

Snow and low temperatures, December 2010

From late November to Boxing Day 2010 the UK experienced two spells of severe winter weather with very low temperatures and significant snowfalls.

The first of these spells lasted for two weeks from Thursday 25 November to Thursday 9 December and saw persistent easterly or north-easterly winds bringing bitterly cold air from northern Europe and Siberia, accompanied by snow. Eastern Scotland and north-east England saw the most persistent and heaviest snow, which accumulated to depths of 50 cm or more across the higher ground by the end of the spell. However, lower lying areas were also affected and the snow increasingly spread to other parts of the UK, so that by early December many areas of the UK were under lying snow. Temperatures struggled to rise above freezing during the day and there were very severe frosts at night. Temperatures widely fell below -10 °C on several nights and on occasion below -20 °C in northern Scotland.

This spell of snow and freezing temperatures occurred unusually early in the winter, with the snowfalls judged as the most significant and widespread in late November and early December since late November 1965.

The period from 9 to 15 December saw milder and quieter conditions with a gradual thaw of lying snow. However, a second spell of severe weather began on Thursday 16 December as very cold Arctic air pushed down across the UK from the north. Snow showers affected the north and west on Friday 17 December, while there was heavier snow across southern England and Wales on Saturday 18 December. Further heavy snow affected south-west England on Monday 20 December. The UK remained under bitterly cold Arctic air until Boxing Day, with day time temperatures again failing to rise above freezing and very severe frosts. While there was little further snowfall, lying snow remained until 26 to 27 December.

The second spell of snow and freezing temperatures has been judged the most significant such spell in December since 1981, although late December 2009 to mid-January 2010 (the previous winter) were also broadly comparable to both these spells.

Overall, the prolonged freezing conditions resulted in an exceptionally cold December across the UK: the coldest December in the last 100 years and the coldest across central England since 1890. Indeed, this was the coldest month in the UK since February 1986, and in Northern Ireland, the coldest individual month of the last 100 years. Despite a mild first half, the UK also experienced the coldest November since 1993 as a result of the very cold last few days.

Impacts

The snowfalls and freezing conditions caused numerous widespread impacts throughout the period - in many cases similar to the disruption of winter 2009/10. The emergency services, local authorities, transport organisations and utilities were all put under great pressure. Snowfalls caused the most problems with transport - road, rail and air - all badly affected at times. Schools were also closed and hospital admissions increased markedly with accidents and falls. The freezing temperatures also caused problems with water supplies.

The first snowfalls on Thursday 25 and Friday 26 November brought problems on the roads across north-east England and eastern Scotland, and a number of school closures. Friday 26 November saw the snow spreading to also affect roads in Wales.

The snow continued to fall, and on Monday 29 November hundreds of schools were closed across Scotland, Northern Ireland and north-east England. Motorists were stranded overnight in Scotland and the A9 was

closed for a time. Airports in the north-east were also affected.

On Wednesday 1 December the wind shifted from a north-easterly to a more easterly direction bringing heavy snowfalls across south-east England. The M25 was badly affected with 400 lorries stranded overnight, and Gatwick Airport was closed. There were also delays and cancellations on the rail network.

Thursday 2 December saw major problems on the transport network with both Edinburgh and Gatwick airports closed. There were numerous accidents on the roads with jackknifed lorries, and the A90 Forth Road Bridge was closed for the first time since it was built in 1964. Thousands of schools across the UK were closed due to snow.

From Friday 3 December the disruption gradually eased. However Monday 6 December saw heavy snow across Scotland's Central Belt resulting in major problems again on the roads, with hundreds of motorists stranded overnight and the M8, M74 and A9 all badly affected. Edinburgh and Glasgow airports were closed. A widespread, gradual thaw set in from Thursday 9 December, slowest in the north.

The second spell saw a belt of snow across southern England and South Wales on Saturday 18 December again resulting in widespread disruption. Airline passengers were particularly badly affected with Heathrow Airport closed at the busiest time of year in the run-up to Christmas. Further heavy snow early on Monday 20 December brought significant problems to both Devon and Somerset with the A38 closed near Exeter and widespread problems on the roads: the AA reported the busiest day in its 105 year history. The East Coast main line was shut on Tuesday 21 December after overhead power lines came down.

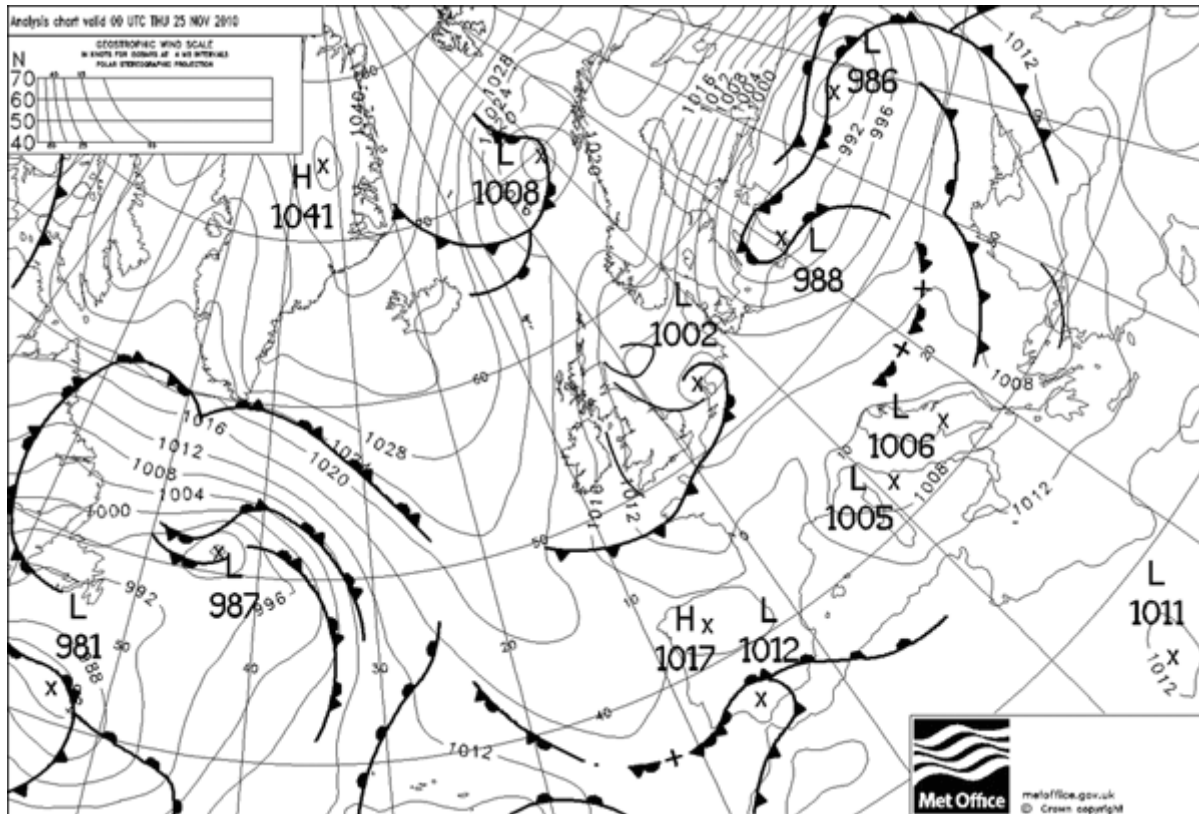
It remained quieter, but bitterly cold with a gradual improvement in travelling conditions until Boxing Day which saw the start of a slow thaw. Burst water pipes then became a problem with Northern Ireland worst affected - a week of sub-zero temperatures and the subsequent thaw resulted in some 40,000 homes and businesses being without mains water.

