

- 2 Pressure gradients tended to be steep and westerly winds reached storm force in many places on the 6th and 7th. As the skies cleared on the 9th and 10th, temperatures fell sharply and isolated snow showers occurred in parts of the British Isles. For the first time in 1981, pressure began to increase over Scandinavia from the 12th which was to set the pattern of weather for much of the remainder of the month. Clear night skies over much of Britain resulted in frosts which were most severe in southern England. Cold continental air affected Britain after the 18th and by the 21st snow was spreading westwards affecting south-west Scotland. Most of Scotland, however, escaped the worst of the snow which was concentrated in Wales and the English Midlands. The weather was exceptionally cold on the 23rd and 24th. Minimum temperatures of -6.2°C and -7.0°C were recorded at Parkhead and Carim respectively. On the 23rd, daytime air temperatures at Carim rose to only -2.6°C . As pressure began to fall on the 25th, a fresh south-easterly wind developed which became strong by the 27th. Temperatures increased slightly and moderately heavy rain fell on the 28th.

March. Wet and mild.

As a decaying depression moved into continental Europe, Scotland experienced relatively strong and moist easterly winds on the 1st and 2nd. The month's lowest minimum temperatures were registered on the 5th, (-3.4°C at Parkhead and -5.0°C at Carim) as the skies cleared. Frontal troughs began to move north-eastwards on the 5th bringing some snowfall to central Scotland. The 5th and 6th together produced 42.4mm of precipitation at Parkhead. Many parts of the British Isles had one of their wettest days on the 7th at the beginning of a period dominated by strong S.SW winds and a series of frontal troughs crossing the country. Temperatures remained unseasonably high until the 14th when an area of high pressure developed to the west, bringing cooler N.NW airflow across Scotland. Amounts of showery precipitation were generally small, some occurring as snow or hail on higher ground. As the anticyclone drifted away southwards on the 18th, it was replaced by a cold westerly airstream bringing yet more snow to high ground. Snow affected much of Scotland again on the 20th while southern England basked in warm sunny weather. The extremely wet and windy weather which affected England and Wales on the 21st and 22nd did not affect Scotland where conditions remained calm, cold and relatively dry, although some snow fell on the 22nd which lay overnight. Temperatures increased sharply after the 23rd as a mild moist southerly airstream affected most of Scotland. The month's highest maximum temperatures were recorded on the 30th at both Parkhead (14.9°C) and Carim (11.2°C).

April. Cool and very dry.

April's weather was dominated by high pressure within the immediate vicinity of the British Isles with only rare incursions of frontal troughs. Total precipitation for the month was only 8.0mm at Carim and 14.3mm at Parkhead, and most of Scotland received less than 40% of the seasonal normal. A trough moved south-eastwards on the 4th bringing with it a small amount of rain but apart from this, the weather was relatively dry until the 10th. A complex area of low pressure and associated frontal troughs affected most of the British Isles after a sunny and exceptionally warm day on the 10th when temperatures rose to 17.2°C at Parkhead. Rain fell over most of Scotland on the 11th and 12th but the skies had cleared again by the 13th. With clear skies, night temperatures fell quickly, remaining only a little above freezing at Parkhead. Slight frosts were recorded at the upland site. The weather in Scotland began to turn colder as air from the Arctic Ocean flowed in from the north. By the 22nd, daytime temperatures had fallen from over 11.0°C on the 21st to less than 6.0°C. A minimum temperature of -7.0°C was reached at 03.00 on the 23rd at the Carim station. Snow fell over Scotland on the 23rd and 24th with some drifting over high ground in a strong E wind. A small depression and associated frontal troughs affected England and Wales on the 24th, 25th and 26th bringing heavy snowfall which caused widespread disruption. Early morning snow showers occurred on the 25th in central Scotland and by mid-day sunny intervals had developed. Cloud spread southwards on the 26th to affect most of Scotland bringing the wettest day of the month at Parkhead (6.0mm). The last four days of the month were, however, its warmest, daytime temperatures reaching 15.4°C on the 29th. Night temperatures, in contrast to a few days earlier, never fell below 9.0°C on the 29th and 30th.

May. Warm and relatively wet.

