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1

Introduction to the project – mapping the weather of the past

It is well known that atmospheric circulation is one of the main factors which determine climate. Consequently, changes of climate are indicative of concomitant fluctuations in the flow of the atmosphere. Given adequate sources of data, mapping methods provide the most effective way to make a study of atmospheric circulation.

In order to obtain a better understanding of present atmospheric behaviour, and to become more aware of the kind of changes which could occur in the future, we need to improve our knowledge of past weather and climate on all time scales, both regionally and globally. A detailed study of weather on a daily basis reveals variations in atmospheric behaviour which are not detectable from investigations on longer time scales.

As far as daily records are concerned, it is possible to examine instrumental meteorological observations made in Europe back to the seventeenth century. Documentary sources allow the search for daily wind and weather data to be extended, albeit with decreasing continuity and reliability, back to the Middle Ages. Up to now, however, apart from a specialised case study of weather conditions during the voyage of the Spanish Armada in 1588 (Douglas *et al.*, 1978 and 1979), the analysis of daily circulation patterns by means of synoptic charts* has been made only from the latter part of the nineteenth century, that is, from the time when official observations began to be made and plotted on weather charts by the newly-established national meteorological services. This is too short a period to determine whether or not fluctuations which have occurred in atmospheric circulation over the past century

* A synoptic chart is a bird's-eye view of weather observations over a large area at a specified time.

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or so are merely random oscillations in a general trend or are themselves part of a more or less regular cyclic pattern.

Following signs in the 1950s that circulation patterns were beginning to develop differently from those experienced during earlier decades of this century, the idea of extending the synoptic record by constructing daily weather maps, using the mostly untapped sources of daily data from the historical-instrumental period of meteorology, began to take shape. There was no doubt that if realised it would demonstrate that the synoptic reconstruction and analysis of daily circulation patterns could be extended back in time beyond the then existing 100-year record. How did this concept come about?

In a number of lectures and articles presented during the early 1960s, Hubert Lamb actively publicised his belief that mapping methods could make an important contribution to the advancement of the study of climatic change. Over the preceding decade he had been working with his colleague A. I. Johnson at the UK Meteorological Office, reconstructing atmospheric circulation patterns back to 1750 by drawing mean pressure maps for the months of January and July (Lamb and Johnson, 1966). Through handling the large volume of historical weather data brought to light with this research, Lamb realised that many of the sources contained the necessary amount of detail to allow synoptic surveys to be made of daily weather changes.

In his life's work compiling a history of world climate, Lamb had discerned certain periods in the record having such distinctive climatic variations as to warrant further and more detailed investigations using, if possible, daily weather mapping methods. When such a period coincided with the great upsurge of instrumental meteorological observations which occurred during the 1780s, we have both the *raison d'être* – interesting weather and climate, and the necessary ingredients – regionally extensive daily quantitative data, for constructing a series of daily synoptic weather maps.

This then is the philosophy which prevailed in the Lamb school of climatology during the late 1960s. It resulted in a programme of research being undertaken by the Department of Geography under Professor W. G. V. Balchin at the University College of Swansea to construct daily weather maps for the 1780s over the eastern North Atlantic–European sector. The study was initially sponsored by the Meteorological Office for the Meteorological Research Committee, with Professor John Oliver at Swansea liaising with Lamb at the Meteorological Office, Bracknell, the present author becoming involved with the project in 1969. Two years later, following the establishment of the Climatic Research Unit in the School of Environmental Sciences at the University of East Anglia, by Hubert Lamb, now appointed university professor, the research was transferred from Swansea to Norwich.

Placed at a critical phase during the closing stages of the Little Ice Age, the 1780s contain a number of outstanding temperature and rainfall extremes, both positive and negative, which must represent some very pronounced regional anomalies in the general circulation. Then, as now, an apparent increase in the variability of weather and climate from season to season and year to year was causing concern. It appears that as a result of increased volcanic activity from about 1780, repeatedly-replenished dust veils in the upper atmosphere had an important effect in prolonging the Little Ice Age into the first half of the nineteenth century, when purely meteorological trends would otherwise have suggested an earlier reversal to warmer conditions (Lamb, 1970). Similarly today, it seems that weather and climate have again entered a less-stable phase, owing to the complicated interaction of several factors. Basically, it appears that a man-made warming, due to the growth of industrially-produced heat and the increasing concentration of carbon dioxide in the atmosphere, is modulating, to an arguably greater or lesser degree, a cooling trend attributable to natural causes.