Weather Data

Snow 25 November to 8 December 2010

From Thursday 25 November the UK came under the influence of a prolonged north-easterly airstream drawing bitterly cold air from northern Europe and Siberia. Eastern Scotland and north-east England were most exposed and saw persistent and at times heavy snowfalls - the snow resulting from moisture picked up as this airstream passed over the North Sea. With the persistent north-easterly winds and freezing conditions, very significant accumulations developed, particularly across the high ground with level depths of 50 cm or more (58 cm at Balmoral, Aberdeenshire on 30 November, and 55 cm at Westgate, County Durham on 2 December).

Figure 1: Synoptic situation at 0000 GMT on Thursday 25 November 2010: the start of the first spell. The UK is under a very cold north-easterly airstream bringing snow showers off the North Sea.



Lower lying areas were also affected by snow. Much of inland Wales saw 5 cm or more of snow during Friday 26 November and the snow coverage gradually extended further south (32 cm at Buxton, Derbyshire on 1 December). On 1 December the wind shifted to a more easterly direction bringing fresh snowfalls to south-east England (26 cm at Charlwood, Surrey on 2 December). Snow also fell in the south and west so that by the morning of 2 December much of the UK was covered by lying snow, even coastal areas of the south (13 cm at Shanklin, Isle of Wight, 9 cm at Guernsey Airport). There was even lying snow at Land's End, Cornwall). Figure 2 gives some indication of the extent of snow coverage across the UK. The last time the UK was almost entirely covered by lying snow was only 11 months earlier - on 7 January 2010 during the coldest spell of last winter.

Figure 2: Snow depths at 0900 GMT on Thursday 2 December 2010. The UK is almost entirely covered by lying snow - greatest depths across eastern Scotland and north-east England but significant depths also across south-east England.

