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JANUARY 1809:
SYNOPTIC METEOROLOGY OF FLOODS AND STORMS OVER BRITAIN

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David E Pedgley

Aquatint by Robert Havell the younger of Wallingford Bridge in 1810 illustrating an early stage of reconstruction.

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by David E Pedgley

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January 1809: synoptic meteorology of floods and storms over Britain

David E Pedgley

Introduction

Towards the end of January 1809 severe and damaging floods affected large areas of Britain. This paper examines the extent, intensity and consequences of the floods, illustrated by numerous newspaper reports (with their well-recognised drawbacks) which attributed them to a rapid thaw of lying snow. It then looks at the weather systems leading up to the floods, based on daily weather observations made at a network of land stations, supplemented by abundant Royal Navy ships' log-books. After starting as a simple enquiry into the weather leading to the collapse of a particular bridge, at Wallingford, Oxfordshire (but formerly in Berkshire), spanning the river Thames, this examination developed into a case study of synoptic meteorology from the early nineteenth century.

Over northern Europe the winter of 1808-9 was very cold (Kington, 2010). By mid-January the narrowest part of the Gulf of Bothnia was already frozen, so that by March a Russian army was able to cross and invade Sweden from Finland (Lindgrén and Neumann, 1986). The severe weather had led to

> 'the rivers in Holland [being] frozen and no vessel can now approach near that coast for the ice.'
> *The Morning Post*, 21 January.

Two packets returning from Sweden to Harwich at the same time

> 'had a most miraculous escape from destruction; they were four days in the ice and were drifting with it into the Kattegat, where pressure of the ice in that narrow channel must inevitably have crushed them to pieces. Fortunately the wind shifted and they made their escape from the danger through sixty miles of solid ice by breaking it with heavy weights and other stratagems.'
> *The Morning Post*, 27 January.

Some records from Royal Navy ships' log-books confirm the severity of the weather. On board HMS *Superb*, beset in ice off Göteborg, armourers were put to making ice saws; and additional rations of spirits were issued to the ice cutters. Bits of condemned cable were used to prevent ice from chafing the side of HMS *Brunswick,* drifting beset for many days in the Kattegat. On the 26th, 'every possible method to break the ice with crow bars [and] capstan bars … but all proved ineffectual.' By the 28th 'a party of men [is] employed transporting the gun carriages from the ship on the ice' because of fears of grounding. (Next day it was noted that the carriages had sunk.) On the 31st, the sea was more open but 'passed by several pieces of loose ice which gave the ship many severe shocks.' Temperatures measured on HMS *Salsette* (apparently around dawn), drifting with the ice near Møn island, ranged from 14 to 26ºF [-10º to -3ºC] from the 16th to 27th.

With the winter so severe in northern Europe, it is not surprising that the persistent south-east winds reaching England brought freezing weather even after crossing the North Sea, with coastal sea ice reported in several places. For example:

> 'In the course of last night [20th] much damage has been done amongst the shipping and small craft in the river Thames, below bridge, the floating ice

> having cut the cables of several vessels, which drifted in consequence from their moorings, and were carried away with velocity by the tide towards London bridge; one vessel run her bowsprit under the centre arch, and the crew, to prevent her passing further, went aloft and lashed her foremast to the ballustrading, but such was the force of the flood, that this barrier soon gave way, and about 15 yards of the stone work fell into the water. Four men were killed by this accident, and it is feared the solidity of the bridge is much shaken.'
> *Caledonian Mercury*, 21 January.

At Harwich, HMS *Urgent* recorded 'a great quantity of ice drifting past' at midday on the 20th; and in Hull Roads, HMS *Onyx* recorded 'much ice running' at midnight on the 21st.

> 'Some damage was done by the breaking up of the ice at Newcastle on Saturday last [28th], but Shields harbour exhibited a very distressing scene. The pressure of the ice was so great as to force almost every vessel on both sides of the harbour from their moorings. Between 20 and 30 of them were driven on the Herd Sand, the Muscle Scarp, and the Black Middens, but most of them got off in the course of the day, considerably damaged. Several vessels are gone to pieces. Sunderland harbour presented nearly a similar scene.'
> *Caledonian Mercury*, 2 February.

HMS *Bloodhound*, anchored at North Shields, recorded on 29 January:

> 'Came down with the ebb, immense quantities of ice …; a brig came athwart the hawse of us [causing much damage]; made us drive a considerable way down the river'.

Following a largely snow-free first half of January, persistence of the cold weather during the latter half allowed a succession of four spells of snow to affect the British Isles. Representative of the weather sequence experienced widely are the following extracts from two diaries for January 1809. The first was kept by William Holland, vicar of Over Stowey, in north Somerset (Ayres, 1986).

> 14th. In coming down the stairs some flecks of snow fell and more since has come down.
> 16th. The snow still increasing.
> 17th. Still deep in snow and a very hard frost.
> 18th. The coldest morning this season and the snow falling fast.
> 22nd (Sunday). A most deep and serious snow … the path is so high with snow that people must work to clear it, so it is resolved there will be no prayers … I never remember such a thing before and I have been vicar of the place these thirty years.
> 24th. A most quick and remarkable thaw, the morning very misty and rainy … the most uncomfortable day I ever remember, everything moist and slutchy [slushy].
> 26th. The waters out everywhere and have done much damage.
> 27th. The waters still out.
> 28th. The morning is very mild, open and pleasant.
> 29th. … ventured this day to Dodington through most rainy and tempestuous weather.
> 30th. Still very windy and rainy. Barometer so low that the marker will not follow it. This evening from five to nine o'clock had the most terrible

wind I remember.

31st. A fine pleasant mild morning but the havock of the wind is everywhere. The church is stripped and so is my house in three parts … all the houses in Stowey have been damaged … and the tiling of the church.

The second diary is that of John Carrington senior, of Bacons Farm, Bramfield, near Hertford (Branch Johnson, 1956)[1].

19th. … great snow all the way to church.
21st. Distressing sharp weather.
22nd. Not to church, but snow all day. Great snow, sharp frost weather.
23rd. Sharp frost and snow.
25th. Water I never saw so much before on the Bramfield road. Great flood.
26th. To Ware to see the waters as a great flood … found the waters very great at Ware, it ran throw some of the howses at Amwell End.

The repeated falls led to widespread accumulations, up to a metre in places and no doubt more over upland areas, thus providing a source for the subsequent floods. But once the thaw set in it was rapid. For example, on the 27th the snow had gone in Birmingham; and on the same day the Edinburgh record stated 'snow melting rapidly and streets in a slush', and on the next day 'of the great mass of snow on the ground yesterday morning only little spots here and there to be seen'. Likewise, the record from Invery, near Banchory, Aberdeenshire, on the 29th was 'little snow on the ground [but] ground still full of frost', which illustrates the point elsewhere that although the snow may have gone, the ground remained frozen because the frost had been severe and persistent.

The floods: widespread disaster

To illustrate the extent, intensity and consequences of the floods, the following reports have been taken from newspapers at the British Library available online[2]. For example, the 4 February 1809 (Saturday) issue of the weekly provincial newspaper *Jackson's Oxford Journal* reported the flood damage to the above-mentioned ancient stone bridge at Wallingford:

> `In addition to the many accidents occasioned by the late floods, we are concerned to state that … the centre arch [sic – arches] of the bridge over the river Thames, at Wallingford, fell suddenly into the water: a carriage and many people were passing over the bridge a few minutes only preceding the accident, but providentially no person was hurt.'

A contemporary illustration (Fig.1, next page and Frontispiece) records the reconstruction needed along with a temporary wooden bridge.

We have a record of the local weather at the time made by John Batcheler, curate of Sutton Courtenay, next to the Thames some 12 km WNW of Wallingford. He noted in the parish register that on 19 January 1809

> 'the thermometer below 24º [F, i.e., -4.5ºC][3] for the greatest part of the day, there fell a rain which froze immediately on touching the ground or any plant. In a day or two after it was succeeded by a deep fall of snow which lay on the

[1] originals at Hertfordshire Archives and Local Studies, DE/X3/1-13
[2] for example: The British Newspaper Archive, http://www.britishnewspaperarchive.co.uk. For the 19th Century British Library Newspaper Database, see www.bl.uk.
[3] Temperatures in the records were always in Fahrenheit. Conversions to Celsius are approximate.

ground till the twenty-fourth when it began to thaw, & rain, which melted the snow so suddenly, the ground being covered with ice under it from the frozen rain above mentioned, that there was the highest flood ever recorded; it exceeded the flood in 1775 by more than fifteen inches [0.4m] perpendicular.'[4]

Fig.1: Aquatint by Robert Havell the younger of Wallingford Bridge in 1810 illustrating an early stage of reconstruction.

Batcheler's account of the local weather is confirmed in greater detail by observations taken regularly three times a day at the country home of the Bishop of Durham next to the Thames at Mongewell, 2 km south of Wallingford (Table A). From the 14th to the 23rd, with winds mostly having an easterly component, temperatures remained near or below freezing. The rain mentioned at Sutton Courtenay was also noted at Mongewell but not as 'freezing rain' even though temperatures were below 32ºF. Temperatures rose to the 30s F [3 to 4ºC] on the 24th and 25th, and the mid-40s [about 8ºC] were reached from 26th to 30th once south-west winds had set in. There was some snow on the 15th and the notable fall of freezing rain and 'hail' on the 19th (with more on the 20th), then two further snowy spells – 22nd and the night of 23rd-24th – changing to rain all day on the 24th and continuing into the following night.

Elsewhere in the Thames valley, floods were widespread, as the following newspaper extracts illustrate. Locations of places mentioned are shown in Fig.2.

[4] Berkshire Record Office: D/P128/1/4, p. 42

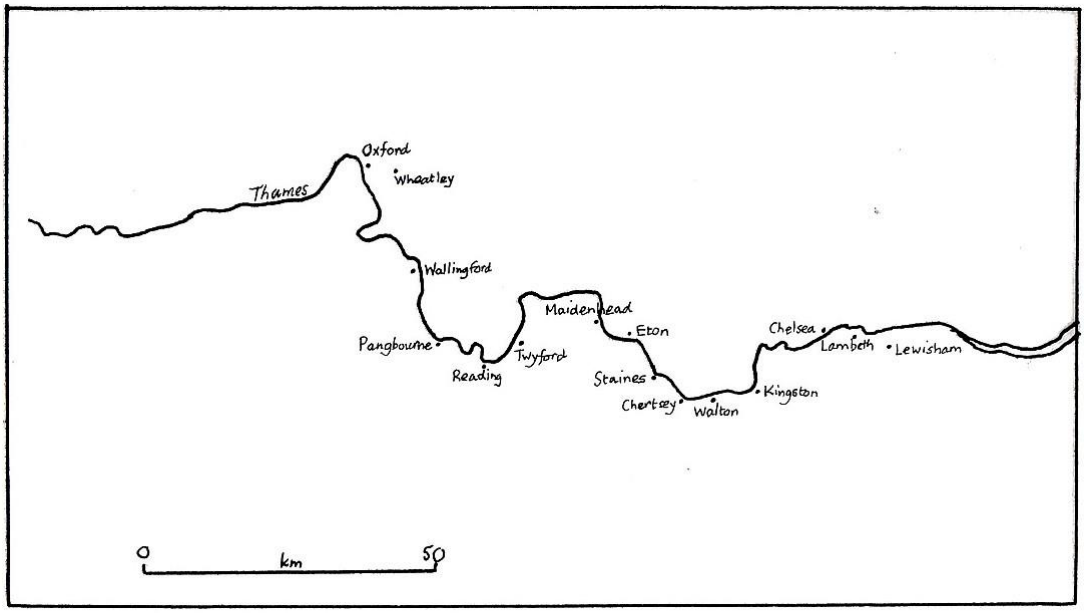

Fig.2: Places in the Thames valley where flooding was recorded in January 1809.

Oxford

> 'The sudden thaw of a great accumulation of snow, accompanied by much rain, has produced in this neighbourhood a flood of greater extent and depth than has occurred here for the last thirty years. Several streets in the suburbs of this city have been inundated, particularly in St Thomas's parish, where the water runs in torrents through the streets, the inhabitants being obliged to remove to their upper apartments. The beautiful walks around Christ Church and Magdalen meadows, which have been of late years considerably heightened, and judged to be above high water mark, are completely covered.'
> *Jackson's Oxford Journal*, 28 January.
>
> '…the waters have increased to such a degree as to render many of the roads in this neighbourhood utterly impassable; that from this city to Abingdon is in several places three to four feet deep; [in] the parish of St Thomas, the village of South Hinksey and many other, the inhabitants have fled to the upper stories and the only means of conveying them sustenance is by boats.'
> *The Oxford University and City Herald,* 28 January.

Reading

> 'The sudden thaw has produced effects in this town and the roads in the neighbourhood which have been scarcely paralleled at any former period. The water produced by the melting of a vast body of snow has rendered some of the roads quite impassable, and the torrents which have thus been caused has [sic] done very considerable damage.'
> *Reading Mercury,* 30 January.

At nearby Pangbourne, some 10 km upstream from Reading,

> 'During Friday and Saturday [27th and 28th] a most distressing scene appeared; [the flood] was in many houses upwards of two feet [0.6m] deep, and in most from a

foot to eighteen inches [0.3-0.5m]; many families were obliged to leave their houses, and most of the inhabitants were driven to their upper stories. Boats were rowed about the village … A great deal of valuable timber has been washed away from the boat builder's wharfs at that place.'
Reading Mercury, 6 February.

Eton

'On Saturday [28th] the Duke of York waited on the King [but he] could scarce get to Windsor for the flood … the College is overflowed. The water came into His Royal Highness's carriage, and he was obliged to get out, and get into a cart to be conveyed through Eton. On his return he rode his horse as far as he could, and was then conveyed to his carriage in a boat. The inhabitants … are obliged to live up stairs, and provisions are conveyed to them in carts and boats, as is the case in all the villages round. The stages cannot go into Windsor, and are obliged to put their passengers and luggage into boats and carts.'
The Mirror of Fashion, 30 January.

Staines

'On Saturday night [28th-29th], as the Exeter mail was on its way from London … the [coachman met] water so deep that the coach floated and the horses swam. The passengers were got out after considerable difficulty, and the horses were disengaged from the coach; the bags of letters sustained but little injury and were conveyed in a post-chaise, accompanied by another post-chaise with the passengers. The coach could not be got out. The whole country around is in the most distressing state; it is covered with water from Chertsey to Maidenhead. The towns are surrounded with floods, running in torrents as high as the parlour windows. Numbers of poor inhabitants have nearly lost their all, which has been carried away in the streams; and in addition to their distress … the country is in such a state that they are not able to do any work; many cannot get out of their houses to purchase food, and what they do procure is put in at their first floor windows.'
The Morning Chronicle 31 January.

Kingston

'…was so completely inundated on Sunday [29th] as to render it impassable by carriages of any description, and the inhabitants were punted to and from their residences. All the houses and offices next the Thames were approachable only by boats; and at Hampton Wick, Thames Ditton, Walton and Sunbury (all near Kingston), many cottages and buildings on the banks of the Thames were washed from their foundations.'
Jackson's Oxford Journal, 4 February.

As for London,

'In Dorset-street, Portman-square, the common sewer has blown up, and left a dreadful chasm … In the neighbourhood of Kennington and Vauxhall, a torrent of water has arisen, which in its progress has carried away furniture, trunks of trees, cattle, etc and has destroyed a great number of bridges.'
Gentleman's Magazine, 1809, p. 83

'Although Sloane-street stands upon high ground, the kitchens are all flooded.

> In many parts of this [Chelsea] and other neighbourhoods near London, persons have been obliged to get in and out of their one pair of stairs windows.'
> *The Times*, 27 January

> 'It will be impossible to ascertain the damage done until free access can be obtained to Lewisham, which, as yet, is totally impracticable, the water in Mill Lane being still as high as the window cills of the ground floor … all the gardens, outhouses etc within reach of the torrent, are entirely destroyed. In Lambeth all the lower apartments of some hundreds of houses are three and four feet under water; and throughout the metropolis, and its neighbourhood, few houses have escaped a drenching from top to bottom, excepting those from the roofs of which the inhabitants took the precaution to have the snow removed previous to the commencement of the thaw. The principal part of Chelsea was under water during Wednesday night [25th-26th], and there was no passing but by boats and carts, to take persons to their own homes. In short, a more extensive inundation has not been known, in and near the metropolis, in the memory of the oldest inhabitant.'
> *The Examiner*, 29 January.

Similar scenes were reported widely across much of England but fewer in Wales and Scotland, and none in Ireland. The fewer reports from the north of England perhaps reflect a lack of available provincial newspapers, although it is more likely that floods there were less widespread, otherwise they would probably have been reported in more southern papers, which often repeated news from other parts of the British Isles.

A desperate state of affairs rapidly developed in many places. In cities and towns, a great deal of distress was caused in low-lying parts by water flowing through cellars, shops and ground-floors of buildings, so that goods were washed away or made worthless, and inhabitants had to retreat upstairs and be supplied with food and fuel through windows from boats and carts. Work was disrupted, streets were filled with torrents carrying away all manner of debris, buildings had to be abandoned, or they collapsed killing or injuring their occupants. Many people lost their all and were totally ruined. Committees were hastily set up to collect donations for emergency relief to the needy. Travel was impossible on foot and could be dangerous even for carts and carriages.

In the countryside, vast areas were inundated, and livestock were drowned before their owners could get them to higher ground. Barns were flooded, and waggons, field gates, fences and hay ricks were carried away. Coach services were interrupted and mail was got through by using circuitous routes; carters misjudging the depth of water on the road lost their horses and farmers had their crops destroyed. Along rivers, traffic was delayed, barges sunk, mills stopped working and weirs were damaged. In many places this was the worst flood for decades or 'beyond the memory of man'.

The following extracts illustrate the extent and severity of the floods at places beyond the Thames valley – the locations of places mentioned are shown in Fig.3 (page 8). It is likely that other accounts exist but are difficult to find because catalogues of libraries and record offices are seldom sufficiently detailed to highlight specific flood or weather content of records.

Fig.3: Places across Britain where flooding was recorded in January 1809.
For additional places in the Thames valley, see Fig.2.

In Exeter,

> 'the continued fall of rain and snow which we have experienced for some time past occasioned the waters of the river Exe to rise to a most tremendous height. The parish of St Thomas the Apostle …, the Exe Island, and the lands adjoining were completely inundated. In the afternoon of Tuesday [24th] the streets in St Thomas exhibited a most melancholy appearance, the shops were shut, being full of water, and the inhabitants obliged to betake themselves to their upper rooms; at this time trees, field-gates, wrecks of various descriptions, and a number of sheep, were bore away by the rapidity of the current. At 4 o'clock this morning, the water attained its greatest height,

which appears to have been about 2 in [5cm] higher than the memorable inundation in the year 1800.'
Trewman's Exeter Flying Post, 26 January.

But the people of Bath had worse to bear, where

'… the accidents have been more fatal and numerous. Three houses in Bedford-street washed down; seven lives lost. James and Joseph Estcourt were at breakfast with their families when the house gave way, in which the wife of the former was killed. James was drawn up by the hair of his head, but had received a compound fracture of his right arm… Joseph preserved the lives of himself, wife and five children; but they have lost every atom of property they possessed. [By the time of the subsequent inquest, ten bodies had been found but it was feared that others remained undiscovered.] All the cellars and store-houses on the low ground adjoining the river inundated, and considerable quantities of liquors, etc materially injured or destroyed; timber, to an immense amount in value, horses, cattle, hay-ricks, wagons, carts, etc, etc carried away: the lower apartments in Pulteney-street were entirely inundated, the Avon having swollen nearly to a level with the pavements of the North and South Parades. The following interesting circumstance, among many others, may be relied upon: the child of a poor woman, whose apartments had been inundated, was observed floating in a cradle down the rapid stream; the spectators on the South Parade were agonized at the sight, the infant now and then endeavouring to raise itself and excite attention. Fortunately the little innocent was preserved by means of some bargemen near the Old Bridge, and restored to its distracted mother… The inhabitants on the Quay, Horse-street, Milk-street, and all the old lower parts of the city, were obliged to take themselves to their upper apartments, and many of them deprived of food and fuel during the day and subsequent night and morning. Boats were employed on Friday [27th] to convey such relief to the wretched sufferers, as there was a possibility of affording them; but many are totally ruined by this merciless visitation.'
Trewman's Exeter Flying Post 2 February.

In Bristol

'Broadmead, and every other street in its vicinity, became the channel for the overflowing of the Froome, which burst its banks .. and soon inundated the lower apartments of every house in the neighbourhood. On Thursday [26th] morning the Exchange exhibited a scene of confusion and anxious enquiry, never perhaps before witnessed – the London mail which should have reached that city the morning before, had not arrived; and rumour was busy in accounting for its delay. About two the mail-bags arrived, brought by the guard on horseback. The mail had been detained at Chippenham. The Exeter mail also could not proceed farther than Bath Easton; the bags brought by the latter were conveyed to Bath on foot, by a circuitous route by the guard.'
Trewman's Exeter Flying Post, 2 February.

In Salisbury

'The inundations in this city and neighbourhood, in consequence of the rapid thaw and melting of the snow, have been deeper … than at any period since the year 1774. Farmer John White of West Harnham, has sustained a heavy loss by the water rushing into his barn, and carrying off and damaging a large

quantity of wheat; and many of the houses in that village had the water a considerable depth on the ground floor. Two houses on the south side of the Close of Sarum had the water a foot deep on the ground floor, and the cellars in the Close were generally filled with water …'
The Oxford University & City Herald, 4 February.

Near Stony Stratford

'A very distressing accident happened early on Friday [27th] morning … The driver of Mr Pickford's waggon … supposing he could pass through the water with his team, made the attempt, when the wagon was overturned, and the driver and nine horses were drowned. The depth of the water was so increased by the flood, that not a vestige of the wagon was to be seen above the surface, and it was upwards of six hours before the accident was discovered.'
Jackson's Oxford Journal, 4 February.

In eastern England, at Chelmsford

'The sudden thaw of the great body of snow which had accumulated … occasioned, on Wednesday [25th], one of the greatest floods ever remembered … By twelve o'clock their waters [of the rivers Cann and Chelmer] had risen to such an extraordinary height, as to completely inundate the cellars, lower apartments, and out-buildings of all the houses on the south-west side of the lower part of the High-street … extending above the old House of Correction, through the interior of which, as well as through the gate-ways and passages of other houses nearer the bridge, the water rushed in violent torrents, rendering that part of the town impassable for pedestrians.'
The Ipswich Journal, 28 January.

'A considerable fall of rain had occurred in the night of Tuesday [24th]; this … caused so rapid a swell that soon after nine the following morning the flood increased with such impetuosity, as not to give many of the inhabitants time to take the necessary precautions of removing their furniture. At five in the afternoon the inundation began rapidly to subside, and at nine had entirely receded from the streets and lanes.'
The Oxford University & City Herald, 4 February.

and in Bury St Edmunds

'The very rapid thaw which commenced on Tuesday se'nnight [24th] caused the water to rise near the Eastgate-bridge … to an unusual height on Wednesday last [25th], insomuch that the passage was rendered extremely dangerous that evening, and still more so on the following night …'
The Oxford University & City Herald, 4 February

In Norwich

'The inundation …, by the sudden and rapid thaw, was greater than has been known for many years. St Martin's at Oak, and many other parts were impassable but by carts and boats, three of the latter plying all day on Saturday [28th] in St Martin's. On [that day] a boy about seven years old fell into the river [Wensum] at the Duke's palace and was carried by the rapidity of the stream through Blackfriars and Fyebridge, when he was drawn out by a man in a wherry …'
The Oxford University & City Herald, 4 February

At Ely

'… the waters here have been higher, by six inches [0.15m], than ever remembered, and the gale of wind on Sunday 29th just at high water, presented such a spectacle as may be conceived, but cannot be properly described. The waters rolled over the banks (as I rode along) in a truly terrific state, and the distress of the inhabitants of the Fens was extremely pitiable. At length the banks gave way in most directions … involving houses, cattle, stacks, corn and every thing, in one general ruin. The damage is estimated at more than half a million [about £15 million today].'
The Times, 7 February

'… the bank of the 100 foot (New Bedford) river broke on Tuesday [24th] evening in 2 places, near Denver sluice, into Hilgay and Littleport fens …; also the bank of the Ouze (or Ten Mile river) above Denver sluice …; the Old Bedford river's bank is also broken , and the waters from thence now running into the fenny parts of the parish of Upwell. Tuesday the river Nene overflowed the turnpike road near Otwell toll bar, forming one sheet of water in common with the overflowed lands in Otwell.'
The Ipswich Journal, 4 February.

'The west and south sides of Downham have the appearance of seas, there being about five feet [1.5m] of water on hundreds of acres of land. It is estimated that the inundation has expended more than 15 miles [25km] in length, and that above 150,000 acres of land are completely flooded. … numbers of sheep have been lost, and the difficulty of finding food for those preserved is such, that many persons have been compelled to sell at a certain loss, particularly as it is so near yeaning [lambing] time. Many persons removed their stacks of oats from the lands on to the embankment, but their labours proved ineffectual, as the high wind on Sunday se'nnight [29th] completely dispersed them. The coaches from London to Lynn, through Downham and Ely, have not travelled since Thursday se'nnight [26th], but were expected down again on 7th [February], as a great number of men were employed on Littleport Bank, in order to render it passable, who worked all Sunday last [3 February]'
The Times, 10 February

Further west, at Worcester

'1809 … the 29th of January, the water at the Water Gate rose to within … 8 inches [0.2m] of the lower edge of the stone fixed in the wall to commemorate the flood on the Severn in 1795, on the North Parade near the bridge'.
A concise history and description of the city and cathedral of Worcester, 2nd ed. (1816) Anon.

'… the excessive floods that have succeeded the rapid thaw of last week … have not only occasioned the Severn to overflow its banks, and inundate the neighbouring country to an amazing extent, but torrents of water have poured from the hills in various directions with such violence as to sweep away every thing before it, and the roads in many places are rendered totally impassable; a number of horses, sheep, and cattle have perished from the owners not being able to get them off the low grounds before the water surrounded them.'
The Oxford University & City Herald, 4 February.

and at Gloucester

> 'the streets and lanes in the lower part of this city, were three or four feet deep … Travelling has been impeded on most of the roads. No coach from the westward has come into, or departed from this city, for some days, the high causeway from the Westgate-bridge to Over and Maisemore being several feet under water, and such a rapid current running over it as to render passing unsafe, either in carriages or on horseback. On Saturday [28th] evening the inundation appeared at the height, when it was about six inches [0.15m] lower than the remarkable flood in February 1795. Two butchers … had a narrow escape from drowning, on their way home in their carts, from our market on [that] evening. The water upon the road, about a mile and a half [2.5km] from this city was so deep, that [one of them] finding that his horse had lost his footing, and in risk of being carried away, leaped into the stream to guide him; but, notwithstanding his utmost efforts, the poor animal was drowned, and the owner, with the utmost difficulty, extricated himself from a similar fate.'
> *The Oxford University & City Herald*, 4 February.

In Lincolnshire

> 'The roads to Gainsborough are in such condition, that it is necessary to convey the mails etc in boats. On Thursday [2nd] the water had so far subsided on the road, that a man attempted to go on horseback to a neighbouring village, but had not proceeded far before he was drowned. About Doncaster, the inundations are greater than ever remembered.'
> *Trewman's Exeter Flying Post,* 9 February.

At Nottingham

> 'A sudden thaw on the 26th, accompanied with heavy rains, occasioned the highest flood … Its greatest altitude was at eleven a.m. of the 28th, when it was two feet 7½ inches [0.19m] lower than its remarkable predecessor [of 1795]. No flood, it is believed, ever rose more rapidly, or receded more slowly. The mischief it occasioned was considerable, especially in the houses of the lower part of the town. A liberal subscription was raised, to afford the sufferers pecuniary relief.'
> Sutton, J. F. (1852) *The date book of remarkable and memorable events connected with Nottingham: 1750-1850.* p. 285.

In Carlisle, . '…from the 13th to 27th we had a most intensely severe frost, accompanied with a strong penetrating east wind; on the 23rd, 24th and 25th, an excessive quantity of snow fell, the average depth of the whole about twenty inches [0.5m]: a mild thaw with heavy rain commenced on the 27th; melted the snow suddenly, which swelled the rivers here beyond their bounds to such a degree, that immense damage was done, and much private property destroyed.'
The Monthly Magazine, 27:111.

> The rivers Eden, Calder and Pettril swelled beyond their banks to a height scarcely ever remembered.' 'The river Esk overflowed all the low ground in the vicinity of its course. It has swept away … the stone weir [at Netherby] … [and the Eden] a recently erected embankment … at Rockcliffe ..'
> *The Athenaeum*, V, p. 251.

In Wales

> 'The floods greatly retarded the arrival of the coaches [in Swansea] from London. On Monday and Tuesday last [23rd and 24th] the mails were 16 or 18 hours beyond their usual time. The waters having since subsided, they now come in nearly as before. A great part of the town of Llanelly was inundated, and the water entered the house of an old man who had resided in it upwards of 54 years, without having before experienced such a visitation. Brecon was similarly circumstanced … The river Wye rose higher than has been known for many years, and the flood swept from its banks everything that could not withstand its fury; vast quantities of timber and other articles floated through Chepstow-bridge'
> *The Cambrian*, 3 February.

Local runoff led to maximum river height on 24 January or thereabouts, but along major river valleys, where water took time to spread downstream, it was a few days later – e.g., nearer 28 January along the middle and lower Thames, and the Severn at Gloucester. (For further references, see the database Chronology of British Hydrological Events.[5])

Not surprisingly, many bridges were damaged, apart from the one mentioned at Wallingford. For example, at Wheatley, near Oxford

> 'A part of the old bridge [over the river Thame] has given way, and the greatest apprehensions are entertained that the works carrying on there, for the improvement of the said structure, cannot stand the violence of such a rise of water, which was measured at one time to be upwards of 12 feet [3.7m] above the bridge.'
> *Ipswich Journal*, 4 February.

