Prime Meridian

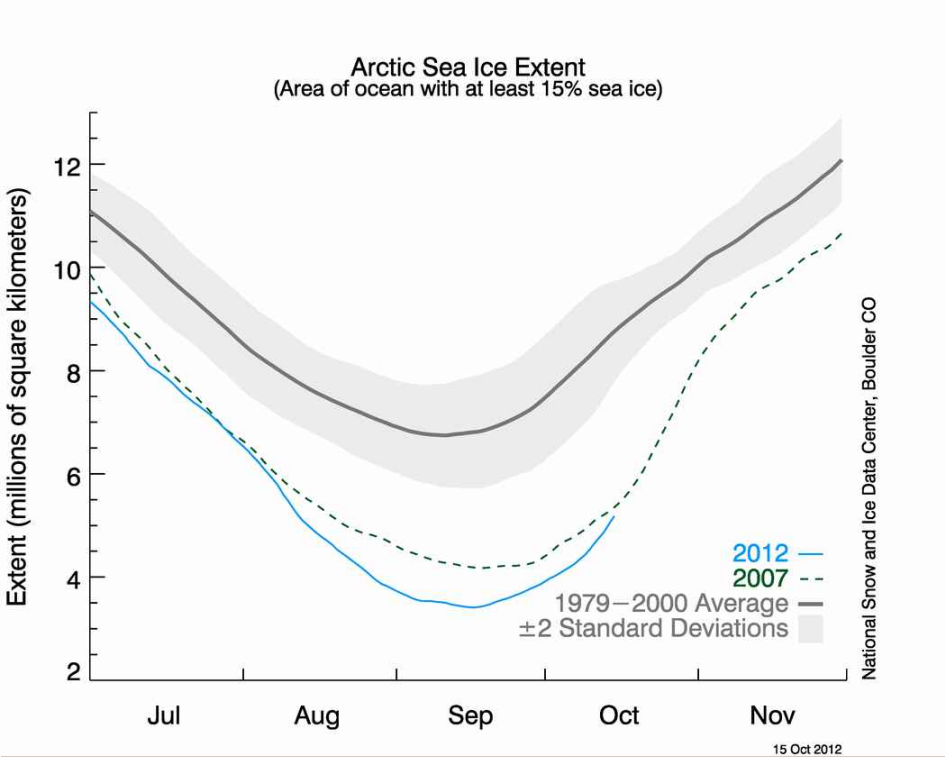
(6) October 17, 2012

Above: A view of the Arctic's floating ice cap from a webcam set up by the University of Washington on behalf of the USA's National Oceanic and Atmospheric Administration. September 21, 2012.

September 2012 – Arctic sea ice halved.

Events in the Arctic this past summer claim the attention of every thinking person who is concerned about the future. The Arctic has always been understood to be a sensitive indicator of climate change and the average sea ice cover for September 2012 was 49% lower than the 1979 to 2000 September mean. Environmentalists have criticised politicians for allowing this moment to pass without stressing its significance. Readers are asked to keep up pressure for climate-awareness on politicians of all parties and to insist on adequate funding for programmes of research essential to the monitoring and prediction of climate change and its implications for communities around the world.

We are now half way through October. At the autumn equinox (September 22, 2012), the half-year of polar day ended as the Sun, descending since mid-summer, finally reached the horizon. From the North Pole, one would see a long twilight usher in the half year of polar night. For several weeks, a bright smudge in the sky would betray the presence of the unseen Sun. It would circle the horizon once a day, as the Earth spins on its axis. This year, the brilliant planet Venus is hanging in the fading twilight gleam, and it will follow the Sun below the polar horizon as the month of November begins.



Sea ice began to reform before the Sun had set. As the Sun sank lower in the sky and temperatures fell, the Arctic Sea could begin to freeze over once again after a summer of record ice loss. On September 16, the remarkable decline of Arctic sea ice ended. At its minimum, ice extent had shrunken to a mere 3.41 million km^2.

The chart left (from the USA's National Snow and Ice Data Center) compares melting and re-growth of Arctic sea ice during 2012 with 2007 and with the 1979-2000 average.

An ice-free Arctic in just four years?

During the period 1979 to 2012, the years from 2007 to 2012 have ranked as the six years of smallest sea ice extent. The weather this year was actually less favourable to ice loss than in the previous record ice loss year of 2007, although, in early August, a strong storm (right: NASA image) formed near the coast of Alaska and migrated into the central Arctic, helping the break up of sea ice.