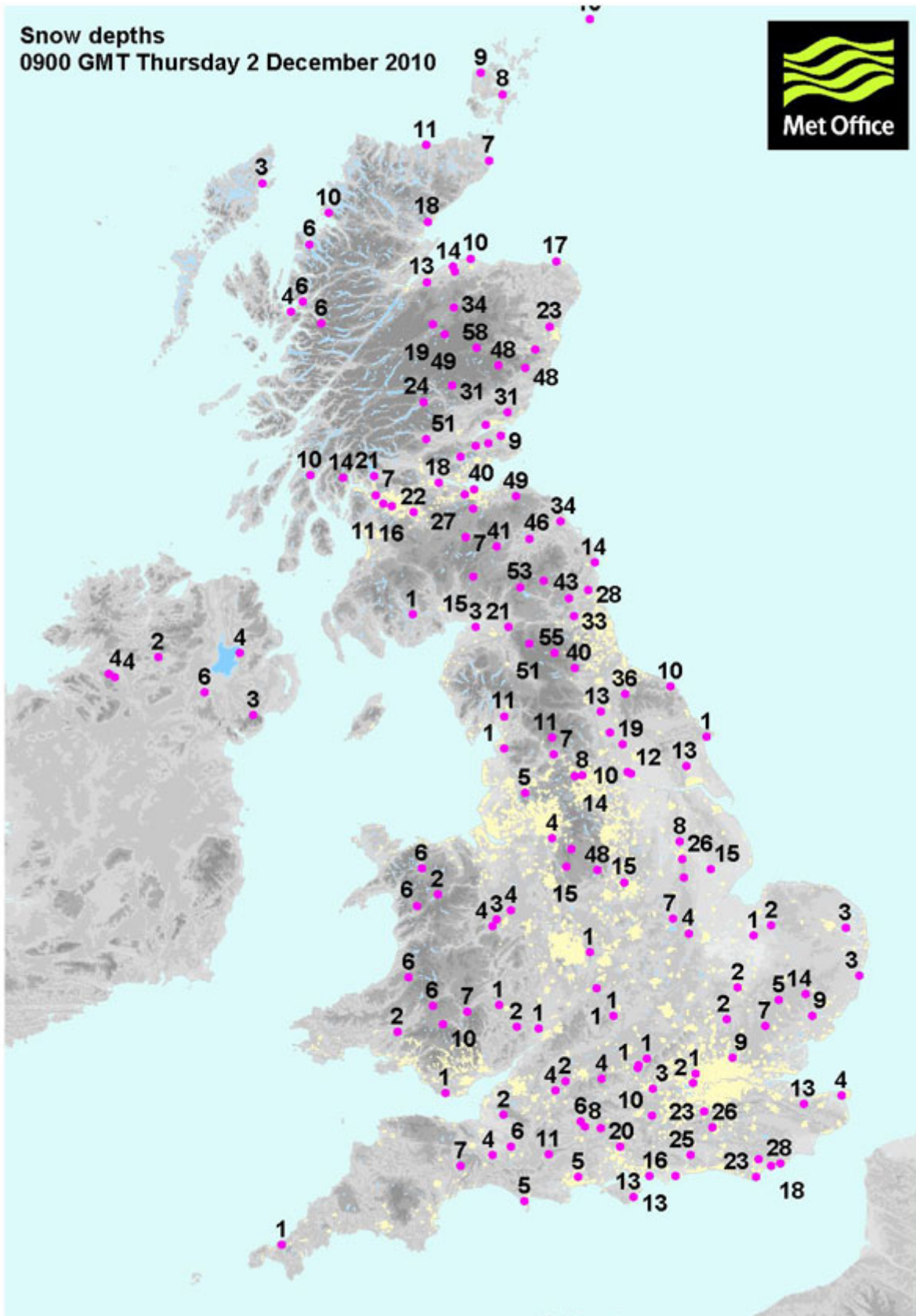
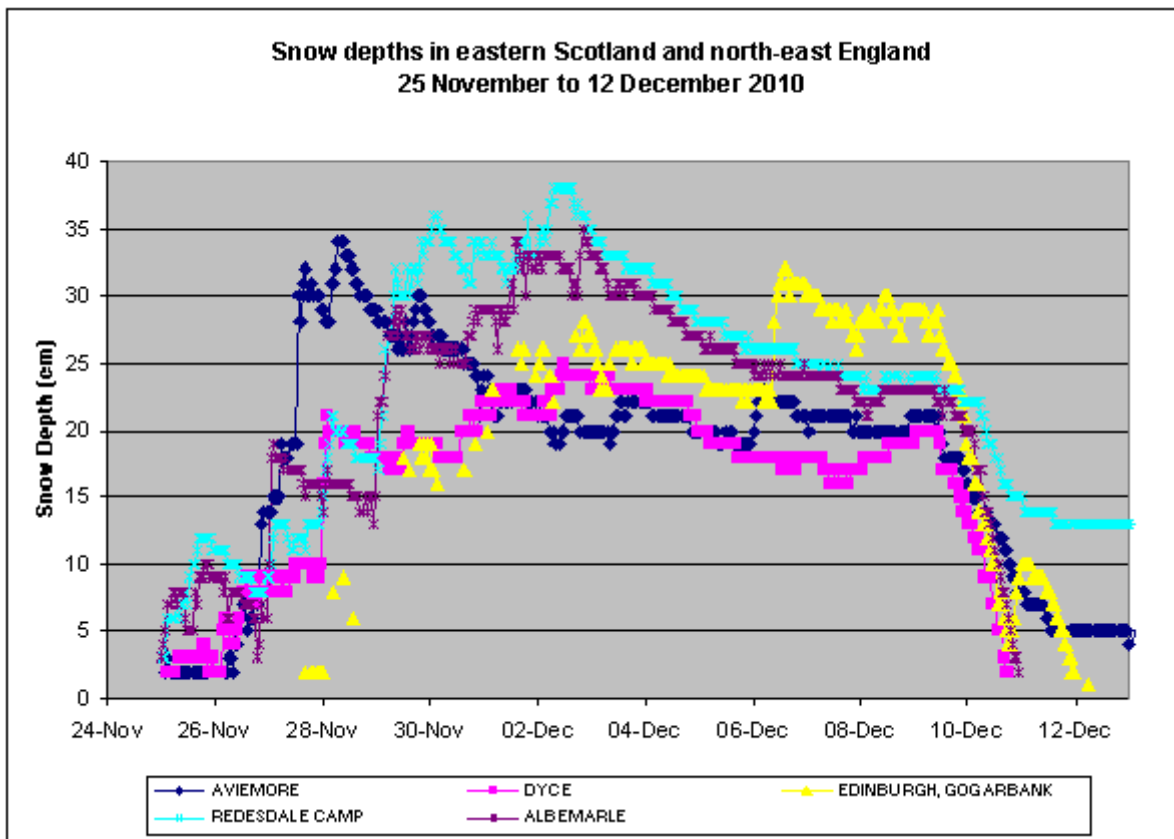


Figure 3: Time series of hourly snow depths in eastern Scotland and north-east England, Thursday 25 November to Sunday 12 December 2010. Locations are Aviemore (Inverness-shire), Dyce (Aberdeenshire), Edinburgh Gogarbank, Redesdale Camp (Northumberland) and Albemarle (Northumberland).



From 4 to 6 December a slow thaw in the south saw the ground largely free of lying snow south of a line from south Wales to the Wash. However, the snow-fields across the northern half of the UK remained undiminished with depths widely in excess of 30 cm. Heavy snowfalls across Scotland's Central Belt on 6 December saw depths of 29 cm at Edinburgh, Gogarbank, 51 cm at Kinross (north of Edinburgh) and as much as 60 cm at Livingston Mill (to the west of Edinburgh). From 9 December snow depths generally saw a gradual decline as milder air encroached across the UK.

Overall this snowy spell, which occurred unusually early in the winter, is judged to be the most significant in November and early December since 26–30 November 1965 (when more than 30 cm was widely recorded across northern England - depths including 56 cm at Ushaw College, County Durham on 30 November 1965, for example). Indeed the spell of snow in November and early December 2010 is judged to be comparable with this.

Temperatures 25 November to 8 December 2010

The snowfalls were accompanied by very low temperatures - with day time maxima frequently remaining below freezing, and some very severe frosts throughout the spell. Lying snow significantly contributed to these very low temperatures.

The night of 27/28 November saw exceptionally low temperatures, particularly under clear skies and with lighter winds in the west. At Llysdinam, Powys in south Wales, $-18.0\text{ }^{\circ}\text{C}$ was recorded, a new November record for Wales, and $-11.9\text{ }^{\circ}\text{C}$ at Mucker Broughderg (County Tyrone) in Northern Ireland. On the following day Sunday 28 November, Llysdinam recorded a maximum temperature of only $-5.6\text{ }^{\circ}\text{C}$, and Castlederg (County Tyrone) only $-1.6\text{ }^{\circ}\text{C}$, again both November records. Many individual stations recorded their lowest ever November maximum and minimum temperatures.