The daily weather maps that have been produced in this project are the earliest such charts to be constructed based on quantitative instrumental data from the history of meteorology. Well-established principles of

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synoptic weather forecasting with regard to the development and movement of pressure systems have been employed in the analysis process to make these historical weather maps directly comparable with current synoptic charts. This research is clearly demonstrating that the daily weather situations which prevailed over Europe two centuries ago can be reconstructed, analysed and classified according to present methods of synoptic meteorology and climatology. The daily continuity which has been maintained in the analysis throughout the series so far has generated sufficient confidence for us to be reasonably sure that the large-scale synoptic features which determined the weather from day to day over Europe during the 1780s can be positively identified and located.

The purpose of this book is to give an account of this research in synoptic climatology. Major results so far achieved are also reviewed, and the maps themselves are presented in a reduced form from the original 26×22 inch working charts. Thus we can see that it is possible to extend the study of daily weather types and circulation patterns back from the mid nineteenth century into the historical-instrumental period of meteorology.

2

The development of observing during the historical-instrumental period of meteorology (1600–1850)

Those who think that meteorology is a comparatively new science are often surprised by the sophistication of the meteorological observations made in the 1780s. But the art of weather observing has a long history.

All down the ages weather has been watched by many people, especially those such as mariners and farmers whose lives and livelihoods depend upon the behaviour of the atmosphere. A large body of empirical knowledge, known as weather lore, gradually evolved, which attempted to relate approaching weather to such items as the appearance of the sky, the behaviour of flora and fauna, and many other natural phenomena. In the early 1600s however, the invention of the barometer and thermometer signalled the transition from purely visual to instrumental observing, through which the study of weather was to be transformed into a more exact and quantifiable science.

Seventeenth-century philosophers showed great interest in these new meteorological instruments, for they appeared to provide the means to investigate causes of weather changes using the scientific method based on systematic observations advocated by Francis Bacon in the early 1600s. It was soon realised that the value of instrumental observations would be greatly enhanced if readings at several different places could be made simultaneously. The earliest documented experiment of this kind was carried out by observers in Paris, Clermont-Ferrand and Stockholm in about 1650.

The first attempt to establish a more permanent network of meteorological stations was made in Italy in 1653, under the patronage of the Grand Duke of Tuscany, Ferdinand II, member of the Medici family and founder of the

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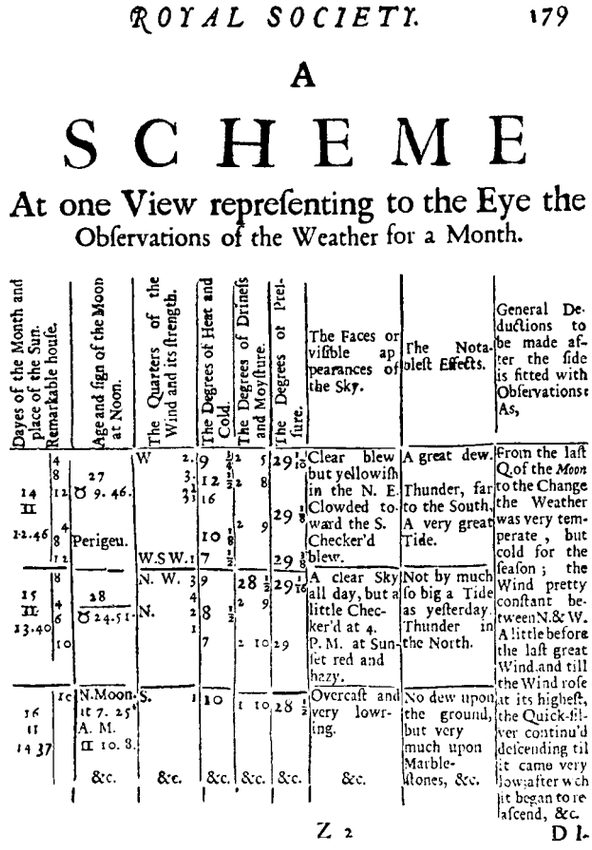
Accademia del Cimento (Academy of Experiments) in Florence. Instruments were dispatched to about a dozen stations mostly situated in northern Italy and a uniform procedure for making the observations was devised. This included the recording of pressure, temperature, humidity, wind direction, and state of the sky. The reports were entered on specially prepared forms and periodically sent to the Academy for perusal and analysis. Although the network ceased to function after the Academy was disbanded in 1667, it did set the the pattern for many later attempts.

