

# Prime Meridian

(29) August 20, 2014

A newsletter following global environmental issues alongside the cycle of the seasons in Southern England

Above: A view across fields in north east Kent from the margin of Beacon Wood. July 29, 2014.

**Arctic sea ice is presently shrinking towards its minimum extent, but this summer's remnant may not be the smallest on record.**

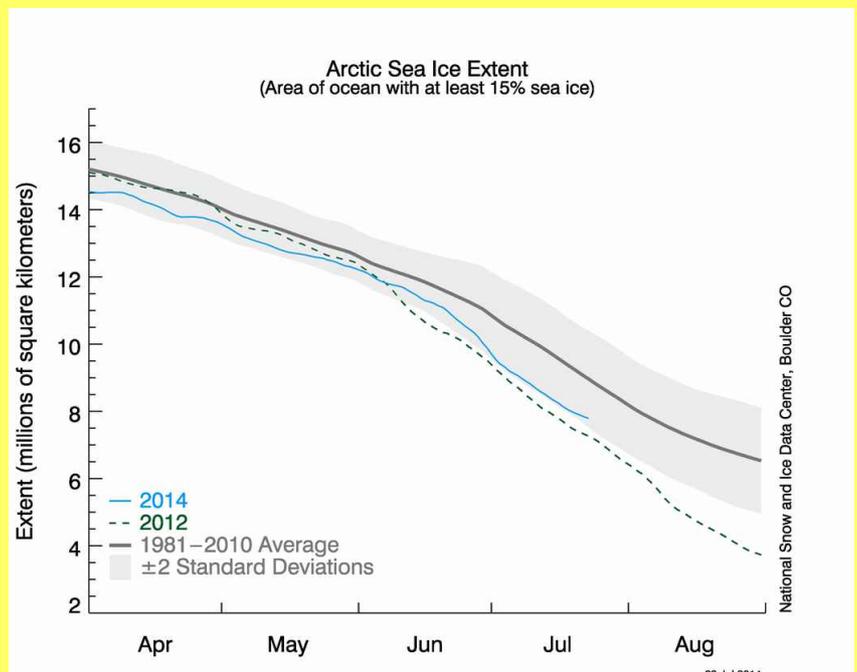
**The extent of Arctic sea ice is presently lower than normal, but it is not as low as in 2012, which saw the most severe melting for the period covered by satellites.**

As Britain swelters under heat wave conditions, the Arctic's cap of floating sea ice continues its seasonal melting. Researchers continue to debate how, if sea ice began to regularly disappear in summer, thanks to a warming world, climate might be changed.

According to data released by the USA's National Snow and Ice Data Center, by early June, the extent of the ice, previously smaller than that for 2012, ceased to shrink so dramatically. Even so, melting in the second half of June was the second fastest in the satellite record and during the first half of July, the sea ice exhibited 121% (104,000 km<sup>2</sup> per day) its normal rate of retreat, with ice loss concentrated in Laptev, Kara and Beaufort Seas.

However, "Ice cover remains fairly extensive in the Beaufort and Kara seas compared to recent summers" and on July 15, the extent of the ice (the area over which it covers at least 15% of the sea surface) remained 440,000 km<sup>2</sup> greater than that in 2012.

Source: *Arctic Sea Ice News and Analysis*. July 17, 2014. National Snow and Ice Data Center.





On May 23, NASA concluded its 2014 Operation IceBridge campaign of aerial surveillance of Arctic ice.

According to a NASA information release: "In late August, a new airborne mission known as the Arctic Radiation - IceBridge Sea and Ice Experiment, or ARISE, will begin. ARISE will use a large suite of instruments to collect data on the atmosphere and on Arctic sea ice. In October, IceBridge will return to Punta Arenas, Chile, to survey Antarctic ice, and next March the mission will return to Greenland, this time aboard NASA's C-130 aircraft."

Above: The calving front of the Humboldt Glacier. IceBridge survey flight. May 1, 2014. Credit: NASA / Jim Yungel

## NASA's Operation IceBridge has contributed to a new and thought-provoking picture of what lies beneath Greenland's ice sheets.

