature since the late nineteenth century *J. Geophys. Res.* Vol. 108, No. D14, 4407 10.1029/2002JD002670