In fact, the idea of making standardised meteorological observations in concert was taken up in the same year, 1667, by the newly-founded Royal Society of London when Robert Hooke, its first Curator, proposed 'A Method for Making a History of the Weather' (see Figure 2.1.). Hooke himself designed a number of instruments for this purpose including barometers for use on land and at sea, a thermometer graduated with zero corresponding to the freezing point of water, and a pressure-plate anemometer for measuring wind force (see Figure 2.2). The aim to establish a network of meteorological stations was further pursued by the Royal Society in 1723 when its Secretary, James Jurin, issued an invitation to those willing and able to participate in a scheme to make weather observations. Jurin's interest in this undertaking was both meteorological and medical; as a medical student at the University of Leyden he had been influenced by the Dutch physician Hermann Boerhaave, who speculated on the effect weather and climate might have on public health.

The observations organised by the Royal Society in 1723 were recorded in 'Weather Journals' having pages divided into columns for entering the day and hour of the report, the height of the barometric reading in inches and tenths, the temperature in degrees and tenths, the direction and strength of the wind, the state of the sky, a brief description of the weather, and finally the amount of rain or melted snow collected since the previous observation, measured in inches and tenths. The wind strength was estimated on a five-point scale in which 0 denoted a flat calm, 1 a

Figure 2.1. Example from the Royal Society scheme for making weather observations as suggested by Robert Hooke (from Shaw, 1933).



ROYAL SOCIETY. 179

A

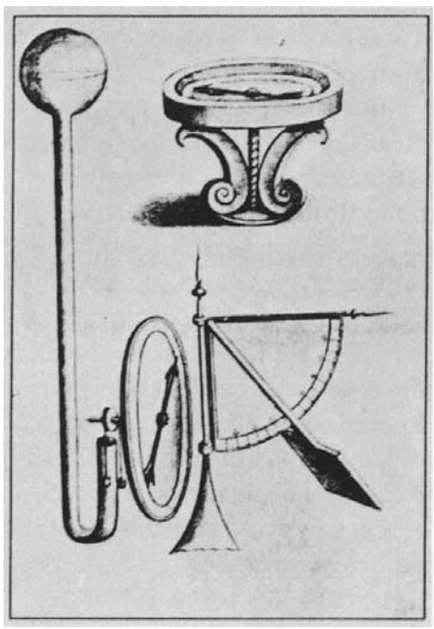
SCHEME

At one View repreſenting to the Eye the Obſervations of the Weather for a Month.

Dayes of the Month and place of the Sun. Remarkable houle.	Age and ſign of the Moon at Noon.	The Quarters of the Wind and its ſtrength.	The Degrees of Heat and Cold.	The Degrees of Drineſs and Moyſture.	The Degrees of Preſſure.	The Faces or viſible appearances of the Sky.	The Notableſt Effects.	General Deductions to be made after the ſide is fitted with Obſervations as,
14 ♓ 22.46	27 ☌ 9. 46. Perigeu.	W 2. 3. W.S.W. 1	9 12 16 10 7	5 8 2 9	29 1/16 29 1/8 29 1/8	Clear blew but yellowiſh in the N. E. Clowded toward the S. Checker'd blew.	A great dew. Thunder, far to the South. A very great Tide.	From the laſt Q. of the *Moon* to the Change the Weather was very temperate, but cold for the ſeaſon; the Wind pretty conſtant betweenN.& W. A little before the laſt great Wind and till the Wind roſe at its higheſt, the Quick-ſilver continu'd deſcending til it came very low: after wch it began to re aſcend, &c.
15 ♓ 23.40	28 ☌ 24.51.	N. W. 3 4 N. 2 1	9 8 7	28 29/32 2 9 2 10	29 1/16 29	A clear Sky all day, but a little Checker'd at 4. P. M. at Sunſet red and hazy.	Not by much ſo big a Tide as yeſterday. Thunder in the North.	
16 ♈ 1 14 37	N. Moon. at 7. 25' A. M. ♈ 10. 8. &c.	S. 1 &c.	10 &c.	1 10 &c.	28 1/2 &c.	Overcaſt and very lowring. &c.	No dew upon the ground, but very much upon Marble-ſtones, &c.	