Along the Thames

> 'The beautiful bridge between Pangbourne and Whitchurch is very materially damaged, inasmuch that it is feared it must undergo a thorough repair.'
> *Reading Mercury*, 6 February.

and

> 'The bridges at Twyford, on the London road [from Reading], being broken down, and the road thereby become impassable, the [Thames] Commissioners have had several meetings on the subject, and the public may be assured that the bridges will be repaired, and rendered passable, as soon as possible.'
> *Reading Mercury* 30 January.

In Devon,

> 'On Tuesday last [24th], as the mail from Exeter to London was passing Feniton bridge [newly built over the river Otter], about five miles [8km] below Honiton … the guard thought he perceived the bridge sinking, and immediately called out to flog on, which was instantly obeyed by the coachman and postillion, and, happy to relate, by so doing, they were preserved from immediate death, for within five minutes the bridge gave way and sank into the flood, which was nearly 10ft [3m] deep.'
> *Hampshire Telegraph and Sussex Chronicle,* 30 January.

Also in Devon

> '… the centre arch on the main river [Exe] at Cowley-bridge has fallen in; and Bickleigh-bridge [also on the Exe] is so damaged as to render the road to

[5] at www.trp.dundee.ac.uk/cbhe/welcome.htm.

Tiverton impassable.'
Trewman's Exeter Flying Post, 26 January.

Near Ipswich

'Constables were placed on each side of [Handford] bridge to warn persons of their danger, as holes of 2 and 3 feet deep were gulled in several places from the impetuosity of the current.'
The Ipswich Journal, 4 February.

At Newport, near Telford

'Early on Friday morning last [27th] the *Defiance* Manchester stage coach, on its way from London, was overturned on the North-bridge. From an over-flowing of the water, in consequence of the thaw, and the great rapidity of the current, several large holes had been washed in the bridge, but at the time of the accident were entirely imperceptible. The passengers, three insides … sustained no material injury. The coachman and guard, though precipitated into the stream, fortunately escaped without any other harm than a complete ducking'.
Jackson's Oxford Journal, 4 February.

In Wales,

'… the bridge over the Usk at Crickhowell was carried away'.
The Cambrian, 2 February.

Lastly, in Scotland

'Much damage has been sustained by violent floods on the Etterick [a tributary of the Tweed] during the last rain [undated]; besides other damage, the beautiful new bridge built over the Yarrow [another Tweed tributary], two miles from Selkirk, … was entirely swept away.'
Caledonian Mercury, 2 February.

Further north, The Inchinnan Bridge over the Black Cart Water near Paisley, collapsed in a flood (Brotchie, 1914).

Before the onset of thaw and flooding, the persistent frost had caused an inconvenient freezing over of rivers. In London, at the Mark Lane Corn Exchange, on 23 January:

'… not a single vessel fresh up from those counties [Essex and Kent] or any other, nor have the working craft on the river [Thames] been able to make any progress since [the 18th] in unlading those which came for last Monday's [16th] market, or had remained over from the preceding week; all seems now set fast by the ice.'
The Bury and Norwich Post, 25 January.

But there was a brighter side:

'The frost was so intense on Saturday [21st] that on that and the following day great numbers of people were skating on the river Lune between Skerton and Halton.'
Lancaster Gazette, 28 January.

The subsequent thawing into 'ice floods' caused damage from masses of floating ice, as the following accounts testify.

> 'As an instance of good fortune during the late overflow of the Wye, the following circumstance is recorded. A barge laden with several tons of goods from Bristol, on the night of the 26th January, floated from her moorings at Red Brook near Monmouth (supposed from the quantity of ice which cut her cable) and drifted down the river within a short distance of Chepstow, a course of near 14 miles [20km], before the approach of the town she was discovered by two men … who, on observing her situation, got on board and … brought her head round and she went through the bridge stern foremost without the slightest injury; and was immediately after brought to anchor in a dockyard belonging to that town'.
> *Hereford Journal,* 15 February.

> 'The late breaking up in the river Lune … has done considerable damage to the weir at Skerton near this town [Lancaster]'. And …
> 'About a mile above Carlisle, the weir that diverts the Calder to Messrs Losh & Co.'s print works, impeded the large, solid blocks of ice that come down the river so that the river flowed into the adjoining grounds … and swept away large trees of various kinds. The river having now lost its natural channel, the new course produced the most dreadful ravages in its progress. On the Pettril, part of the stone weir and sluice of the cotton mill belonging to Messrs Rothwell & Co were carried away by the flood'.
> *Lancaster Gazette,* 11 February.

> In Stirling, Thomas Lucas recorded in his diary for the 30th 'the storm still continues with partial thaw, wind, rain, sleet etc which makes the weather extremely disagreeable; the bridge received some damage from the ice floating down the river.'[6]

> Further north, whereas at Invery, Banchory, there was skating on the river Feugh on 23 January, by early next month it was being reported that:
> 'a considerable quantity of timber … having been carried to the sea by an ice flood and cast upon the coast, … a reward of five guineas will be paid to those who will give such information as may lead to the conviction of any person stealing said timber from the coast.'
> *Aberdeen Journal*, 8 February.

Despite the extensive flooding and damage, it is surprising that problems caused by ice floes on rivers were not more widespread.

The weather: snow, freezing rain and gales

It is clear from these newspaper accounts that the floods were widely attributed to the sudden and rapid thaw of snow that had accumulated. Why was the thaw so sudden and widespread? It is possible to find answers by examining daily changes in the weather pattern during the second half of the month. These patterns are revealed by daily weather maps based on observations from a network of land stations, supplemented by records from log-books of many Royal Navy ships at sea and at anchor. Log-books have been used by others to reconstruct synoptic charts – for example, at the time of the Battle of Trafalgar (Wheeler, 2001). See also Oliver and Kington, 1970 and Wheeler (1995, 1998 and 1999).

[6] Stirling Local History Society: PD16/4.

Over land

Records of weather over land were obtained from three principal sources: meteorological journals providing tabulations of daily observations, diaries (both published and manuscript) and newspapers. Although in 1809 it is likely that a number of meteorological journals comparable to that at Mongewell were being kept, if they had been sent to the Royal Society for storage they would not have survived. Regrettably, the Society's policy seems to have been to keep them for only a couple of years (Harries, 1924). There is none in the Society's library now apart from the Mongewell register. However, some 35 other registers or diaries have survived, sufficient to allow construction of daily synoptic charts with a fair confidence. Table B shows places where records are available daily at up to three set times each day, and whether or not there are records of pressure, temperature and wind direction (wind strength was seldom noted and then only qualitatively). Fig.4 (page 17) shows the locations of these places. Most observers recorded the weather, even at places[7] where there were no observations at set times. Some observers recorded maximum and minimum temperatures, but almost none noted rainfall amount. These journals (manuscripts, photocopies or transcripts) are held by archives, most notably those of the Meteorological Office and County Record Offices, and by libraries (national, society and university) as well as other repositories such as Armagh Observatory. Morning (08-10 hr) observations are the most numerous, so this time of day was chosen for construction of daily synoptic charts. There are fewer records from the afternoon (14-15 hr) and still fewer from the evening (20-23 hr).

At sea

Records of weather at sea were obtained from Royal Navy ships' log-books, supplemented by reports in newspapers. Because of the great naval activity during the contemporary Peninsular War, many ships were active in coastal waters and as far away as Portugal and Spain, as well as the Baltic Sea. The names of these ships were obtained from two principal sources: the Admiralty's monthly list book for January 1809[8] and records of arrivals and sailings at various ports, from Falmouth along southern and eastern coasts as far as Leith, notably those reported in *Lloyd's List*, daily 'ship news' from *The Morning Post* and twice-weekly 'port news' from *Trewman's Exeter Flying Post,* but also other national and regional papers. The log-books themselves were also an important source, where ships at anchor noted arrivals and sailings (and collisions!), and where ships at sea noted encounters with others. It is likely that the vast majority of Royal Navy ships active during January 1809 have been found and their log-books abstracted.

The log-books compiled by ships' captains or masters[9] were examined from 304 ships, providing approximately 50,000 known-time weather observations – a database greatly exceeding that available over land. The following is a general description of the contents of these log-books. According to *William Falconer's Dictionary of the Marine*[10], the log-book contained the contents, copied daily at noon, off the log-board, which was 'a sort of table, divided into several columns, containing the hours of the day and night, the direction of the winds, the course of the ship, and all the material occurrences that happen during the twenty-four hours, or from noon to noon; together with the latitude by observation. From

[7] Belfast, Heytesbury (Wiltshire), Invery (Banchory, Aberdeenshire), Manchester and Scarborough.
[8] The National Archives ADM8/97.
[9] The National Archives ADM51 and ADM52 respectively.
[10] Thomas Cadell's new corrected edition, London, 1780: http://nla.gov.au/nla.cs-ss-refs-falc-0001 (accessed February 2015).

this table the different officers of the ship are furnished with materials to compile their journals …'.

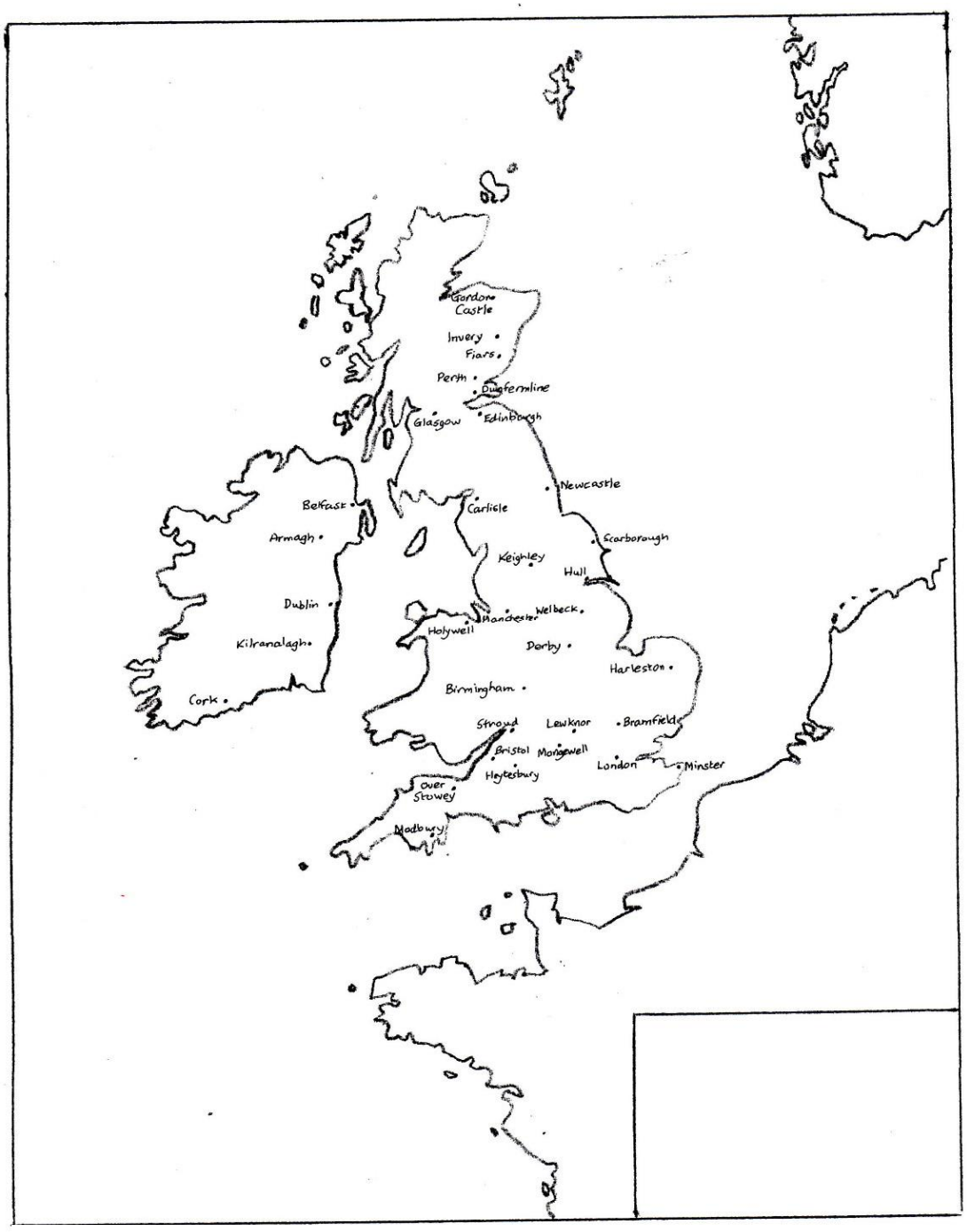

Fig.4: Places with daily records of the weather in January 1809.

Two example pages from log-books used in this study are shown in Fig.5 (pages 19 and 20). Each page is ruled into columns headed 'H' (hour of the day), 'K' (speed in whole knots), 'F' (speed in 'fathoms' – eighths of a knot), 'courses', 'winds' (directions only, relative to magnetic north), 'no. of signals', and 'remarks and occurrences' (or 'remarks etc') along with the name of the ship and the day of the week as well as date. Rarely there is an additional column for officers' initials every four hours – presumably at change of watch. Only something like one in ten log-books was printed: the great majority consist of blank pages hand-ruled into the columns described above. When a ship was at sea, the observations

from one or two days were enough to fill a page, each day being divided into 'AM' and 'PM'[11], separated by a row for 'noon' where there was provision for 'course', 'distance' (the straight line covered since the previous noon), latitude and longitude, as well as a bearing and distance (miles or leagues) from a known point, either seen at the time (typically a coastal feature, or a lighthouse[12] at night) or estimated from the latitude and longitude. Errors in these positions can be as much as a whole degree, judging by records from ships known to be close but, for the most part, latitude could be determined accurately and the principal difficulty was posed by longitude. At this time (1809) whilst the marine chronometer based on Harrison's design was available, and the method of estimating longitude by lunar distances had been perfected, by no means all officers used these facilities and the old system of so-called 'dead reckoning' was in common practice still.

Observations of weather (and swell), recorded in the column headed 'remarks and occurrences', are interspersed (without any punctuation) among many other entries. The primary concern of the captain or master when compiling the log-book was presumably to have a record of the times of changes made that affected navigation whilst at sea: getting under way, the setting of sails, damage resulting from gales, high seas or sea ice, loss of gear, loss of a crew member by falling from the yards or overboard, collisions with other ships, heaving of guns overboard to lighten the ship and thereby ease labouring in high seas, sounding the depth when in shallow water; and arrival at the end of a voyage. All these entries involve much nautical terminology. In addition, a record was kept of other ships encountered, particularly Royal Navy ships 'in company' or 'in sight' (with exchange of identities) or others in convoy.

When a ship was not at sea, but was anchored or moored, the columns are headed 'month and day', 'date', 'winds', 'no. of signals', and 'remarks and occurrences'. Because less detail was needed to describe the running of such a stationary ship, each page can then contain the records for several days, even as many as ten when the 'AM' and 'PM' entries run in succession, with little or nothing between. Moreover, less attention was given to keeping a record of the weather. Such log-books can be replete with 'do. Wr.' (ditto weather) entries, emphasising an apparent lack of attention to changes in the weather. Often there were only two observations in a day, usually immediately after the 'AM' and 'PM' indicators, but also sometimes also at noon. In the extreme, there may be only one observation without even specifying AM or PM. However, some stationary ships did maintain full records comparable to those kept whilst at sea. Combining such detailed records from several adjacent stationary ships can provide considerable precision in the timing of weather events at a given place (assuming clocks were approximately synchronised). Similar precision is possible for ships at sea that are sailing close together, for example in fleets, or as convoy escorts, or when blockading enemy ports.

[11] In 1805, the civil day was introduced beginning at midnight, to replace the nautical day that had begun at mid-day – according to 'General Instructions to Captains', a copy of which was pasted into the log-book for HMS *Favourite* for 1 January 1809.

[12] It is perhaps surprising that 35 lighthouses and light vessels are named in the log-books for 1809 along the east and south coasts, ranging from the Isles of May and Keith (at the entrance to the Firth of Forth) to St Agnes (in Scilly). There were also lighthouses along the west coast of France, as well as at Corunna – the site of a mass evacuation of the British army from Spain during the Peninsular War. However, none is mentioned along the south coast of Ireland.

Fig.5: Example pages from Royal Navy ships' log-books used in this study (courtesy of The National Archives).

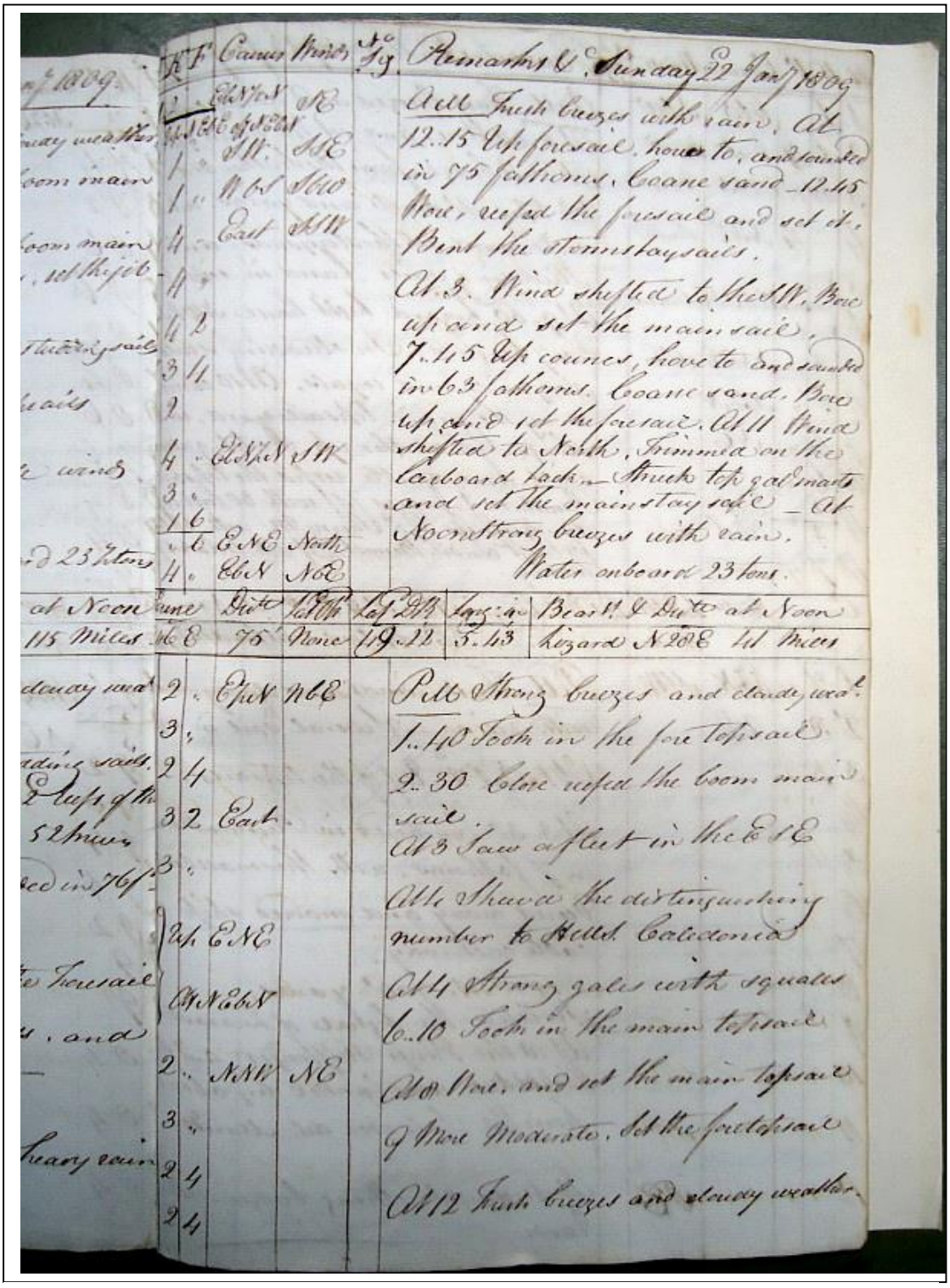

Fig.5(a): HMS Weazle*, south-west of the Lizard 22 January 1809 (TNA: ADM51/2972).*

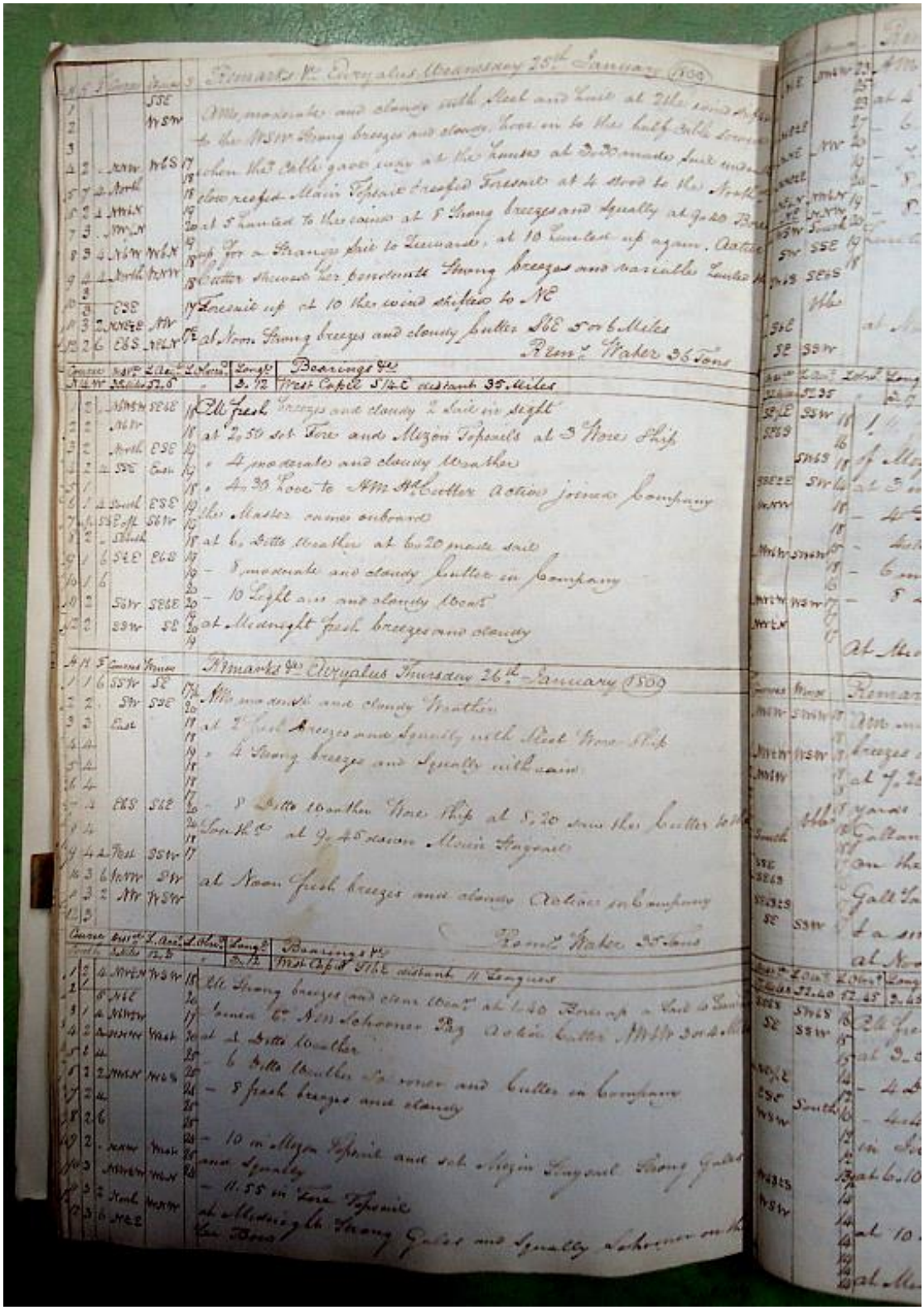

Fig.5(b): HMS Euryalus*, in the southern North Sea 25 and 26 January 1809 (TNA: ADM51/1862).*

When a ship was at sea, wind *direction* was often recorded five to ten times a day, normally using a 32-point compass. Timing varied from day to day and from ship to ship – no two log-books are the same. Even so, there was almost always an entry for 1 am and 1 pm. Remaining details – wind strength and 'weather' – were written in the 'remarks' column, and at times not necessarily related to the recorded wind directions (thereby introducing problems when interpolating winds for a given time of day). Wind *strength* was frequently recorded at 4 and 8 am, and at 4, 6 and 8 pm; noon and midnight were less often used. Each observation was preceded by the time except the earliest, which was almost always put first before any entries concerning, for example, the running of the ship. The timing of this first entry is not entirely clear, but it was probably during the first hour after midnight (and likewise noon), judging by the timing of subsequent entries. The 'AM observation' was by no means always identical with the previous midnight observation, presumably made by the officer going off watch. If so, the difference would suggest that observations were not necessarily made close to the hour indicated. Occasionally, additional, and more precisely-timed, observations were made 'between hours'.

Wind *strength* was described using a well-established set of phrases that subsequently evolved into the Beaufort Scale. Consequently it is easy to translate recorded strength into Beaufort force, and hence speed in knots. (For a discussion, see Wheeler and Wilkinson, 2005). Because of short-term fluctuations in the wind, an observation may have been made when the direction or strength, or both, had deviated from a more representative longer-term mean. Such an observation may be suggested by comparison with others, either in a sequence from a particular ship or more especially from nearby ships. Examples are shown in the Tables later.

The abbreviation 'do. Wr.' was frequently used, and presumably indicated no real change in the weather since the previous entry. But 'weather' is unlikely to have had its present-day meaning – it almost certainly referred to the wind. The evidence for this deduction comes from the use of descriptions such as 'do. Wr. with rain' when the previous entry made no mention of rain. Also, entries of 'do. Wr.' can be repeated over many periods lasting several hours (even more than 12) when the previous observation recorded rain or fog, for example, but there is no indication from neighbouring ships of such persistence of rain or fog. The word was being used as in 'the weather side' of a ship – the direction from which the wind is blowing, bringing with it, for example, fog or precipitation. Moreover, it seems to be the wind *strength* only that is involved, for there are many examples where 'do. Wr.' was used when the direction had changed between observations.

When the direction of the wind was described as 'variable' it does not necessarily mean 'light and variable', as when pressure gradients were weak; it could also happen with a progressive veering or backing, as with the passage of a front or centre of a low pressure system; or with erratic winds, as in showery weather; or even the normal variability of both strength and direction (with implications that observations were not always truly representative). When the strength of the wind was described simply as 'more moderate' it had weakened since the previous entry but to an unspecified extent (unless a subsequent observation can provide an estimate), and may mean no more than a change from 'hard gale' to 'strong gale', for example. An entry of 'taken aback' is usually associated with a change in wind direction – perhaps unexpected. The weather was often called 'squally', meaning gusty rather than accompanied by distinct squalls, as occur near showers. 'Squalls' were almost always associated with wind strengths force 5 or stronger, and 'heavy squalls' with strong or hard gales (force 9-10).

Exact meanings of terms used to describe the weather may not be obvious. Although 'rain' and 'snow' are straightforward, hail (and even 'sleet') may also include ice pellets, as will be illustrated later. Does 'small rain' refer to intensity or persistence? It was probably the former, and may include drizzle although that was sometimes recorded separately, and always as 'drizzling rain'. It is clear that 'showers' was not often used with today's strict meaning but included what would now be called 'intermittent rain' or even 'outbreaks of rain'. Conversely, 'rain at times' could include showers. 'Frost' or 'cold weather' was not commonly recorded, even when it was obviously present (until around the 25th), although 'hard' and even 'severe' frost was sometimes noted. Perhaps frost was seldom relevant to ship operations; certainly there were very few references to ice on rigging. Only one of the ships used in this study took thermometer readings..

Visibility was important to navigation. 'Haze' was commonly recorded, and must have included 'mist', which was used only once in all the records used. However, it is not known what the upper limit of visibility was. 'Fog' must not be assumed to infer a visibility less than some agreed distance. Weather was often described as 'thick', indicating poor visibility, and used either with 'haze' and 'fog', or with precipitation (e.g., 'thick with snow') or strong winds (implying much flying spray). 'Clear' weather seems to refer to visibility, not to lack of cloud cover, because it is often used after a record of 'haze', 'fog' or 'thick weather'. The state of the sky did not warrant consistent recording, although 'cloudy' was frequently used, perhaps because of its significance in navigation for sighting on the midday sun to measure latitude. There was never a mention of cloud amount. 'Fine' and 'fair' weather may not imply differences in cloudiness. 'Fair' was used to describe weather (notably wind) favourable to maintaining a ship's steered course; 'fine' seems to have been used as a generalised description, like the rarely occurring 'pleasant weather', and was almost always associated with only light or moderate winds.

It should be emphasised that all weather records were of spot observations – there is no indication of intention to keep a continuous record or even to note consistently the presence of all the usual elements. A gap of several hours between entries may or may not mean there had been little change in wind or weather. Only rarely is there a record for the onset of fog or its clearance, and never for the start and stop of precipitation. Sometimes seriously bad weather went unrecorded, as is made clear by comparing observations from neighbouring ships – hence the absence of a record does not necessarily mean the absence of weather worthy of note. No doubt there were many occasions when recording the weather would have had low priority compared with that of running the ship. A marked change in, for example, the wind direction, from one entry to the next must not be read as though the second entry necessarily indicates the time of that change. However, sometimes attention is drawn by words such as 'wind veered to the west', but might still be unclear whether that means 'winds recently veered' or simply 'noted to have veered since the last record'. If a different direction had been recorded only an hour or two previously, it is reasonable to infer the time of change with some precision. Such records are valuable for helping to locate the passage of fronts, for example.