Cold northerly winds brought a cold start to the month with night frost but temperatures improved as a depression moved south-eastwards across Scotland on the 3rd and 4th. Rain fell on both days. The weather remained unsettled for several days as low pressure lingered to the SW of the British Isles. This migrated eastwards into continental Europe but pressure remained low over Britain. Coastal fog, which had been a feature of the weather from the 10th gradually affected inland areas. A series of frontal troughs crossed north-eastwards across Scotland after the 14th and rainfall was recorded on nine of the following ten days. Isolated thunderstorms occurred on the 15th and 17th and fog continued to

4. affect many areas. Low pressure stagnated over the British Isles after the 24th, and on the 26th and 27th thunderstorms occurred over central Scotland. Between 14.00 and 15.00 on the 27th, Abbotsinch recorded 25.2mm of rain "street lights came on, and there was much local flooding" (London Weather Centre Monthly Weather Summary). The Stirling area escaped the storms, only 4mm of rain being recorded at Parkhead, and 25mm at Carim. Fronts moving north-eastwards across Scotland on the 21st produced a mild but very wet end to the month.

June. Cool, dull and wet.

Rainfall was recorded on 13 out of the first 14 days as a succession of frontal troughs passed eastwards across Scotland after the 1st. High pressure became established to the west of the British Isles during the 15th which dominated the weather for the remainder of the month. Temperatures fell as NW winds brought cold air from the north Atlantic but precipitation was recorded on only four further days. The skies cleared briefly on the 21st and 22nd and daytime temperatures at last showed some sign that summer was round the corner, reaching 21.6°C at Parkhead on the 21st. (Carim 18.0°C). Clouds again became broken on the 27th and night-time temperatures fell sharply in the light northerly winds. Ground frosts occurred in some sheltered locations in Scotland. The last two days were again cloudy and relatively mild.

July. Dull and cool.

The weather remained cloudy with rain for the first nine days as cyclonic activity affected the whole of the British Isles. As pressure began to increase from the SW on the 8th, the skies cleared for a short time bringing the first warm weather. Although an anticyclone was always in close attendance, frontal troughs continued to bring cloud and rain although there were sunny intervals. The 10th was the month's wettest day producing 11.6mm at Parkhead and 14.5mm at Carim. As a ridge of high pressure extended northwards over the north Atlantic on the 14th air was brought in to Scotland from a more northerly quarter and daytime temperatures remained generally lower than the seasonal normal for the next ten days. It was particularly cold on the 22nd in rain-bearing northerly winds. There were, however, a few milder and sunny interludes during this period. By the 25th, a ridge of high pressure was moving across the British Isles and was to dominate the weather patterns for the remainder of the month, although a weak frontal trough brought some rain to northern Britain on the 28th. The weather was, however, drier and warmer and we at last experienced something approaching a

recognisable warm spell. Temperatures topped 20°C on the last six days of the month, reaching 22.3°C at Parkhead (18.5°C at Carim) on the 27th.

August. Warm and extremely dry.

High pressure to the south-west of the British Isles with ridges extending north-eastwards into the country dominated the weather patterns for most of the month bringing warm and dry conditions. Frontal troughs moving south-eastwards across Scotland between the 2nd and the 5th brought cloud and rain particularly on the 3rd but falls were very small (2.9mm at Parkhead and 4.0mm at Carim). There was widespread fog on the 5th and 6th but this tended to be confined to isolated coastal areas in Scotland. A cold front crossed Scotland on the 8th and 9th but failed to produce any rain in the Stirling area. While England remained sunny after early morning fog, Scotland experienced intermittent rain between the 10th and 13th as frontal troughs moved in from the west. After the 15th temperatures began to fall as cooler air came in from the NW. Night minimum temperatures fell unseasonably to below 6.0°C at Parkhead on the 16th and 17th as the skies cleared. General rain returned late in the afternoon on the 17th as clouds moved in from the west, and the next two days were cloudy and wet although rainfall amounts were still small (Parkhead 3.2mm, Carim 4.5mm on the 19th). Pressure began to increase from the SW after the 20th but the anticyclone which persisted over Britain from the 23rd to the end of the month brought much cloud and coastal fog. Daytime temperatures, however, exceeded 20°C on eight consecutive days until the 31st.

September. Warm at first, becoming wet and cold.

