

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

# Prime Meridian

(24) April 16, 2014

Above: Looking along a frozen fjord in Greenland. The fjord, located in East Greenland (Østgrønland), lies downstream of the Violin Glacier (Violingletscher). The picture was taken on April 5, 2014 in the course of a survey flight for NASA's Operation IceBridge. Image: NASA/Michael Studinger.

## NASA's vital 6 year mission to survey planet Earth's icy regions.

Understanding what is happening to the ice sheets, glaciers and sea ice in the Earth's Arctic and Antarctic regions will be essential if we are going to be able to foresee future climate change and sea level rise. NASA launched the Ice, Cloud and Land Elevation Satellite (ICESat) in 2003, but this ceased collecting science data in 2009 and its replacement, ICESat2, is not scheduled to be orbited until 2016.

Meanwhile, the data gap is being filled by NASA's Operation IceBridge, a key research programme which is deploying a fleet of research aircraft in "*the largest airborne survey of Earth's polar ice ever flown.*" It involves "*the most sophisticated suite of innovative science instruments ever assembled to characterize annual changes in thickness of sea ice, glaciers and ice sheets.*"

The 2014 began with two surveys of the Arctic sea ice north of Greenland, flown out of Thule Air Base in Greenland. On March 14, researchers then flew from Thule to Fairbanks, Alaska, collecting data *en route*. Michael Studinger, IceBridge's project scientist reported "*It is very rare that an area as large as the entire Arctic Basin is cloud free at 1,500 feet or below*". The next day, another phase of survey activity began, this time focussed on the Beaufort Sea and Chukchi Sea. The team headed back to Thule on March 21 and later flew surveys over the Fram Strait between NE Greenland and Svalbard, and then the Canadian Arctic. On April 4, they flew to Kangerlussuaq, a more southerly location, from which they could survey the southern part of Greenland. The busy schedule continues and readers can follow the continuing progress of this mission online on the Operation IceBridge website under "Current Campaign."

Operation IceBridge is a compelling example of how scientific research plays a fundamental role in planetary stewardship.





**New report from the Intergovernmental Panel on Climate Change emphasises risks to human communities, including those to food security.**

Unlike earlier reports, the new document for policy makers highlights and assesses the threats from climate change. The following concerns were noted. Recent decades have seen the impacts of climate change on both the natural world and human systems. There is widespread warming and melting of high latitude permafrost. Glaciers worldwide are generally shrinking, affecting water resources downstream. Although only a few species have yet suffered extinction, the geographical ranges, seasonal activities, migration patterns, abundances and interactions between species have, in the case of many species, been changing as climate has changed. Markets are sensitive to climate extremes, as demonstrated by price rises in response to climate extremes. Wheat and maize have been particularly vulnerable with less impact on rice and soybeans (whose median change has been zero). On the whole, negative impacts on crops have been more prevalent than positive effects. Despite a rise in deaths associated with heat and cold in some regions, it appeared that climate change had so far caused only a small and poorly quantified impact on human health compared with other factors. On the other hand, those who are *“socially, economically, culturally, politically, institutionally, or otherwise marginalized are especially vulnerable to climate change”* and the impacts of recent heat waves, droughts, floods, cyclones and wildfires *“include alteration of ecosystems, disruption of food production and water supply, damage to infrastructure and settlements, morbidity and mortality, and consequences for mental health and human well-being.”* Climate change must be expected to *“affect poor people’s lives directly through impacts on livelihoods, reductions in crop yields, or destruction of homes and indirectly through, for example, increased food prices and food insecurity.”* Wars, warned the report, destroy the infrastructure necessary to enable human communities adapt to climate change.

Source: WGII AR5 Phase I Report Launch 1 31 March 2014 *Climate Change 2014: Impacts, Adaptation, and Vulnerability*  
SUMMARY FOR POLICYMAKERS

Left: Wheat ripens in a field beside St Peter's & St Paul's Church, Ash, Kent (August, 2012).





## Seasons in South East England February, 2014



Above: February 9. A view from Old Terry's Lodge Road across to Borough Green, which lies in Holmesdale, a valley between the Chalk and the Lower Greensand. Kent, England.