The synoptic charts

The sources described above provided sufficient frequency and geographic coverage of weather observations for an attempt to be made to construct daily synoptic charts of the sort familiar to most of us today. Over land, observations of pressure and temperature were plotted in the conventional way, and wind directions were added in the form of arrows. An

attempt to reduce pressures to sea level was made as follows. Assuming that the observations at Somerset House required negligible adjustments to reduce them to sea level, then readings can be similarly reduced at other places on days when an isobar crosses both them and London. Such isobars can be drawn by using streamlines based on ship observations of winds, because it can be readily deduced from modern charts that streamlines over the sea cross isobars towards lower pressure at an angle of 10 degrees or thereabouts. By extending over-sea streamlines across England into Wales and eastern Ireland, a few days were recognised where deduced isobars across London also passed over or close to other places where pressure was measured and could therefore be adjusted to equal that measured in London. Where such adjustment could be made on several days, the mean adjustment was applied to all days in this study. For most places too far from London, in northern England and Scotland, the same technique is applied, based on Edinburgh observations which had already been adjusted to London pressures using the few favourable days. In this way, readings at all places on all days have been adjusted; and from them isobars have been drawn.

Concerning a ship's position whilst at sea, that recorded at midday is assumed to be a good approximation for the position at 8 or 9 am, bearing in mind the above-mentioned errors and the slow speed of ships – typically no more than five knots. At those hours there were insufficient records, without resorting to dubious interpolation from adjacent hours. Instead, the more frequently recorded wind at noon or 1 pm was used. Where several ships happened to be clustered within half a degree of latitude or longitude of each other, wind speed and direction were averaged by eye. The ease with which this may be achieved can be judged from the examples of clustered observations listed below in Tables C-J. The more ships there are in a cluster the more likely their average will be representative of the true wind by being free of short-term fluctuations or errors; conversely, isolated ships may be less representative. The number of ships in a cluster is shown on the charts at the end of each plotted wind shaft; isolated ships are therefore easily distinguished. A justification for this averaging method is the impressive consistency of the resulting wind fields. Also, regarding precipitation, bearing in mind the inconsistent emphasis between ships in recording precipitation, its occurrence at any time between 8 or 9 am and noon or 1 pm was considered to be adequate for a morning chart. Again, advantage was taken to combine the observations from clusters of ships. However, it is recognised that the resulting indicated extent of precipitation areas may exceed the true extent at 8 or 9 am if it had spread by noon or 1 pm.

An attempt has been made to add fronts to some of the charts but they should be taken as tentative, particularly because there is a lack of continuity from previous days, notably over the Atlantic Ocean outside the study area. Moreover, at times of rapid evolution of the pressure field, the combination of observations from the period 08 hr to midday introduces smoothing that obscures the positioning of fronts. In addition, the presence of much thawing snow on the ground leads to a weakening of temperature gradients, even in presence of strong advection, so that fronts are rendered more diffuse.

Synoptic patterns

The methods described above have been adopted in the construction of the following series of synoptic charts for each of the days of the study. They use mostly conventional symbolism. Positions of ships at sea are precise to within about one degree of latitude and

longitude, and times to within an hour or two. Locations of places mentioned where ships were anchored or moored are shown in Fig.6.

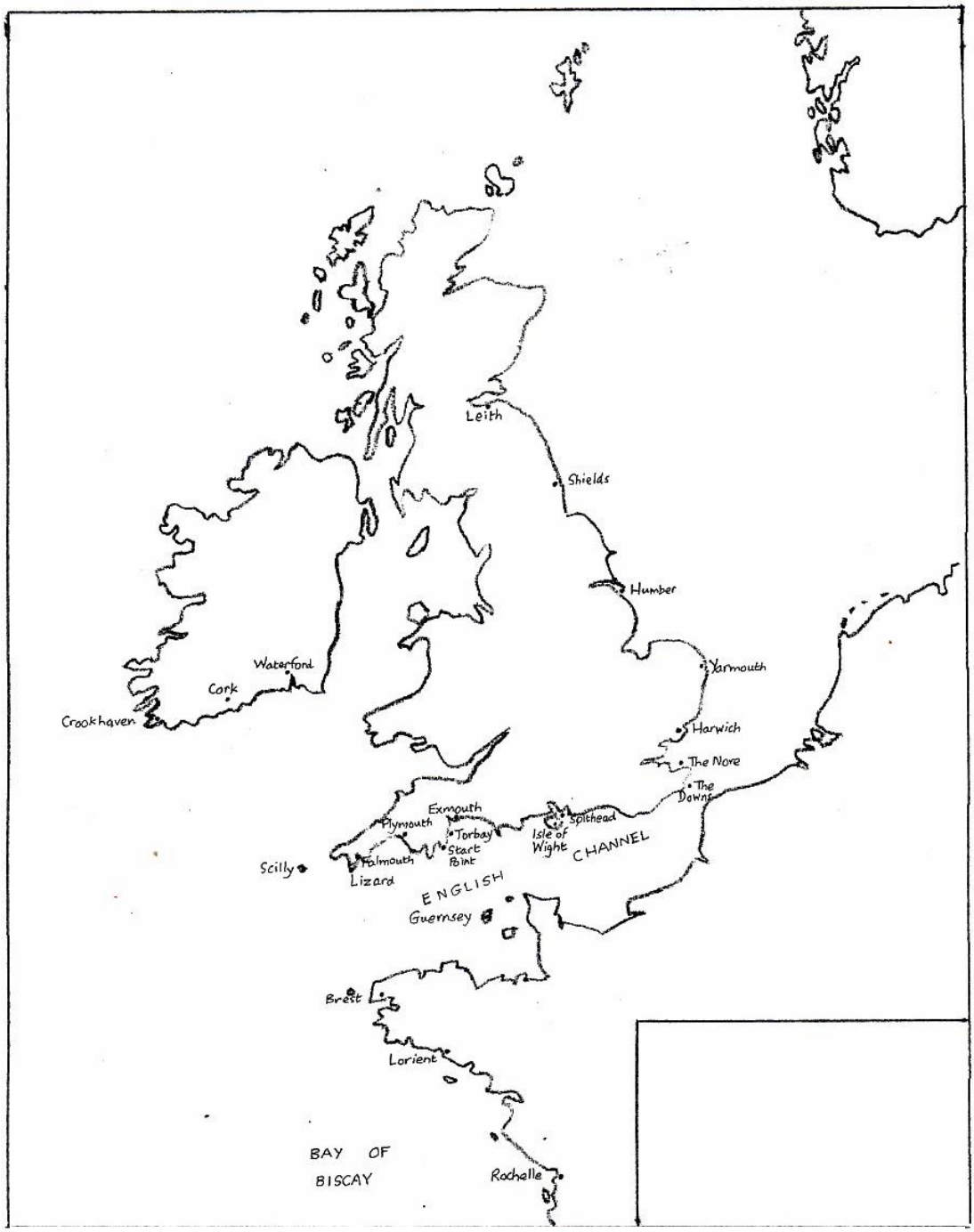

Fig.6: Places where Royal Navy ships were moored or at anchor during January 1809.

14-15 January 1809: the first snowy spell

A quasi-stationary front lay from SW Ireland to the tip of Cornwall and a shallow disturbance (Low A) seems to have moved south-eastwards along it, reaching western France by the 15th. Seven ships in Cork Harbour recorded E-SE gales on the 14th and 15th, with rain all day on the 14th, heavy at times. (In fact, winds at Cork remained from the E until the 25th, showing that until then the centres of eastward-moving disturbances passed to the south of Ireland.)

Three ships in Falmouth Harbour recorded SE winds on the 14th backing to E gales after midnight, and there was prolonged and heavy rain until about midnight. At Guernsey, winds remained E-SE throughout the two days. It is clear from these records that the front did not move east of these two places.

Seven ships of the Channel Fleet left Torbay at 2 am on the 14th, together with HMS *Temeraire*, sailing slowly together SW across the entrance to the English Channel to blockade the port of Brest. Their independent observations of the weather show good consistency (Table C). In combination they provide an almost hourly sequence (only 8 of the 48 hours are not represented). Almost all ships kept a weather record every four hours from midnight, as well as at 1 pm and 6 pm, but there was no regularity at other times, as is demonstrated by the Table. It is important to remember that the absence of a record does not necessarily mean absence of that weather. For, example, it is clear that although rain occurred from 6 am to 8 pm on the 14th, it often went un-recorded, perhaps because it was not important for navigation, in contrast to wind and visibility. This emphasises the value of being able to combine the records from several nearby ships.

Three marked changes in wind can be distinguished:

1. moderate-fresh (force 4-5) winds veered from E to S at noon when the ships were clustered south of Start Point, increasing to force 6-8 until midnight when the ships were at 49ºN 4ºW, and
2. winds rapidly turned to W and decreased to light-moderate (force 2-4) or light and variable; then
3. ESE winds force 5-6 quickly set in towards 3 pm of the 15th.

A little further west, three ships that happened to be close together SW of the Scilly Isles also provided consistent records. Although not enough for an hourly sequence, wind changes comparable to those above can be recognised:

1. force 2-4 E winds veered to S and SW force 5-6 at 6 am on the 14th when the ships were close to 49ºN 4ºW, and then became
2. light NW or variable by 8 pm until,
3. at 9 am on the 15th, SE winds force 2-4 set in.

Rain, heavy at times, was recorded for much of the 14th but not after 9 pm.

These changes can be interpreted as the fronts of a small low pressure centre (low A) at the point of occlusion moving SE across the entrance to the English Channel. This is drawn on the synoptic chart for 14 January. Support for this interpretation is provided by observations from HMS *Earl Spencer*, sailing from Mevagissey (Cornwall) to Cork, and happening to pass close to the low centre. A force 2 SSE wind (when the ship was near 50ºN 5ºW) soon veered to a force 5 SW wind, but within a few hours became light and variable before a force 5-6 SSE wind returned by 8 am of the 15th (when the ship was near 51ºN 7ºW).

The front was met by two ships south-west of Ireland. HMS *Brisk* encountered a wind change from S to W near 50ºN 9ºW at noon on the 14th; and HMS *Princess Charlotte* similarly near 52ºN 14ºW at 6 am on the 15th. These W winds south of the front briefly reached the west coast of France. Eight ships off Lorient, centred at 47ºN 5ºW, whilst not having such good agreement as the Channel Fleet, did show a sudden change at 6 am on the 15th from SSE to W and NW, maintaining force 4-5. This was followed by a progressive veer to NE by midnight, suggesting that the low centre moved south-eastwards east of Lorient.

Confirmation is provided by records from three ships off Rochelle, near 46ºN 1ºW, where SSE winds veered at midnight of the 14th to SW and W, maintaining force 4-5. Here, too, this was followed by a progressive veer to NW by midnight of the 15th and to N by 6 am on the 16th, when the low centre is deduced to have been to the east. Further south, near 44ºN 3ºW, HMS *Conflict* recorded light and variable winds for much of the 14th and 15th until mid-afternoon, when NW-NE winds, force 5, set in. These changes suggest that the low centre moved south-eastwards near the coast of France.

Meanwhile, a cold front moved westwards across the southern North Sea and southern England, perhaps in association with a low centre that moved from the Netherlands to north-eastern France. In consequence, ships at anchor in The Downs, off the east coast of Kent, experienced moderate NNW winds at first on the 14th slowly changing to NNE by evening before veering to a frosty, moderate-fresh E wind by midnight (Table D), when a fall of snow and sleet commenced that persisted to mid-day of the 15th. Gale force E winds continued during the 15th until late in the evening, when they decreased to fresh-strong (force 5-6). These changes are consistent with a cold front crossing The Downs during the evening and introducing sub-freezing continental E winds. Ships at anchor off Yarmouth had NNE winds early on the 14th veering to E by the evening and continuing from that direction during the 15th. A similar wind veer from N to E was noted inland, at both Minster (Isle of Sheppey) and Harleston (Suffolk) with snow on the 15th at both places – 'a very great snow' at the latter. Showers of snow and hail were recorded by several ships off the coast of East Anglia and Kent.

With maximum temperatures 30º to 35ºF [-1º to 1.5ºC] widely on the 14th, snow reached southern Ireland, and later in the day extended to southern England. In addition, snow showers, heavy in places, affected coastal parts of north-eastern England and eastern Scotland. Snow in the south continued overnight so that by the following morning it had spread to the northern Midlands, but not as far as Manchester. Two inches [5cm] were lying in Birmingham. Maximum temperatures were widely 25º to 30ºF [-4º to -1ºC], and sleet was recorded as far south-west as Devon but not the Channel Islands. Showers continued in coastal parts of north-eastern England and eastern Scotland, with 1 inch lying in Edinburgh.

In London, winds veered from NW-N early on the 14th to E-SE by the 15th, with daytime maximum temperatures near freezing point. There was some snow overnight 14th -15th and more during the second half of the 15th.

16-18 January 1809: a dry interval with severe frost in Scotland

With an anticyclone centred over the North Sea the weather was largely dry, but cloudy at first becoming largely fine during the 17th and 18th, with temperatures below freezing day and night, and minima 15 to 20º F [-9.5 to -7ºC] during clear spells at night. Winds were from between E and S over the whole of the British Isles. SE gales along the south and east coasts of Ireland led to several ships being wrecked. From the 17th to 25th the light winds over Scotland and often clear skies led to a spell of very frosty weather. Minima were typically 20 to 30ºF [-7 to -1ºC] until the 21st, then 10 to 20ºF [-12 to -7ºC]. At Perth, this was 'the most severe frost known for 15 years', and the weather was calm with a heavy hoar frost, but freezing fog and thick rime 23rd-25th.

19-20 January 1809: ice storm, widespread freezing rain

Pressure remained high to the east and a centre of low pressure (low B) moved eastwards from off SW Ireland, along the south coast of England to the southern North Sea. The centre of this low can be tracked using wind records from ships in the English Channel. On the 19th, two ships in the Scilly Islands recorded W-SW winds all day, but not far to the east, at Falmouth, three ships noted SE winds until mid-morning and then a veer to W. Similarly, at Newlyn HMS *Parthian* recorded a veer from SSE early in the day to NW by early afternoon. At Spithead, four ships recorded winds from SE until early afternoon when they became variable in direction but NW by evening. These changes indicate that the centre moved from Cornwall eastwards across Spithead. Six ships of the Channel Fleet, clustered at 48ºN 5ºW, experienced S winds until mid-morning, then a veer to W by early afternoon. South of Spithead, four ships at near 50ºN 2ºW recorded S-SE winds until noon, followed by a veer to W-NW by mid-afternoon. Further east, in the Dover Strait, fresh S-SE winds persisted most of the day, becoming light and variable during the evening. Similar such winds were recorded by three ships in The Downs. However, further north, W winds did not reach Yarmouth Roads where seven ships recorded SE winds all day, becoming light and variable only during the morning of the 20th, followed by N-NE winds from noon. These records indicate that the low centre, having reached the southern North Sea, continued to move away eastwards.

Maximum temperatures were 25º to 32ºF [-4 to 0ºC] on the 19th with freezing fog in places. Snow fell over much of Ireland, and over southern England and the Midlands during the afternoon and evening, reaching a depth of 3 or 4 inches [10cm] in Birmingham. Rain fell to the south of the snow belt, separated from it by a large zone of freezing rain. This remarkable 'ice storm' is illustrated by some newspaper reports.

> 'The following very extraordinary circumstance occurred at Leybourne, near Malling [Kent] on Thursday evening [19th]. A boy … went into a field … and saw a number of rooks on the ground very close together. He made a noise to drive them away, but they did not appear alarmed: he threw snow-balls at them, to make them rise, but they still remained. Surprised at this apparent indifference, he went in amongst them and actually took up 27 rooks. He also picked up, in several parts of the field, 93 larks, a pheasant, and a bustard. The cause of the inactivity of the birds was a thing of rare occurrence in this climate; a heavy rain fell on the Thursday afternoon, which, freezing as it came down, so completely glazed over the bodies of the birds, that they were fettered in a coat of ice, and completely deprived of the power of motion. Several of the larks were dead, having perished from the intenseness of the cold. The bustard, being strong, struggled hard for his liberty, broke his icy fetters, and effected his escape.'
> *Hampshire Telegraph and Sussex Chronicle,* 30 January.

> 'In the afternoon and evening it rained and freezed [sic] so that all without doors was ice, which destroyed many birds of all kinds by their feathers being frozen together'.
> *Diary* at Minster, Sheppey, Kent

> 'Nothing in the recollection of the present times was known like the effect of the fall of water from the sky, about 3 o'clock on Thursday se'nnight [19th], in the metropolis. When the rain first descended, it so immediately froze on the

> warmest garments of the passengers, that several of the members, when they arrived at the House of Commons, had great difficulty in getting the flaps of their hats thawed, or broken from their great coats. All umbrellas became instantly petrified, and the street ways became so perfectly glazed, that two gentlemen put on their skates at Hyde Park Corner, and skated beyond St James's Church.'
> *The Ipswich Journal*, 28 January.
>
> 'On the 19th appeared the Cirrus cloud, followed by Cirro-Stratus. In the afternoon a freezing shower from the eastward double-glazed the windows, encrusted the walls, and encased the trees …' (Luke Howard, at Plaistow)
> *The Athenaeum*, V, p.251.
>
> 'Rain and freezing at the same time all the day, which made the roads extremely slippery.'
> *Diary* at Heytesbury
>
> 'Sleet and rain which froze on the ground.'
> *Diary* at Stroud

Rain, sleet and hail were recorded at several sites in London where the temperature was close to or below freezing. Similar weather occurred widely, from northern Ireland (Armagh: 'snow and sleety hail in the wind') to Kent. (Fig.7, page 29, suggests the extent of the freezing rain.) Rain was recorded by ships at Spithead, The Downs, The Nore/Sheerness and nearby Margate Roads (but not at Harwich or Yarmouth). Ten ships off the east coast of Kent (Dover Straits, The Downs and The Nore) provide an almost hourly sequence of observations (Table E) that reveal the effect of the front that gave freezing rain over southern England. Moderate-fresh (force 4-5) SE winds during the morning veered to S in the afternoon, decreasing to light and variable by 9 pm (and remaining like that for most of the next day). Rain and sleet started soon after noon and persisted until a little after midnight. Frost was noted at only one of these ten ships, but several others (not included in Table E because they had less detailed records) also showed the presence of frost, so it is likely that most if not all the ships experienced frost and that much of the rain was freezing. Indeed, HMS *Castor* noted specifically 'rain and frost'.

Hail was seen at some ships: HMS *Kite*, *Nightingale*, *Snipe* and *Spitfire* at The Nore/Sheerness, HMS *Clyde* at The Downs, HMS *Fearless* in Deal Roads, and HMS *Pandora* at 51ºN 3ºE in the southern North Sea. No doubt 'hail' in these records is what today would be called 'ice pellets' – raindrops or largely melted snowflakes that had refrozen whilst falling. Luke Howard observed at Plaistow:

> 'Its composition, which I examined on a sheet of paper, was no less curious than the effect. It consisted of hollow spherules of ice, filled with water, of transparent globules of hail, and drops of water at the point of freezing, which became solid on touching the bodies they fell on [i.e., super-cooled]. The thermometer exposed from the window indicated 30.5º [F, i.e., –1Cº].'
> *The Athenaeum*, V, p.251.

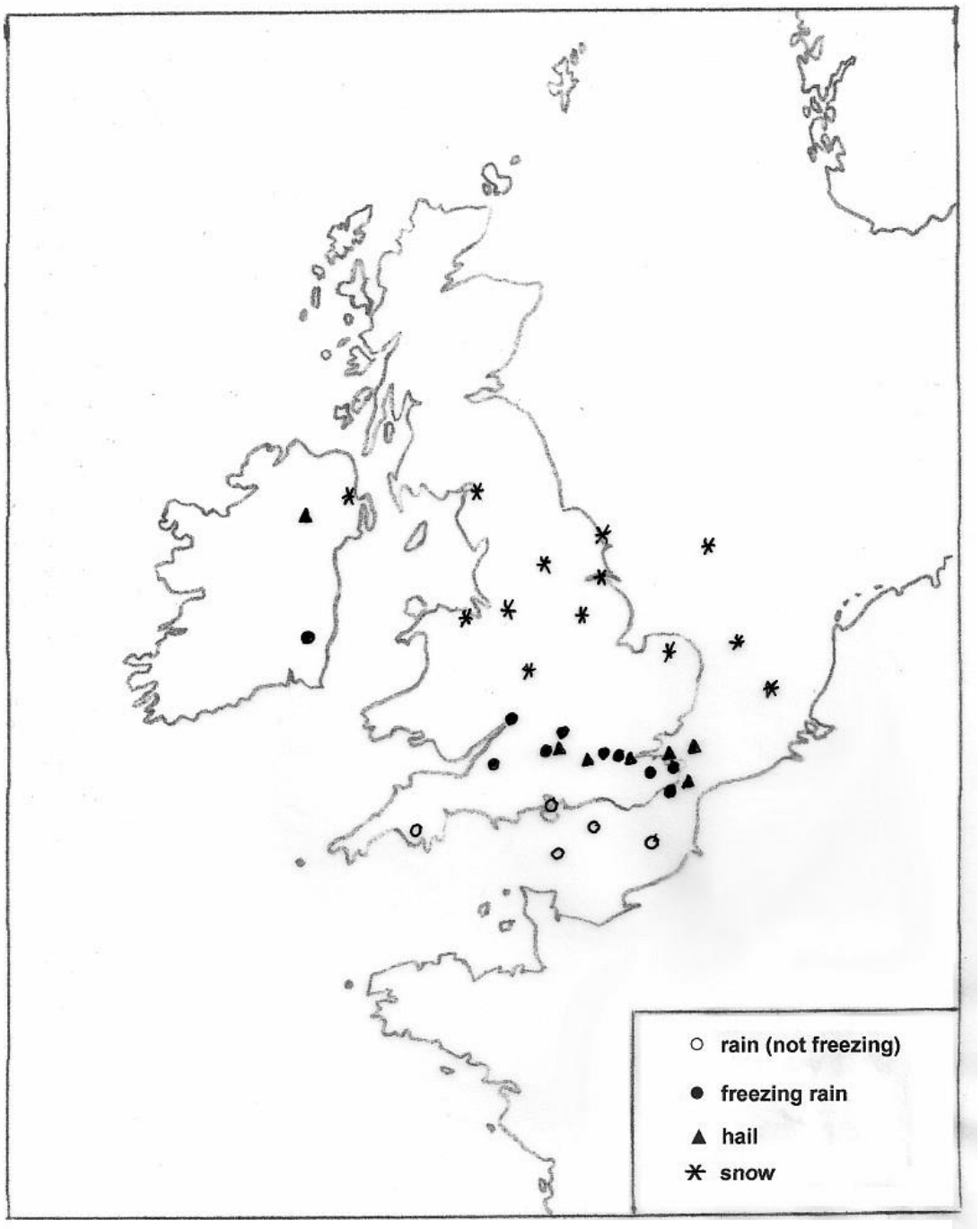

Fig.7: Records of freezing rain and hail (ice pellets) during the afternoon and evening of 19 January 1809.

Even 'sleet' may have included ice pellets in some records, as suggested by the description 'sleety hail' from Armagh. For example, 'sleet' was noted by HMS *Rolla* (in the Dover Strait) during the afternoon and by HMS *Calliope* (at 52ºN 3ºE) during the evening, despite a 'severe frost', as recorded by HMS *Crocus* near Dover. It seems the word 'sleet' is being used sometimes for want of an alternative to describe unusual weather.

The 20th was a little less cold – maxima mostly 30º to 35ºF [-1 to 1.5ºC] – with Ireland and south-western England having further snow and rain, some of it freezing, but it was largely fine in the Midlands and north-western England. There was further snow in East Anglia and

it returned to eastern Scotland later in the day. A quasi-stationary front lay east-west along the English Channel. The Channel Fleet (consisting of 8 ships) near 50ºN 4ºW met thick fog from midnight to noon drifting eastwards on W winds force 2-4. Fog or 'thick hazy weather' was also present at Spithead early in the day in NE winds force 2-4 north of the front; and in the Dover Strait in the afternoon.

Thunder and lightning accompanied heavy rain at 50ºN 12ºW (south-west of Ireland) towards midnight of the 19th, presumably reflecting the presence of convection in deep cold air behind the low.

21 January 1809: continued severe frost in Scotland

Maximum temperatures continued at 30 to 35ºF [-1 to 1.5ºC] with cloudy weather in the south of the British Isles but fine in the north. Snow reached southern England late in the day. A gentle northerly flow covered much of the British Isles. Even so, a heavy swell from the west was noted during the first half of the day in the western English Channel, despite winds being from the N or variable. Presumably this swell was a result of earlier events further west. In Scotland, the frosty spell that started on the 17th intensified. At Invery, the sunset temperature was 15ºF [-9.5ºC] and by 8 pm it had fallen to 7ºF [-14ºC], with 4ºF [-15.5ºC] on the snow surface. In Edinburgh, 9ºF [-13ºC] was recorded the following morning at 7am.

Four ships off the north-west tip of Spain recorded lightning during the evening, but its significance is unclear.

22 January 1809: another snowy spell (and the army's retreat from Corunna)

Another centre of low pressure (low C) took a similar track from off the tip of Cornwall, along the south coast of England to the southern North Sea. Again, the track can be found using wind records from ships in the English Channel. The hospital ship HMS *Hornet*, in the Scilly Islands, recorded NE winds, whereas at Falmouth winds were E-SE to about noon, when they backed to N but dropped to calm towards midnight. Similar winds were noted by HMS *Parthian* at Newlyn: E-SE during the morning, backing to N during the afternoon. At Plymouth winds were at first SE, veering to SW by noon, then to N by late afternoon. These records indicate that the centre passed along the south coast of Cornwall and then just north of Plymouth. This deduction is supported by observations taken by the Channel Fleet clustered at 49ºN 5ºW, returning to Plymouth and Spithead. These, together with other ships nearby, again provided an almost hourly sequence of observations (Table F), that show the following changes:

1. moderate-fresh (force 4-5) S winds backed to SE and increased to fresh-strong (force 5-6) before veering to SW at 6 am; then
2. soon after noon there was a sudden veer to NNE and an increase to strong-gale force by 4 pm, followed by a decrease to moderate to strong by midnight, with several ships recording 'taken aback' at the time of the veer.

These changes show that the centre of low C passed just north of the fleet. Accompanying the low there was continuous rain from 8 pm on the 21st until 1 pm on the 22nd. Several ships recorded a heavy or great swell from the west on both 21 and 22 January, no doubt generated by Atlantic gales that reached the English Channel on the next day.

A remarkably similar sequence (Table G) was noted by another fleet of ships that had left Vigo, Portugal, on 12 January (under the command of Rear-Admiral Sir Samuel Hood), calling at Corunna, Spain, on the 15th and assisted with the evacuation of the retreating British army, before sailing to England (with HMS *Victory*) on the 18th as escort to a convoy of more than two hundred transports. The two fleets passed each other near 49ºN 5ºW during the afternoon of 22 January, as noted by HMS *Weazle*, soon after the centre of low C had passed nearby. This enabled a comparison to be made of observations from a particularly large number of ships (Tables H and G). Earlier, on the 21st, this fleet had encountered a strong-gale (force 6-8) NW wind that soon dropped to light and variable for up to 12 hours centred on noon (when it was clustered near 49ºN 6ºW); then a S wind picked up, becoming fresh (force 5) by midnight. Soon after noon on the next day there was a rapid veer through NW to a strong (force 6) NE wind – the change often taking place between two successive observations, before backing to N by evening. Again, some ships recorded being 'taken aback' at the sudden wind change; there was also a westerly swell.

To the south, at Lorient a fresh-strong (force 5-6) S wind veered to SW by 3 am then backed to SE during the morning, becoming light and variable to mid-afternoon before picking up from NW-N strong-gale (force 6-9). At Rochelle, the S wind, moderate to fresh (force 4-5) veered to SW by 6 am then backed to S by late morning before veering to W-NW fresh-strong (force 5-6) by noon and increasing to strong gale (force 9) during the evening. In south-eastern Biscay, at 44ºN 3ºW, HMS *Conflict* recorded light and variable winds on the 21st, but a westerly set in during the early hours of the 22nd, reaching force 9 by late morning.

Near the Isle of Wight, winds were also at first E-SE, falling light at noon and then becoming N. At 51ºN 2ºW winds were E to mid-afternoon, but then backed to N by midnight, indicating that the low centre passed by to the south; whereas not far away, near 50ºN 1ºW, the morning SE winds became variable to mid-afternoon then N-NE, indicating that the centre passed overhead. Further east, in the Dover Strait winds were SE to late afternoon then variable in direction until N winds set in at 9 pm, indicating that the centre there, too, passed overhead. Much the same happened at The Downs, where the 'wind shifted suddenly' at 10pm, as recorded on HMS *Trusty*. Still further east, at 52ºN 3ºE) winds were SE until they changed to N by midnight.

In the early hours of the 22nd, when winds were E, HMS *Primrose* (having left Spithead on the 14th as an escort for a convoy to Corunna) ran aground on The Manacles rocks, off the eastern side of the Lizard. All the crew were lost save for one boy. About the same time, the *Dispatch*, one of the transports bringing troops back from Corunna, was driven ashore nearby and 104 men from the 7th Hussars who had survived the battles of the Peninsular War were drowned before they were able to reach England; only 7 were saved. By the afternoon, a heavy swell from the E and NE had built up over an area approximately 49º-51ºN 3º-7ºW, close to the northern side of the low. An additional heavy swell, but from the W, was recorded over the southern Bay of Biscay well to the south of the centre. HMS *Snapper*, near 44ºN 9ºW, suffered minor damage: at 2.30 am she 'shipped a very heavy sea on the Quarter; unshipped all the Quarter hammock stanchions and washed several articles overboard'.