Z 2 D l.

Figure 2.2. Meteorological instruments designed by Robert Hooke for the Royal Society scheme of weather observations (from Shaw, 1933).



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light air, 2 a moderate wind, 3 a strong wind, and 4 a most violent wind. Observers were requested to send copies of their journals every year to the Royal Society in London for publication in the *Philosophical Transactions*, and for a few years reports were received from correspondents in Europe, America and Asia.

Other scientific bodies and individuals attempted to organise networks of weather observing stations in the eighteenth century, including the Great Northern Expedition to Siberia under Bering in the 1730s, and Goethe in the German state of Sachsen-Weimar during the 1770s. However, these endeavours do not provide the geographical coverage nor continuity of data required for any sustained synoptic study, and it is not until the 1780s that sufficient material becomes available for this purpose. During this decade concerted efforts to make and collect standardised meteorological observations were begun on a grand scale in both France and Germany, and it is these which provide the core of data for the present investigation.

Following the lead of meteorologically-inclined physicians, such as Boerhaave and Jurin, medical authorities in France during the late eighteenth century decided to make a systematic study of the possible relations between weather conditions and public health. Consequently, in 1778 the *Société Royale de Médecine* was established, under the patronage of Louis XVI, to maintain a regular and ordered correspondence on meteorological and medical matters with doctors throughout the kingdom (Kington, 1970). Vicq d'Azyr was appointed Secretary-General and, together with the French meteorologist-cleric, Le Père Louis Cotte, became actively involved with establishing and maintaining an extensive network of weather stations for the Society with the country's physicians acting as observers. Four years earlier in his *Traité de Météorologie* Cotte had given information about how to make daily instrumental observations, based on his own experience in keeping a weather journal at Montmorency near Paris. Similar instructions on instrumental exposure, observational procedure, and methods of recording and summarising the daily reports were now issued by the Society so as to ensure that standardised, comparable observations would be made by the team of doctors. The correspondents were requested to make observations of pressure, temperature, wind, humidity, rainfall, evaporation, state of the sky, and significant weather three times a day at sunrise ('matin'), about two to three hours after midday ('midi') and at 9 or 10 o'clock in the evening ('soir'). They were issued with specially printed forms for recording the daily reports in monthly sets (see Figure 2.3) which were regularly sent to the Paris headquarters of the Society for collation.

Whilst many eighteenth-century observers had previously taken readings of temperature simply from indoor thermometers hung in fireless rooms, a serious attempt was now made to obtain a more representative and comparable value by exposing thermometers in sheltered north-facing sites outside. The instruments were graduated in degrees Réaumur, a scale on which the freezing point and boiling point of water are 0 ° and 80 ° respectively. Observations of atmospheric pressure were made with mercury barometers graduated in Paris inches and lines. Before the adoption of the metric system during the Napoleonic era, Paris inches and lines were commonly used in Europe for measuring atmospheric pressure. The Paris inch was divided into 12 lines, each line being further subdivided either into tenths or twelfths. One Paris inch is equivalent to a pressure interval of 36.1 millibars, i.e. one Paris line is approximately equal to 3.01 millibars. Where possible, vernier-type devices were fitted to the barometers to allow readings to be made to an accuracy of tenths or twelfths of a line, that is, thirds or quarters of a millibar.

By the mid 1780s the observation network comprised over 70 stations and had been extended beyond the borders of France to include correspondents in other countries of Europe as well as in America and Asia (see Table 2.1). This was the kind of meteorological organisation envisaged by the French scientist Antoine Lavoisier in 1781 when he pointed out that in order to prepare a forecast the meteorologist would need simultaneous daily observations of various weather elements:

> The forecast of the changes due to the weather is an art that has its principles and

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Figure 2.3. Register of daily observations for October 1781 kept at Dijon, Burgundy by Dr Maret for the *Société Royale de Médecine*. Thrice-daily readings are given of barometer (Paris inches, lines and twelfths), thermometer (degrees Réaumur), wind direction, state of the sky, and significant weather. Monthly summaries relating to the atmosphere, botany and diseases are also given (from Kington, 1980).