Pressure remained high over the British Isles for the first three days and the 2nd was pleasantly calm and clear. After early morning mist on the 3rd, clouds moved in from the west in the afternoon as the anticyclone drifted eastwards into continental Europe. Maximum temperatures remained high and on the 4th and 5th, overnight temperatures fell to only 13.1°C and 13.5°C at Parkhead (13.5°C at Carim). Pressure remained relatively high for several days and there were some spells of fine weather, sometimes after early morning mists. A deepening low approached Scotland from the west on the 8th becoming stationary to the north-west of the country. Rain and strong winds affected most of western Britain on the 10th but winds remained light and rainfall amounts small in the Stirling area. After the 10th, temperatures began to fall as the summer seemed to move quickly into autumn. The 12th and 13th were cloudy and dry but a

- 6¹ depression and associated fronts moved in rapidly from the west on the 14th and 15th bringing extensive rain. The pattern was now set for the remainder of the month as a succession of active depressions brought further cloud and rain, and occasionally strong winds. A particularly deep depression approached from the SW on the 19th, moving to a position off the coast of Norway by the 21st. Torrential rain fell in strong westerly winds overnight between the 19th and 20th. Gale damage and flooding were widespread. A little more than 30mm of overnight rain fell at Parkhead. The weather pattern was repeated between the 26th and 28th which resulted in another 36mm at Parkhead and an incredible 84mm at the Carim station for the three days. Over much of the British Isles, September's rainfall was double the normal.

October. Very cold, wet and windy.

Further very heavy rain fell as Low 'H' approached the British Isles from the SW in late September to become stationary over the Irish Sea by the 3rd. 56mm was recorded at Carim over the first three days, and 83mm at Parkhead. At the lowland station this is equal to the average rainfall for the whole month. Strong northerly winds affected much of Scotland on the 2nd and 3rd, with drifting snow in the mountains. The weather remained wet with occasionally strong W winds. A deep depression moved north-eastwards across the British Isles on the 8th which brought the wettest day of the month (Parkhead 16.4mm, Carim 21.0mm). As this moved away towards Norway, Scotland was affected by showery air from the Arctic Ocean. Some of these showers fell as snow in northern Scotland. As the low filled, a ridge of high pressure extended over Britain by the 14th and night temperatures fell sharply as the skies cleared. Minimum temperatures fell to -4.6°C on two consecutive nights at Parkhead (13th/14th and 14th/15th) while on the more exposed hill slopes of the Ochils, at Carim, they only reached -0.5°C , and -3.0°C . (This frost hollow effect in the Forth Valley will be discussed later in this bulletin.) Fresh W and SW winds returned to Scotland bringing 12mm of rain to Carim and a general respite from night frosts. Frontal troughs on the 22nd, 23rd and 24th brought further rain but frosts returned when night skies cleared. A deep depression moved eastwards from south of Greenland to affect the weather in Britain after the 26th. Rain was recorded on the next four days, the greatest amount falling on the 29th. Further frontal troughs crossed Scotland overnight between the 30th and 31st bringing fresh to strong relatively mild W winds.

November. Stormy at times. Highly changeable.

The month set the scene for the forthcoming winter as the weather was determined by oscillation between cold polar air from the north-west and warm tropical air from the south-west. Both daytime maximum and night minimum temperatures showed a wide range of variation. At Parkhead, the former varied between 4.1°C and 13.7°C, the latter between -2.3°C and +9.4°C. Cyclonic weather patterns continued to bring cloud and rain for the first 3 days. High pressure began to build from the south on the 4th and by the 5th an anticyclone lay over the British Isles. Night temperatures fell and frosts were recorded on three successive mornings at Parkhead, the 6th, 7th and 8th. As the anticyclone drifted eastwards fog affected Scotland on the 7th and 8th. A series of frontal troughs crossing Scotland during the evening of the 8th heralded a period of three exceptionally dry and mild days. On the 11th the maximum and minimum temperatures at Parkhead were unseasonally 13.7°C and 8.3°C respectively. Rain spread from the NW on the 15th at the beginning of a spell of unsettled weather which lasted until the end of the month. Vigorous depressions moved across the far north of Scotland on the 19th and 20th and again on the 23rd and 24th bringing gales and rain. The two storms were separated by yet another interlude of mild SW winds. The 19th was the wettest day of the month at both Parkhead (16.3mm) and Carim (23.5mm). Scotland and parts of northern England experienced some prolonged periods of snow during the second storm. By now it was clear winter had set in, and apart from one mild interlude on the 26th, low temperatures and snow over the north, and higher ground, dominated the Scottish weather for the remainder of the month.