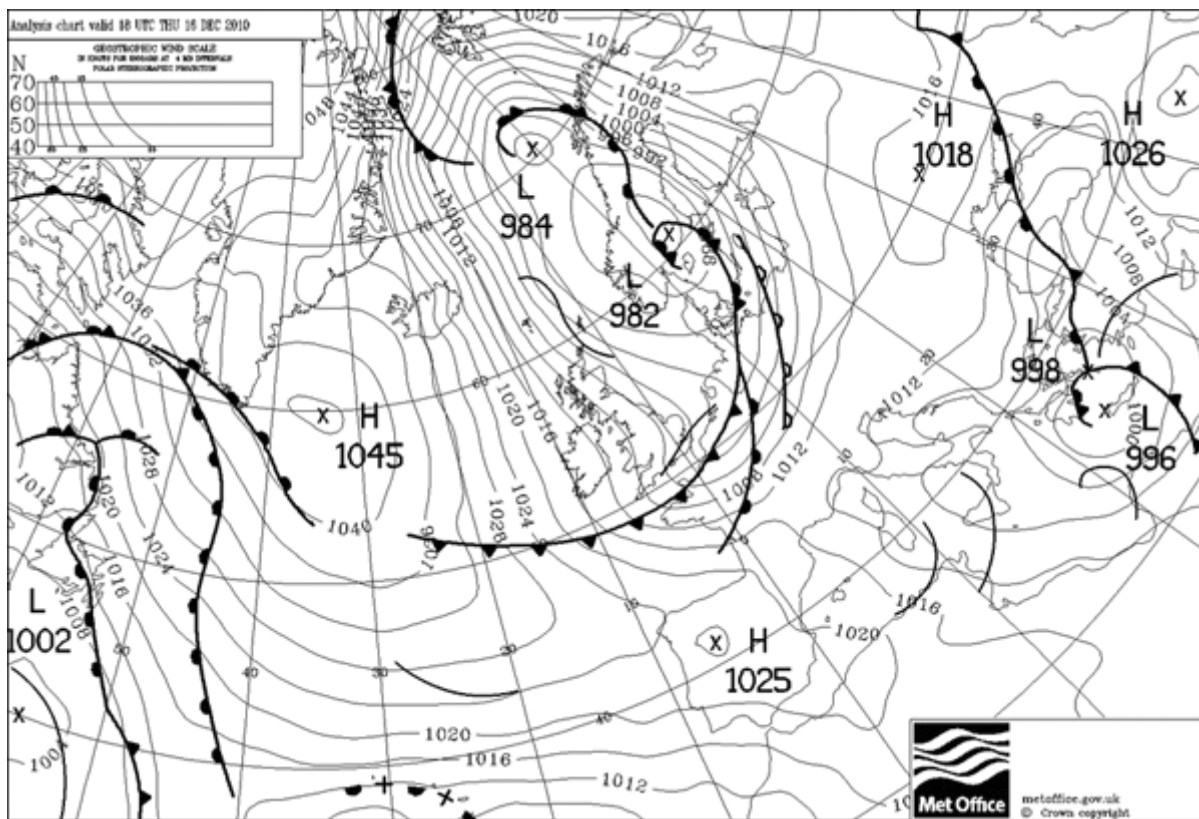
By 1 December, strong easterly winds in the south-east and the south coast of England made conditions feel even colder with severe wind-chill. Winds gusted to 47 Knots (54 mph) at Berry Head (Devon) and 41 Knots (47 mph) at Walton-on-the-Naze (Essex). With lighter winds, the lowest temperatures were in Scotland with Altnaharra (Highland) recording -21.1 °C on 1 December and -21.3 °C on 2 December, the lowest December temperature in the UK since 30 December 1995. The night of 2/3 December was again particularly cold with minimum temperatures across the UK widely -5 to -10 °C and -20.0 °C recorded at Ravensworth (North Yorkshire), the first time -20 °C had been recorded in England since January 1987.

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Snow 17 to 26 December 2010

Very cold air of Arctic origin pushed down across the UK from the north during Thursday 16 to Friday 17 December at the start of the second spell of severe weather bringing snow showers to northern Scotland, Northern Ireland, west Wales and south-west England (30 cm at Betws-y-Coed, Snowdonia and 23 cm at Edenfel, County Tyrone on the morning of 18 December, for example).

Figure 5: Synoptic situation at 1800 GMT on Thursday 16 December 2010. A cold front is followed by a bitterly cold Arctic airstream over the UK.



Snow fell across south Wales and southern England on 18 December, and there were further heavy snowfalls again across south-west England early on Monday 20 December (26 cm at Dunkeswell Aerodrome at 0900 GMT). An area of snow moved across Wales and central England on 22 December (21 cm at South Newington, Oxfordshire at 0900 GMT on 22nd) but after this, with pressure gradually rising across the UK, there was little further snowfall in the run-up to Christmas. However most of the country remained under lying snow in prolonged, bitterly cold conditions. Winds were generally light with sunshine during the day.

Figure 6: Snow depths at 0900 GMT on Monday 20 December 2010. The UK has once again almost complete lying snow coverage. Depths are significantly less in north-east England and eastern Scotland when compared to the start of the month (see map of 2 December 2010 earlier). However, lying snow is significantly deeper across Northern Ireland, Wales and south-west England.