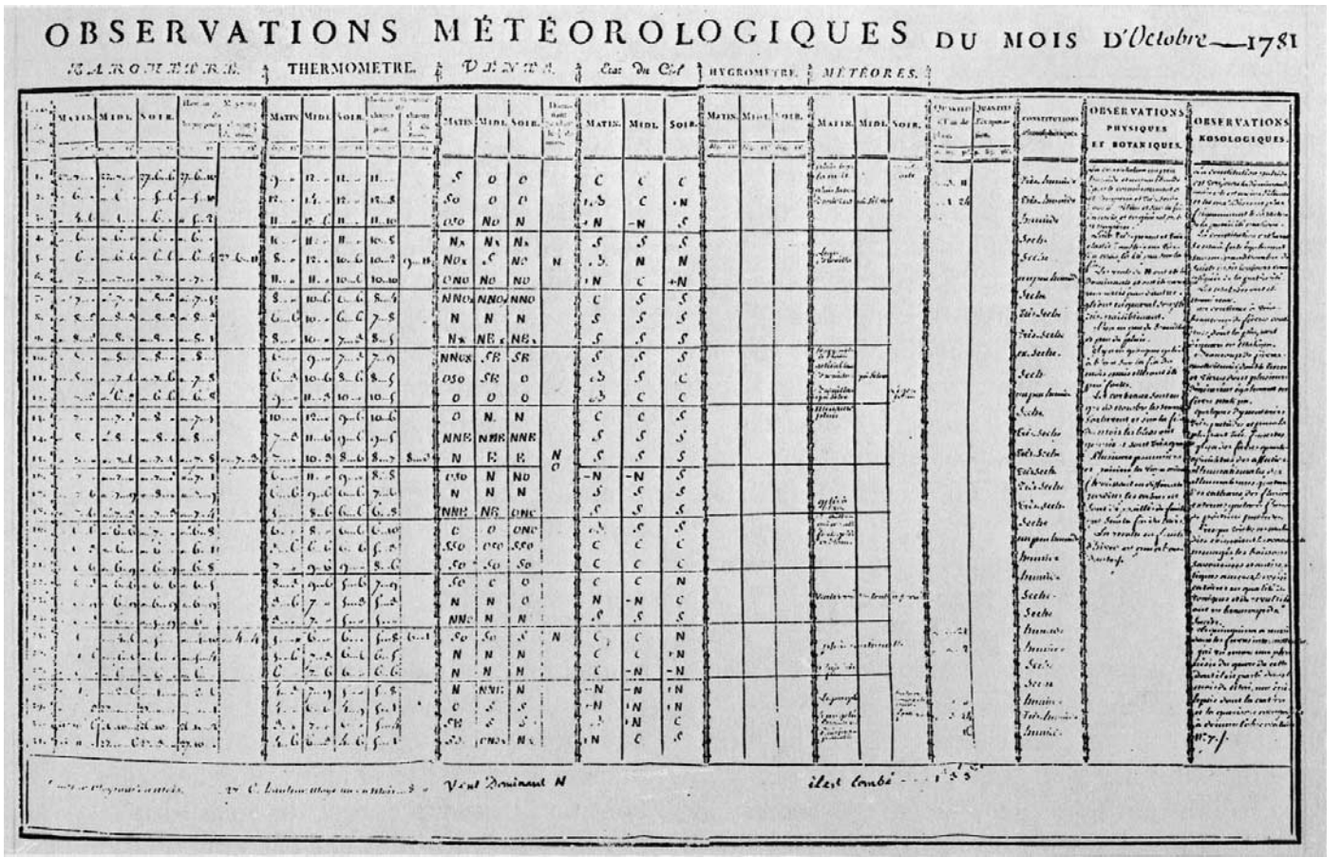

Table 2.1. *Catalogue of meteorological stations making weather observations in the 1780s.*

Key
SRM: *Société Royale de Médecine*
SMP: *Societas Meteorologica Palatina*
p: pressure t: temperature u: humidity w: wind sky: state of the sky wr: weather r: rain
e: evaporation