Thunder and/or lightning was recorded by four ships off Lorient in the early hours near the centre of low C, where there is likely to have been deep cold air.

Over land, with maxima continuing at 30º to 35ºF [-1 to 1.5ºC] in the south but 20º to 30ºF [-7 to -1ºC] over northern England and Scotland, the snow that had reached southern England late the previous day spread as far north as a line roughly Liverpool to Scarborough, but mixed with sleet or rain at times in the extreme south (and possibly with some freezing rain), although turning back to snow there towards midnight as the N-NE winds set in. In London, 'on Sunday morning, the 22nd, the thermometer was 23º[F, -5ºC], snow fell the whole day but the temperature gradually increased and about ten at night it rained and the morning was 35º[F, 2ºC], but at six or seven o'clock on the 23rd it had fallen to 18º[F, -8ºC], making a difference of 17deg [F, 9.5degC] in the course of a single night of eight hours.' (*The Monthly Magazine*, 27: 111).

Scotland continued very cold under clear skies and light winds – Glasgow and Edinburgh had their coldest day for several years with maxima 20º to 22ºF [-7 to -6ºC]. At Perth the temperature was minus 3ºF [-19.5ºC] at 10 am and only plus 7ºF [-14ºC] at 2 pm. By 9 pm it had fallen again, to 0ºF [-18ºC]. Ireland was largely dry but with cold N-NE winds and maxima of 28º to 30ºF [-2 to -1ºC]. On the following day, snow reached northern Ireland and northern England (6 inches [0.15m] recorded in Hull) as far as the border with Scotland (with 4 inches [10cm] falling on Carlisle), by which time it had died out over much of England.

23 January 1809: quiet, but frosty

A weak northerly flow covered eastern England, and maxima continued at 30º to 34ºF [-1 to 1ºC] in the south but 25º to 32ºF [-4 to 0ºC] in northern England and Ireland. The intense cold continued in Scotland, with maxima 20º to 25ºF [-7 to -4ºC]. At Invery, 'water froze in the rooms with constant fires – windows and mirrors covered thick with hoar frost'. There were snow showers over north-eastern England, and more widespread snow reached southern England towards evening, but with rain in the south-west.

24-25 January 1809: wreck of the East Indiamen 'Admiral Gardner' and 'Britannia'

Yet another centre of low pressure (low D) moved from west to east, but this time further north across southern-most counties of England, accompanied by a distinct wind shift to west, often sudden, followed by an increase to gale force. The eastward progress of this system can be tracked from the ships' records. Although onset times of the veer were seldom recorded they can be deduced for a given place by combining records from adjacent ships. Using time spans between successive direction changes – for example, from south in the first record to west in the second – the overlap between ships narrows down the likely time the change took place, often with a precision of an hour or two.

The system can be detected first on the 23rd by seven ships south-west of Ireland – clustered at 48ºN 10ºW. Here, winds were light and variable at first but became S-SE force 4-5 before veering to W between 6 and 7 am and increasing to force 8-9 during the morning. There was rain for much of the day. Nearer the Irish coast, a single ship, HMS *Brisk*, at 50ºN 11ºW, similarly recorded light and variable winds at first, becoming S force 5-6 during the morning before veering to W between 1 and 2 pm, but not increasing in strength. Again there was persistent rain, beginning at sunrise. Another single ship, HMS *Princess Charlotte*, heading into Crookhaven, recorded E winds from sunrise, backing to NE towards midnight, and with continual heavy rain from mid-day. At Cork, too, winds persisted from the E, again with rain

from noon, heavy at times. However, further south, HMS *Gluckstadt*, escorting a fleet of empty transports to Portugal, near 47ºN 11ºW encountered the veer between 8 and 11 am, when the wind changed from SW force 5 to WSW force 9 until midnight. This slight change in direction could not be found at all over the Bay of Biscay. For example, off Lorient the wind was W force 8-9 throughout the 24th.

These changes in wind direction show that the low centre passed eastwards between the two northern ships, *Brisk* and *Princess Charlotte*, sailing off the south coast of Ireland, and the subsequent progress of the veer up the English Channel is shown by the following notes.

> 23rd
> From six ships of the Channel Fleet clustered at 49ºN 5ºW: wind SW, force 4-5 by 6 am, backing to S by noon and increasing to force 8-9 before veering to W between 6 and 8 pm and continuing at force 8-9 until at least midnight. Rain set in mid-morning.
> At Falmouth: wind S-SE, force 4-5, veering to W at 7 pm and increasing in strength to force 8-9 by midnight. There was rain from noon, heavy at times.
> At Plymouth: wind N, force 4-5, becoming variable from 6 am then S-SW by mid-morning, increasing to force 6 by evening before veering to W force 9 by 10 pm. Again, there was rain from noon.
> In Torbay, 'it blew a most tremendous gale of wind again all last night [23rd-24th], SE to WSW, attended with shocking snow showers and rain … it is blowing [24th] such a hurricane that no boat as yet can come on shore.' (*Morning Post*, 24 January)
>
> 24th
> Portsmouth: wind W, force 5-6, becoming light and variable or calm between 7 am and 1 pm, when it veered to W and increased to force 9 from mid-afternoon to at least midnight.
> Beachy Head: wind S, force 4-6, becoming light and variable during the morning, veering to W between 1 and 2 pm and increasing to force 8-10 by 4 pm until at least midnight.
> Guernsey: wind W force 9, backing to SW by noon, then veering to W still force 9 until at least midnight. Rain at times all day.
> Dover Strait: wind SE, force 5, becoming light and variable by mid-morning, veering to W between 6 and 8 pm, and soon increasing to force 9-10.
> The Downs: wind E to SE, force 4-6 to early afternoon, then light and variable until veering to W between 6 and 8 pm and increasing to force 8-10 by midnight.
> The Nore: wind SE, force 4-6 to 6 pm, then variable before veering to W between 8 and 10 pm, and increasing to force 8-9 by midnight.
> Along the Dutch coast, near 2ºE: after being SE during the 24th, the wind at first on the 25th became calm until a breeze picked up from the WSW by 2am, strengthening to force 9 by 4am.

It is clear from these records that the veer was followed within a few hours by a force 8-10 gale that persisted throughout the remainder of the 24th and reached the southern North Sea early on the 25th. HMS *Clorinde* suffered in this gale. This ship had sailed from Spithead on the morning of 21st as escort to a fleet of eight East India Men (which had been prevented from sailing on the 19th because of fog), then encountered strong gales at 50N 3W on the 24th, and was seen in distress at 1 pm that day, and again at 11 am on the next with top mast gone. She returned to Spithead in the morning of 26th with loss of her main mast. The fleet turned back but two were reported to be onshore at the 'back' of the Isle of

Wight, its south-western coast. However, all were able to reassemble and sail again, on 23 February, except one – the *Henry Addington*, which returned to The Downs on 27 January with loss of main and mizzen topmasts and other damage, having been 12 hours on shore at Bognor Rocks.

Further west,

> 'On Tuesday, the 24th … during a tremendous gale of wind, HM hired transport *Argo* … bound from Portsmouth to Spain … was driven on shore and stranded on Pembrey Sands, Carmarthenshire.'
> *The Cambrian*, 3 February

Tragedy struck at The Downs. Early on the 24th, two ships of the East India Company, having recently left London for India (the *Admiral Gardner*) and China (the *Britannia*), had rounded the North Foreland to be off the east coast of Kent when they encountered strong-gale (force 6-8) SE winds such that they took shelter on the leeward side of the Goodwin Sands, near The Downs. However, the above described westerly gale reached the area later in the day and both ships lost their shelter and were driven on to the Sands and wrecked. Captain Eastfield's account of the loss of his ship *Admiral Gardner* is very graphic[13]. According to him the veer was at 7 pm, which is consistent with records from Royal Navy ships. Many distress guns were fired in the early hours of the 25th, and daylight revealed the stricken vessels. Boats were sent early in the afternoon from Deal, Broadstairs and Ramsgate, and help came from those Royal Navy ships in The Downs able to provide it, but it was the boatmen who saved the crews as it was impossible for others to get alongside. Three of the crew of the *Admiral Gardner* were drowned, and seven from the *Britannia*. Also wrecked was the *Apollo* bound for the West Indies; only one man was saved out of 20 (*Lloyd's List*, 27 Jan. 1809; *Caledonian Mercury*, 30 Jan. 1809).

Observations from ten Royal Navy ships, in The Downs and the Dover Straits, provide a detailed account of the weather (Table H). SSE winds, force 6-8, early on the 24th decreased to light-moderate (force 2-4) and backed to ESE by 8 am. Then followed a spell of light and variable winds until 6 pm (presumably preventing the ships from leaving their shelter), when a moderate-fresh (force 4-5) wind sprung up from WSW, soon increasing to a fresh-hard gale (force 8-10). This gale continued until noon on the 25th at the same time veering to NW. The wind then soon decreased to moderate-fresh and rapidly veered further – to N by 4 pm, SE by 6 pm and S by midnight.

These round-the-clock changes in one day are consistent with the low centre crossing southern England on the 24th reaching the North Sea by early on the 25th, then followed by a quickly-moving ridge ahead of the next low. Rain, with some early snow, persisted throughout the 24th but cleared early on the 25th, only to be renewed towards midnight.

Three ships in the North Sea near 52ºN 3ºE show that the centre passed close to them as they recorded fresh SSE winds with sleet, veering to W by 6 am with some drizzle and an increased wind to strong-gale (force 6-8), but continuing to veer to N by noon with a return of sleet and snow. Winds then decreased to moderate-fresh and became E by 4 pm and SE by midnight with further sleet and snow. Again round-the-clock in one day!

Sleet or snow in the eastern Channel early on the 24th soon turned to rain that persisted for the remainder of the day, heavy at times. Next day, winds veered further as the low centre moved away: to N by 3 am and to SE by evening. On the afternoon of the 23rd snow had

[13] http://www.eicships.info/ships/s815/captain.htm (accessed May 2015).

spread to southern Ireland, and on the following day across southern England by morning, reaching northern Ireland and the north of England by the evening (12 inches [0.3m] or more at Birmingham, and now 9 or 10 inches [0.25m] at Carlisle), by which time it had been replaced by rain from the Midlands southwards with maxima widely 30º to 35ºF [-1 to 1.5ºC] (where lying snow was abundant) but 40º to 45ºF [4.5 to 7.5ºC] in London, where much of the lying snow would have thawed in the heavy rain. The next day, this snow belt had spread to south-eastern Scotland and northern Ireland (6 inches in Belfast) but had been replaced by rain over much of England as the thaw spread (although a foot of snow was lying at Welbeck). Maxima were 30º to 35ºF [-1 to 1.5ºC] over northern England and southern Scotland and 35º-40ºF [1.5 to 4.5ºC] in the south, but closer to 45ºF [7.5ºC] in London. In north-eastern Scotland, temperatures remained below 25ºF [-4ºC].

26-28 January 1809: spread of the thaw

By the 26th another low (E) seems to have been moving slowly north-eastwards off the western coast of Ireland to be centred west of Scotland by the next day. Mild SW winds, reaching gale force, had spread to Ireland, Wales and England except the north, with temperatures touching 45º to 50ºF [7.5 to 10ºC] in the south and 35º to 40ºF [1.5 to 4.5ºC] in northern England (but still about 32ºF in Scotland), leading to a continuation of the thaw. It was mostly cloudy and in the south there were showers of rain and hail, but in northern England there was snow at first, spreading further north to much of eastern Scotland, heavy in places and with drifting in NE gales (6 or 7 inches [0.2m] in Edinburgh, and 20 inches [0.5m] in Carlisle). This weather persisted overnight and into the following morning, when winds turned to between S and W with clearing skies, but 5 inches of snow were still lying in Glasgow. Maxima reached 35º to 40ºF [1.5 to 4.5ºC] over northern England and Scotland, but 47º to 52ºF [8.5 to 11ºC] over the Midlands and southern England where there was light rain at times. By the 28th, fresh SW winds covered the whole of the British Isles. It was exceptionally mild in the south, with temperatures reaching 50º to 55ºF [10 to 13ºC], but only 40º to 45ºF [4.5 to 7.5ºC] in northern England and Scotland. Once the thaw set in it was rapid. For example, on the 27th the snow had gone in Birmingham. The Edinburgh record stated ‘snow melting rapidly and streets in a slush’, and on the next day ‘of the great mass of snow on the ground yesterday morning only little spots here and there to be seen’.

The synoptic charts for these three days do not show any clear-cut disturbances, but periods of rain can be identified from ships’ records. For example, by combining ships’ records from each of Plymouth (3), Torbay (6) and near 50ºN 2ºW (7), it seems that rain was more or less continuous from midnight on the 26th to mid-afternoon on the 27th. Weather became hazy (misty?), or even foggy, between midnight on the 26th and midnight on the 27th. During the rainy weather winds were force 4 to 6, backing from WSW to SSW, later veering to SW by the end of the 28th with a return of rain. Similar wind changes were recorded by three ships close to 50ºN 11ºW, but rain there was less persistent and the wind veer to SW occurred close to midnight of the 27th. These changes are consistent with a shallow wave moving north-north-eastwards across the Western Approaches during the 27th, then crossing southern England on the 28th and so accounting for the exceptionally high temperatures there.

29 January 1809: a severe gale

An intense centre of low pressure (low F) moved north-eastwards, crossing from just south-east of Ireland to the east of Scotland leading to a very windy but mild day, with temperatures similar to the 28th. Rain spread northwards as far as southern Scotland. At Plaistow, Luke Howard noted a lunar halo on the 28th, and a solar halo was seen at Birmingham for part of the 29th – consistent with the northward spread of frontal clouds. At Invery, although this was the third day of thaw, it was noted that 'ground still full of frost', illustrating the slowness of change after a week-long severe cold spell.

A well-defined wind direction change from S to W swept eastwards across the country. Its progress up the English Channel could be tracked from the records of ships at sea, which provided the following approximate times:

49ºN 4ºW 9 am
50ºN 3ºW noon
50ºN 1ºW 2 pm

This timing is confirmed by ships at anchor: Falmouth between 7 and 10 am, in Torbay noon, at Spithead 2 pm, and at The Downs (where the direction change was less pronounced) closer to 5 pm. Winds reached force 9-10 and squalls, sometimes violent, were recorded widely both before and after the veer in direction, which was accompanied by rain, sometimes heavy. These changes can be illustrated by records from eight ships in Torbay (Table I), showing the following sequence:

1. fresh-strong (force 5-6) SW winds backed to S by daylight and increased to fresh-strong gale (force 8-9) with heavy squalls; then
2. a rapid veer to W soon after noon (accompanied by a little rain); then
3. a decrease to moderate-strong (force 4-6) by midnight.

A very similar sequence was recorded by eight ships at Spithead, but with a veer to WSW and perhaps an hour or two later than at Torbay. Further east, in the Dover Strait and The Downs, seven ships recorded a SW wind force 4-5 backing a little to SSW and increasing to fresh-hard gale (force 8-10), with some rain; then a veer to SW during the afternoon (although timing is uncertain from lack of detailed observations) and maintaining strength until midnight. During the afternoon HMS *Iphigenia*, in the Solent, experienced 'in a sudden squall one of the girt lines gave way by which 14 hammocks were blown away and lost'.

These events indicate the passage of a cold front. A heavy SW-W swell developed over the western English Channel during the morning, with a 'tremendous sea' recorded at 50ºN 3ºW by HMS *Sprightly* by the afternoon. At 6.30 pm the *Sprightly* 'shipped a heavy sea which carried away the larboard davit and jolly boat from the stern – but got in board and very much stove'.

Further west, at 49ºN 11ºW winds changed abruptly at 4 am from S to N, force 8-9 (indicating that the low centre passed close by), backing to NW by noon. Continuous rain, heavy at times, fell during the early hours. Yet further west, at 49ºN 15ºW, winds were NW force 4-5, backing to W by the afternoon then SW, but light and variable by midnight. At Cork (6 ships, but with less detailed records), squally winds veered from SW to NW between midnight and 7 am, reaching force 8 and again with rain, heavy at times. Similar changes

were recorded nearby by HMS *Rowena* off the Irish coast at 51ºN 9ºW, indicating that the wind veer was probably between 6 and 7 am.

Along the east coast:

The Nore	SW 5-6 increasing to 6-8 by noon with heavy squalls, veering during the afternoon to W 9-10 and continuing to midnight
Yarmouth	SW 4-5 increasing to 9 during the afternoon, veering about 6 pm to become W during the evening
Humber	S-SW 4-5 increasing to 9 during the afternoon, veering during the evening to WSW and decreasing to 5-6
55ºN 02ºW	SW 4-5 backing S-SE 6-8 during the afternoon, veering by 6 pm to SW-W 8-9
Leith	SW 4-5, backing SE during the afternoon, veering to SW by midnight
59ºN 01ºW	SSW 5-6 veering to WSW towards noon, then backing through S to E by midnight (then rapidly to NW) – indicating that the low centre passed to the south

Further south, at Lorient the veer was less definite – from a strong-gale (force 6-9) SW wind during the morning to a strong (force 6) noon W wind, preceded by some rain. A similar veer occurred later at Rochelle, by mid-afternoon, but with no recorded rain. In the Bay of Biscay, at 44ºN 3ºW, a veer at noon from SW to NW was recorded by HMS *Conflict*. Off Finisterre, three ships near 43ºN 10ºW recorded a veer at 6 am, from a severe SW gale (force 9-10) to W, decreasing and backing to a strong SW wind (force 6) by the evening.

This rough weather caused difficulties at sea, particularly the loss of ships' boats. HMS *Hindostan*, among the ships close to 49N 4W, at 11 am encountered a hard gale (force 10) and a heavy sea such that she 'lost a 25-foot cutter from the Quarter by a heavy lurch'; and at 1.30 pm it was recorded 'ship very labouring [sic] and shipping a great deal of water'. Also at 11 am, HMS *Sprightly* encountered very heavy gales with 'the vessel labouring a lot' such that three of her guns 'were hove over board to lighten her'. In addition, the two ships at 50ºN 1ºW, HMS *Rebuff* and HMS *Firm*, collided, but the damage was minor. During the afternoon, HMS *Mariner*, at The Nore, recorded '[jolly] boat … swamped and parted the painter, and was lost with everything belonging to her'. By 1 am the following morning, HMS *Indignant* in The Downs 'shipped a heavy sea which washed the jolly boat over board, threw the cutter into the side and stove her, also carried away 4 half-ports and stove others'. Ships at anchor were not spared. For example:

At Falmouth:

> 'early this morning a most severe gale came on from the south, which continued until 11 o'clock, when it shifted suddenly to the WNW and blew very hard. The *Chesterfield* (packet) broke from her moorings and drove onshore. *The Duke of Kent* (packet) also dragged her anchor and struck the ground. In Carrick Road, the *America* parted her cable and drove on board a transport which lost her bowsprit and fore-mast.'
> *Trewman's Exeter Flying Post*, 2 February

The same paper gave this report from Plymouth:

> 'last night [28th-29th] and this morning it blew a most dreadful hurricane at SSW and continued with incredible fury all day.'

Also, a letter from Plymouth dated the 30th contained the following:

> 'The hurricane, which abated yesterday [29th] about sunset, re-commenced about ten last night, and has continued ever since with the most terrific violence.'
> *Jackson's Oxford Journal*, 4 February

Here, at 1 pm, HMS *Orestes* recorded 'the cutter broke adrift from the stern with 3 men'. (On the 31st: 'found the cutter in Catwater much stove and everything lost out of her; 2 seamen drowned'). At Spithead during the afternoon 'the vessel [HMS *Alban*] pitching heavily; washed from the stern the jolly boat'. A transport from Plymouth, with provisions for men-of-war at Torbay, having over run the bay in the gale, ran on shore … near Exmouth Bar (*Trewman's Exeter Flying Post*, 2 February).

In Wales:

> 'During the hurricane on Sunday [29th] afternoon, a small building was blown down at Caerwent, in Monmouthshire; which fell upon a person of the name of Langley, who was standing near it, and crushed him to death. This unfortunate sufferer had buried his wife only on the preceding day.'
> *The Cambrian*, 3 February

The following observations illustrate the widespread occurrence of inland gales.

London, Plaistow	'after a fine morning the wind began to blow hard from the south' (*The Athenæum*, V, p.251)
Sunbury	'stormy' day
Modbury	'very strong wind till about 3'
Heytesbury	'two or three little storms in the afternoon & evening – the wind rough'
Stroud	'stormy day'
Bristol	'extremely tempestuous' day
Holywell	'hurricane at 5 pm blew down a great ash in garden'
Newcastle	'stormy night'
Carlisle	'very stormy night'
Edinburgh	evening – 'high SW' wind
Perth	'south-easterly gale'

However, there were no records of strong winds further north, suggesting that the low centre passed between Perth and Aberdeen. This track is consistent with ship records from Leith (6, but lacking in detail), where SW winds backed to SE during the afternoon, then veered to SW-W by midnight.

30 January 1809: hurricane force winds

Another, similarly intense low (G) crossed the British Isles from south-east of Ireland to the North Sea off northern England, leading to an extremely windy day. Two ships happened to be near the low centre before and after it crossed the British Isles. HMS *Fortunee*, near 48ºN 10ºW, recorded a wind reversal during the morning from fresh SW to a strong NE gale;

and HMS *Nightingale*, near 54ºN 1ºE, after a calm spell noted a N breeze springing up at 11.30 pm, increasing to a strong gale within an hour. This movement of the centre suggests a mean speed of 30-40 knots.

The following records illustrate the strength and widespread occurrence of inland gales:

Harleston	afternoon 'stormy'
Minster	day 'strong wind', night 'SW very stormy'
London, Clare Street	'very heavy storm'
London, Syon House	'high wind all day', night 'very high wind'
London, Sunbury	night 'stormy'
Heytesbury	day 'wind very rough', night 'wind uncommonly rough'
Stroud	'stormy'
Bristol	'very windy'
Modbury	'violent storm most of day'
Birmingham	'high wind until 12 o'clock [?midnight]'

Gales were even stronger than on the previous day, as shown by the use of the words 'violent', 'excessive', 'most terrible' and 'uncommonly rough'.

Meanwhile, at Plymouth, at 3.30 pm, HMS *Peacock* recorded 'came on a violent gale of wind from WNW'. And …

> 'On Monday [30th] evening it blew an hurricane; many houses in this town were completely unroofed; several chimneys blown down; and slates and bricks falling in every direction rendered it extremely dangerous to pass the streets. The majestic row of trees which formed the avenue to Cowick House, near this city, are entirely destroyed; and in that field and one adjoining upwards of one hundred large elms etc are entirely rooted up, forming a scene which almost conveys to the mind the dreadful idea of an earthquake.'
> *Trewman's Exeter Flying Post*, 2 February

At Portsmouth

> 'On Monday evening the wind blew from off the Middle Storehouse in H. M. Dockyard 5 tons 1 cwt of lead in three pieces – one, weighing 80 cwt was driven by the violence of the gale … to the distance of 111 ft.'
> *Hampshire Telegraph and Sussex Chronicle*, 6 February

> 'The whole of this day it has blown a tremendous gale at WSW, and we fear much damage has been done at Spithead.'
> *The Morning Post*, 1 February

Daybreak next day revealed the havoc caused by the storm. For example, HMS *Undaunted* recorded at 7.30 am '6 vessels onshore at South Sea and Stokes Bay beach; several with their masts and bowsprits sprung; several ships of war drove during the night'. Similarly, HMS *Pilchard* at 8 am 'saw five ships onshore on South Sea beach and four in Stokes Bay; and several dis-masted.' However,

> 'The late gales did not do so much injury here as might have been expected, considering their strength, duration and the vast number of shipping that were lying at Spithead and in the harbour – 8 transports and a galliot [small sailing boat] … were driven onshore in Stokes Bay and 7 transports in South Sea beach.'
> *Hampshire Telegraph and Sussex Chronicle*, 6 February

At Brighton

> 'We had yesterday [30th], and the greater part of the night, one of the most tremendous gales of wind ever recollected in the memory of the oldest inhabitants, scattering with its boisterous powers bricks and tiles in various directions … while the sea seemed to take an equal part in the contention by rising to an alarming height, lashing the shore and cliff with deafening sound.'
> *The Morning Post*, 31 January
> [The gale coincided with a spring tide – full moon was on the 31st.]

In London, Luke Howard remarked that at Plaistow '… during the whole night of the 30th

> [the wind] raged with excessive violence from the west, doing considerable damage. The barometer rose, during the hurricane, one tenth of an inch [nearly 4 mbar] per hour.'

> 'About four o'clock [in the] afternoon [of 30th] an alarming fire happened at Warne's Hotel in Conduit Street, Bond Street … The first floor … where the fire was first discovered … the devouring element burst through the windows with astonishing rapidity … The wind, which blew a strong gale from the south-west, directed the flames towards the front of the house, which was completely consumed, with an adjoining house towards Swallow Street, in about fifty minutes. The engines afforded timely assistance and a great portion of the property was saved by the activity of the servants. The Horse and Foot Guards were stationed to keep off a numerous mob, and by this regulation the firemen were enabled to extinguish the flames by nine o'clock.' 'The violence of the wind blew the cinders into Swallow Street and Vigo Lane, where a shower of fire descended and the inhabitants were compelled to stand on the tops of their houses to put out the sparks.'
> *Jackson's Oxford Journal*, 4 February

On the Thames,

> 'On Monday night [30th-31st], the shipping and craft of all descriptions on the River suffered great damage. The number of trees that broke adrift from the Tower, downwards through the Pool, carrying all other shipping away with them that they came in contact with, exceeds anything of the kind for many years past. The surface of the water was covered with wreckage. It is supposed that no fewer than 200 sail of colliers, foreign vessels, keels, lighters etc were adrift at one time. From Union Stairs to Limehouse Hole, presented … a dismal spectacle of destruction. Vessels on all sides were to be seen without a mast standing; some with loss of bowsprits, others were perfect wrecks and onshore lying on their beam ends. Several laden vessels were sunk – many lighters with provisions, on coming in contact with large colliers, were immediately sent to the bottom. … it would be impossible to estimate the extent of the damage sustained. At Gravesend, and between that place and The Nore, we learn that great havoc was made. It, however, affords us some consolation that … very few lives have been lost.'
> *Morning Post*, 2 February.

However,

> 'Monday evening [30th] a ferryboat with 11 persons was upset by the violence of the wind, about midway between Dukes's Shore, Limehouse and Globe Stairs, Rotherhithe, when 7 were drowned. The same evening, a house in George Alley,

Fleet market, inhabited by Irish labourers, was blown down, when a woman who had recently lain in, and her baby, were crushed to death.'
Ipswich Journal, 4 February.

Near Norwich

'One of the large trees at the entrance to Sprowston Hall was blown down … .
It is remarkable that it was planted the day King Charles was beheaded,
30th January 1649, and blown down the same day 1809, being 160 years old.'
Bury and Norwich Post, 8 February

Like the previous day, a veer in direction swept eastwards. For example, ships in the English Channel recorded the following:

49ºN 4ºW	SW at first backing to S 8-9 during the morning and 'blowing a hurricane' at noon
50ºN 1ºW	WSW at first, backing to S-SSW force 6-8 during the morning, then veering from near 11 am force 9-10 (with heavy squalls) to W force 8-9 by midnight
51ºN 1ºE	WSW at first, backing to SSW during the morning, then veering from near noon force 9-10 (with heavy squalls) to SW-W force 9-10 by midnight
The Downs	SW at first, backing to SSW during the morning, then veering from at noon force 8-10 to WSW by midnight
53ºN 3ºE	WSW at first, backing to S by noon, then veering by 5 pm force 8-10 to W by midnight with heavy squalls

The timing of this veer is confirmed by ships at anchor. At Falmouth it was around 10 am, from SSE to W force 9-10, then decreasing to light and variable by midnight. At Torbay (Table J) the sequence was:

1. a moderate-strong W wind backing to S by daylight and increasing to strong-hard gale (force 9-10) with heavy squalls and rain; then
2. a rapid veer to W at noon; then
3. heavy squalls during the afternoon, followed by a decrease to force 5-6 by midnight.

Again, similar changes were recorded at Spithead, but winds were even stronger. After the veer to west in the early afternoon (and the end of several hours of rain, sometimes heavy), strong-hard gales (force 9-10) continued until midnight, reaching their peak (force 11-12) during the evening. In the Dover Straits and The Downs, the veer from SW gale to W occurred late in the afternoon peaking in the evening as a 'very hard gale', 'tremendous gale' and 'hurricane'. These changes indicate the passage of another cold front, with the wind shift accompanied by violent squalls. The word 'storm' (force 11) was not used for wind strength in the log-books but 'stormy weather' sometimes was. These occasions, as well as 'very hard', 'very heavy' and 'violent' gales (the latter presumably stronger than 'hard gales', and therefore of storm force) were recorded from late morning to mid-afternoon over the western English Channel, transferring to The Downs from 6 pm to midnight. Even stronger winds, of hurricane force, were recorded by three ships during the early afternoon in the western English Channel, and again by another ship in The Downs at midnight. It is clear that a period of storm and hurricane force winds lasting up to six hours progressed eastwards along the English Channel.