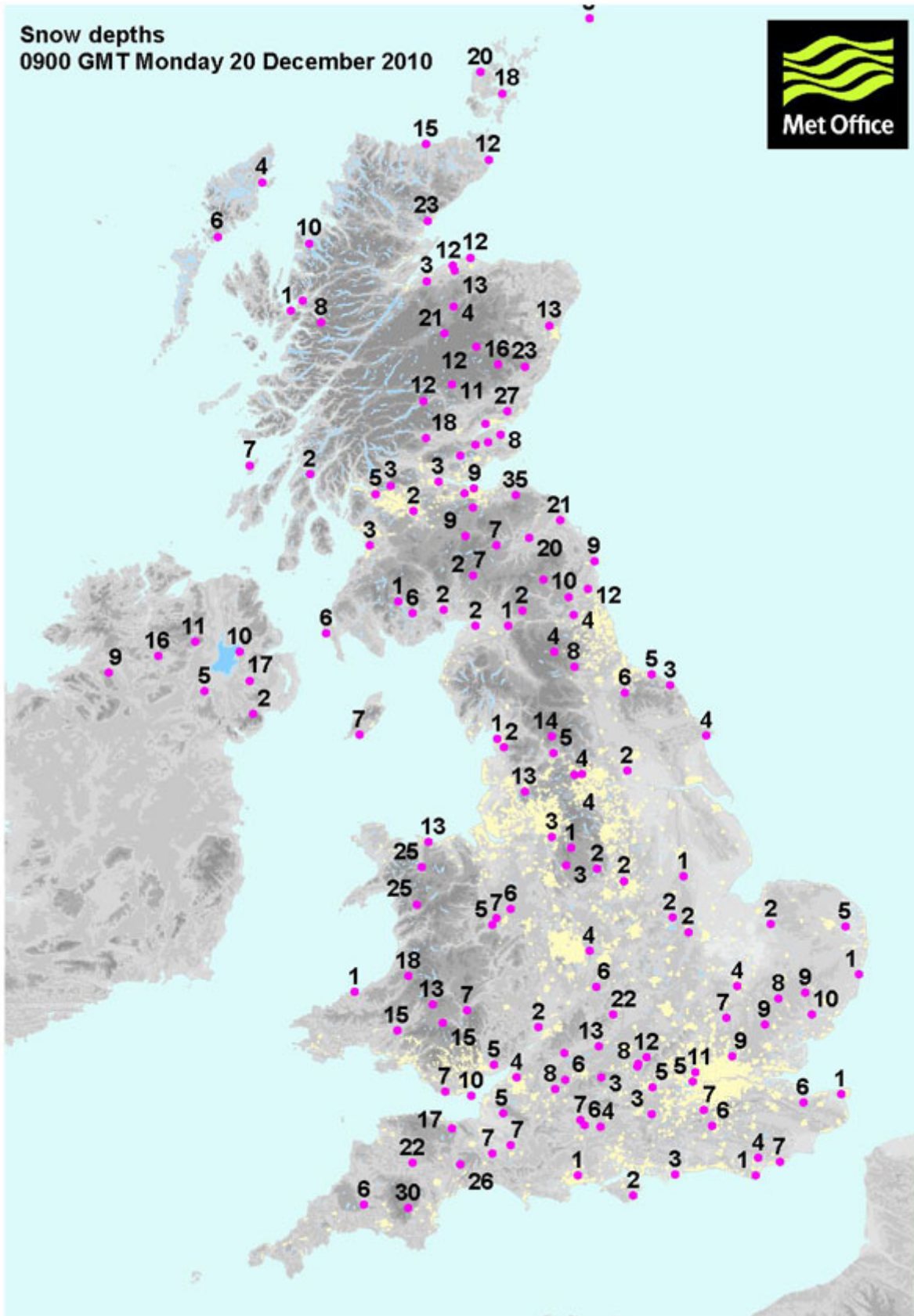
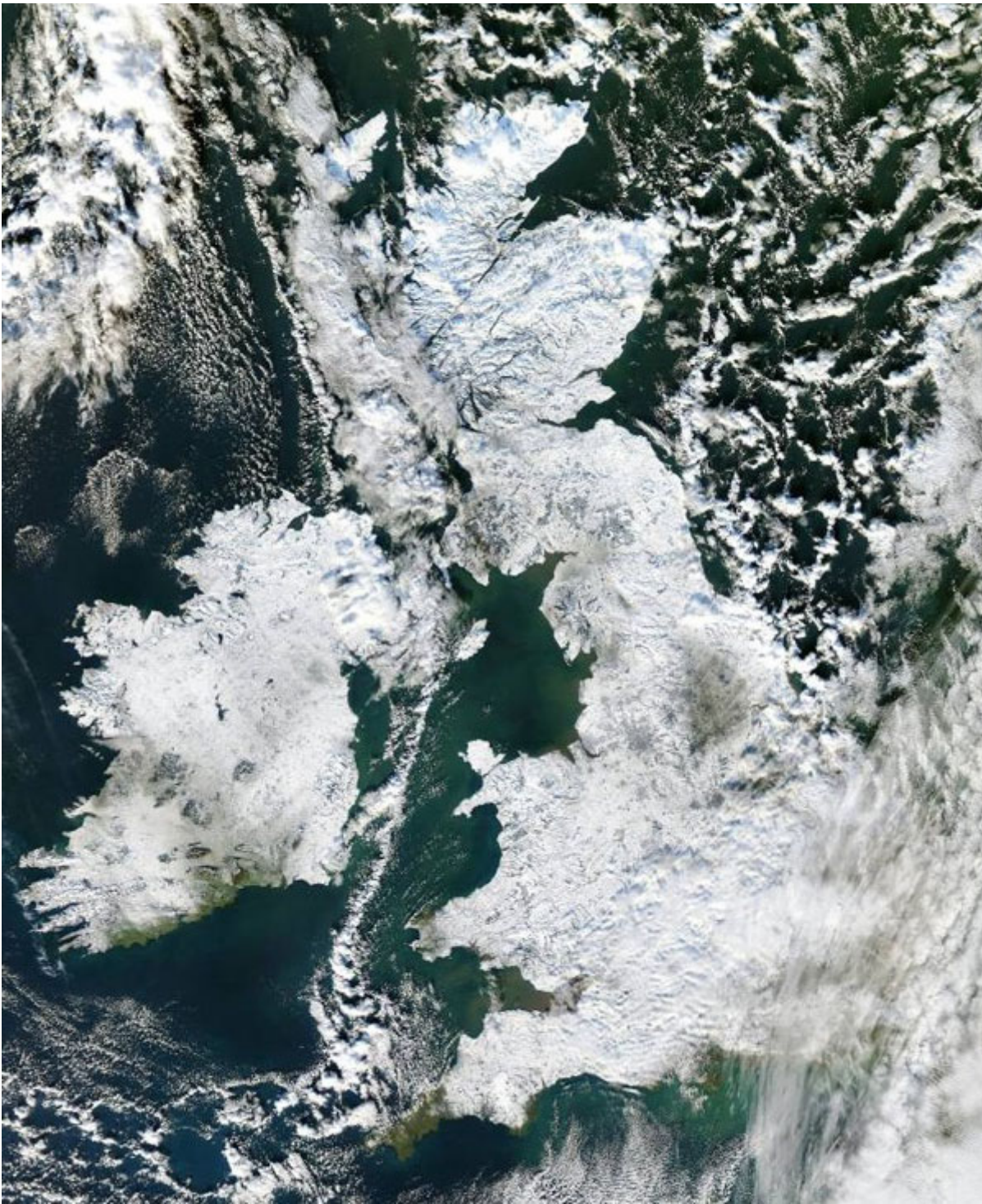