December. Extremely cold with extensive snow.

The clear anticyclonic weather of late November was replaced by cloudy and milder conditions during the evening of the 2nd. Night temperatures, however, still fell below freezing. Showers fell in cool NW winds on the 5th and 6th occurring as snow in parts of Scotland. As the skies cleared late on the 7th, temperatures fell quickly and severe frosts were widespread. While pressure gradients remained slack and skies relatively clear, temperatures at night fell to -8.0°C or below on 4 consecutive nights. By the 12th slightly milder air affected Scotland but in the English Midlands temperatures fell to record breaking low levels. A daytime maximum of -14°C was followed by -25°C the following evening. Conditions were so severe that the BBC weather man had to have new temperature discs made before he could issue his forecast!! Heavy snow moved in from the

- 8 SW as an active depression approached from the W with associated frontal troughs. The snow had moved away by the 15th when the skies cleared and temperatures fell as polar air moved back into the British Isles. Daytime temperatures on the 15th never rose above -4.4°C . In the calm, cold air, temperatures fell below -14°C on two consecutive nights, the 16th/17th and 17th/18th. There were prospects of a thaw on the 19th as fresh southerly winds brought in much milder air but there was widespread snowfall on the 20th, the wettest day of the month (23.9mm at Parkhead). Snow turned to rain and conditions underfoot became extremely unpleasant. On the 22nd the skies cleared again as polar air returned. There were overnight frosts in the days before Christmas and snow showers affected many areas. Milder weather returned on Boxing Day but precipitation again occurred as snow and there were some moderately heavy falls in southern England. Snow turned to rain by the 29th and there were hopes of a continued thaw. How wrong can you be? It is unlikely that anyone can remember such cold weather during their lifetime — this was the coldest December since 1890 in many places.

CLIMATOLOGICAL AVERAGES FOR PARKHEAD

Climatological averages are usually taken over periods of 30 years in the case of temperature and 35 years in the case of rainfall. This is because, in Britain, there is a built-in year to year variation in all the parameters which we use to define climate. If we use too small a number of years our average may be biased by one extreme value. As there are only 11 years of records for Parkhead there is, therefore, considerable room for error in the calculation of averages. The table of climatological averages for this station should, therefore, be viewed with some caution (Table 5).

RESEARCH NOTES

The Effects of Elevation

(Figure 2)

Increasing surface elevation constitutes a particularly important control on patterns of weather and climate. Higher ground tends to experience lower temperatures, but higher rainfall and wind speeds. A comparison of the 1981 climatological data for Parkhead (35m) and Carim (332m) serves to illustrate the effect of surface elevation.

The Ochil site is clearly cooler than the University campus. Average difference in maximum temperature is approximately 3.5°C .

This represents a rate of change of temperature, or lapse rate of 11.8°C per 1000m. Average minimum temperature differences are considerably lower, reflecting not only a lower degree of atmospheric turbulence and greater atmospheric stability, but also strong topographic controls. Parkhead experiences a marked frost hollow effect in the low lying Forth valley and minimum temperatures are frequently less than those recorded at Carim. The average difference is approximately 1.3°C which represents a lapse rate of only 4.4°C per 1000m. During September and October 1981, temperatures were 'inverted' on several occasions.

The relationship between precipitation and surface elevation is considerably more complex and cannot be assumed to be uniform. Not only are the meteorological processes more complex but the raingauge also becomes subject to error in the more exposed upland areas where a large proportion of winter precipitation may occur as snow. However, by expressing Carim's recorded monthly precipitation as a percentage of that at Parkhead it is possible to obtain a crude comparison between the two. The overall figure is of the order of 140% which suggests an average annual total at Carim of approximately 1160mm.

Rainfall in the Stirling Area

In the latter part of the nineteenth century there were a number of rainfall observers in the Stirling area whose records were collated by Colonel Stirling of Gargunnoch House and published in the annual *Transactions of the Stirling Natural History and Archaeological Society*. From an early group of 14 in 1894 the list grew to 24 by 1921 although not all were in the Forth Valley. The data from these stations, most of which have now closed, have provided a useful insight into rainfall variation in the Stirling area.