Station	Period	Observer	Authority	Observation Times	Elements Observed
Albury, Surrey	1782–96	Godschell Man	Private	1×daily	p, t, w, wr
Ancenis, Brittany	1786–92	—	SRM	3×daily	p, t, w, sky, wr
Argentat, Limousin	1783–5	Lertourgie	SRM	3×daily	p, t, sky, wr
Arles, Provence	1782–8	Dr Bret	SRM	3×daily	p, t, w, sky, wr, r
Arras, Artois	1783–93	Dr Buissart	SRM	3×daily	p, t, u, w, sky, wr
Aylsham/Buxton, Norfolk	1786–91	A. E. Powell	Private	2×daily, probably at 0900 and 2100 with occasional readings at noon	p, t, w, wr, r
Barcelona	1780–1827	F. Salva y Campillo	Private	0600, 1400, 2300	p, t, w, sky, wr

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Table 2.1. (*cont.*)

Station	Period	Observer	Authority	Observation Times	Elements Observed
Basel	1755–94	—	—	0700, 1300, 2100	p, t (mean daily values), wr
Beaune, Burgundy	1784–5	Lecousturier de l'Oratoire	SRM	3×daily	p, t, w, sky, wr
Belmont Castle, Perthshire	1782–99	J. S. Mackenzie	Private (Marquis of Bute)	2×daily	p, t, w, wr, r
Berlin	1781–8	N. von Beguelin, Professor, Academy of Sciences	SMP	0700/0800, 1430, 2200	p, t, u, w, sky, wr
Bern	1760–	—	—	daily	p, t (mean daily values), wr
Besançon, Franche-Comte	1783–7	Meillardet	SRM	3×daily	p, t, w, sky, wr
Billom, Auvergne	1779–90	Avinet	SRM	0600–0800, occasionally 1500	p, t, w, sky, wr
Bologna	1782–92	Matteuci, Professor of Astronomy and Physics	SMP	0700, 1400, 2100	p, t, u, w, sky, wr
Brest, Brittany	1783–4	Aublet	SRM	3×daily	p, t, w, sky, wr
Bridestow, Devon	1782–4	T. Heberden	Private	0800, 1400	p, t, wr
Brussels	1782–92	Mann and Chevalier, Abbots, Academy of Sciences	SMP	0700, 1400, 2100	p, t, w
Buda	1781–92	F. Weiss (Astronomer Royal) and F. Bruna	SMP	0700, 1400, 2100	p, t, u, w, sky, wr, r
Cadiz	1786–9	—	Private	daily	p, t, w, sky, wr
Cambuslang, Lanarkshire	1785–1809	J. Meek, D.D.	Private	0800, 1400/1500, 2200	p, t, w, sky, wr, r
Castel Sarrazyn, Languedoc	1783–5	Ressayre	SRM	3×daily	p, t, w, sky, wr
Châlons-sur-Marne, Champagne	1785–90	Dr Moignon	SRM	3×daily	p, t, w, sky, wr
Chinon, Touraine	1780–91	Linacier	SRM	3×daily	p, t, w, sky, wr
Clermont Ferrand	1784–90	—	SRM	3×daily	p, t, w, sky, wr
Copenhagen	1781–90	T. Bugge, Astronomer Royal; Professor of Astronomy and Mathematics, University of Copenhagen	SMP	0700, 1200, 2100	p, t, u, w, sky, wr, r
Dax, Gascogne	1782–5	Dufan	SRM	3×daily	p, t, w, sky, wr
Delft/The Hague	1782–6	S. P. van Swinden	SMP	0700, 1400, 2100	p, t, u, w, wr, r, e
Dijon, Burgundy	1761–85	Dr Maret	Private, SRM and SMP	3×daily	p, t, w, sky, wr, r, e
Downing Hall, Holywell, Flintshire	1784–90	T. Pennant	Private	daily, mostly	p, t, w, wr

