

COLD WINTERS IN THE UK: A CASE STUDY OF 2012/13

Following on from two previous extremely cold winters (2010/11 and 2011/12), the winter of 2012/13 was especially lengthy, lasting from late October 2012 through to mid-April 2013. People became tired of the consistently low temperatures and lack of sunlight; not only was it a very cold winter, it was also a remarkably dull one. People also became unwell; the amount of light does impact upon people's health and mood.

Many low temperature records were set, including the coldest Easter Sunday ever recorded in the UK, at Braemar, Central Scotland (-12.5°C on 31 March). Prior to that, the record was -9.8°C in Inverness-shire, a record dating back to 1960. 2013 also saw the coldest March in the UK in over 50 years. Sky News showed an impressive photograph of intrepid joggers in the Peak District running along a track cut through snowdrifts 3 metres high. (<http://news.sky.com/story/1072108/easter-sunday-is-the-coldest-on-record>).

Moreover, the preceding two summers had been poor. People were simply fed up!

What is the jet stream, and why does its position matter to the UK's weather?

The polar front jet stream (PFJS) is a system of strong winds located between the Polar and Ferrel cells in the upper troposphere (Figure 1). At that height, wind speeds of 200 km/hour are common. The existence of a jet stream was unknown prior to the First World War Zeppelin airships. It is the reason why eastbound flights in these latitudes are faster than westbound ones. Aircraft scheduling reflects the jet stream impact. A typical flight-time from London Heathrow to New York JFK is 7 hours 40 minutes, but only 6 hours 40 minutes for the return journey.

The polar front lies between 40 and 60 degrees of latitude in both hemispheres. It is responsible for fine or wet, cold or hot weather in our latitudes. If the jet stream moves southwards in the northern

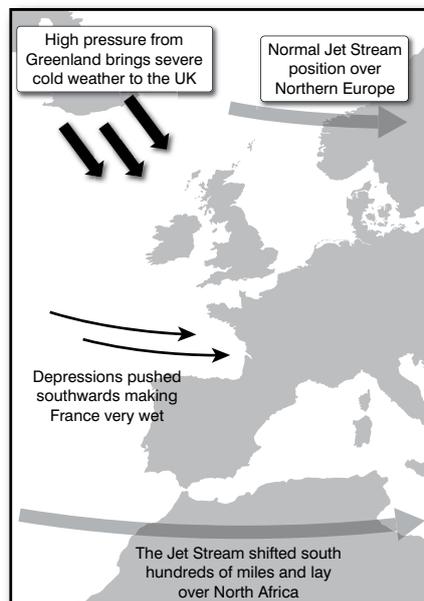


Figure 1: The position of the jet stream in the winter of 2013

hemisphere, it drags with it cold polar air, bringing more anticyclones to the UK in winter. It pushes the depression belt that normally dominates British winter weather further southwards. Weather for us during winter 2012/13 was therefore dominated by high pressure, with very low temperatures as Siberian air was pulled in from the Eurasian landmass, with snow typical of winter high pressure pulling very cold air in over the North Sea. When Atlantic depressions met these cold high pressure systems, moist air was chilled, bringing severe snowstorms to most of the British Isles. From time to time, different regions were worst hit. On occasions snow hit the south coast, especially the south east region, coming up the English Channel. At other times the whole western section of the British Isles was affected, especially Cornwall, Devon and Wales.

Transport disruption and school closures

Limitations to transport and energy continued for many days after these January falls. More snowfalls occurred, but the key problem became ice. Limited melting during the day froze overnight, leading to sheet ice and multiple accidents the next day. Police and Met Office warnings were amber and red and people were told to stay

at home unless their journey was absolutely essential.

Mid-January 2013 brought a period of particularly heavy snowfall, beginning on the 18th, and bringing massive disruption to transport as well as other services. More than 400 flights were cancelled from Heathrow in a day. One departure board at Terminal 5, covering 55 flights between 11.50 and 16.50, showed four serious delays and 34 cancellations. Both runways were seriously affected and people were working round the clock to try to keep at least one of them usable at any time. Gatwick, despite having only one runway, did rather better and only flights to and from the Channel Islands were cancelled at this point. In other serious snowfall events, Gatwick did close for periods of many hours, but never completely.

School closures were the order of the day several times and in many areas during winter 2012/13. Sales of sledges soared!