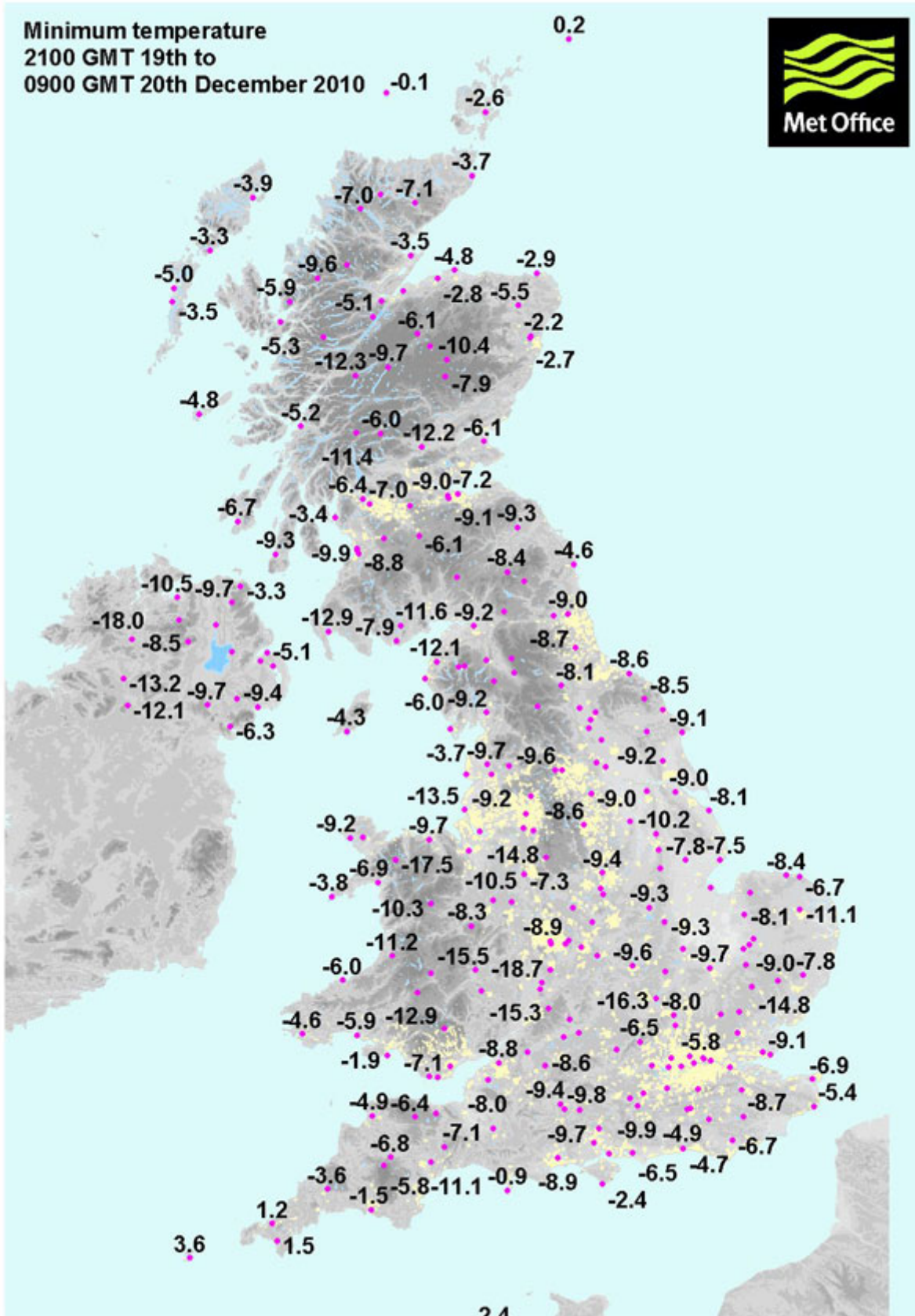
Figure 7: A satellite image of lying snow covering Great Britain and Ireland on Friday 24 December 2010, Christmas Eve, showing lying snow almost completely covering the UK, with the exception of a few areas (e.g. Isle of Wight and the far south-west of Cornwall). Even these areas experienced lying snow at the start of December. Image from the [NERC Dundee Satellite Receiving Station](#), Dundee University, Scotland.



Temperatures 17 to 26 December 2010

With the UK in an Arctic air mass and lying snow, temperatures remained exceptionally low in the run-up to Christmas - indeed this second spell overall was slightly colder than the first. Minimum temperatures on 19 December included $-19.6\text{ }^{\circ}\text{C}$ at Shawbury (Shropshire) and $-19.5\text{ }^{\circ}\text{C}$ at Pershore (Worcestershire), and $-17.5\text{ }^{\circ}\text{C}$ at Capel Curig (Gwynedd) on 20 December, for example. By 23 December minimum temperatures had fallen to $-20.8\text{ }^{\circ}\text{C}$ at Altnaharra (Highland), while in Northern Ireland, Castleterg (County Tyrone) recorded $-18.7\text{ }^{\circ}\text{C}$ on the morning of 23 December, the lowest temperature on record in Northern Ireland.