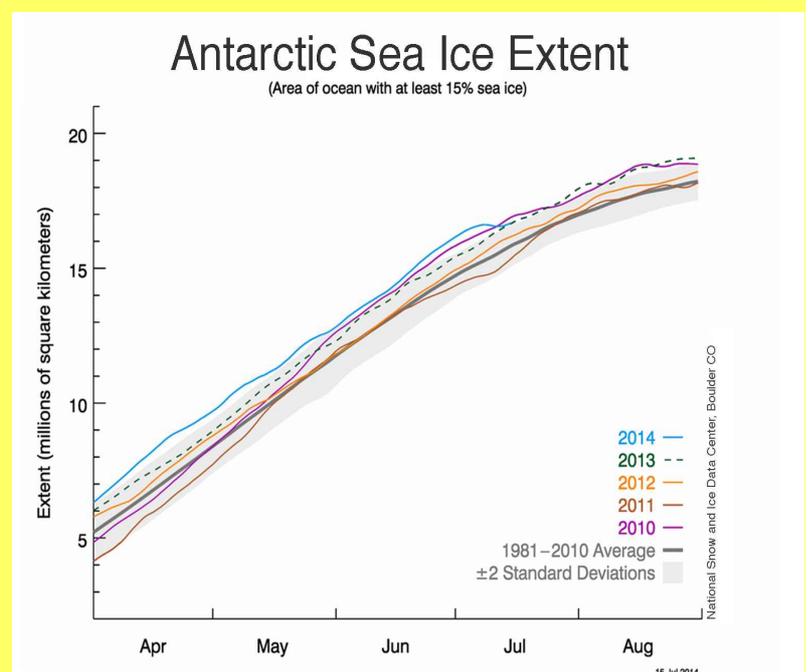
A collaboration between NASA and scientists at the University of California, Irvine, NASA has revealed previously elusive details of the rock surface beneath the edges of Greenland's ice sheet. the sub-surface topography. A May 19 NASA press release reported that: "*canyons under Greenland's ocean-feeding glaciers are deeper and longer than previously thought, increasing the amount of Greenland's estimated contribution to future sea level rise.*"

Using airborne radar; satellite radar interferometry data on the speed and direction of ice movement and estimates of snowfall and surface melt to the sea, their study revealed over 100 canyons under glaciers that flow into the sea. Many of these canyons remain below sea level 100 km inland. This implies that Greenland will be making a much more substantial contribution to future sea level than estimated in previous models in which the acceleration of ice loss from Greenland, seen during recent decades, would cease once the glaciers melted back onto the land. Their conclusions, welcoming an "*unprecedented level of spatial detail and precision*" were published in *Nature Geoscience*.

Mortlighem, M. *et al.* (2014). *Nature Geoscience* 7: 418-422.

## The Antarctic's sea ice cover is continuing to expand.

The extent of the floating sea ice around Antarctica has been expanding compared to the long-term average (1981-2010). The July 17, 2014 NSDIC report discussed how: "*Antarctica has experienced many of the same general signals of Earth's changing climate as in the Arctic, including general warming, ice sheet loss and faster-flowing glaciers. This makes the small, long-term upward trend in Antarctic sea ice extent rather puzzling. The record sea ice maxima over the past two years (relative to the modern satellite era) have added to the puzzle.*"



The NSIDC reported that the extent of Antarctic Sea ice was 16.16 million km<sup>2</sup> on July 1, 2014, which was 1.37 million km<sup>2</sup> higher than the 1981 to 2010 average and 0.76 million km<sup>2</sup> higher than on July 1, 2013. We may be looking at a record ice extent this year. Explanations have focussed on wind directions and sea temperature.

[The report cited a recent paper which our readers might like to chase up: Reid, P., S. Stammerjohn, R. Massom, T. Scambos, and J. Leiser. 2014 in press. The record 2013 Southern Hemisphere sea-ice extent maximum. *Annals of Glaciology*, in press, 64(69).]