Case studies

Wales

Welsh farmers possibly suffered more than any others, but what was unusual about the winter of 2012/13 was the vast area of snow-covered land, lasting for weeks. The BBC Radio 4 'Today' programme on Saturday 30 March 2013 interviewed a Welsh hill farmer who expected to have lost 400 lambs minimum to the bad weather, but would not know the death toll for sure until the snow had melted. Sheep trying to find shelter tend to hide against hedges but are then overtaken by snowdrifts, in this case as high as 12–13 metres (Figure 2).

Finding ways to help the snow-hit sheep farmers who had lost livestock was said to be an urgent priority by the Welsh Assembly, after demands from the Farmers' Union of Wales. A key problem that was identified was the need to dispose of carcasses of fallen livestock. EU regulations state that, even in such circumstances, livestock may not be buried, a cheap local method of disposal, dictating instead that the farmer must pay for



Figure 2: Sheep in snow near Offchurch
Source: David P. Howard/Wikimedia

the removal and disposal of carcasses by contractors. With animal losses so high, this could have crippled some farmers. On 8 April this EU rule was waived, allowing carcasses to be buried.

Brighton and East Sussex

Brighton is not used to very much snow. With its coastal location, it experiences the ameliorating effect of the sea in winter. 2013 however brought two great snow shocks, one in January and the other in March. On both occasions, the snow-bearing winds came up the English Channel, hitting the coast first. Once the sleet/snow began, it lay very quickly on sub-zero ground and really took people by surprise. This was one of those situations where everyone had a story.

22.1.13: my own experience

Sleet fell from 3.30 pm. People did not think it serious, but as I work in Brighton and Hove but live inland in the High Weald, an area which catches any snow in the region, I left at 4.00 pm to try and avoid problems. Sleet was sticking to the roads, to everything, so quickly. Two hours later, and having tried three different routes out of Brighton, I had got nowhere! The South Downs lie just inland of the city, creating an imposing physical barrier. The increase in the rate of lying snow with height can be startling. I found myself stranded and decided that was the moment to 'phone a friend'. She gave me a bed for the night, so I turned round and queued another hour to travel three

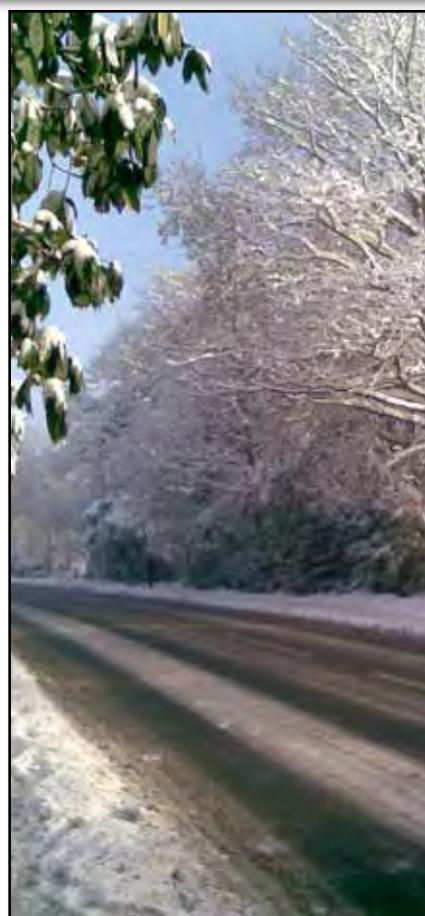


Figure 3: The A26 in Crowborough, Sussex, several days after the main snowfalls of January, 2013

Source: Alison Rae

miles to her home along the coast road. I was lucky; others took much longer.

Crowborough, located inland on the High Weald of Sussex (217 m), one of the highest locations in the South East region, is renowned for catching heavy snow. Figure 3 shows the A26 several days after the January snowfall, despite



Figure 4: Icicles on guttering – a sign of long-term freeze/thaw

Source: Alison Rae

salting and gritting. Figure 4 shows the result of regular daytime thawing and night-time freezing.

March 2013

A similar event in March affected even more people. Again, late afternoon snow stuck quickly, freezing, and Brighton was gridlocked within two hours, making headline national news. Roads had been gritted, but the ground was just so cold that the sleet and snow iced over as it fell. Local workers took hours to travel short distances home. Buses stopped running. People were stranded right across the city of Brighton and many spent the night in their cars on the A23 northwards out of the city. Students were unable to reach home from school. In my day and boarding school, 60 extra staff and students had to be accommodated at school, using sofas, cushions and so on, to be comfortable for the night. One student and her mother took until 5.00 am the next day to arrive home.