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Station	Period	Observer	Authority	Observation Times	Elements Observed
Dublin	1781–1811	M. Faviere, Comptroller of the Works, Dublin Castle	Private	daily	wr
Dublin	1783–4	—	Private	2×daily, mostly	p, t, w, sky
Düsseldorf	1782–4	Liessen and Phennings	SMP	0700, 1400, 2100	p, t, w, sky, wr
Epoisse, Burgundy	1784–5	Forestier	SRM	3×daily	p, w, sky, wr
Erfurt	1781–8	Planer	SMP	0700, 1400, 2200	p, t, w, sky, wr, r, e
Eyjafirth, Iceland	1747–1846	J. Jónsson (father and son)	Private	Daily	w, sky, wr
Faeroes	1781–2	—	Private	3×daily	p, t, w, sky, wr
Geneva	1782–9	Senebier	SMP	0700, 1300, 2100	p, t, u, r
Gordon Castle, Morayshire	1781–1827	J. Hoy	Private	0800	p, t, w, wr
Göttingen	1783–7	Gatterer	SMP	0700, 1400, 2100	p, t, u, w, sky, wr, r, e
La Grande Combe des Bois, Franche-Comte	1783–8	Mougin Lude	SRM	0800	p, t, u, w, sky, wr
Grenoble, Dauphiné	1783–4	Dr Chanoine	SRM	3×daily	p, t, u, w, sky, wr
Haguenau, Alsace	1781–91	Dr Keller	SRM	3×daily	p, t, w, sky, wr
Halifax, Yorkshire	1782–6	C. Ashworth	Private	daily	wr
Hamburg	1767–1808	Brodhagen	Private	3×daily	p, t, w, wr
Harleston, Norfolk	1786–1832	T. Passant	Private	daily	w, wr
Herbipolis (Würzburg), Franconia	1781–8	Egel	SMP	0700, 1400, 2100	p, t, u, w, sky, wr, r
Johnstone, Renfrewshire	1768–1805	J. Houston	Private	daily, mostly	wr
Kemnay/Disblair, Aberdeenshire	1758–95	J. Burnett	Private	daily, mostly	w, wr
Kincardineshire	1782	G. Watson	Private	daily	w, wr
Laigle, Normandy	1784–5	—	SRM	3×daily	p, t, w, sky, wr
Lambhús, Iceland	1779–89	R. Lievog, Astronomer	Royal Danish Government	0600, 1200, 1800, 2000/2100	p, t, w, sky, wr
Leningrad	1782–92	Euler, Secretary, Academy of Sciences	SMP	0600, 1200/1400, 1800/2200	p, t, w, sky, wr
Lille, Flanders	1783–6	Dr Saladin	SRM	3×daily	p, t, u, w, sky, wr r, e
Liverpool (Old Dock Gates)	1768–93	W. Hutchinson	Private	0800, 1200	p, t, w, sky, wr
London	1723–1805	T. Hoy *et al.*	'London Weather Diary' (Manley)	daily	p, t, w, wr
Lons-le-Saunier, Franche-Comte	1784–90	—	SRM	3×daily	p, t
Luçon, Poitou	1785, 1788	Merland de Chaille	SRM	3×daily	p, t, w, sky, wr
Lyndon Hall, Rutland	1748–63; 1777–89	T. Barker, Country Squire	Private	0700, 1400	p, t, w, wr, cloud motion, r
Madrid	1784–9	—	Private	0800	p, t, w, sky, wr

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Station	Period	Observer	Authority	Observation Times	Elements Observed
Mafra, Portugal	1783–6	D. Joaquim da Assumpção Velho, Professor of Physics and Mathematics	Real Collegio de Mafra	3×daily	p, t, w, sky, wr, r
Mannheim	1781–92	J. Hemmer	SMP	0700, 1400, 2100	p, t, u, w, sky, wr, r
Mar, Aberdeenshire	1783–92	Earl of Fife	Private	daily (August, September and October)	wr
Marseilles	1782–92	S. Jacques de Silva Belle	SMP	0800, 1400, 2200	p, t, u, w, sky, wr
Metz, Lorraine-Moselle	1783–4; 1790–1	Gentil (1790–1)	SRM	3×daily	p, t, u, w, sky, wr
Middelburg, Zeeland	1782–8	J. A. van de Perre	SMP	0700, 1400, 2100	p, t, u, w, sky, wr r
Milan	1763–1838	F. Reggio	Private	2×daily	p, t, w, sky, wr,
Minehead, Somerset	1783–4	J. Atkins	Private	0600/0800, 1200, 2100	p, t, w, wr, r
Mirebau, Anjou	1780–7	Ayrault	SRM	3×daily	p, t, w, sky, wr
Modbury, Devon	1788–1868	J. Andrews (father and son)	Private	daily; 0800, 2000 from 11/1790; 0800, 1200, 2000 from 1/1791	wr
Mongewell, Oxford	1771–1823	Rev. S. Barrington Bishop of Durham	Private	0800, 1200, 2200	p, t, w, wr
Montdauphin, Dauphiné	1783–8	D'Arbalestier and Charmeil (Surgeon Major)	SRM	3×daily	p, t, w, sky, wr
Montdidier, Picardy	1783–1869	Drs V. and C. Chandon	SRM and private	3×daily	p, t, u, w, sky, wr
Montlouis, Roussillon	1780–5	Dr Barrère	SRM	3×daily	p, t, w, sky, wr
Montluçon, Bourbonnais	1784–5	Rochette	SRM	3×daily	p, t, w, sky, wr
Moscow	1783–9	Engel and Stritter	SMP	0600, 1400, 2200	p, t, w, sky, wr
Mulhausen, Alsace	1778–86	D. Meyer	SRM	3×daily	p, t, u, w
Munich	1781–92	Huebpauer, Reader in Theology, Augustine order	SMP	0700, 1400, 2100	p, t, w, sky, wr
Nantes, Brittany	1779–83	Richard du Plessir	SRM	3×daily	p, t, w, sky, wr
Norwich	1778–1815	W. Youell, Manager, New Mills	Private	2×daily	w, wr
Padua	1781–92	Toaldo	SMP	0700, 1400, 2100	p, t, w, sky, wr, r
Perpignan, Roussillon	1783–5	—	SRM	3×daily	p, t, w, sky, wr
Poitiers, Poitou	1775–1819	Dr de la Mazière	SRM and private	3×daily	p, t, w, sky, wr