## “Unstoppable” melting of Antarctic glaciers.

Expansion of sea ice is sometimes cited by counter-advocates of global warming to imply that ice cover is growing over a cooling Antarctic continent. It is important to distinguish between the fates of sea ice and the Antarctic ice sheets. In May this year there was a great deal of media coverage for a NASA press release which publicised the findings of a new study led by Eric Rignot of the University of California at Irvine.

The abstract of the paper, published in *Geophysical Research Letters* explained: “*We measure the grounding line retreat of glaciers draining the Amundsen Sea Embayment of West Antarctica using Earth Remote Sensing (ERS-1/2) satellite radar interferometry from 1992 to 2011. Pine Island Glacier retreated 31km at its center, with most retreat in 2005-2009 when the glacier un-grounded from its ice plain. Thwaites Glacier retreated 14km along its fast-flow core and 1 to 9km along the sides. Haynes Glacier retreated 10km along its flanks. Smith/Kohler glaciers retreated the most, 35km along its ice plain, and its ice shelf pinning points are vanishing. These rapid retreats proceed along regions of retrograde bed elevation mapped at a high spatial resolution using a mass conservation technique (MC) that removes residual ambiguities from prior mappings. Upstream of the 2011 grounding line positions, we find no major bed obstacle that would prevent the glaciers from further retreat and draw down the entire basin.*”

Rignot explained the implications for the NASA press release: “*The collapse of this sector of West Antarctica appears to be unstoppable,*” he said. “*The fact that the retreat is happening simultaneously over a large sector suggests it was triggered by a common cause, such as an increase in the amount of ocean heat beneath the floating sections of the glaciers. At this point, the end of this sector appears to be inevitable.*” Also “*This sector will be a major contributor to sea level rise in the decades and centuries to come,*” Rignot said. “*A conservative estimate is it could take several centuries for all of the ice to flow into the sea.*”

Rignot, E. et al. (2014). *Geophysics Research Letters* Article first published online: 27 MAY 2014. DOI: 10.1002/2014GL060140.



## The Summer Solstice June 21, 2014.

Left: The Sun peaked out from a cover of broken cumulus clouds over West Kingsdown, Kent, on the afternoon of June 21.

The re-labelled *Stellarium* image shows the location of the Sun and its planets at noon, as they would have been without the Earth's atmosphere obstructing our view.

## Seasons in South East England June, 2014



Above: Looking across a field of ripening wheat towards St Peter's and St Paul's Church, Ash, Kent. June 21, 2014.



June was not a record-breaker in the UK, but with a mean temperature of 14.2°C (1.2°C above the 1981-2010 average) June 2014 was, even so, the 9<sup>th</sup> warmest in a record extending back to 1910. The UK received just 76% of its normal June rainfall and 109% of sunshine.

According to the Met Office: *"The month opened with a few showery days, albeit quite warm with the exception of one generally cooler and wet day on the 4th; the showers often became heavier and more widespread around the 7th to the 10th."* June 9 saw episodes of rain in the south and a temperature that reached 26.5°C at Writtle in Essex.



Generally dry conditions prevailed from June 11 to 13, with isolated showers in areas including the SE through to June 22. Lightning strikes were responsible for delays at Gatwick Airport (West Sussex) and power failures to hundreds of homes in the Thames Valley on June 13 and 14. The SE missed out on the UK's highest temperature of 27.0°C, recorded at Cupar in Fife (Scotland) on June 18. The Met Office reported that *"The 23rd started dry and bright, but isolated thunderstorms and showers developed in the afternoon, mainly in south-eastern areas. A band of heavy showers developed in the afternoon of the 24th in a line from Merseyside to Norfolk - with some flash-flooding in Skegness - but many areas were warm and sunny; temperatures reached 25.9°C at Solent (Hampshire)."* On June 26, the UK's lowest temperature (0.9°C) was recorded at Altnaharra in Sutherland. Thunderstorms occurred in East Anglia on June 27 and 28, with showers mostly restricted to the SE and E coastal areas on June 29. On June 30, despite being sunnier, saw *"scattered heavy showers developed around the Thames Valley and Home Counties with Wisley (Surrey) recording 25 mm in only 2 hours."*



SE and central S England, mean max. temp.: 20.8°C (1.2°C); mean min. temp.: 10.6°C (0.6°C). Hours of sunshine: 248.4 (123%). Rain: 35.3 mm (69%). Anomalies re. 1981-2010 norm in brackets. Source: online Met Office data.