Figure 8: Minimum night-time temperatures from 2100 GMT on 19 December to 0900 GMT on 20 December 2010. Temperatures fell widely below $-10\text{ }^{\circ}\text{C}$ and it was particularly cold across Wales and Northern Ireland ($-18.0\text{ }^{\circ}\text{C}$ at Castleterg, County Tyrone)



Day time temperatures frequently remained well below freezing all day, with a maximum of only $-8.2\text{ }^{\circ}\text{C}$ at Pershore, Worcestershire on 19 December, for example. Northern Ireland saw temperatures remaining continuously below freezing from 19 to 26 December with a maximum temperature of $-11.3\text{ }^{\circ}\text{C}$ at Edenfel, County Tyrone on 23 December, again a new Northern Ireland record. This was one of the longest spells of sub-zero temperatures across Northern Ireland on record.

Figure 9 Maximum day time temperatures on Monday 20 December 2010. Although it was slightly milder along the south coast of England, most other parts of the UK remained well below freezing all day.

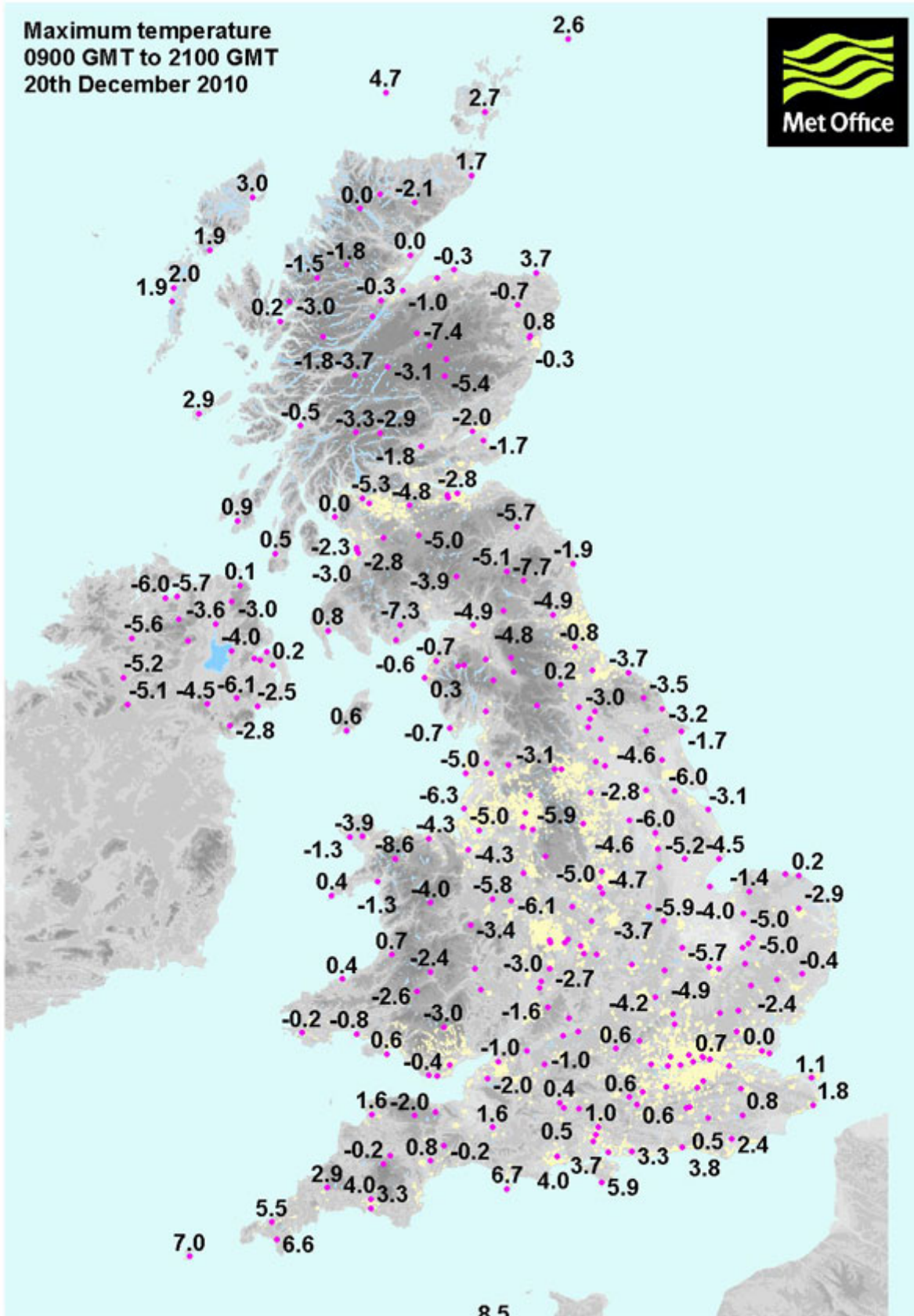
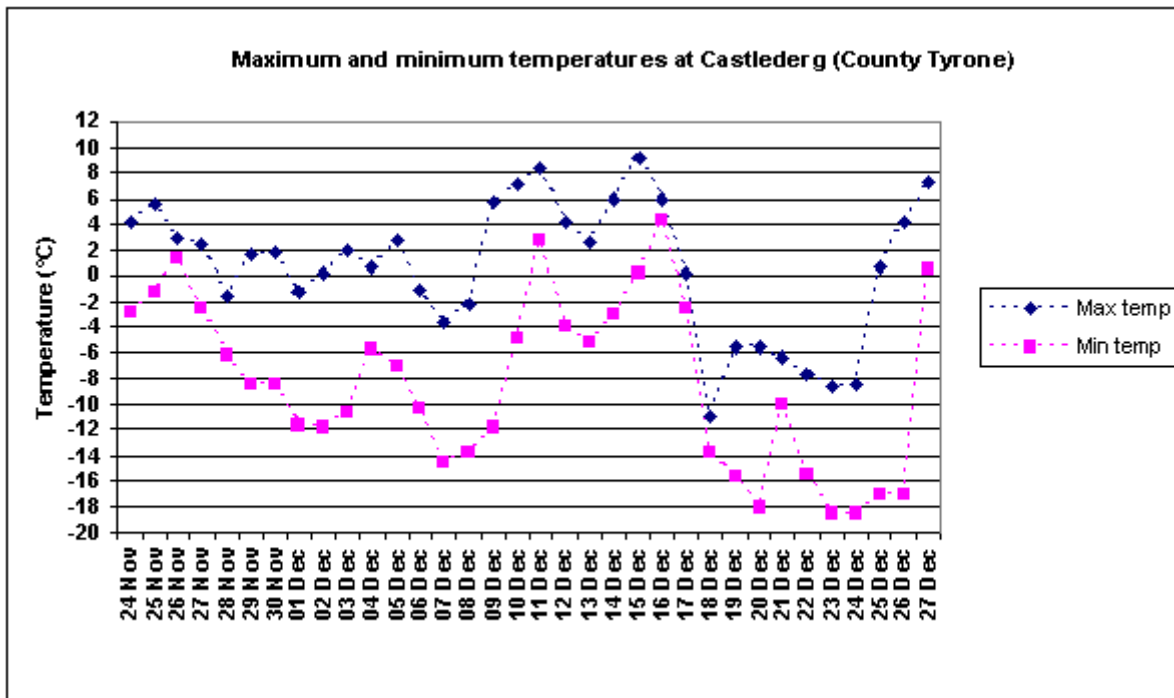