The coldest Easter recorded in recent decades

By Easter people in general, and farmers in particular, were bracing themselves for yet more snow. There was a feeling of

relentlessness. The Met Office predicted snow down the East coast and in the South East region, especially Kent, East Sussex and Surrey. It lasted until 6 April. Previously, 1983 had been the snowiest Easter, and 1962 the coldest. March 2013 proved to have been the fourth coldest March since 1910. On 22 March 2013, BBC weather forecast announced the ‘coldest March weekend in 50 years’. The meeting of moist Atlantic air with the cold high pressure weather system with its clockwise airflow, located over the eastern British Isles was once again the weather pattern that produced another 30 cm of snow in some regions, especially in Wales, Central England and Northern Ireland, over Easter. Ground remained frozen over much of the country, threatening wildlife, and areas not suffering too much from snow were often hit with ice, leading to road accidents yet again.

Given that 2013’s cold and lengthy winter was dominated by very cold air from the Eurasian mainland, it is interesting to compare what was happening in the rest of Europe. In Germany the low temperatures were also relentless. The 2013 March temperature nationally was 4.1°C below what was expected, at around -1°C. In parts of eastern Germany -18°C was not uncommon at night during March, and heavy snowfall occurred late into that month.

Moscow had record levels of snowfall during the winter of 2012/13, at 180% of the norm, making it the snowiest winter on record. In Austrian cities a daytime maximum temperature of below 0°C is extremely rare after 20 March, but several cities experienced subzero maxima during late March, including Vienna (-1.2°C on 23 March and -1.7°C on 25 March). One result was that April began much cooler across Europe, with little sunshine and cold, wet soils contributing to a very late start to crop germination and probably later and more limited harvests than usual in summer/autumn 2013. Food prices for consumers across the Continent increased as more had to be imported to make up for the consequences of 2013’s vicious winter.

‘Shivering Britons snap up late holiday deals in Easter exodus as cold snap continues’ (Mail Online 27.3.13). One solution to the

seemingly unending chill was to go on holiday. An estimated 1.7 million Britons escaped the UK’s freezing conditions on last-minute holiday bookings to warmer climes. The Canary Islands, Tunisia, Majorca, Egypt and Turkey were particularly well patronised; French and Austrian ski resorts did well too. Between Maundy Thursday (28 March) and the Tuesday after Easter Monday (2 April), 600,000 holidaymakers left from Heathrow, 214,000 from Gatwick, 110,000 from each of Manchester and Stansted, 55,000 from Luton and 100,000 from the Scottish airports. Gatwick reported Barcelona, Geneva and Malaga as key locations. 98,000 travellers flew with British Airways on 28 March.

At that point, forecasts threatened the worst weather until the end of April, but, as things happened, fortunately that was not the case.

The energy crisis

A simple correlation exists in that the colder it gets, the more we turn up our heating. In March 2013 UK gas supplies were really low, down to one-tenth of normal stocks. Three Qatari tanker-loads of LNG (liquefied natural gas) were sent, the first docking at the Isle of Grain terminal in the Thames estuary on 24 March 2013, with the second and third reaching ports in Wales on 26 and 30 March. A further tanker arrived from Trinidad on 3 April. The three Qatari tankers brought 430 million cubic metres (mcm) of gas; a day’s supply for the UK is around 370 mcm. Most of the rest of our supply was coming from a European pipeline plus our own North Sea gas platform sites.

These supplies and others like them did improve gas supplies,

but at the cost of the UK paying higher wholesale prices. This came at a time when energy prices were rising anyway (household bills had already doubled in seven years), meaning people simply had to pay more or be colder than they would choose to be. According to the NHS website, ‘Every winter in the UK 25,000–30,000 deaths are linked to the cold weather.’ Based on the length of a normal winter, that’s one death every seven minutes, so what might 2012/13’s winter do to the death rate, mainly amongst the poor, frail elderly population? People on limited or fixed incomes are just too worried about the cost to turn the heating up. The *Spectator* magazine predicted a total of over 30,000 cold-related deaths. In his article of 30 March 2013 (<http://blogs.spectator.co.uk/coffeehouse/2013/03/dying-of-the-cold-a-very-british-disease>), Fraser Nelson expressed outrage that such a death toll is seen as inevitable and acceptable. It seems the Norwegians joke about our attitude because, in their colder climate, no one really dies of the cold in any winter. Planned cuts to energy charges (about 10% by 2020) will be more than wiped out by additional charges to counteract global warming (about 16% for the same period).