REFERENCE

HARRISON, S.J. 1982. Rainfall in the Stirling area. *Forth Naturalist & Historian*.

Forth Valley Frost Hollow

Lower lying areas subject to the accumulation or 'ponding' of cold air draining from upper slopes, commonly referred to as frost hollows, are a well documented feature of local climate (Hawke 1944, Harrison and Currie 1979). The Forth Valley is no exception, and experiences inversions of temperature, when the valley floor becomes much colder than the surrounding hill slopes. These are particularly well developed when atmospheric pressure is high and

10 night skies clear during the winter months. Such conditions arose during December 1981 which provided the opportunity to carry out detailed observations.

By the late afternoon of the 11th, a ridge of high pressure developed over much of the British Isles. The air was generally calm and the skies cloud free for much of the following night resulting in very rapid heat loss from the already cold ground surface. (Temperatures in parts of the English Midlands had fallen to -20°C by early morning on the 12th). Temperatures were recorded every three hours along a north/south transect line across the Forth valley using a whirling psychrometer. By 18.00 on the 11th the frost hollow effect was already obvious but during the evening it intensified as temperatures in the middle of the valley fell to -14.8°C . The greatest temperature difference between hill slope and valley floor was recorded at 03.00. By 06.00 a down-valley wind had become established which mixed the air a little and tended to reduce very slightly the intensity of the frost hollow effect.

Note: This work was carried out by Miss R. Wallace as part of her B.Sc.(Hons) Environmental Science degree programme.

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Fogs in the Forth Estuary

It has been suggested that the Forth estuary has one of the highest incidences of coastal fog in Scotland (Dixon 1939), some of which are the spring and summer haars typical of the North Sea coast of Britain (Lamb 1943). The dependence of many fog forecasting models on temperature contrast between the lower atmosphere and the sea surface (for example: Noonkester 1979), when considered in conjunction with tidally controlled water temperature oscillation at the entrance to tidal inlets and estuaries (for example: Heath 1977), suggests that such control may extend to the formation of fogs in confined coastal waters. Alexander (1964) observed a tidal control of haar in the Eden estuary in Fife.

As part of an NERC funded project, visibility observations from Inchkeith lighthouse in the Forth estuary have been analysed and reveal a markedly greater frequency of fogs at certain states of the tide. The frequency of fogs at 10.00 and 16.00 GMT has been related

to coded data based on the timing of high tides. The dispersion diagram has been presented in circular rather than linear form (Figure 3). While fogs observed at 10.00 appear to occur most frequently on a falling tide, those at 16.00 are most frequent at high tide. The explanation for these apparent correlations lies in the complex heat and moisture balances in the estuary which are currently under investigation.

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TABLE 1
MONTHLY TEMPERATURES (STIRLING, PARKHEAD) 1981

	Mean °C Maximum	Diff. from Average	Highest Maximum	Lowest Maximum	Mean °C Minimum	Diff. from Average	Highest Minimum	Lowest Minimum	Mean °C	No. of Days ≤ 0°C	Mean Earth Temp. °C
January	* (7.2)	+1.3	(10.5)	(1.9)	0.7	+0.2	7.0	-4.5	3.5	16	3.1
February	* (6.3)	0	(11.0)	(2.3)	0.2	-0.5	6.7	-6.2	3.3	17	3.0
March	9.6	+0.9	14.9	4.4	2.8	+1.1	8.3	-3.4	6.2	5	4.7
April	12.5	+0.8	17.2	5.4	2.9	-0.2	9.6	-3.5	7.4	3	8.5
May	15.2	+0.1	19.7	7.2	6.7	+1.3	12.0	-1.9	10.9	3	11.6
June	16.8	-0.7	21.6	13.2	8.5	+0.5	13.3	3.0	12.6	0	15.2
July	18.6	-1.0	22.3	16.2	10.1	-0.4	14.6	6.6	14.3	0	16.1
August	19.6	+0.7	23.3	14.0	10.5	+0.6	15.9	5.4	15.0	0	16.6
September	17.2	+1.1	21.9	13.0	8.2	-0.2	13.4	2.5	12.7	0	14.3
October	10.4	-2.2	13.2	8.1	1.2	-4.4	10.3	-4.6	5.8	11	7.7
November	9.5	+0.7	13.4	4.1	2.5	+0.2	9.4	-2.3	6.0	10	6.1
December	2.7	-4.1	10.8	-4.4	-5.7	-6.9	2.5	-14.5	-1.5	29	N/A
Year	12.1	-0.1	23.3	-4.4	4.1	-0.6	15.9	-14.5	8.1	91	-