### Storms, rain and yet more flooding, but with some respite after mid-February.

February was mild, but from January into mid-February a succession of low pressure systems continued to arrive from the Atlantic Ocean bringing unusually stormy weather. Flooding occurred in low-lying areas and massive waves struck the coast. Even when the weather had become less extreme, from February 15, unsettled weather persisted. Over the UK as a whole, rainfall was 184% of the 1981-2010, so that it was the 4<sup>th</sup> wettest February on record. At the same time, it received 108% of its usual sunshine and it was mild, with the mean temperature of 5.2°C being 1.5°C warmer than the mean. SE and central southern England were very wet, receiving a massive 270% of normal precipitation.

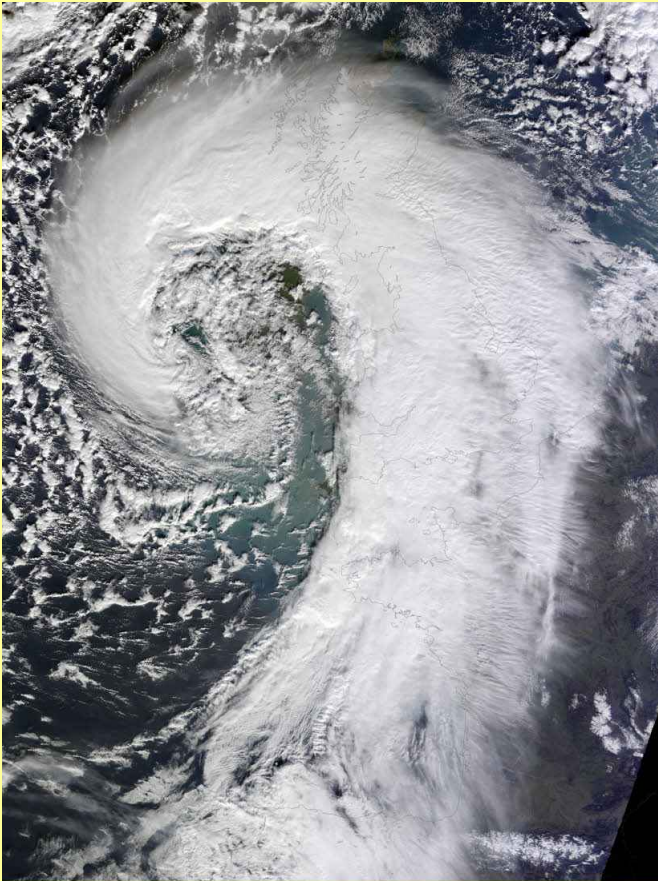


Flooding and climate change became hot topics. Politicians found themselves challenged by angry and sceptical audiences about whether they had shirked their responsibilities. In places like the Somerset levels of South West England, it was claimed, the immediate cause of flooding was the failure of the Environment Agency to dredge the rivers for two decades. It was argued that with rivers reduced to one third of their former capacity, the arrival of water pumped away to protect homes around Taunton and Bridgwater caused flooding. On the other hand, rainfall had been unusually heavy, due to repeated storms hitting the UK. In December 2013 and January and February this year, SW England and Wales S saw respectively 141%, 180% and 223% of the 1981 to 2010 norm. We shall return to this debate in future issues.

Left and below: Floods at the village of Eynsford in Kent on the first day of February 2014. Locals recalled that this was not the worst flood that the village had experienced within living memory and that the 1960s had seen waters lapping at the foot of the churchyard.







Intense winds occurred during the first two weeks of Feb. On the first day, southern coastal areas were buffeted by gusts of around 96.5 km per hour. On Feb. 5, a gust of 129 km per hour hit Berry Head (Devon, SW England). The Needles Old Battery on the Isle off Wight recorded notable gusts, 148 km per hour (Feb. 8), 130 km per hour (Feb. 9), 154 km per hour (Feb. 12), 174 km per hour (Feb. 14).