There is no record of an accompanying 'heavy sea' from the Channel, possibly because there was insufficient time for the waves to build. There are, however, records of difficulties encountered, and the apparent ready acceptance of a need to throw guns overboard. During the afternoon, HMS *Brazen* (49ºN 4ºW) recorded 'the ship taking the seas in over the lee gangways, battened down the hatches, lost jolly boat from the Quarter … hove the lee Quarter and Forecastle guns overboard, hove the starboard Quarter deck and Forecastle guns overboard, round shot … etc.' At 7 pm, HMS *Rebuff* (50ºN 1ºW) 'threw overboard the two bow guns, six pounders, to ease the brig, it labouring much and shipping a great quantity of water'. In The Downs, by 8 pm HMS *Humber* recorded that 'it blew a most tremendous gale with a heavy sea which lasted all night'; at 9.30 pm HMS *Peruvian* was 'obliged to cut away from the stern the 6-oared boat …'. By 11.15 pm HMS *Euryalus,* near 52ºN 3ºE off the Dutch coast*,* recorded 'staysail gave way, split all to pieces'; and soon after midnight HMS *Fly*, at The Downs, experienced 'tremendous squalls' with 'ship riding very heavy'. In the early hours of the following morning, at 3 am, HMS *Pandora* (53ºN 3ºE) 'threw two of the sea guns overboard to ease the ship'; and at 3.30 am noted 'carried away the starboard yard arm (main) – split the main topsail which blew away all before the 4th reef; rolled overboard 6-pound shot through the scupper holes'.

Similarly, there were difficulties for ships at anchor. Many began to drift and some ended up onshore. There were also collisions, perhaps a result of crowding brought on in part by attempts to find shelter and avoid the extreme weather. For example, at Falmouth there was

> '… a repetition of the same weather and winds as yesterday, but if possible it has blown harder today. The *Carteret* (packet) broke from her moorings this afternoon and is driven onshore on the rocks at high water mark.' Then at 7 pm, 'the gale is much moderated, boats are gone to the assistance of the *Carteret*.'
> *Trewman's Exeter Flying Post*, 2 February

Also, at 10 am, 'a transport came athwart hawse [of HMS *Non Pareil*] – carried away the jib boom and catheads and damaged fore and main channels'; at noon HMS *Plover* recorded that '*Meteor* (transport) drove & took away our cable by which means his anchor came up to our bow and cotted [i.e., tangled with] the anchor …'; and at 4 pm HMS *Gleaner* noted that 'the *Mary* (cutter) [was] foul of us and carried away our martingale and [its] stage'.

At Plymouth: 1.30 pm, HMS *Barfleur*, 'launch swamped astern – lost masts, sails, oars …'; 2 pm: HMS *Amazon*, 'the yawl parted from the stern and went ashore'; afternoon: HMS *Norge*, '[launch] broke adrift from stern – drove onshore and was lost'; 4 pm: HMS *Weazle*, 'a transport drove on-board us and carried away the jib boom'.

At Torbay, HMS *Impetueux* drove foul of HMS *Royal George* around 2 pm; the latter cut her cables and stood out to sea within an hour.

In Guernsey at noon, HMS *Quebec* recorded that 'heavy sea … carried away the driver boom which split the sail'; and during the afternoon 'the best bower anchor came home' in 'a perfect hurricane'. Nearby, on HMS *Diomede*, 'fell overboard and was drowned John Blaffey seaman' – most likely a victim of the exceptional winds.

In the Solent, HMS *Iphigenia* noted 'violent gusts' in a strong S gale during the early afternoon, causing the ship to drift. At Spithead, during the same afternoon, HMS *Undaunted* 'observed several vessels onshore on South Sea and Stokes Bay beaches'. HMS

Pilchard recorded 'the cutter swamped astern and broke adrift' and at 8 pm 'a transport ran foul of us and carried away our jib boom and martingale'. Similarly, HMS *Wild Boar* 'lost the jolly boat off the stern by the sea striking her; lost also the oars, boat hook, block and falls'; and with HMS *Abundance* 'by the ship bolting, carried away our fore and main channels'. The *Morning Post* report from Portsmouth dated the 31st stated 'the gale of wind last night continued till 12 o'clock [midnight] when it abated …'; also: '… the only effect of the tremendous gale will be in masts, yards, cables, anchors and bowsprits.'

At Sheerness,

> 'It blew the most tremendous gale at The Nore that has been experienced for many years past; it was with great difficulty the Men-of-War rode it out with their yard and topmast struck. HMS *Namur* rolled so much from the sudden squalls that one of her carronades [mortar-like ordnance] upset from the slide on the forecastle. HMS *Galatea* drove from her moorings; all her boats but one were stove'.
> *Morning Post*, 31 January

Further west, near 49ºN 11ºW winds were WSW force 8-9 at first, veering to NW-N around 5 am, then backing during the afternoon to W force 6-8, with HMS *Dryad* recording thunder and heavy rain around 7 pm. These gales caused problems. At 5 am, HMS *Phipps* (48ºN 12ºW) recorded 'came on a most tremendous gust of wind, lay the brig on her beam ends … cut away the masts'; whereas at 6 am, HMS *Snapper* (45ºN 8ºW) 'shipped several very heavy seas which unshipped the weather hammock boards and stanchions and bent several of them', and on HMS *Niobe* (48ºN 9ºW) 'in securing the jolly boat on the Quarter, by a sudden jerk … the boat broke adrift; lost overboard with her John Beale seaman'. The *Niobe* was escorting a convoy of 40 transports taking 4300 soldiers to Spain under the command of Maj.-Gen. John Sherbrooke. The convoy had set sail from Portsmouth on 15th, got to near 48ºN 10ºW by the 22nd and remained there before it became dispersed by the gales. By 3rd February two of the transports had reached Cork, and one got back to Portsmouth and reported the difficulties. Later, all but one of the remaining transports reached ports along the south coast of Ireland. Off the south-west coast of Ireland, the crew deserted the *Macclesfield*, from London to Surinam, after losing her rudder and receiving much damage in the gale.

Off Lorient. HMS *Contest* experienced the fury of the gale [on the 29th and 39th] 'and the poor fellows on board her were forced to get down below and to belay the rudder; they could not get any victuals except biscuit for 48 hours.' (*Trewman's Exeter Flying Post*, 2 February).

HMS *Gluckstadt* (46ºN 11ºW), at 4 am in a heavy WSW gale, recorded 'the ship labouring very hard on her beam ends and the waist full of water. People employed clearing away the guns which for the safety of the vessel was requisite to be sent overboard. One pump kept constantly going.' An hour later: '6 of her guns overboard; 4 of the weather 24-pounders broke from the lashing and was [sic] washed overboard.'

Yet further west, close to 48ºN 15ºW, winds were light and variable at first but they rapidly increased from NE, reaching force 9 by 3 am (showing that the centre of low pressure passed nearby), followed by a decrease to force 4-5 in the afternoon and backing to W, then SW by midnight. The centre passed to the S of Cork where winds backed from S at first, through SE and NE to N force 8-9 by noon, then to NW before decreasing to light and variable by the end of the day.

To the north,

> 'The *Triton*, from Rio Janeiro to Liverpool, was driven on shore on Monday [30th], got off that evening and towed upon the Hoyle Bank where she went to pieces during a violent gale that night.'
> *Caledonian Mercury*, 3 February.

Even the more sheltered east coast did not escape the storm, as the following ship records show.

The Nore	SW 5-6 increasing to a squally 8-9, veering to W 8-10 during the afternoon
Yarmouth	WSW 4-6 backing to S by noon, veering at 6 pm to SW 8-9 and to W-NW by midnight
Humber	WSW 9-10 at first, decreasing and backing to S-SE 5-6 by the afternoon, and further backing to NE 9-10 by midnight
55ºN 2ºW	WSW 9-10 at first, decreasing and backing to S by noon and to NE by 6 pm, then NW by midnight
But, Leith	variable 2-4

Wind changes in the Bay of Biscay capture the passage of the cold front.

47ºN 3ºW (off Lorient)	SW 6-8, veering W 9 at 6 am, moderating to force 4 late in evening
46ºN 1ºW (off Rochelle)	W 4-6, backing to SW by 3 am and S 8-9 at 6 am, veering near 11 am to W and later NW 4-6
43ºN 10ºW (off Finisterre)	SW 8-10, by 4 am to W 6-8, then decreasing 2-4 by noon, and backing to SW by midnight

Two ships recorded thunder and/or lightning near 48ºN 13ºW, in the rear of the low.

31 January 1809: a pleasant day at last

With low G having reached the North Sea and a ridge moving in from the west, a quieter day prevailed over much of the British Isles. Maximum temperatures reached 45º to 50ºF [7.5 to 10ºC] over southern England and 40º to 45ºF [4.5 to 7.5ºC] elsewhere. It was widely described as 'fine' or 'pleasant', and even 'delightful' and 'charming' – observers were no doubt relieved after the previous days of extreme weather – although further rain arrived in the south-west late in the day. The rapid changes accompanying the ridge and the following system are illustrated by these records from ships progressively further west:

The Downs	violent (force 10-12) W winds at midnight rapidly moderated to force 4-5 by 4 am, and became light and variable during the afternoon and evening, followed by a backing to S force 2-4 by midnight
50ºN 2ºW	W 8-9 decreased rapidly to light and variable by 5 am until 3 pm, then S becoming force 4-5 by midnight
Torbay	W 4-5 decreased to light and variable or calm during the morning, than picked up from S during the afternoon to become force 4-5 by midnight
48ºN 10ºW	W 8-9 soon moderated to 4-5, then backed to S by 8 am, followed by a few hours thick weather with rain and a

	veer to SW at noon, persisting to midnight
47ºN 15ºW	SW 2-4 became S 5-6 by 5 am, with a veer to SW-W by 10 am, persisting to midnight

Conclusions

During the latter half of January 1809 a succession of lows, progressively more vigorous, passed over or close to the British Isles along tracks changing from NW-SE to SW-NE. Frosty SE winds became replaced by markedly milder SW winds. Large areas of snow, each followed by rain (with a notable spell of freezing rain), spread progressively further north until the whole of the British Isles was subjected to a rapid thaw and consequent widespread severe flooding, loss of life and much damage. The change in track of the lows probably reflects a shift in position of a major upper-air trough over the Atlantic, and the associated strong zonal temperature gradient would account for the severity of the gales on the 29th and 30th, and presumably even earlier gales over the ocean, judged by the onset of heavy westerly swells from the 21st.

This study has demonstrated three main points.

1. It is possible to produce daily synoptic charts for the early nineteenth century that are comparable in detail with those routinely prepared in the late twentieth century, and from which the tracks of large-scale disturbances can be deduced.
2. By comparing records from log-books of neighbouring ships, anchored or at sea, some indication of the quality of the weather observations can be assessed.
3. By combining observations from neighbouring ships it is possible to reduce the effects of omissions and transient deviations, and so assist in producing both reliable hourly (almost) sequences and consistent synoptic analyses.

Regarding quality of observations, comparison of records from neighbouring ships reveals not only that there may be errors in calculated positions (even as much as a degree of latitude or longitude) but also that they are 'spot' observations, and not part of a systematic record. That is perhaps not surprising as a log-book would most likely have been used, if needed, as evidence of what action had been taken to navigate the ship. The Tables provide much evidence to support this point. Although observations were most often made at the times of change of watch (every four hours), they could also be made at any other hour of the day or night. Changes in wind or weather need not have taken place immediately before a record was made. Moreover, recording both wind and weather together was far from usual. Wind alone (often either direction or strength, not both) was common; 'weather' alone was less common. Consequently, the absence of some element in the record must not be taken to mean that element could have been recorded but was not. For example, the absence of a record of rain does not mean it was not raining. The same applies to absence of frost records – particularly relevant for this study. In addition, the word 'weather' almost certainly refers to the wind alone, not as we would understand it (wind as well as clouds, precipitation, etc.); and the meanings of 'fair' and 'fine' are unclear. Such considerations should be taken into account when using records from isolated ships, where comparisons are not possible.

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Table A
Observations at Mongewell (2 km south of Wallingford, Oxfordshire),
at 8 am, 2 pm & 8 pm, 14-31 January 1809

	temp. ºF	*press.* in.	*wind*	*weather*	
Sa 14					
8	28	29.67	N	cloudy	
2	31	29.68	NNE	cloudy	
8	28	29.68	E	cloudy	
Su 15					
8	27	29.65	NE	snow	
2	28	29.65	NE	cloudy	
8	24	29.65	NE	cloudy	
Mo 16					
8	25	29.89	E	cloudy	
2	28	29.95	E	cloudy	
8	25	29.95	E	cloudy	
Tu 17					
8	26	29.95	-	cloudy	
2	28	29.94	-	cloudy	
8	n/a				
We 18					
8	19	29.80	E	fine	
2	25	29.79	E	fine	
8	17	29.79	E	fine	
Th 19					
8	23	29.64	SE	cloudy	
2	28	29.45	SE	rain [freezing] & hail	
8	29	29.49	-	rain [freezing] & hail	
Fr 20					
8	28	29.40	N	cloudy	
2	32	29.38	N	cloudy	
8	31	29.38	-	rain [freezing] & hail	
Sa 21					
8	29	29.35	N	cloudy	
2	32	29.39	-	cloudy	
8	30	29.40	-	cloudy	
Su 22					
8	30	29.9[a]	NE	snow	‘snow fell all day’
2	35	28.98	NE	snow	
8	31	28.98	NE	snow	
Mo 23					
8	14	29.52	NW	fair	
2	32	29.57	W	fine	
8	28	29.57	S	cloudy	
Tu 24					
8	33	29.28	E	cloudy	‘a great deal of snow fell in the
2	38	29.29	E	rain	night & rain all the day’
8	35	29.29	-	rain	
We 25					
8	38	29.32	W	fine	‘rain in the night’
2	37	29.60	N	cloudy	
8	33	29.65	SE	rain	
Th 26					
8	45	29.11	SW	cloudy	
2	46	29.9[b]	SW	cloudy	
8	43	29.11	SW	cloudy	
Fr 27					
8	43	29.35	SW	cloudy	
2	47	29.35	SW	cloudy	
8	(n/a)				
Sa 28	(n/a)				
Su 29					
8	46	29.15	S	cloudy	‘some rain in the day’
2	47	29.76	S	cloudy	
8	(n/a)				
Mo 30					
8	43	29.27	SE	cloudy	‘a great deal of rain in the course of the day’
2	46	28.90	SE	rain	
8	45	28.61	SE	rain	
Tu 31					

8	35	29.60	SW	fine
2	44	29.71	SW	fine
8	28	29.79	S	cloudy

[a] probably 29.90 [b] probably 29.09

Table B

Places with quantitative measurements

H = hour P = pressure T = temperature W = wind direction
+ = record available - = record not available

PLACE	H	P	T	W	OBSERVER	SOURCE (MOA = Met. Office Archives)
*London: Roy. Soc (Somerset House)	8 14	+ +	+ +	+ +		*Phil. Trans., 1809*
*London: Strand	8 12 23	+ + -	+ + +	+ - -	John Cary	*Edinburgh Ann. Reg., 1809*, 493
*London: Syon House	8 15	+ -	+ +	+ -	Thomas Hoy	MOA
London: Sunbury	15 ?	- +	+ -	- +	Rev. James Cowe	MOA
Minster (Kent)	8	-	-	+	Stephen Rouse	Kent RO: M2567
*Mongewell (Oxfordshire)	8 14 20	+ + +	+ + +	+ + +		Roy. Soc. Liby.: MA299
Lewknor (Oxfordshire)	mid-morn.	+	+	+		Oxfordshire RO: Par161/17/1
*Stroud	8 14	+ -	+ +	+ -	Thomas Hughes	MOA
*Bristol	8	+	+	-	Dr Pole	*Gents. Mag. 1809*, 98
*Modbury (Devon)	8	+	+	+	John Andrews	MOA
Harleston (Norfolk)	3-6 17-18	- -	- -	+ +	Thomas Pellant	MOA
*Birmingham	8 14 20	+ + +	+ + +	+ + +		Birmingham Ref. Liby. Boulton & Watt Collection: box15
Derby	14	+	-	-	Thomas Stanwick	*Derby Mercury*, 2 February 1809
*Holywell (Flintshire)	8 14	+ +	+ +	+ +	D Pennant	MOA
*Welbeck Abbey (Nottinghamshire)	9 21	+ +	+ +	+ +		British Liby. Add. 10882, ff. 175v-176r
*Hull	9	+	+	+	Henry Barnard	Hull History Centre
Keighley (Yorkshire)	20	-	+	+	Abraham Shackleton	Cliffe Castle Museum, Keighley
*Newcastle-upon-Tyne (Jesmond)	9 15 23	+ + +	+ + +	+ + -	James Losh	Newcastle Literary and Philosophical Society Liby.
*Carlisle	8 12 20	+ + +	+ + +	+ + +	William Pitt	National Liby. Scotland: Acc. 10069/54
*Glasgow (Cambuslang)	10	+	+	+	James Meek	Glasgow University Liby. MS Gen 325
*Edinburgh-1	8 12 22	+ - -	+ + +	- - -		*Edinburgh Ann. Reg.*, *1809*, 468-469
Edinburgh-2	7 12	+ -	+ +	+ -		*The Scots Mag., 1809*, 2, 92
Edinburgh (St John's Hill)	?	+	-	-	George Waterston	National Liby. Scotland: Acc. 10776
Dunfermline	?10	+	+	+	Rev. Henry Fergus	National Liby. Scotland: Acc. 10069/81
Perth	var.	-	+	-	James Ramsay	MOA
Fiars (Kincardineshire)	?	-	+	+		MOA
*Gordon Castle (Moray)	8 15	+ +	+ +	+ -		MOA
Cork	8-9	+	+	+		MOA
*Kilranalagh (Kiltegan) (Co. Wicklow)	9-10 14-15	+ +	+ +	- -		Royal Irish Academy Liby. 12 K 14, 63-64
*Dublin	10 22	+ +	- -	- -		Royal Irish Academy Liby. 12 B(2) 21
*Armagh	8 14	+ +	+ +	+ +		Armagh Observatory

*19 places with pressure readings at 8-10 hr. (12 places at 14-15hr, 9 places at 20-23hr)

Table C

Weather records of eight ships in the western entrance to the English Channel, 14-15 January 1809*

	CHANNEL FLEET							*Temeraire*
date/time	ship – *see list below*							
	1	2	3	4	5	6	7	
midnight	-	-	-	-	-	-	-	-
AM	N1	NE	NE	ENE 4	var 2	ENE 2 z	- 4	NE
2	-	-	-	-	ENE	-	-	ENE
	ENE	-	-	-	-	-	E	-
4	-	calm	E	- 5	E 2	E 4	- 4	ESE 4
	-	SE	-	-	-	ESE	-	-
6	-	-	- 5 ir	-	E	SE	-	-
	-	-	SE	-	-	-	-	-
8	E r	ENE 5 z	- 6 ir	- 5	SE r	- 5	- 5 pr	SSW
	S	-	-	-	-	-	ESE	-
10	SSW	-	-	-	-	S	-	-
	-	-	-	-	-	-	-	-
14 noon	SE 5 z	ESE	E 8	-	SE 5 r	-	-	- 5 z
PM	SE 5	S 5 z	ESE 5 ir	SE 5	SSE 5	SE 5		SE
2	S 5 r	-	- 5	-	S	-	SSE 5	var
	-	-	-	-	-	S	-	S
4	S	SSE 5	var	- 5	S 5	S	- 5	- 5 z
	SSW	-	-	-	-	S	-	-
6	- 6 qr	S	-	- 5	S 5	S 5 r	SE 5 pr	- 5 r
	-	-	-	-	-	-	-	-
8	-	-	- 6	- 6 qr	S 6 r	- 8 qr	- 6 r	-
	-	-	S	-	S	-	S	-
10	-	- 5	-	-	S	-	-	-
	-	S	-	-	NW	-	-	var
midnight	W 4	var	var	var	var 2	W	SSW 5	- 2
AM	W	WNW 2	W	W	WNW 1	W 4	W	N
2	-	-	-	-	-	-	-	-
	-	-	WNW	-	W	-	-	-
4	- 4	NW 2	- 2	- 4	- 2	- 2	calm	- 1
	-	-	-	-	WNW	-	-	-
6	-	-	var	-	-	-	-	-
	-	-	-	calm	-	-	-	WNW
8	calm	calm	calm	calm	W 2	- 1	calm	- 1
	-	-	-	-	-	-	-	-
10	-	-	-	-	-	ESE	-	-
	-	-	-	-	-	-	-	-
15 noon	SE 2 z	ESE	SE 2	ENE	SE 1	ENE 2	calm	-
PM	SE 5	ESE 2 c	ESE 5	-	ESE 1	-	ESE 1	SE
2	-	-	-	-	-	-	-	-
	SSW	-	- 6	-	-	SW 5 q	-	-
4	- 5	SE	-	-	ESE 4	- 5	- 5	- 5
	SSW	-	E	-	-	SW	-	-
6	SE 5	ESE	- 6	- 5 q	ESE 4	- 5	E	SE
	-	-	-	SE	-	-	-	-
8	- 5	- 2	- 6	- 5	ESE	- 5	- 4 r	-
	-	-	-	-	-	-	-	-
10	-	E	-	-	-	S	-	-5
	-	-	-	-	-	-	-	-
midnight	ESE 4	-	E 6	-	ESE 4	SSW 5	E 4	SSW 4

1 *Achille,* 2 *Caledonia* (flag ship), 3 *Dreadnought,* 4 *Impetueux,* 5 *Revenge,* 6 *Royal George,* 7 *Shannon*

* In this Table, and D to J, the following letters are used to indicate the recorded weather:

snow, s; hail, h; rain, r; showers, p; squalls, q; fog, f; haze, z; thick weather, k; a hyphen indicates absence of a record.

Table D

Weather records of six ships in The Downs, off the east coast of Kent, 14-15 January 1809

date/time	ship – *see list below*					
	1	2	3	4	5	6
midnight	-		-	-	-	-
AM	l/v ir	N 5 rs	N 4	NNW 4	- 4	NNW 5
2	-	-	-	-	-	-
	-	-	-	-	-	-
4	- 4	-	- 4	NW 4	N -	-
	-	-	-	-	-	-
6	N	-	-	-	-	-
	-	-	-	-	-	-
8	- 4	N -	- 4	NNW 4	N -	NNW -
	-	-	-	-	-	-
10	-	-	-	- 4	-	-
	-	-	-	-	-	-
14 noon	- 4	N -	- 4	- 4	NNW -	- 5
PM	N 4	NNE 4	N 4	NW 4	- 4	NNE 5
2	-	-	-	-	-	-
	-	-	-	-	-	-
4	NNE 4	-	N 4	NNE -	-	-
	-	-	-	-	-	-
6	- 4	-	NNE 4	- 4	N -	-
	-	-	-	-	-	-
8	var -	NE -	E 4	ENE -	-	NE -
	-	-	-	-	-	-
10	-	-	-	E -	NE -	-
	-	-	-	-	-	-
midnight	ENE 5 rs	- 5	- 5 s	- 5 s	E -	- 5 s
AM	SE 8 ks	ENE 5	E 5 ks	ESE 5 s	- s	- 5
2	- 10 rs	-	-	-	-	-
	-	-	-	-	-	-
4	ESE 10	-	E 9 qs	- 5	ESE -	-
	-	-	-	-	-	-
6	-	E 5 s	-	-	-	var
	-	-	-	-	-	-
8	E 10 irs	-	- 9	E 5	-	- 6
	-	-	-	-	-	-
10	-	E -	-	-	-	-
	-	-	-	-	-	-
15 noon	SSE 10	- 5	- 9	- 5 s	ESE 6 s	- 6
PM	ESE 9 s	E 5 ps	E 9	E 5	- 6	E 5
2	-	-	-	-	-	-
	E -	-	E 8	-	-	-
4	- 9	-	ENE 9 is	- 5	ESE -	-
	ESE -	-	-	-	-	-
6	- 9	-	- 9	-	- 5	-
	-	-	-	-	-	-
8	- 9	-	- 9	- 5	E -	-
	-	-	-	-	-	-
10	-	E -	E -	-	-	-
	-	-	-	-	-	E -
midnight	-	- 5	- 9	- 5	E -	- 5

1 *Calliope* 2 *Clyde* 3 *Pandora* 4 *Tribune* 5 *Trusty* 6 *Zenobia*

Table E

Weather records of ten ships around the east coast of Kent, 19-20 January 1809

date/time	ship – *see list below*									
	1	2	3	4	5	6	7	8	9	10
	NORE			**DOWNS**		**DOVER STRAITS**				
midnight	SE 4	-	SE 5	SE 4	-	- 4	-	-	-	--
AM	- 4	SE 4	SE 5	SE 2 is	SSE 4	NE 4	SE -	SE 5	SSE 4	SSE 5 -
2	-	-	-	-	-	-	-	-	-	-
	-	-	-	--	SSE -	SE -	-	-	-	-
4	- 4	- 4	-	- 2	-4	-	- 4	-	- 4	SE -
	-	-	-	-	SE -	SE -	S -	SSE -	-	-
6	-	-	-	-	-	SE 4	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
8	SE 4	- 5	-	-	-	- 4	var	SE 5	-5 c	SE
	-	-	-	-	SSE -	-	-	-	S -	-
10	-	-	SE -	- 2	-	-	-	-	SSE -	-
	-	-	-	-	-	-	-	-	-	SE -
19 noon	ESE 4	SE 4	-	S 4 c	- 5	-	- 5	- 5	SE 5	- 4
PM	- 5 z	SE 5	SSE -	SSE 4 rs	-	SSE -	- 5 r	SE 6 rs	- 5	SE 4
2	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
4	- 6 rs	- RS	-	- 4	-	-	-	-	S 4 r	SE 5 rs
	-	-	-	-	SSE -	-	-	-	-	-
6	- 6	-	- 4 rsk	- 4	-	-	-	SSE 6 rs	SSW 4	-
	-	-	-	-	-	-	S 5	-	-	-
8	- 4 s	- 5	- 4 R	- 2 rs	var	S -	- 1	S -	l/v r	-
	-	-	-	-	-	-	var	calm	-	S -
10	E -	-	SSW 1	-	-	-	-	S -	-	-
	-	-	-	W -	-	-	-	WNW 2	-	-
midnight	NE 2	SW 4	SSW -	- 2 c	- 5	-	- 1 ir	var 2	l/v	calm z
AM	NE 2	SW 4	SW 2 z	W 2 rs	NW 4	NNW 4 z	var 4	var 4	l/v	- 2
2	-	-	-	-	-	-	- 4	-	-	-
	-	WNW -	-	-	-	-	NNW 4 r	-	-	N
4	- 2	NW 4	-	- 2	-	- 4	-	-	- 1	-
	-	-	-	-	NW -	-	-	-	-	-
6	-	-	-	-	-	-	- 1	-	- 1	-
	-	-	-	-	calm	-	-	-	-	-
8	NW 4c	- z	W -	- 2 z	var	-	-	var	-	-
	-	-	-	-	-	-	calm	-	-	l/v
10	-	-	WNW -	-	-	-	var	-	- 1	-
	-	-	-	-	-	S -	-	-	-	-
20 noon	- 2 kf	NW - z	-	l/v z	-	- 4	var	l/v z	- 1 z	NW 1
PM	-	NW - z	NW 4 d	- 1 z	- 1 zr	ESE 2 z	ENE 2	l/v	l/v f	- 1 kz
2	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	calm	-	-	-	-
4	- 2	-	-	- 1	-	-	- 4 r	-	NE 4 f	-
	calm kf	-	-	-	-	W -	NE -	-	-	-
6	-	-	NNW -	-	NE - r		- 4	-	-	-
	-	-	-	-	-	var	-	-	-	NNE -
8	calm	- 4	-	l/v r	var	-	-	l/v R	-	-
	-	-	-	E -	-	-	var	-	-	ENE -
10	-	-	-	-	E -	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
midnight	- 1 s	NNW 4	N 4	- 4 z	- 1	- 4 z	-	- 1	- 4	NE 4 z

1 *Dictator,* 2 *Mariner,* 3 *Clyde,* 4 *Osprey,* 5 *Beagle,* 6 *Cherokee,* 7 *Cordelia,* 8 *Flamer,* 9 *Gallant,* 10 *Rolla*