Figure 10: Daily maximum and minimum air temperatures* at Castledearg (County Tyrone) from 24 November to 27 December 2010. The spell from 18 to 24 December was exceptional and saw daytime maximum temperatures below $-5\text{ }^{\circ}\text{C}$ and night-time minimum temperatures on several nights between $-15\text{ }^{\circ}\text{C}$ and $-18.7\text{ }^{\circ}\text{C}$, a new Northern Ireland record minimum. Subsequently, water supplies in Northern Ireland were very badly affected due to frozen / burst pipes.



*Daily maximum air temperature between 0900 GMT on day D to 0900 GMT on day D+1 Daily minimum air temperature between 0900 GMT on day D-1 to 0900 GMT on day D

It remained bitterly cold across the UK through Christmas. Maximum temperatures on Christmas Day widely remained well below freezing (even in central London, St James' Park recorded a maximum of only -0.4 °C), and in south Wales Llysdinam, Powys recorded a maximum of -7.8 °C - a new December record for Wales. It was not until Boxing Day that a slow thaw eventually set in with gradually rising temperatures over the next few days.

Temperature records by country - November and December 2010

The following tables list lowest maximum and minimum temperatures in November and December 2010, compared to historical records. New provisional records are marked with an asterisk.

In Northern Ireland, a new minimum temperature record was set: -18.7 °C at Castlederg (County Tyrone) on the morning of 23 December 2010, beating the previous record of -17.5 °C on 1 January 1979 at Magherally (County Down). The normal maritime influence on Northern Ireland's climate means that temperatures as low as this are exceptional. New maximum and minimum temperature records for November and December were set in both Wales and Northern Ireland (refer to the tables)^. That new temperature records were set between 25 November and 26 December gives some indication of the severity of this spell, which was broadly comparable to that of late December 2009 to mid-January 2010.

^Records are based on mainly on digitised data from 1959. Please note that the existence of earlier paper records exceeding these values cannot be ruled out.

Lowest November minimum temperatures recorded, by country

Country	Minimum temperature	Location	Date	Record	Location	Date
England	-13.5 °C	Topcliffe (North Yorkshire)	28 Nov 2010	-15.5 °C	Wycliffe Hall (North Yorkshire)	24 Nov 1993
Wales	-18.0 °C*	Llysdinam (Powys)	28 Nov 2010	-11.7 °C	Welshpool (Powys)	9 Nov 1921
Scotland	-16.1 °C	Altnaharra (Highland)	29 Nov	-23.3 °C	Braemar	14 Nov

Northern Ireland	-11.9 °C	Mucker Broughderg (County Tyrone)	2010	(Aberdeenshire)	1919
			28 Nov 2010	-12.2 °C	Lisburn (County Antrim)

Lowest November maximum temperatures recorded, by country

Country	Maximum temperature	Location	Date	Record	Location	Date
England	-3.5 °C	Hunt Hall Farm (County Durham)	27 Nov 2010	-4.0 °C	Pontefract (West Yorkshire)	30 Nov 1978
Wales	-5.6 °C*	Llysdinam (Powys)	28 Nov 2010	-2.4 °C	Llanwddyn (Powys)	23 Nov 1993
Scotland	-6.7 °C	Altnaharra (Highland)	30 Nov 2010	-10.5 °C	Kinbrace (Highland)	29 Nov 1985
Northern Ireland	-1.6 °C*	Castlederg (County Tyrone)	28 Nov 2010	-1.4 °C	Armagh (County Armagh)	26 Nov 1977

Lowest December minimum temperatures recorded, by country

Country	Minimum temperature	Location	Date	Record	Location	Date
England	-20.0 °C	Topcliffe (North Yorkshire)	3 Dec 2010	-25.2 °C	Shawbury (Shropshire)	13 Dec 1981
Wales	-17.5 °C	Capel Curig (Gwynedd)	20 Dec 2010	-22.7 °C	Corwen (Denbighshire)	13 Dec 1981
Scotland	-21.3 °C	Altnaharra (Highland)	3 Dec 2010	-27.2 °C	Altnaharra (Highland)	30 Dec 1995
Northern Ireland	-18.7 °C*	Castlederg (County Tyrone)	24 Dec 2010	-16.1 °C	Katesbridge (County Down)	28 Dec 2000

Lowest December maximum temperatures recorded, by country

Country	Maximum temperature	Location	Date	Record	Location	Date
England	-8.2 °C	Pershore (Worces.)	19 Dec 2010	-9.0 °C	Lincoln (Lincolnshire)	17 Dec 1981
Wales	-7.8 °C*	Llysdinam (Powys)	25 Dec 2010	-5.5 °C	Moel Cynnedd (Powys)	31 Dec 1978
Scotland	-13.8 °C	Altnaharra (Highland)	21 Dec 2010	-15.9 °C	Fyvie Castle (Aberdeenshire)	29 Dec 1995
Northern Ireland	-11.3 °C*	Edenfel (County Tyrone)	23 Dec 2010	-9.0 °C	Boom Hall (County Londonderry)	27 Dec 1995

* denotes new provisional record

For a detailed summary of this event, refer to the following publication:

Prior J, Kendon M. 2011. The disruptive snowfalls and very low temperatures of late 2010. *Weather*, **66**: 315-320

Last updated: 16 June 2016