From Feb. 12 to 14, strong winds damaged trees and even buildings. The cyclone (top left) crossing the UK was imaged by the MODIS (Moderate Resolution Imaging Spectroradiometer) aboard the Terra satellite on Feb. 12. NASA commented: *"Soggy winters are not unusual in the United Kingdom, but this winter has been in a category of its own."* The Met Office recorded that: *"Many trees were felled by the wind and on 12 February around 100,000 homes and businesses were without power. Several buildings experienced structural damage from the strong winds. For example, the storm of 12 February resulted in some damaged roofs at Porthmadog, Gwynedd and a member of the public was killed on 13 February after trees brought down power lines in Wiltshire. A motorist was killed in central London on 14 February after falling masonry struck a car."*



Lower left: During the stormy weather, a massive tree was uprooted and it fell across the road. Its crown crushed a gate to Saxten's & Cage's Wood, Kent.

On Feb. 7, Altnaharra (Sutherland) saw the UK's minimum temperature of  $-7.7^{\circ}\text{C}$  and on Feb. 24, three London locations, Kew Gardens, St James's Park and Heathrow recorded the UK's highest temperature of  $14.9^{\circ}\text{C}$ .

SE and central S England, mean max. temp.:  $9.7^{\circ}\text{C}$  ( $2.8^{\circ}\text{C}$ ); mean min. temp.:  $3.7^{\circ}\text{C}$  ( $2.8^{\circ}\text{C}$ ). Hours of sunshine: 97.9 (138%). Rain: 149.0 mm (283%). Anomalies re. 1981-2010 norm in brackets.

Source: online Met Office data.

Below: On February 16, after the more extreme weather has passed, a bare hedgerow near West Kingsdown basks in passing sunshine, which pleasantly reminded everyone that spring and warmer weather were on the way.







Left: Bluebells emerge from the woodland floor in Saxten's & Cage's Wood, Kent (Feb. 9). Looking northwards across the Thames from London's National Theatre, a double rainbow appears against a gloomy sky (Feb. 10). A cautious sheep stares back at the camera, Kent (Feb. 16). Birch catkins along Roger's Wood Lane, Kent (Feb. 20).



## Global climate; February, 2014.

### A long way from being a record-breaker.

Taking temperatures for both land and sea surfaces across the entire Earth, the global average temperature for February 2014 was a mere  $0.41 \pm 0.12^\circ\text{C}$  above the 20<sup>th</sup> Century average of  $12.1^\circ\text{C}$ . It ranked only as the 21<sup>st</sup> warmest February on record, with the all-time high being Feb. 1998.

Globally, the surface of the land was  $0.31 \pm 0.32^\circ\text{C}$  warmer than the average. This made it a nondescript 44<sup>th</sup> warmest Feb. with 2002 as the warmest on record. It was another matter over the ocean, which at  $0.45 \pm 0.04^\circ\text{C}$  above the norm actually made it to 7<sup>th</sup> place in the record, with 1998 and 2010 rated as joint first.

For the Northern Hemisphere the combined positive anomaly for land and ocean was  $0.35 \pm 0.17^\circ\text{C}$  above the norm, which made it the 28<sup>th</sup> warmest February on record with 2002 as the warmest. For land areas in this Hemisphere, the temperature anomaly was  $1.17 \pm 0.34^\circ\text{C}$  above the norm and this made it merely the 53<sup>rd</sup> warmest on record; warmest was February 2002), although the ocean, at  $0.46 \pm 0.04^\circ\text{C}$  above the average, continued the trend by now familiar from month to month, to rate near the top of the chart without being record-breaking. It was the 5<sup>th</sup> warmest on record, with 2010 as warmest. Things were warmer in the Southern Hemisphere, where it was summer. Land and ocean together showed a temperature anomaly of  $0.48 \pm 0.07^\circ\text{C}$  above the mean, making it the 11<sup>th</sup> warmest February (2010 was warmest). The ocean was  $0.45 \pm 0.06^\circ\text{C}$  above the average, again, the 11<sup>th</sup> warmest (warmest 1998), but the land, whose temperature in January had reached a never-before-recorded  $1.13 \pm 0.15^\circ\text{C}$  above the mean, was just  $0.68 \pm 0.12^\circ\text{C}$  hotter and was only the 12<sup>th</sup> warmest (warmest was 2010).

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



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