Top left: Corky-fruited water dropwort (*Oenanthe pimpinelloides*), planted in Sydenham Hill area, South London by London Borough of Southwark (June, 2014). Field scabious (*Knautia arvensis*), roof garden, Queen Elizabeth Hall, South Bank complex, London (June 18). Borage (*Borago officinalis*), roof garden, Queen Elizabeth Hall (June 18).



Above: June 18, 2014. A field of poppies planted in Geraldine Mary Harmsworth Park, beside the Imperial War Museum, London, to commemorate lives lost in the First World War. Britain declared war on Germany on August 4, 1914, a century ago, this year.



Left: Weather over Britain, on the day of the summer solstice, June 21, 2014. The image was obtained from the NOAA-15 satellite at 16:07 GMT. Courtesy Geoff Hamilton.

Below left: A pyramidal orchid (*Anacamptis pyramidalis*) flowering on a field margin, West Kingsdown. In England, this species is found mostly in the South and East. Below right: Hedge woundwort (*Stachys sylvatica*), along a hedgerow, near Ask, Kent.





Above left: Feverfew (*Tanacetum parthenium*) and corn cockle (*Agrostemma githago*) bloom on the roof garden, South Bank, London. June 18, 2014. Above right: Ecology consultant Andrew Waller of ASW Ecology (standing) and associates were out in the long June twilight, by the lake in Belair Park conducting a study of bats for the London Borough of Southwark, South London. June 26, 2014.

## Hottest June in the record.

Monthly analyses of global climate from the USA's National Oceanic and Atmospheric Administration (USA) cited April 2014 as joint first with April 2010 as the hottest April on record, May 2014 broke the record and June 2014 continued the trend, with a global average temperature that was  $0.72 \pm 0.09^\circ\text{C}$  above the 20<sup>th</sup> Century average of  $15.5^\circ\text{C}$ .

For all land surfaces, the temperature was  $0.95 \pm 0.14^\circ\text{C}$  warmer than the average, the 7<sup>th</sup> warmest June on record (with 2012 as the warmest), whilst the ocean surface attained its highest recorded June temperature,  $0.64 \pm 0.04^\circ\text{C}$  above the average.

In the Northern Hemisphere, the temperature for the land and ocean together was  $0.81 \pm 0.12^\circ\text{C}$  above the mean, joint hottest in the record with June 2010 and 2012. Land in the Northern Hemisphere was overall  $0.98 \pm 0.13^\circ\text{C}$  above the norm (6<sup>th</sup> warmest, the warmest was June 2012), however, the ocean,  $0.71 \pm 0.05^\circ\text{C}$ , above the average and was the hottest on record for June.

In the Southern Hemisphere, the combined land and ocean temperature was  $0.88 \pm 0.136$ , which made it the 5<sup>th</sup> hottest June (the hottest was 2005). The ocean, at  $0.58 \pm 0.04^\circ\text{C}$  above the average, was the 2<sup>nd</sup> highest June temperature on record, behind 1998. With a positive temperature anomaly of  $0.63 \pm 0.06^\circ\text{C}$ , this was likewise the 2<sup>nd</sup> .hottest June behind 1998.

This was “*the first time that the monthly global temperature anomaly was higher than  $0.60^\circ\text{C}$* ”. It is expected that significantly warmer conditions will set in when the central and eastern equatorial Pacific Ocean next experiences a warmer El Niño phase, but neither El Niño nor La Niña (cooler) conditions were evident. However, “*NOAA's Climate Prediction Center estimates that there is about a 70 percent chance that El Niño conditions will develop during Northern Hemisphere summer 2014 and 80 percent chance it will develop during the fall and winter.*”

Source: NOAA National Climatic Data Center, *State of the Climate: Global Analysis for June, 2014*, published online. Data provisional.

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Email: [prime-meridian01@hotmail.com](mailto:prime-meridian01@hotmail.com)

Web address: <http://www.ecospheresproject.wordpress.com/>

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