The most effective way to help people keep warm should also reduce energy expenditure, i.e. improve loft and other insulation, plus boiler upgrades to those with greater efficiency. Various government schemes have been introduced to remedy this, but nevertheless, many who are living in fuel poverty (spending >10% of taxed income on energy bills) are not helped. Many middle class professional people now find themselves in fuel poverty.

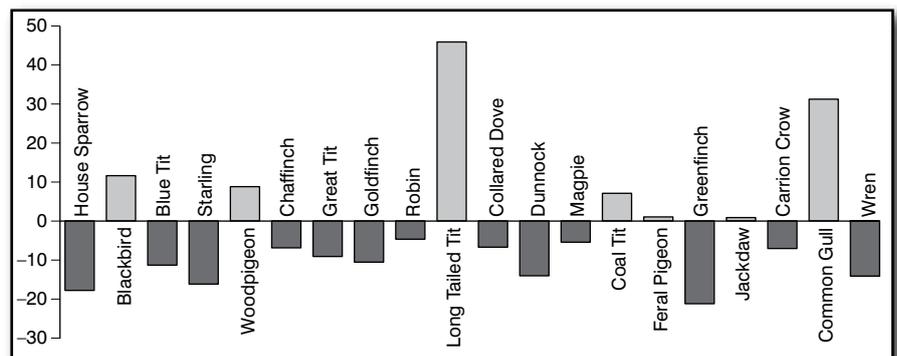


Figure 5: Big Garden Birdwatch 2013: % change since 2012

Source: RSPB

Impacts on wildlife

Since 2012/13 was the third successive extremely cold winter, the impacts on struggling wildlife have been compounded. The RSPB Big Garden Birdwatch of 2013 showed considerable decreases in bird populations even from the previous winter. Starlings and house sparrows, already classed as ‘threatened’, saw further declines of 16% and 17% respectively. Others seriously affected are shown in Figure 5. Birds which normally winter further north, like fieldfares, jays and siskins, are seen more commonly in our gardens. Many households feed the birds and it is noticeable that new companies have come onto the market selling feedstuffs.

Climate change?

Whenever we experience freak weather, people attribute it to climate change. When I was a small child in 1963, a year with a winter renowned as particularly long and difficult across the British Isles, no one thought of climate change. It was not yet in people’s minds, not even those of climatologists and meteorologists. Recent extreme winter events force us to question the reasons behind them. Can the difficult British winters of 2010/11, 2011/12 and 2012/13 be explained thus? What about extreme individual events like Superstorm Sandy (October 2012), which are becoming increasingly frequent?

‘Climate change will bring greater extremes in weather, the government’s outgoing chief scientific advisor [Sir John Beddington] has warned as Britain experienced freezing cold weather and snow, with thousands of homes across the UK without power.’ (The *Huffington Post* 25.3.13).

Higher average global temperatures are also likely to bring greater variability in our weather. Sir John predicts significant climate change over the next 20–25 years, based on past human damage to the global weather system, even without future additional pollution, though others disagree strongly with him. There is evidence that the Arctic is heating up much faster than other parts of the world, which, along with inevitable population increase, will create massive issues of food, water and energy security.



Figure 6: Snowy gardens in Sussex, January 2013

Source: Alison Rae

Conclusion

The British are known for being obsessed with the weather because of the variability of weather patterns in the Cool Temperate Western Margin region. More extreme events certainly make people discuss it more. Climate change is likely to bring increasing extremes, so future generations may see winters like 2012/13 as nothing out of the ordinary.

Predictions were for yet another bitter winter for 2013–14. The main energy companies increased their prices by around 10% in November 2013!

Websites

www.dailymail.co.uk/news/article-2264363/UK-snow-Dig-The-worst-come-Ro...

This site has over a hundred pages of winter disruption photos.

www.telegraph.co.uk/news/picturegalleries/uknews/8176958/Brrritain-snow-causes-travel-chaos-in-the-UK-as-the-cold-snap-continues.htm

A snowy scene on Brighton beach

www.telegraph.co.uk/topics/weather/9815007/Travel-chaos-as-commuters-battle-snow
Report from 21 January 2013, including a video.

<http://news.sky.com/story/1063376/snow-and-ice-cause-chaos-on-rail-and-roads>

Selection of photos and videos.

FOCUS QUESTIONS

1. Identify climatic and weather factors affecting British winters 2010 - 2013. How unusual are these factors?
2. Research the impacts on hill farmers of such harsh winters. Consider both livestock and arable businesses.
3. Investigate the extent to which such harsh weather can benefit the economy, for instance in winter sport resorts, winter sun holidays.
4. Essay: Discuss the evidence available for global climate change causing cooling as well as warming.