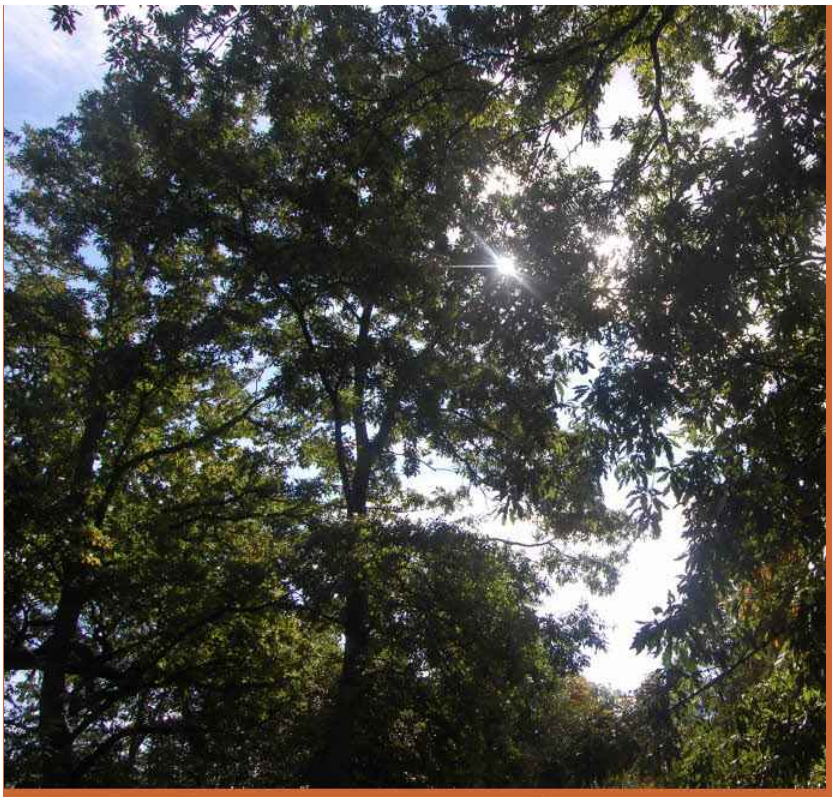
Because an ice-free ocean will absorb much more incoming solar radiation than a highly reflective ice surface, there have been concerns that if the area of ice shrank to a critical tipping point, the Arctic Ocean will suddenly jump to a new and irreversible state in which it would be ice-free (technically meaning ice extent below 1 million km^2) in the summer. It would now be absorbing so much heat in summer that the thin ice which formed during winter months would readily melt each year with the arrival of warmer weather. This is not certain, and no tipping point was seen in recent climate simulations by Dr. Steffan Tietsche (now at the University of Reading) and co-workers. However, Arctic climate may arrive at ice-free summers without any tipping point as such, and perhaps, much sooner than expected. Richard Kerr, who writes on topical science issues for the leading USA journal *Science*, discussed how climate models had been predicting that the Arctic would experience ice-free summers by 2100, yet now researchers are suggesting that this could occur within just three decades. Dr. Julienne Stroeve of NSDIC estimated that Arctic summers could be ice-free by 2030 to 2040, whilst Dr. Wieslaw Maslowski of the Naval Postgraduate School in Monterey, California, thought that because the ice has thinned so rapidly, it will now be much more vulnerable to summer melting and we might see an ice-free Arctic as soon as 2016. Time will tell.

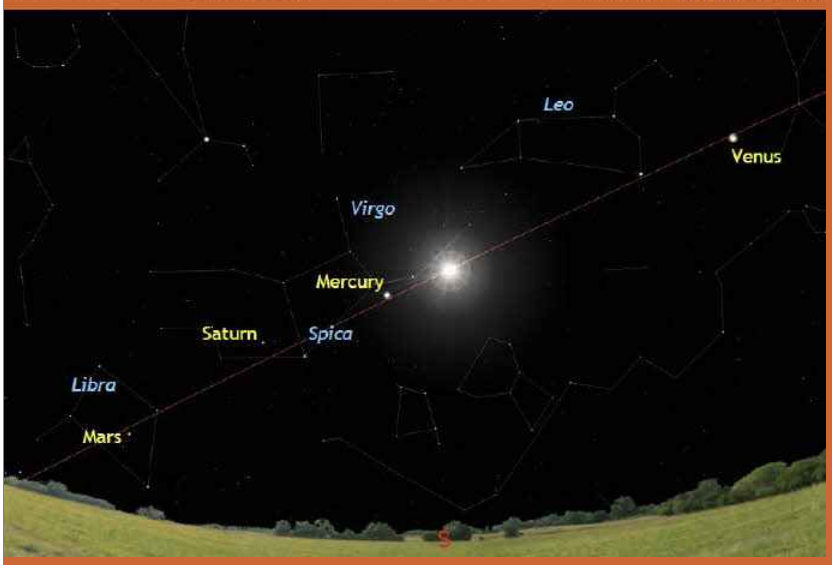
Kerr's article made a telling point (p. 1,591): "*Last week's record-shattering shrinkage of summertime sea ice was yet another reminder that scientists do not understand how global warming is driving the Arctic toward inevitable ice-free summers.*" One of the key tasks of the *Prime Meridian* newsletter will be to emphasise the fundamental duty of governments to support research into how the Earth (not least its climate) works, because the well-being of human communities is tied inextricably to our ability to understand the planet on which we live.

Kerr, R. A. (2012). Ice-Free Arctic Sea May Be Years, Not Decades, Away. *Science* **337**: 1,591.

Tietsche, S., Notz, D., Jungclaus, J. H. & Marotzke. 2011. Recovery mechanisms of Arctic summer sea ice. *J. Geophys. Res. Lett*. 38, L02707.

Left: Sept. 15. As the Arctic sea ice shrank to its smallest extent, SE England was seeing the final days of summer. This view looks through a gap in a hedgerow, across the woods and fields near Ash in Kent. Weather at home has posed its own problems. The very wet summer of 2012 has not been good news for farmers. Britain has been a net exporter of wheat each season since 2001/02, but 2012 saw a 23-year low with this years crop down 12.8 % from the last season, so Britain is set to become a net importer in 2012/13 (Report by Reuters).





Autumn Equinox.

Upper left: London enjoyed a warm and sunny day for the equinox, the farewell to summer. The Sun shone down through a tree canopy that was still green and, as yet, largely untouched by autumn's colours.

Lower left: On September 22, the Sun lay against the stars of Virgo, which were unseen through the day-time sky, as were the four planets Mars, Saturn, Mercury and Venus. Re-labelled *Stellarium* image.

Churches prepared for their traditional Harvest Festival service, and at All Saints, in West Dulwich, London, good weather, encouraged locals to turn out for its Autumn Community Fair (below). This was one of those events with the pleasant atmosphere of a village gathering, and a reminder of how the huge conurbation of London grew to its present size by swallowing up numerous villages. Many, like Dulwich, lay well beyond the original boundaries of the city.

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Images (unless otherwise stated): M. J. Heath.