Table F

Weather records of ten ships clustered around 49ºN 5ºW, 21-22 January 1809

date/time	ship – *see list below*									
	1	2	3	4	5	6	7	8	9	10
midnight	NNE 1	-	calm z	- 2 f	NNE 1	- 2	- 5	- 1	-	- 6 q
AM	NNE 1	N 4 r	- r	-	NNE 4 r	NE 4	-	NE 2	-	NW -
2	-	NNW -	-	-	-	-	NW -	-	-	-
	-	-	-	-	-	-	-	-	N -	-
4	NE 4 r	NW 2	-	NE 4 z	NE 4	- 4	- 4	- 2	-	- 6
	-	-	-	-	NE -	-	N -	NW -	-	NW -
6	-	-	-	-	var	NNW -	-	-	-	- kr
	-	NW -	-	calm	-	NW -	-	-	-	-
8	calm	-	calm ir	calm	N 4	E 1	NNE 1	- 2	-	-
	-	-	-	-	NW -	-	-	-	-	-
10	-	-	-	-	var	-	calm	N-	N -	-
	-	NNE --	-	-	-	-	-	NNE -	-	-
21 noon	N 2 z	- 2	- 4	- 4	l/v	l/v	W -	- 2	-	- 4 z
PM	NNE 1 z	- 1 z	S 1 z	-	l/v	-	l/v	S 4	-	NW 1
2	-	-	-	-	-	W -	SSW 1	-	var 2	-
	-	-	-	-	-	ESE -	-	-	-	-
4	SE 1	-	var ir	- 2	l/v	- 2 z	- 4	- 4	-	-
	-	SE -	-	SE -	SSE -	S -	-	-	-	-
6	SE 4 z	-	-	- 2 z	S 5	SSE -	-	SSE 4	SE - f	-
	-	-	-	SE -	-	-	-	-	-	SSW -
8	- 4 r	SSE 5 r	- 5 r	-	S 2	- 5 kr	- 4	- 5	-	-
	-	-	-	-	-	S -	-	-	-	-
10	-	-	-	-	-	-	S -	-	-	-
	-	var	-	-	S -	SSW -	-	-	SSW -	S -
midnight	SSW 4 r	S 5	var	S 4 r	S 4 R	- 4 r	SSE 5 R	SSW 2 r	- 5 r	- 1
AM	var	S 5	SW 5 r	S 5 r	S 5 r	S 5 r	- 5 pr	S 8 r	- 5	SW -
2	-	var-	-	-	S -	-	-	SE -	-	- 9 r
	-	SE -	-	SE -	SE -	SSE -	SE -	-	SE -	-
4	SE 6 r	-	SE 6	- 6 r	SE 5	S 5 kr	- 5	SE 8	-	S 4
	-	-	-	-	S -	S -	-	var	-	SW -
6	SW 4 r	S -	SW -	var	SSW -	SW -	-	SW -	-	-
	-	-	-	-	SW -	-	-	-	-	-
8	-	-	var 4 ir	SW 6	SW 4 r	- 5	SW 4	- 4 r	- 5	- zr
	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-
	-	SW --	-	-	-	SW -	-	-	-	-
22 noon	SW 4 r	- kr	var 4	- 6	SW -	- 5	- 5 pr	- 4	SW 5	- 4
PM	WSW 4	W 5 r	SW 5 r	SW 2 kr	WSW 5 r	WSW 5	SW 5	WSW 5	SW 9 q	NE 4
2	NNW -	-	var	NE -	NNE -	-	-	-	-	-
	-	NNE -	NE -	-	-	NNE -	N -	NE -	var	-
4	- 9 r	N -	NE 9 q	N 6	NNE 6 q	- 5	-	- 5	-	-
	-	-	-	-	-	-	-	-	-	-
6	- 9	-	- 9	- 6	NNE 6	- 5	- 6	WNW 8	-	N -
	-	-	-	-	NE -	-	NNE -	-	-	-
8	- 9	-	NE -	NE 6	NE 6	- 8	- 6	WNW 8	- 9	- 5
	-	-	-	-	N -	N -	-	-	-	N -
10	-	-	-	-	N -	-	-	NW -	-	-
	-	-	-	-	-	-	N -	N -	-	-
midnight	-	- 8	NE -	- 5	N 5	WSW 5	- 6	- 5	N -	N 4

1 *Achille,* 2 *Caledonia* (flag ship), 3 *Dreadnought,* 4 *Impetueux,* 5 *Revenge,* 6 *Royal George,* 7 *Shannon,* 8 *Christian VII,* 9 *Sharpshooter,* 10 *Goshawk*

Table G

Weather records of ten ships from Corunna passing through 49ºN 5ºW, 21-22 January 1809

date/time	ship – *see list below*									
	1	2	3	4	5	6	7	8	9	10
midnight	-	-	-	-	-	-	-	-	-	-
AM	NW 4	WNW 5 ir	W 6	NW 5	W 6	SW 9	-	WNW 6	NW 8	NW 9
2	-	-	-	-	NW -	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
4	-	NW 5	-	- 5	- 6	- 2	NW 4 q	l/v	- 6	- 4
	-	-	-	-	-	-	-	-	-	-
6	-	-	-	NE -	- 4 z	-	-	-	-	-
	-	-	-	NW -	N -	-	var	-	SW	-
8	N -	NE 2 r	-	- 4 z	l/v	-	- 1	l/v	-	var 4
-	-	-	SSE	-	calm	-	-	-	-	-
10	-	-	-	-	-	SW -	-	-	SE	-
	-	-	W --	-	-	-	-	-	-	W -
21 noon	WSW -	E -	- 2	- 2	calm	- 4	- 2	-	SE 4	-
PM	WSW 2	var 2	W 2	W 2	- 1 z	- 4	NW 2	W 1	SW 2	N 1 z
2	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	l/v	SSE -	WSW -
4	S -	-	- 2	- 2	SW 1	S 4	S -	- 1	- 1	- 1
	-	-	-	-	-	-	var	SW -	-	-
6	SSE -	-	-	- 2	-	S -	- 4	- 4 r	-	S 4
	-	-	-	-	S -	-	-	-	-	-
8	S -	SSE 6 r	- 4 r	-	- 4	- 5 r	SE -	- 5 r	-	S -
	-	-	-	-	-	-	-	SSW -	SSE -	-
10	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
midnight	S 5 qr	-	- 4	- 5 r	S 6 r	S 5	- 5 r	-	SSE - qr	- 8 qr
AM	SE 5 k	SSE 6	SE 5 r	S 5	S 6 qr	S 6 kr	-	SSE 5 qr	SE 6 r	- 8 r
2	-	-	-	-	var	-	-	SE -	-	var
	- 8	-	var	-	-	-	var	-	-	SE 9
4	-	var qr	- 6 zr	SE 5	- 6	- 5	- 6 r	- 5 r	- 5	- 9
	-	-	-	var	-	SW	-	ESE -	SSW -	-
6	var	-	SW -	-	-	-	- 4 r	-	-	var
	-	-	-	SSW -	-	-	-	var	SW -	-
8	var	SSW - z	SW - kr	- 5 r	SSW 4 r	- 5	- 2	- 4 kr	-	- 4
	-	-	-	-	-	-	-	SW -	SW -	-
10	- 6	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	var	-	SW -	-
22 noon	W 6 kr	NE 6 q	W 8 r	- 4 kr	W 4 zr	SW 6 q	NW 5 d	- 4	NE - f	- 5 r
PM	NNE 6 r	-	var 5 zr	S 5 r	NE 6 zr	NE - r	ENE 6 qr	- 5 q	NE 9	ENE 5 zr
2	-	-	-	NW -	-	-	-	-	-	-
	-	NNE -	-	-	var	-	W -	-	-	NE -
4	-	-	-	- 6 r	- 6	- 6	- 6	- kr	-	N 6
	- 8	-	N -	-	N -	-	N -	- 6 q	NE -	NE -
6	-	-	- 5	- 6	-	- 4	- 6	-	-	-
	-	-	var 5	-	- 6	N -	-	-	N -	-
8	-	-	-	- 6	N -	- 4	- 6	- 6	- 6	-
	N -	N -	-	-	N -	-	N -	-	-	-
10	N -	-	-	-	-	N -	-	-	-	-
	-	-	-	-	-	-	W -	-	-	-
midnight	-	-	var 5	N 6	N 6	- 5	W 6	N 5	N -	- 4

1 *Audacious*, 2 *Barfleur*, 3 *Elizabeth*, 4 *Endymion*, 5 *Implacable*, 6 *Mediator*, 7 *Norge*, 8 *Resolution*, 9 *Victory*, 10 *Ville de Paris*

Table H

Weather records of ships near the wrecking on the Goodwin Sands, 24-25 January 1809

date/time	ship – *see list below*									
	1	2	3	4	5	6	7	8	9	10
	DOWNS				**DOVER STRAIT**					
midnight	SSE 5 r	SE 8	SSE - zs	- 5	- 5 s	S 8 q	S 5	-	S 5 r	S 5 r
AM	SE 6 rs	SE 9 q	SSE 5 rs	SSE 5 kr	SSE 6	-	SSE 5 r	SSW 2	var 5	SE -
2	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
4	- 4 hr	ESE -	-	-	- 1	- 8	- 5	S -	- 4 r	- 4 r
	-	-	-	-	-	-	-	-	var	-
6	-	- qr	-	NNW -	calm kr	-	SE -	-	S -	-
	-	-	SE -	-	calm r	SE -	-	-	-	-
8	ESE 4 r	- 4	-	calm r	-	- 5 r	E 5	E 2 r	- 2 r	- 2 z
	-	-	ESE -	-	-	-	-	-	-	var
10	var	E -	-	var	calm	-	- 4 r	-	-	- 2
	-	-	-	-	-	-	-	-	NW -	-
24 noon	E 4	- 4	- 1 zr	-	l/v	ENE 1	ESE 4	- 2	- 4 r	- 2
PM	E 5 r	ESE 4	E 2 fr	calm	calm	l/v	-	E 2	calm	E 2 z
2	-	-	-	-	-	-	-	-	WNW -	-
	-	-	-	-	-	- 4 r	-	-	WNW -	ESE -
4	-	-	-	W 1	WNW 9 q	-	- 4	var	- 8 r	-
	-	-	-	-	- 5	-	-	-	W -	WNW -
6	- 2	SW 4 r	-	-	W -	-	l/v r	-	- 8	calm
	-	-	-	-	-	-	-	-	-	-
8	- 5 r	-	W -	-	- 9	- 2	l/v	-	- 8	-
	-	-	-	-	-	-	-	-	-	-
10	WSW -	- 4	-	-	-	W -	- 10	-	-	- 9 zr
	-	-	WSW -	-	-	-	WSW -	-	-	-
midnight	- 5	- 8	- k	- 5	-	- 9 r	- 10	- 9	- 9	WSW 9
AM	- 6 r	WSW 10 q	WSW 8 f	S 9 q	W 8 q	S 9 q	- 10 qr	WSW 9	W 10	SW 9 r
2	WNW -	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
4	-	-	SW 10 kr	S 9	- 8	- 9 q	- 10	WSW 9	- 10	- 9
	-	-	-	WNW -	- 9	-	-	-	W -	-
6	-	-	WNW -	-	-	-	-	-	-	-9
	-	-	-	-	-	NW -	-	-	-	-
8	W -	NW -	-	W -	-	- 9	- 10	-	- 9	WNW 8
	-	-	-	-	SW -	-	-	W -	-	-
10	WNW -	NW -	NNW -	- 8	-	-	-	-	-	-
	-	-	-	NW	-	-	-	W -	-	-
25 noon	NW -	- 9	- 10	- 8	- 5	NW 9	NW 10 q	WSW 9	SW 5	-
PM	- 5	NNW 8	-	NNW 5-	S -	- 8 q	- 10	NW 9	- 4 z	- 5
2	NE -	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	N -	SW -	-
4	var	- 8	-	-	-	- 5	NNW 5	-	- 4	NNE -
	-	ENE -	-	NNE -	-	-	ENE 5	-	SE -	E -
6	SE -	-	-	-	-	- 4	-	-	SE 2	SE 5
	-	-	-	-	-	SSE	-	-	-	-
8	-	SE -	- 4	-	-	- 4	E -	-	- 5	SE 5
	-	-	-	-	SE -	-	-	-	-	-
10	-	-	-	-	-	-	-	E -	-	ESE -
	-	-	-	-	- 5	-	-	-	-	-
midnight	SW 4	- 8	- 4	- 4 z	-	- 5 r	SSE 4 r	SSE 2	- 5 r	SE 4 k

1 *Clyde,* 2 *Flamer,* 3 *Beagle,* 4 *Cherokee,* 5 *Cordelia,* 6 *Crocus,* 7 *Gallant,* 8 *Indignant,* 9 *Osprey,* 10 *Rolla*

Table I

Weather records of ships in the English Channel, 29 January 1809

date/time

TORBAY ship – *see list below*

	1	2	3	4	5	6	7
midnight	SSW 6 q	- 5	SW 6 z	SW 5 qr	-	-	SW 5
AM	S 6	SW -	SSW 6	SSW 5	WSW 8	SW 5	SW 5
2	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
4	- 8 qr	SW 4	SSW – ir	S 4	SW 8	-	S 6
	-	-	-	-	-	-	-
6	-	-	-	-	-	- 9	-
	-	-	-	-	-	-	- Q
8	-	S 9	SSW 9 Q	S 6 r	S 8	SSW 8 qr	- 9 q
	-	-	-	-	-	-	-
10	-	S -	S 10	SW -	-	-	S -
	-	-	-	-	-	-	- 9
29 noon	- 9 q	SW 9 r	SW - q	SW 9	- 9 q	-	SW 9 q
PM	WSW 9 Q	W 9	SW 11 q	W 9 qr	SSW 9	W 9 z	W 9
2	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
4	-	- 9	-	W 5 q	SW 9	W 9	W 9
	-	-	W 9	-	-	-	-
6	-	W -	-	W 5	-	WNW -	-
	-	-	-	-	-	-	-
8	- 8	- 9	W 5	W 5	WSW 9	- 5	- 6
	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
midnight	W 4	- 9	W 9	W 4	- 9	- 5	WSW 6

1 *Achille*, 2 *Caledonia*, 3 *Dreadnought*, 4 *Revenge*, 5 *Royal George*, 6 *Parthian*, 7 *Shannon*

SPITHEAD/SOLENT ship – *see list below*

	1	2	3	4	5	6	7	8
midnight	-	- 5	- 4 r	SSW 2	- 5	- 5	- 8 q	S 6
AM	SW 6	SSW 5	- 5 r	SW 5	SW 5	-	- 8 q	SSW 6
2	-	-	-	-	-	-	-	-
	-	-	W -	-	-	-	-	-
4	- 6	S 5	- 5	-	-	-	SSW -	- 6
	-	-	-	-	-	-	-	-
6	-	-	-	-	S -	-	- 5	- 6
	-	-	-	-	-	-	-	-
8	- 6	S 5	var 5 q	- 5	-	SSW 4	S -	- 4
	WSW -	-	-	-	-	- 8 z	-	-
10	- 5 r	-	-	-	SSW 8	-	-	-
	-	-	-	-	-	-	-	-
29 noon	-	S 8 k	- 8 qr	S 6	- 8	- 8	- 6 Q	- 6 z
PM	- 9 qir	S 8 zr	- 5 r	SW 6 r	SSW 9 Q	- 9 z	- 6 Q	- 6
2	-	-	-	-	-	SW -	-	-
	-	-	- 8 q	-	-	-	-	-
4	-	- 10 q	WSW -	- 9	WSW -	- 9	SSW -	-
	-	-	-	-	-	-	-	-
6	-	SW 10	-	- 9	-	W -	-	- 6 q
	-	-	-	-	-	-	-	-
8	SW 5	- 10	- 8	-	-	- 6	-	- 8 z
	-	-	-	-	-	-	-	-
10	-	W -	WSW -	-	-	WSW 5 q	-	-
	-	-	-	-	-	-	-	-
midnight	- 5	- 8	- 4	W 5	-	W 5	-	SW 8 z

1 *Abundance*, 2 *Antelope*, 3 *Ariel*, 4 *Bellona*, 5 *Bombay*, 6 *Hibernia*, 7 *Iphigenia*, 8 *St Albans*

DOVER STRAIT and DOWNS ship – *see list below*

	1	2	3	4	5	6	7
midnight	SW 4	S 5	-	SW -	SW 5	SW 4	SW -

AM	- 9		S 5	z	SW 10		SW 6		SW 5		SW 4	z - 8
2	-		-		-		-		-		SW -	-
	-		-		-		-		-		-	-
4	- 9		-		SSW 10		SSW 6		- 5		SW 5	z SW 8
	-		SW -		-		-		-		-	-
6	-		S -		-		-		-		-	-
	-		-		-		-		-		-	-
8	- 9		-		- 10		SSW 9	kr	SW 5		-	S -
	SW -		-		-		-		-		-	-
10	-		-		-		-		-		- 9	-
	-		-		-		-		-		SW -	-
29 noon	- 9		- 5		-	qz	SW 9		- 9		WSW 9	W -
PM	SW 9		S 6		- 10		SW 6		SSW 8		SW 9	z - 5
2	-		SSW -		-		-		-		-	-
	-		-		SW -				-		-	-
4	-		-		WSW 10		- 9	r	-		SW -	-
	-		-		-		-		SW -		-	-
6	-		-		-		-		- 8		-	WSW -
	-		SW -		-		-		-		-	-
8	-		-		- 10		- 9	Q	- 5		-	-
	-		-		-		-		-		-	-
10	SW -		-		-		-		-		WSW -	-
	-		-		-		-		-		-	-
midnight	- 9		-		SW 10		SW 9		WSW 5		- 8	z SW -

1 *Beagle*, 2 *Cherokee*, 3 *Gallant*, 4 *Indignant*, 5 *Osprey*, 6 *Rolla*, 7 *Trusty*

Table J

Weather records of ships in the English Channel, 30 January 1809

date/time

TORBAY

ship – *see list below*

	1	2	3	4	5	6	7	8
midnight	W 4	- 9	W 9	W 4	- 9	- 5	WSW 6	
AM	W 4	SW 9 qr	W 5 z	SW 5	WSW 9	SSW 5	WSW 5	- 9 Q
2	-	-	-	-	-	-	-	-
	-	-	SSW -	-	-	-	-	-
4	- 4	SW -	-	SW -	SW 9	-	SSW 5	- 9
	-	-	-	-	-	-	-	-
6	-	SW -	-	-	-	- 6 z	-	S -
	-	-	-	-	-	-	-	-
8	SW 5 qr	SSW -	S - qr	S 4 r	S 9 Q	-	SSE 9 pr	-9
	-	-	-	-	SSW -	SW 9 zr	-	-
10	-	-	SSE 10 r	-	SW -	-	S -	-
	- q	-	-	-	-	-	-	-
30 noon	SW 9 qr	-	SW - Qr	- 9 r	WSW 10	- 9	SW 9 Q	SW 9 Q
PM	W -	- 9 Qr	SW 10 ir	SW 9 qr	WSW 10	WSW 10 r	SW 9 q	SW 9 Q
2-	-	-	-	-	-	-	-	-
	-	-	- Q	-	SSE -	- 11	WSW -	-
4	-	NW -	W -	W 9 q	-	W -	- 9 Q	- 9 Q
	WSW -	-	-	-	SSW -	-	W -	-
6	-	WSW -	WNW -	W 9	-	-	-	- 9
	-	-	-	-	-	- 10 r	-	-
8	- 8	var 9	W -	W 9	SSW 10	-	WNW 9	- 8
	-	-	-	-	SW -	-	-	-
10	-	WNW -	-	-	SSW -	-	-	-
	-	-	-	-	NW -	-	-	-
midnight	- 4	NW 4	SW 5	W 4	- 8 q	- 5	-4	-

1 *Achille*, 2 *Caledonia*, 3 *Dreadnought*, 4 *Revenge*, 5 *Royal George*, 6 *Parthian*, 7 *Shannon*, 8 *Whiting*

SPITHEAD/SOLENT

ship – *see list below*

	1	2	3	4	5	6	7	8
midnight	- 5	- 8	- 4	W 5	-	W 5	-	SW 8 z
AM	SW 5	W 9	-5 q	SW 5	WSW 5	-	- 5	SSW 5
2	-	-	-	-	-	SW 5	-	-
	SSW -	-	W -	-	-	-	SSW -	-
4	- 5	- 9	-	- 5	-	-	-	- 5
	-	-	-	-	-	-	-	-
6	-	-	-	-	SW -	W -	- kr	-
	-	-	-	-	-	-	SW -	-
8	-	SSE 8 qr	- 5 r	- 4 z	S -	- 5	-	- 5
	SW --	-	-	-	- 8 r	-	SSE - Qr	-
10	- 10 r	-	WSW -	-	-	W 9 kR	-	-
	-	-	-	-	-	- 9	-	-
30 noon	WSW 10	S 10 qR	- 9 qr	SSE 9 r	- 9 Qr	- 9	S - Qir	- 6 z
PM	- 10	SSW 10 qr	- 9 QR	SSW 9	S 9	- 9 qr	-	- 6 r
2	W -	-	-	-	-	SW -	-	-
	-	-	-	-	-	-	S -	-
4	- 10 q	- 10	W -	-	-	- 1- r	-	- 6
	-	-	-	-	WSW -	-	-	-
6	- 10	- 10 Q	-	WSW 9	-	W 10	WNW 9	- 10 q
	-	-	-	-	W 12	-	WNW -	-
8	-	- 10 Q	- 10 R	- 10	-	-	-	- 9 q
	-	-	var	-	W -	W 10	-	-
10	-	-	-	-	-	-	-	-
	-	-	-	-	WNW -	-	-	-
midnight	-	-	- 10	NW 11 r	-	- 9	-	- 9

1 *Abundance*, 2 *Antelope*, 3 *Ariel*, 4 *Bellona*, 5 *Bombay*, 6 *Hibernia*, 7 *Iphigenia*, 8 *St Albans*

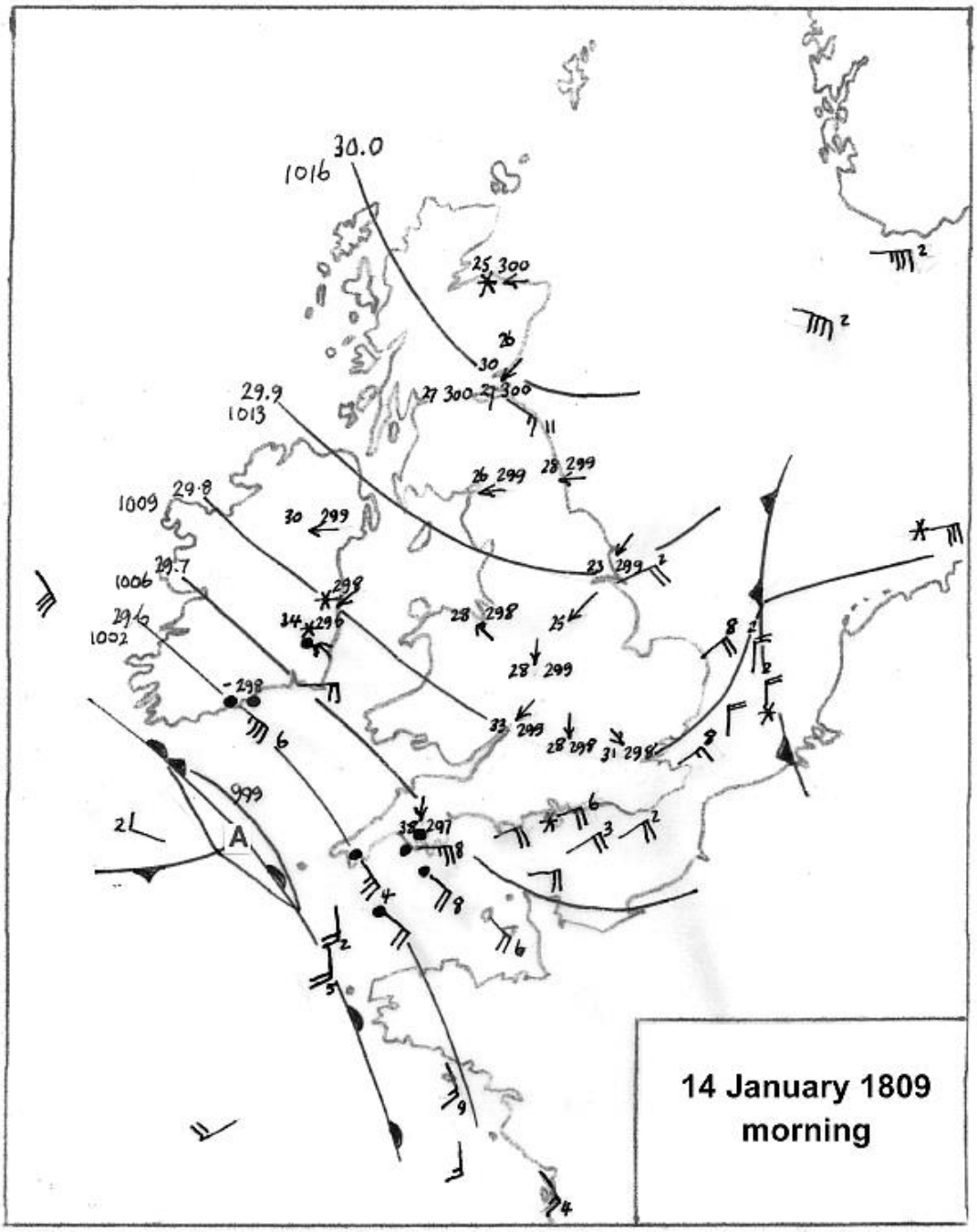
DOVER STRAIT and DOWNS

ship – *see list below*

	1	2	3	4	5	6	7	8
midnight	- 9	- 4	SW 10	SW 9	WSW 5	- 8 z	-	SW -

AM	SW 5	SW 5	SW 9	SW 10	WSW 5	WSW 9 z	-	- 8
2	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
4	-	- 4	- 9	- 10	WSW 5	-	SW 8	SW -
	S -	-	-	-	SW -	-	-	-
6	-	SSW -	SSW -	-	-	-	-	-
	-	-	-	-	-	-	-	-
8	- 6	-	- 1 q	-	-	-	-	SSW -
	-	-	-	-	-	-	-	-
10	-	SSW 6	-	- 9 rs	-	WSW 9 q	-	-
	-	-	-	-	SSW -	-	-	-
30 noon	- 6	- 8 r	-	SW 9	- 5 r	- 9	SSW 9 r	SW -
PM	S 6	SSW 9	- 10	SW 9 rs	var 8 q	SSW 9 k	- 9	- 9 r
2	-	SW 6	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
4	-	-	- qr	SW 10	- 8	S -	-	SW -
	-	-	SW -	-	-	-	WSW 10 ir	-
6	-	WSW -	- 11	-	WSW 10	-	-	- 11
	-10 Q	-	-	-	-	-	- 10	-
8	-	- 11	S -	SW 10	- 10	- 9 z	-	-
	-	-	-	-	W -	-	-	-
10	S -	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
midnight	- 10	- 12	-	SW 10	- 10	- 9	W 10	WSW 11