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Table 2.1. (*cont.*)

Station	Period	Observer	Authority	Observation Times	Elements Observed
Pontarlier, Franche-Comte	1777–5, 1791–3	Dr Tavernier and le Père F. Tavernier	SRM	3×daily	p, t, w, sky, wr
Prague	1781–91	A. Strnadt, Astronomer Royal	SMP	0700, 1500, 2100	p, t, u, w, sky, wr, r
Regensburg	1781–91	P. Heinrich, Cleric and Professor of Experimental Physics	SMP and SRM	0700, 1400, 2100	p, t, u, w, sky, wr, r
Ribe, Denmark	1786–1816	L. Heinssen	Private	daily, mostly	wr
Rieux Evêché, Languedoc	1783–90	Abbot Darbas	SRM	3×daily	p, t, w, sky, wr
La Rochelle, Aunis	1777–93	Seignette, Secretary, Academy of Sciences	SMP and SRM	0700, 1400, 2100	p, t, w, sky, wr, r, e
Rome	1782–92	Abbot G. Calandrelli, Professor of Mathematics, College of Rome	SMP	0700, 1400, 2100	p, t, u, w, sky, wr, r, e
Rouen, Normandy	1777–80, 1783–90	Lépecq de la Clôture	SRM	3×daily	p, t, w, sky, wr
St Brieuc, Brittany	1783–5	Dr Bagot	SRM	3×daily	p, t, w, sky, wr
St Dié, Lorraine	1783–9	Dr Félix Poma and G.-F. Renaud	SRM	3×daily	p, t, w, sky, wr
St Gotthard	1781–92	P. Laurentio Mediolanensi and Onuphrius, Franciscian Order	SMP	0700, 1400, 2100	p, t, u, w, sky, wr
St Jean d'Angély, Aunis	1786–9	—	SRM	0600, 1400, 2200	p, t, w, sky, wr
St Lô, Normandy	1786–	—	SRM	3×daily	p, t, w, sky, wr
St Malo, Brittany	1782–8	—	SRM	3×daily	p, t, u, w, sky, wr
St Paul-Trois-Châteaux, Dauphiné	1781–91	Dr Caudeiron	SRM	3×daily	p, t, w, sky, wr
Selborne, Hampshire	1768–93	Rev. G. White	Private	0800, 2000	p, t, w, wr
Skálholt, Iceland	1777–81	H. Finnsson, Bishop	Private	1000, 2200	p, t, w, sky, wr
Spitzbergen, Norway	1783–6	Wilse	SMP	0700, 1400, 2100	p, t, w, sky, wr
Stockholm	1783–7	P. Wargentin and H. Nicander, Secretaries, Academy of Sciences	SMP	0600/0700, 1300/1400, 2200	p, t, u, w, sky, wr
Stroud, Gloucestershire	1771–1813	Dr T. Hughes	Private	0700, 1400, 1800 and 'night'	p, t, w, sky, wr

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