1 *Beagle*, 2 *Clyde*, 3 *Gallant*, 4 *Indignant*, 5 *Osprey*, 6 *Rolla*, 7 *Trusty*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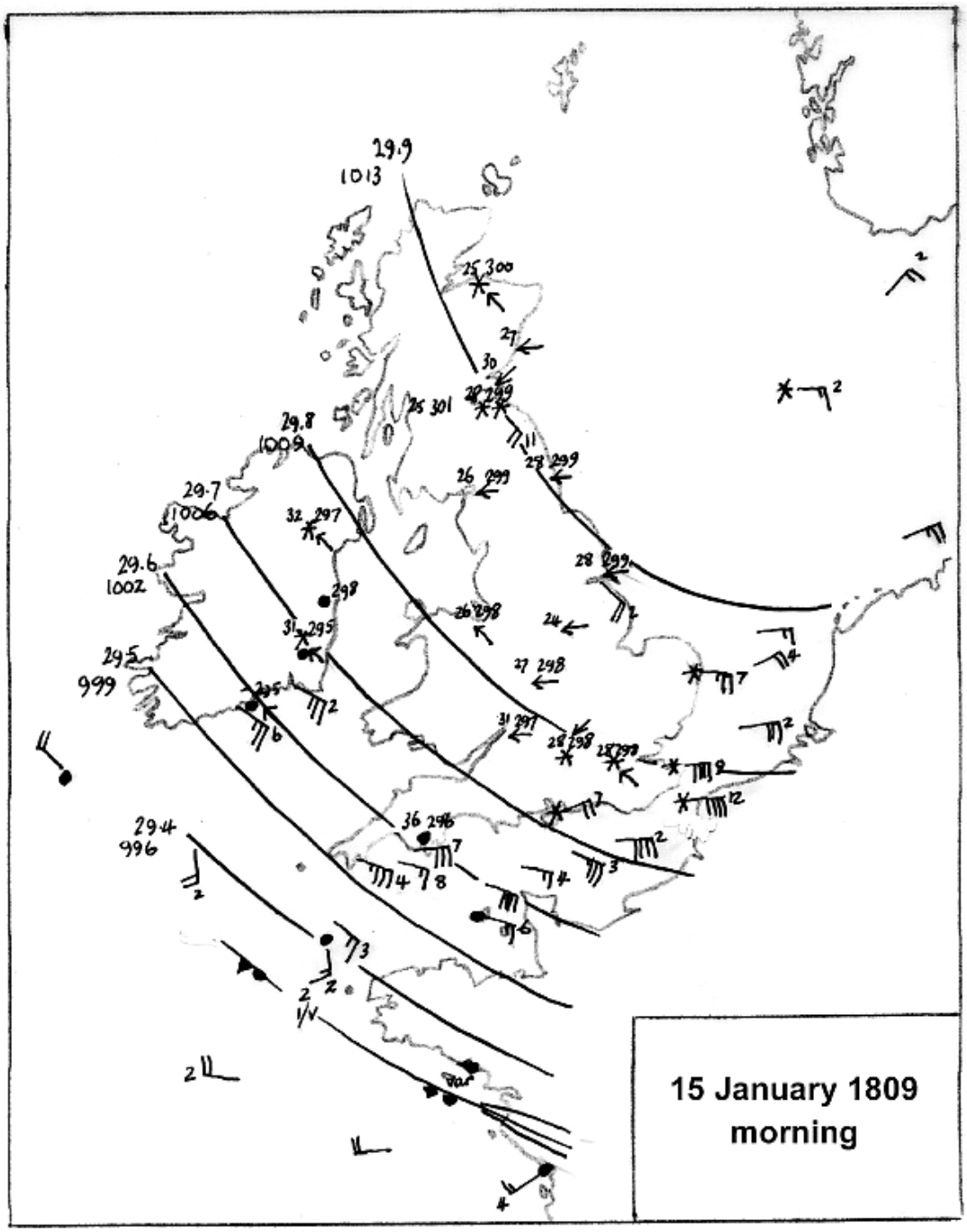
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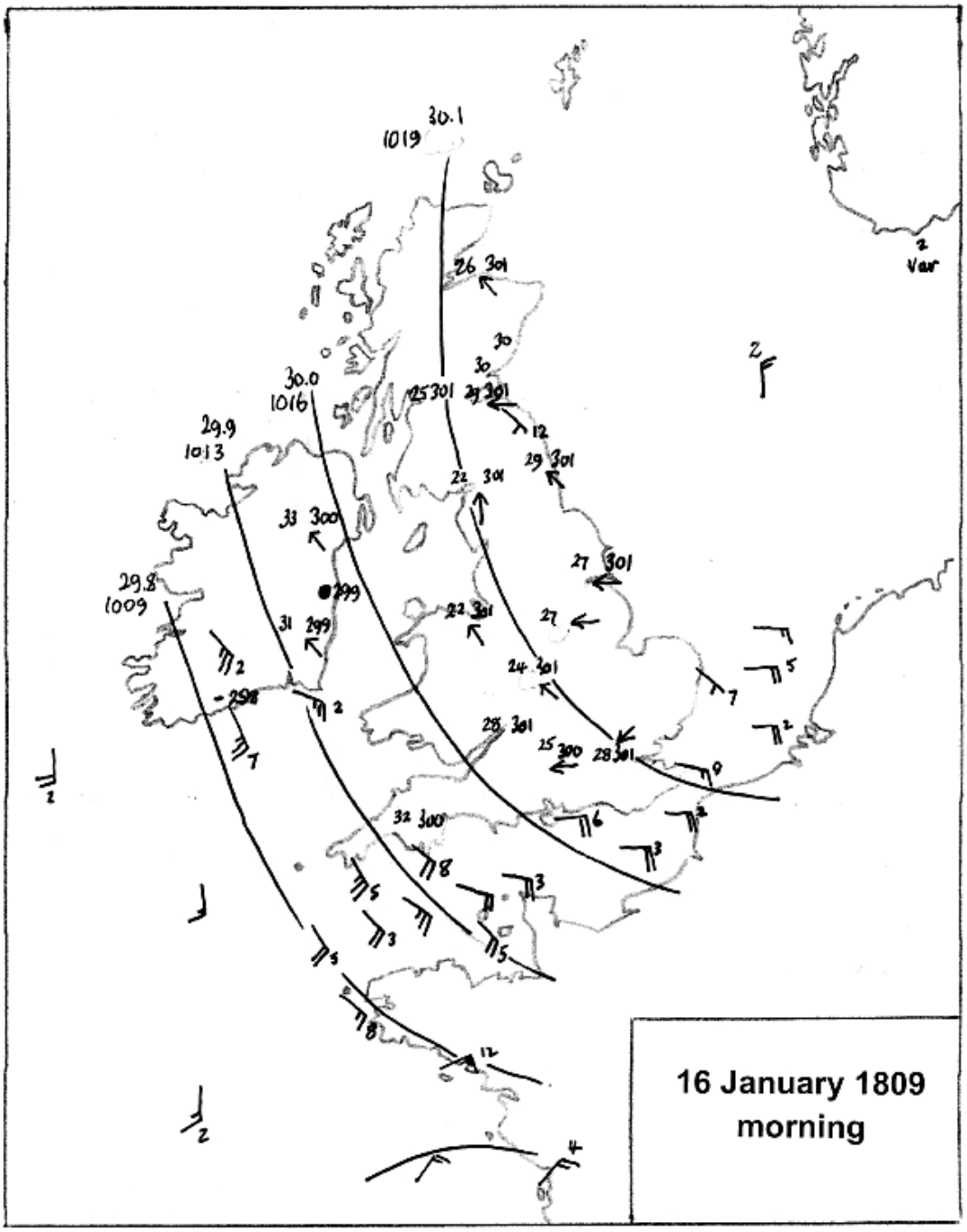
15 January 1809
morning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16 January 1809
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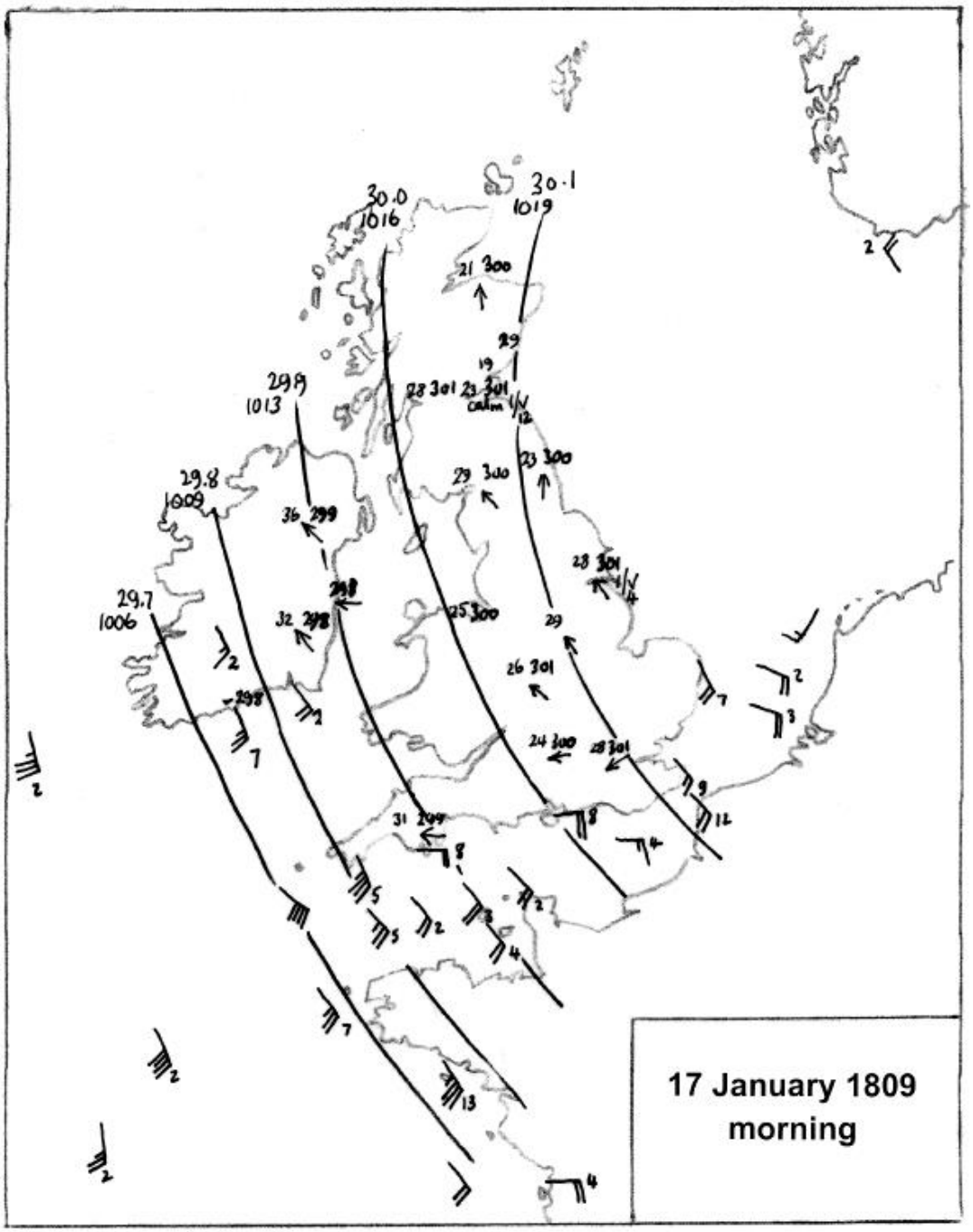
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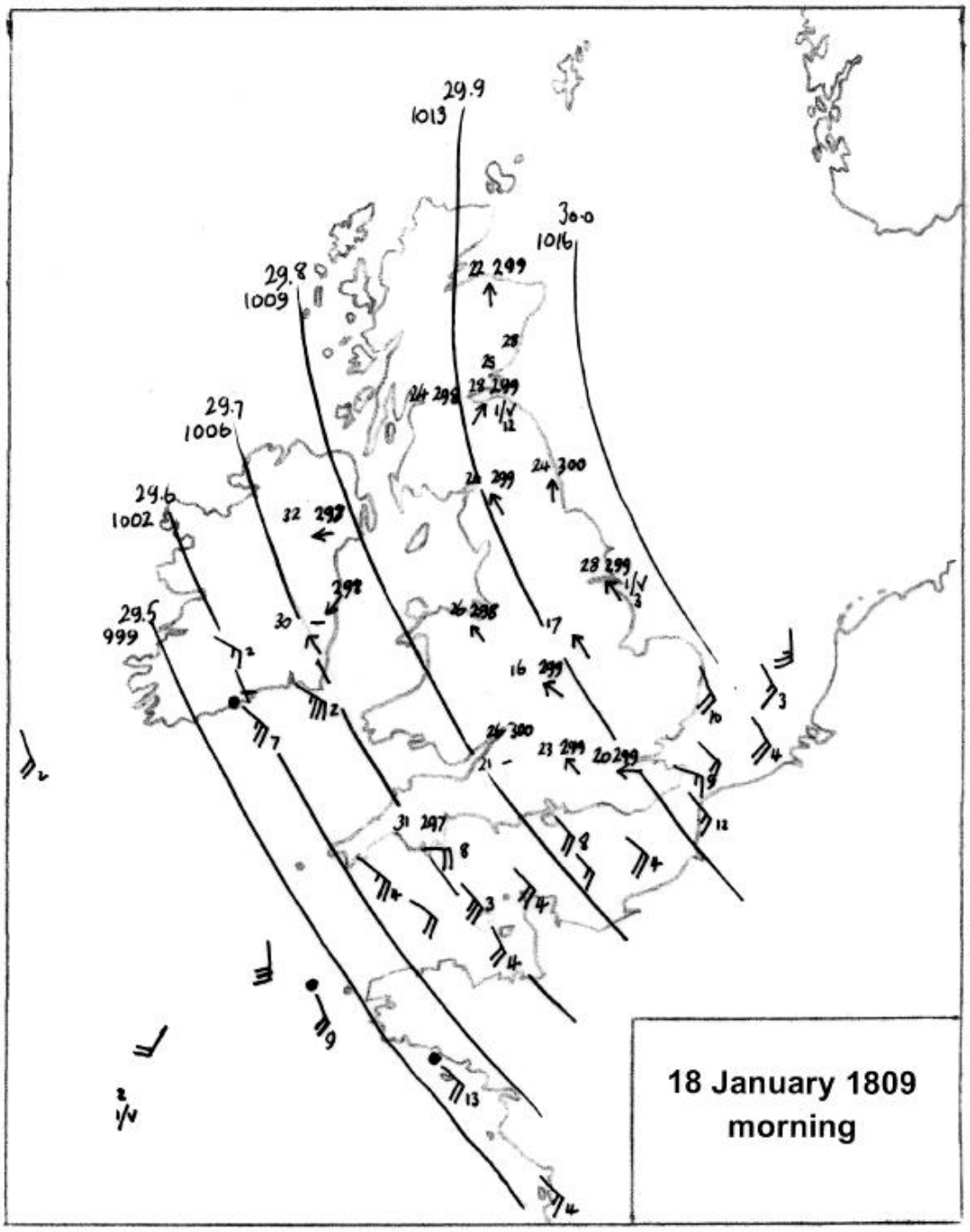
17 January 1809
morning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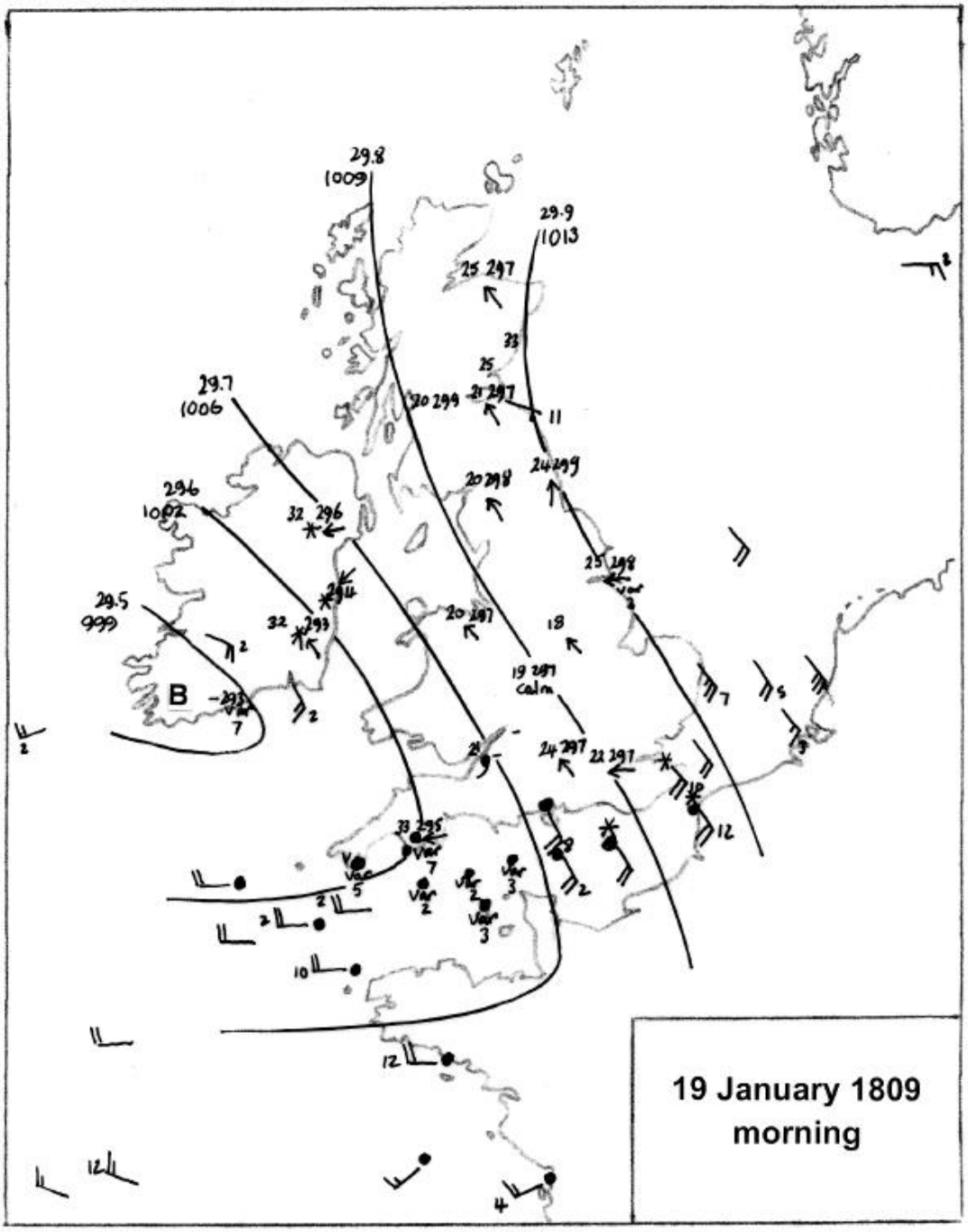
18 January 1809
morning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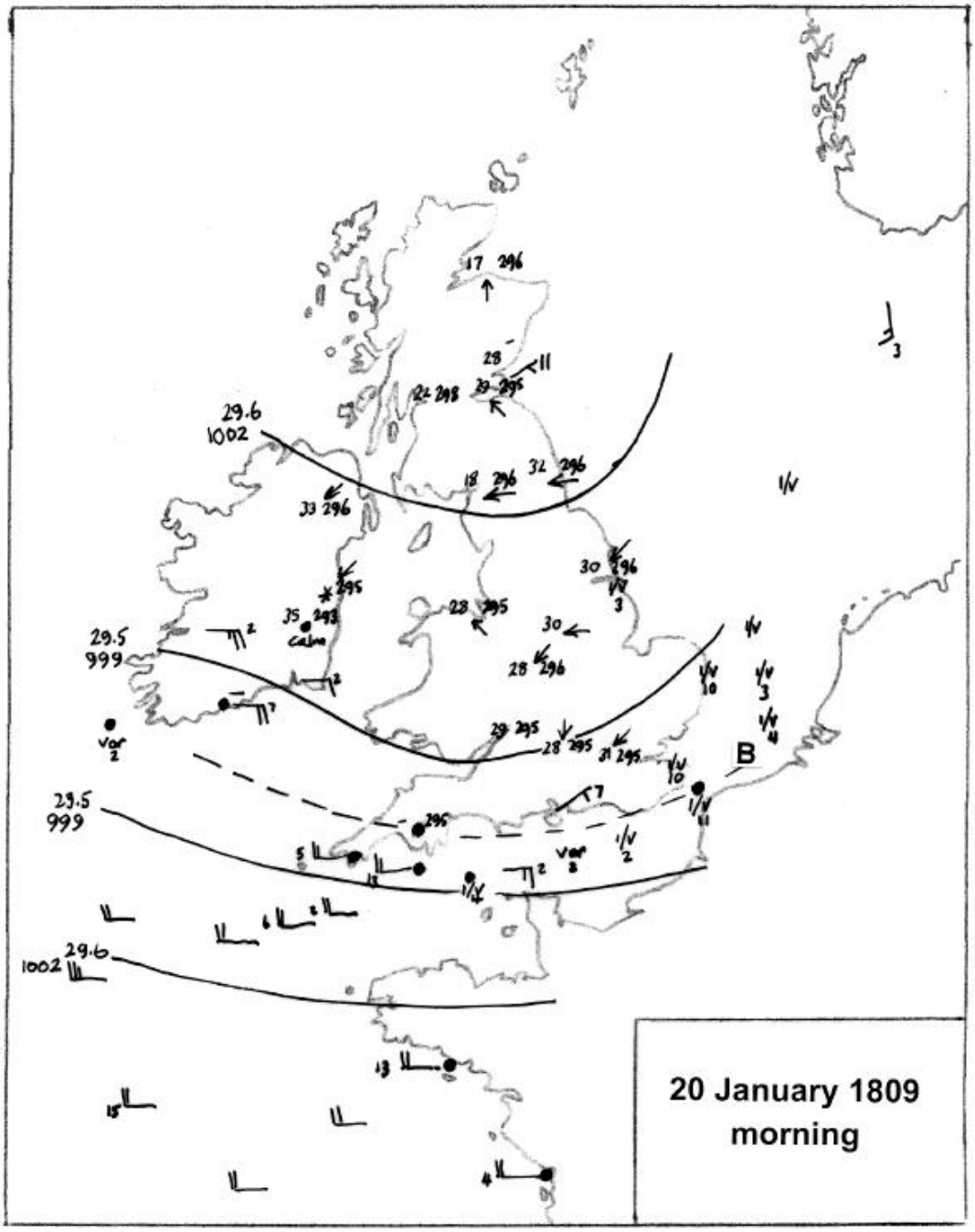
19 January 1809
morning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20 January 1809
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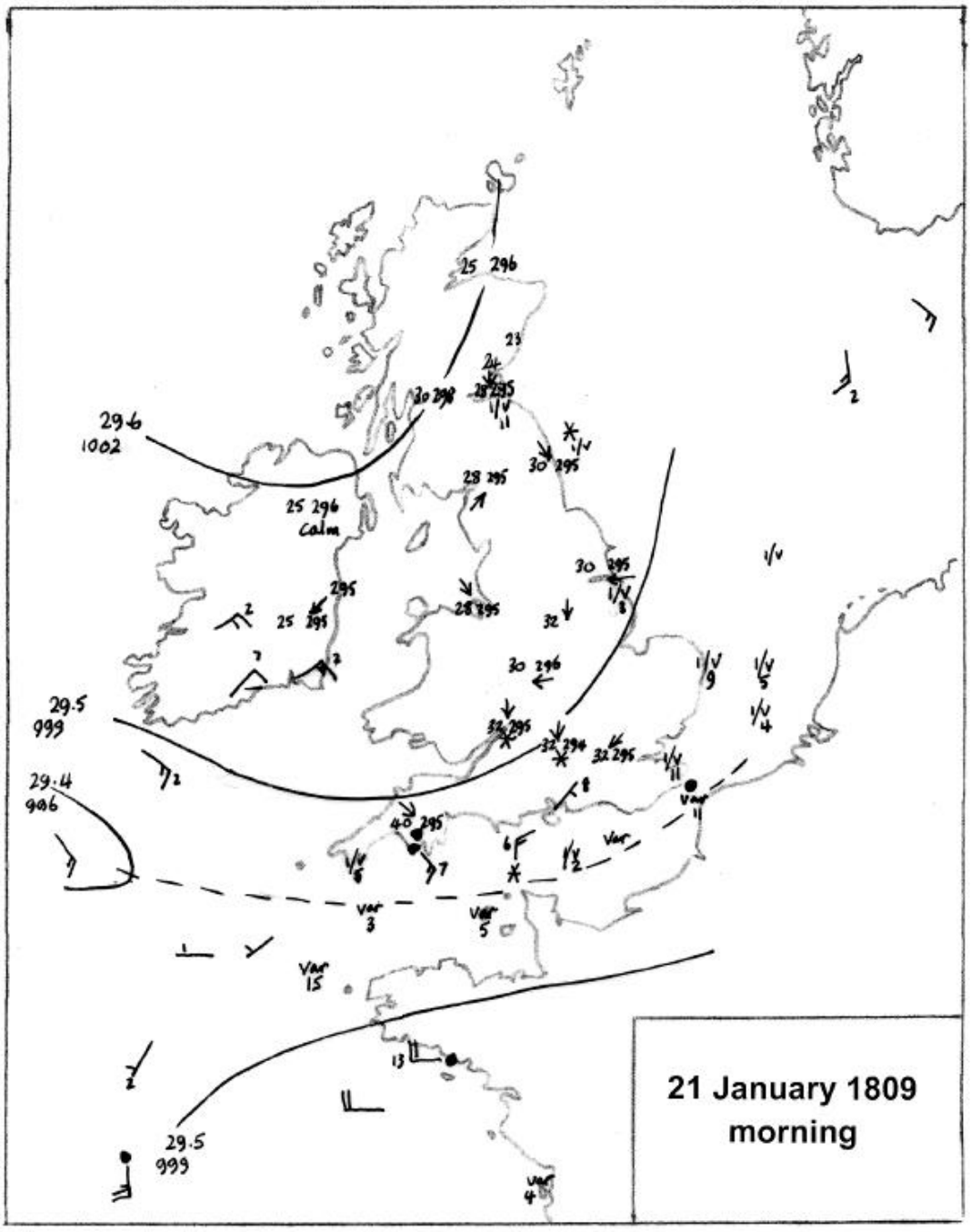
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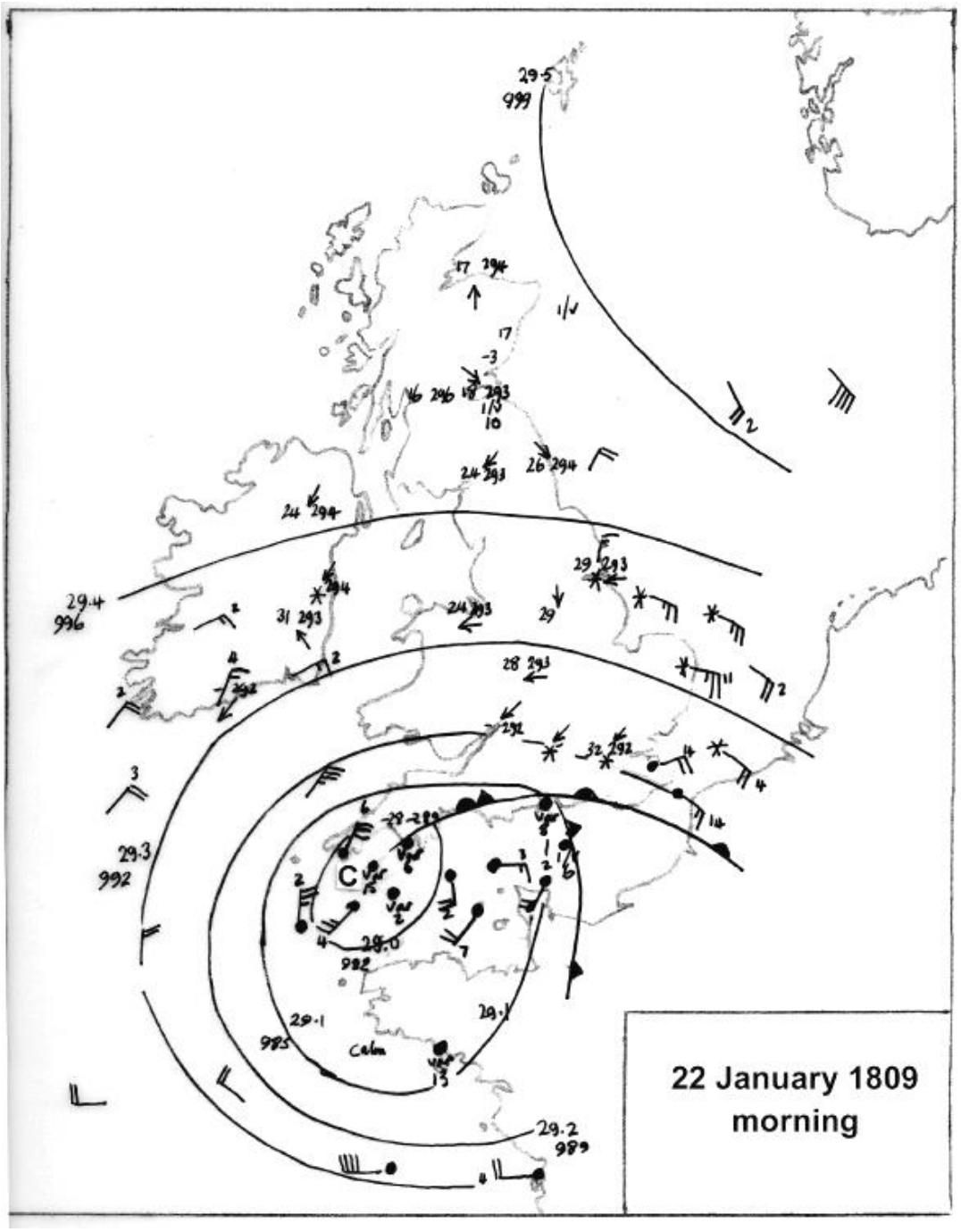
21 January 1809
morning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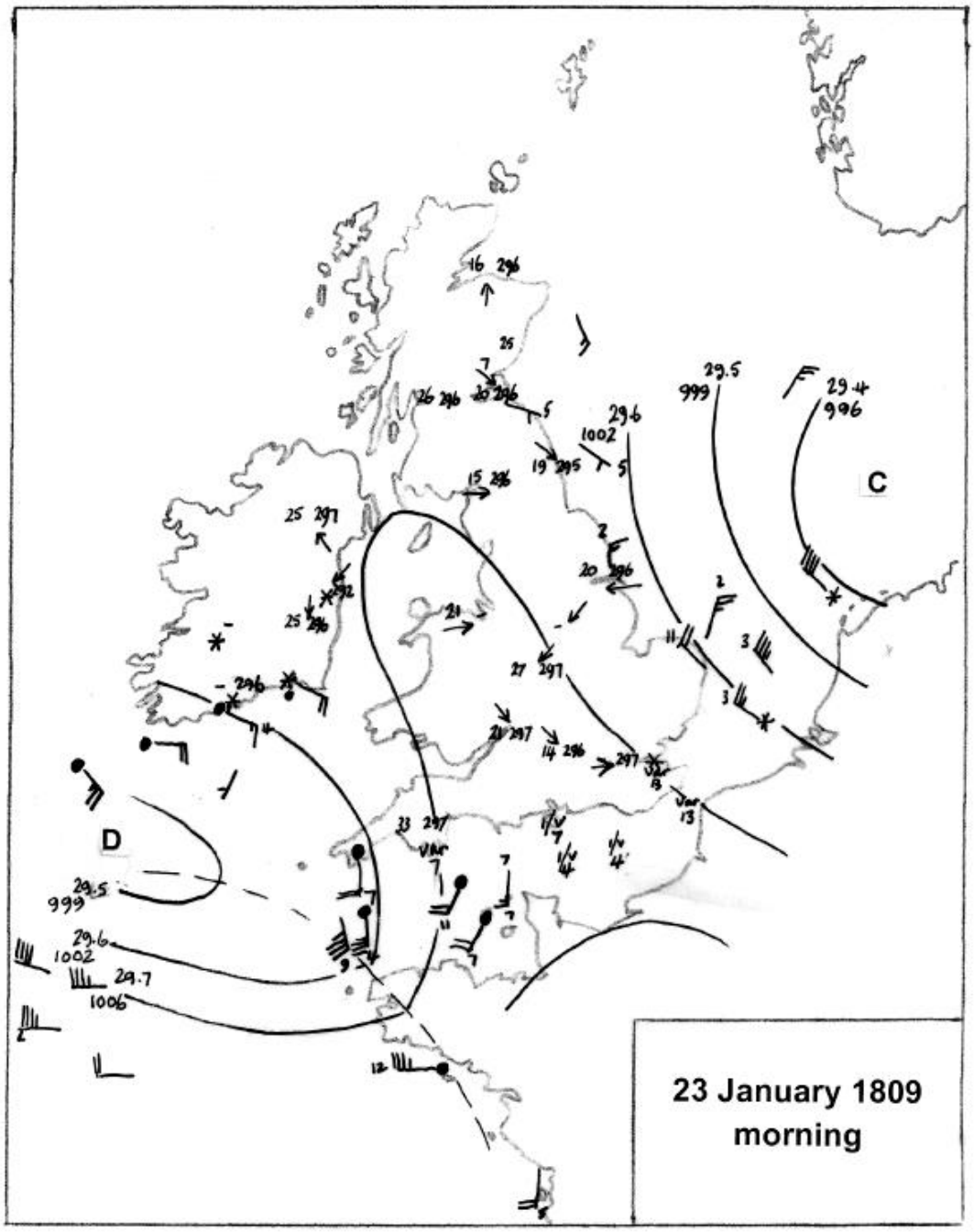
22 January 1809
morning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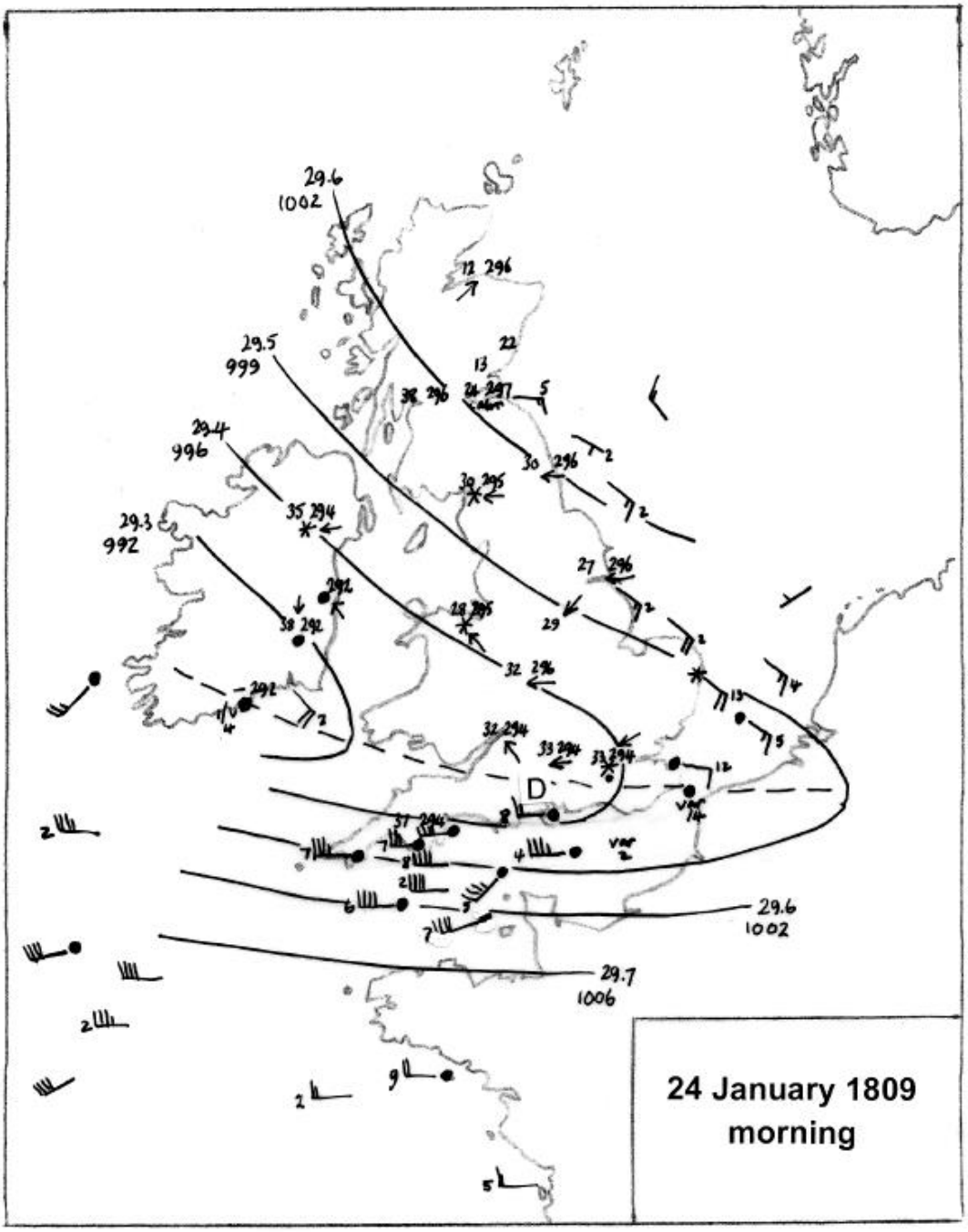
morning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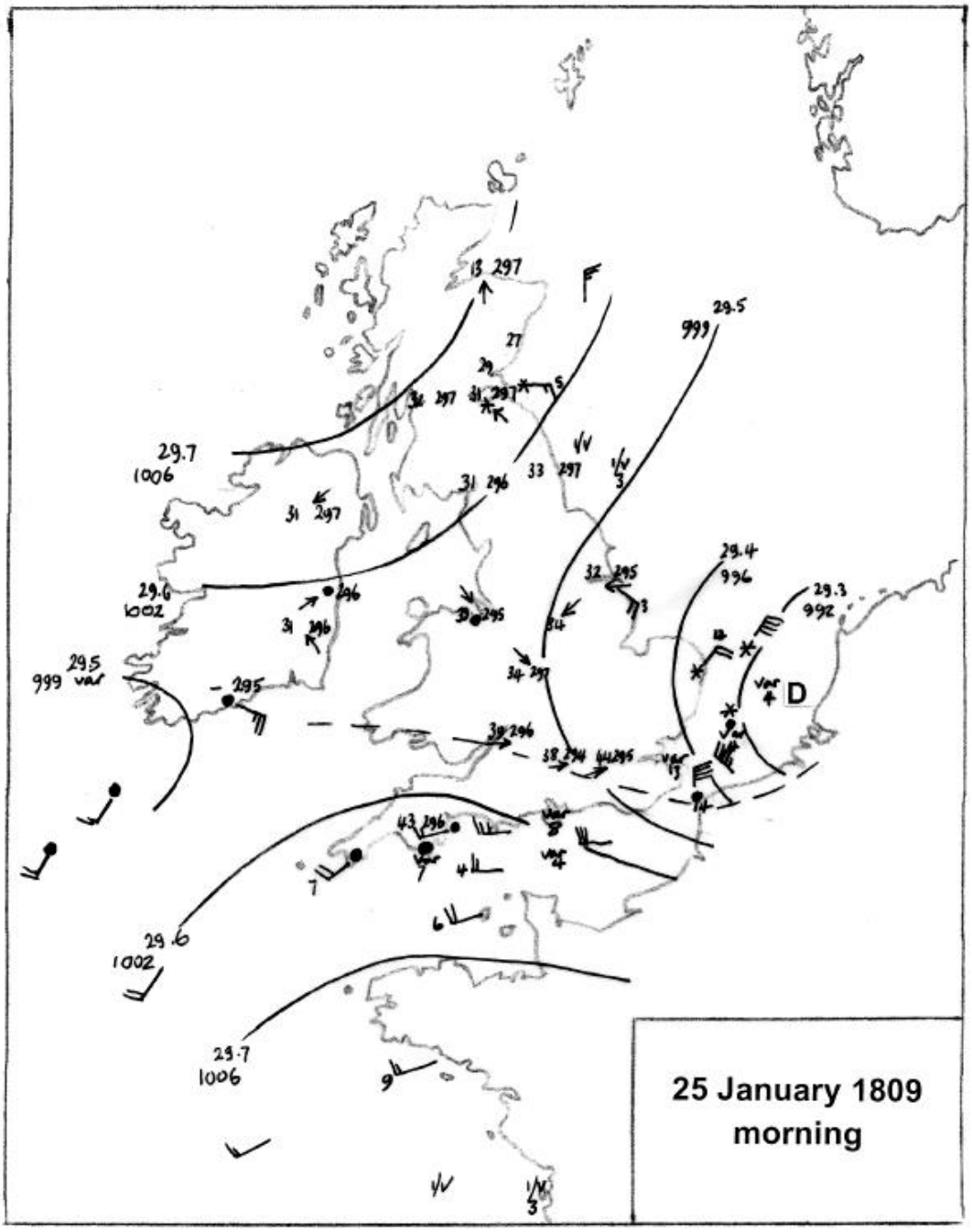
D
24 January 1809
morning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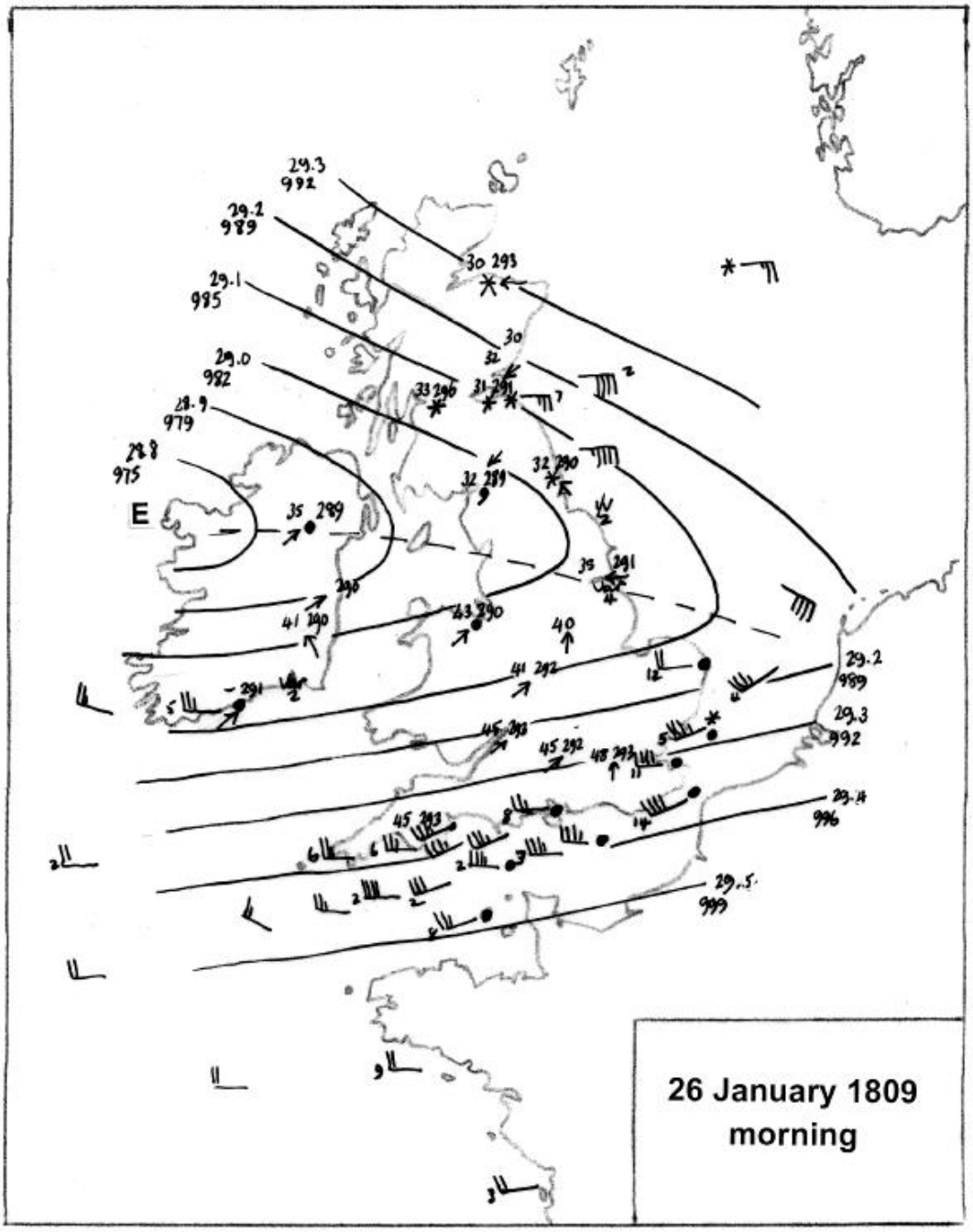
25 January 1809
morning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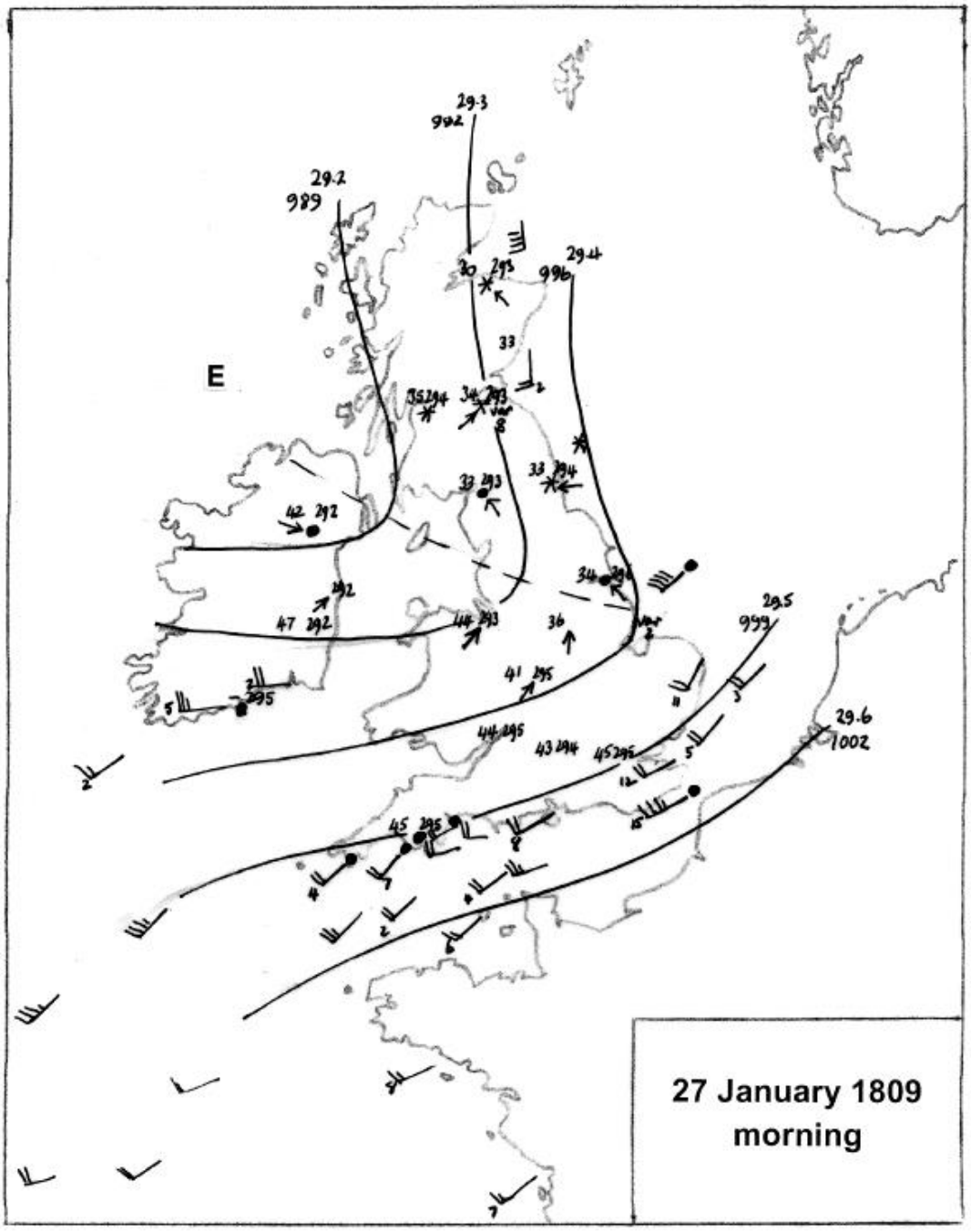
26 January 1809
morning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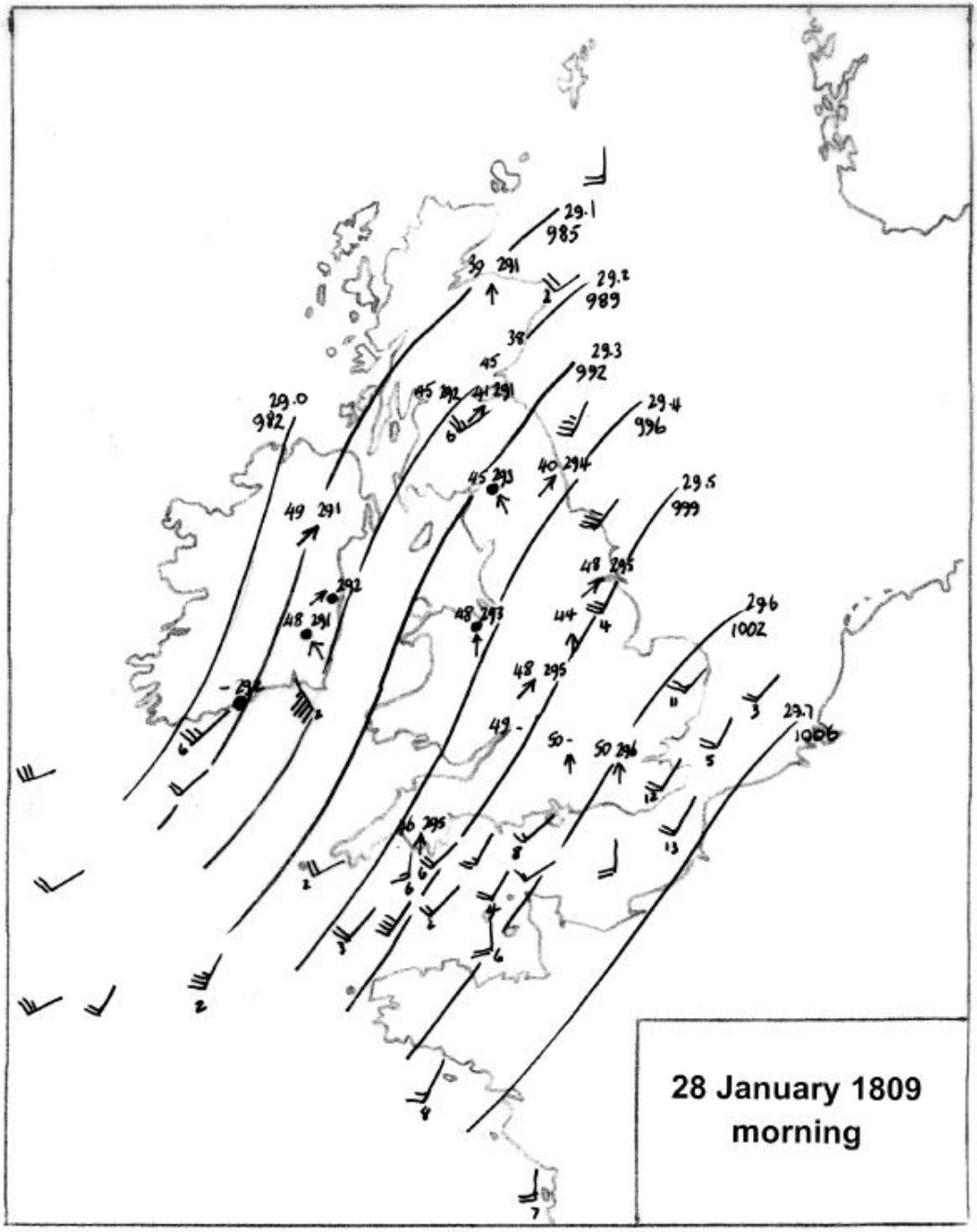
27 January 1809
morning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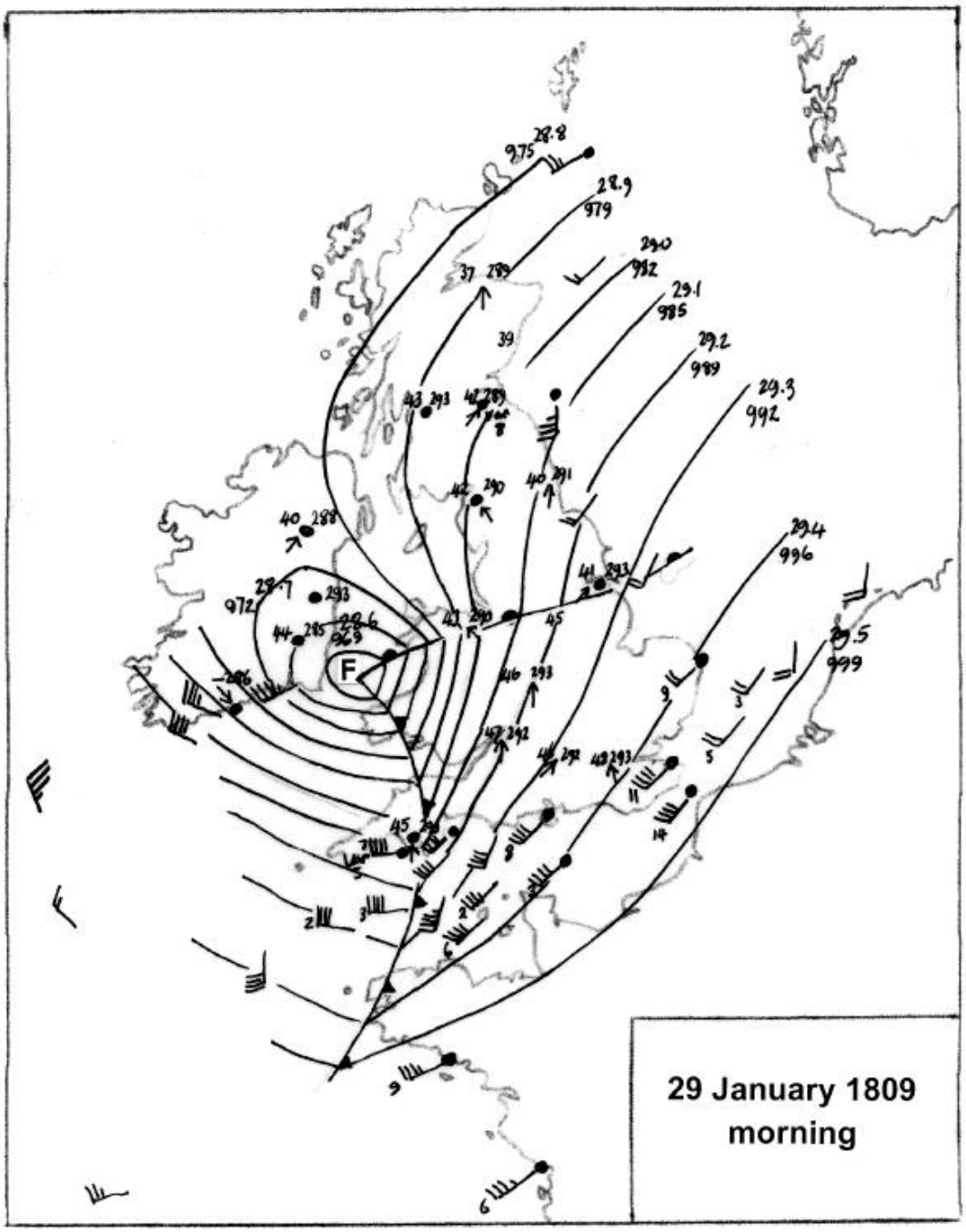
28 January 1809
morning


29 January 1809
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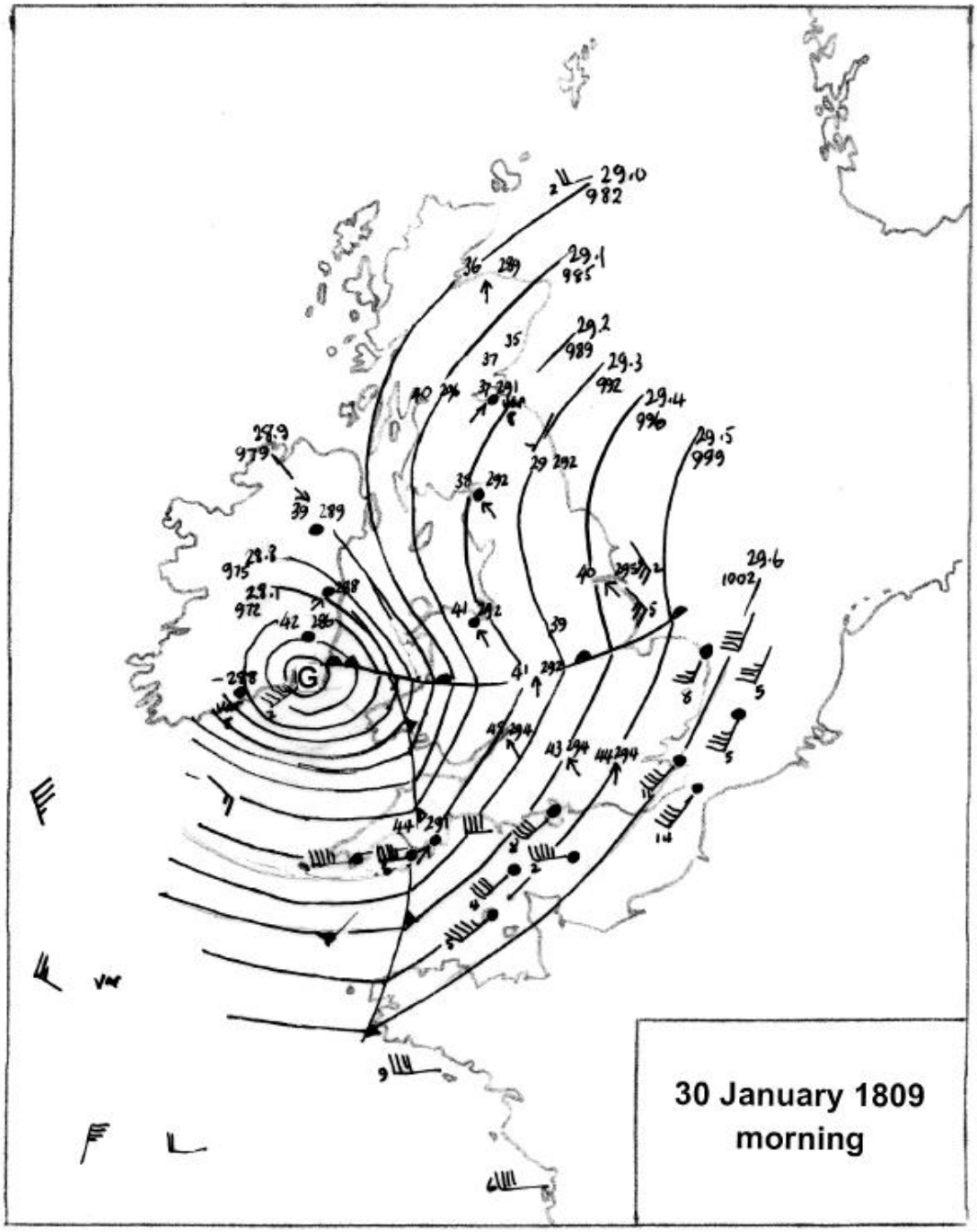
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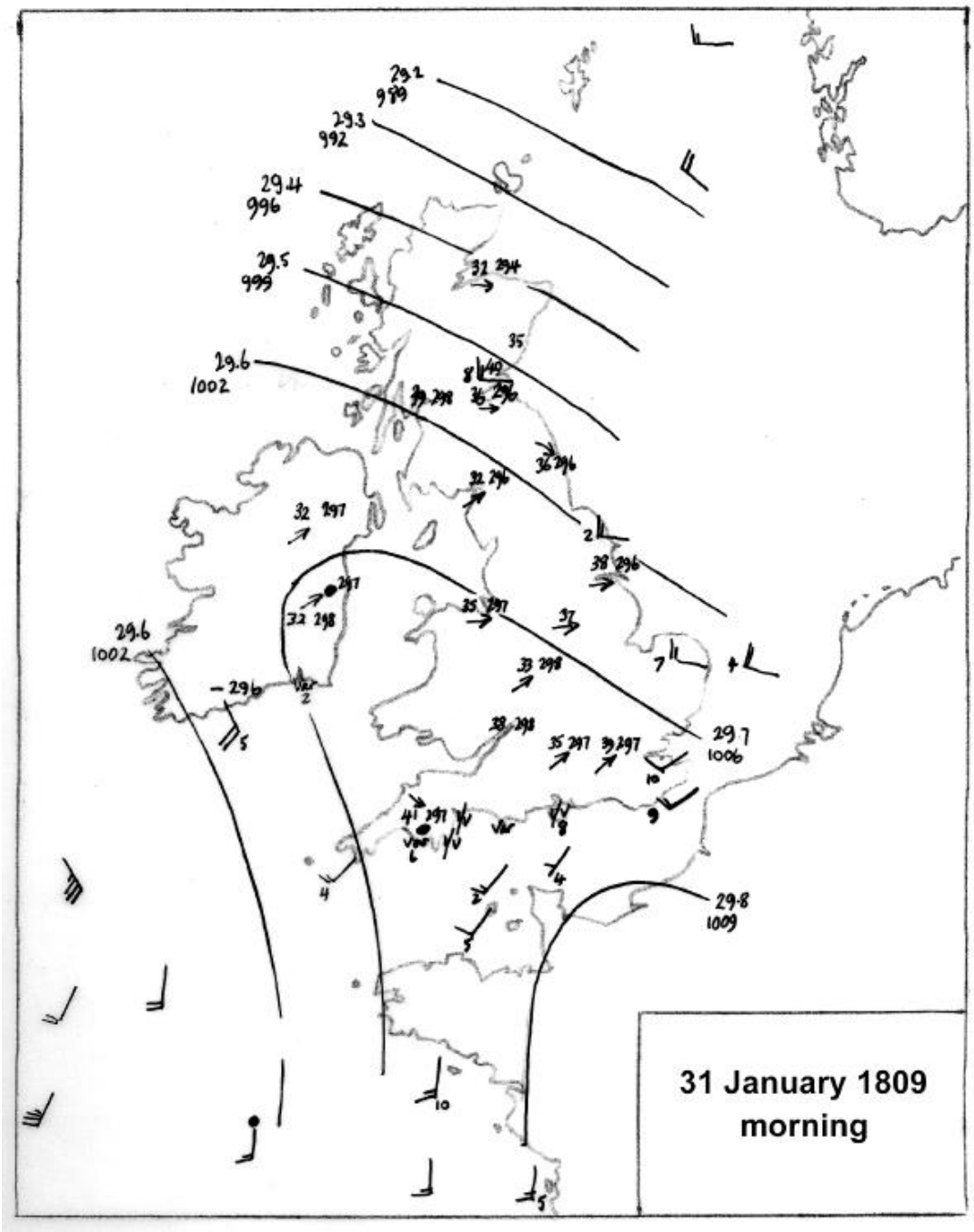
30 January 1809
morning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31 January 1809
morning