* Incomplete record: means estimated

TABLE 2
MONTHLY TEMPERATURES (OCHIL, CARIM) 1981

	Mean °C Maximum	Diff. Carim- Parkhead	Highest Maximum	Lowest Maximum	Mean °C Minimum	Diff. Carim- Parkhead	Highest Minimum	Lowest Minimum	Mean °C	No. of Days ≤ 0°C
January	3.4	-3.8	7.5	-2.0	-1.1	-1.8	6.0	-6.5	1.2	20
February	2.3	-4.0	8.5	-2.6	-1.8	-2.0	4.0	-7.0	0.3	23
March	5.3	-4.3	11.2	0.0	0.7	-2.1	5.6	-5.0	3.0	11
April	9.8	-2.7	14.5	0.8	0.6	-2.3	6.9	-7.0	5.2	15
May	12.4	-2.8	19.1	5.5	4.9	-1.8	9.0	-6.0	8.7	2
June	13.4	-3.4	18.0	10.5	8.0	-0.5	11.0	0.5	10.7	0
July	14.7	-3.9	18.5	11.0	8.1	-2.0	12.0	4.5	11.4	0
August	16.6	-3.0	20.5	11.0	9.7	-0.8	14.5	4.5	13.2	0
September	13.3	-3.9	18.0	8.0	8.1	-0.1	13.5	5.0	10.7	0
October	6.6	-3.8	9.5	3.0	1.2	0.0	5.0	-3.0	3.9	6
November	6.8	-2.7	10.8	1.0	2.1	-0.4	7.5	-4.0	4.5	8
December	NO DATA - STATION INACCESSIBLE									

TABLE 3
MONTHLY PRECIPITATION (STIRLING, PARKHEAD) 1981

	Total Precipitation (mm)	Difference from Average (1971-1981)	Greatest Fall in 24 Hours		Number of Days			
			Amount (mm)	Date	Precipitation Recorded	0.2mm or more	1.0mm or more	5.0mm or more
January	72.3	-25.8	14.8	18th	23	22	16	4
February	47.2	-20.9	18.6	2nd	13	13	6	4
March	125.8	+49.8	22.3	5th	23	19	16	7
April	14.3	-23.5	6.0	26th	6	6	4	1
May	60.7	+ 4.9	8.0	16th	19	19	14	5
June	63.6	+11.0	12.0	2nd	17	17	12	5
July	46.8	-13.7	11.6	10th	16	15	11	3
August	10.1	-47.2	3.2	19th	9	8	4	0
September	165.1	+81.2	31.3	20th	18	18	14	9
October	160.1	+77.0	66.2	1st	22	21	15	9
November	101.7	+ 1.8	16.3	19th	19	19	15	8
December	53.4	-30.1	23.9	20th	14	14	9	2
Year	921.1	+64.5	66.2	1st October	199	191	136	57

TABLE 4
MONTHLY PRECIPITATION (OCHIL, CARIM) 1981

	Total Precipitation (mm)	Greatest Fall in 24 Hours		Number of Days		
		Amount (mm)	Date	Greater than/= 0.5mm	Greater than/= 1.0mm	Greater than/= 5.0mm
January	60.5	12.5	2nd	21	15	4
February	64.0	18.5	2nd	14	10	4
March	N/A	—	—	—	—	—
April	8.0	4.5	10th	6	4	0
May	97.5	11.5	31st	23	20	7
June	110.6	17.5	7th	N/A	—	—
July	71.5	14.5	10th	18	13	6
August	9.8	4.5	19th	N/A	—	—
September	256.0	66.0	26th	19	17	12
October	172.0	37.0	1st	19	17	12
November	116.5	23.5	19th	21	20	15
December	NO DATA — STATION INACCESSIBLE					

TABLE 5
CLIMATOLOGICAL AVERAGES FOR STIRLING (PARKHEAD)
UNIVERSITY OF STIRLING (1971-1981)

	Maximum °C Air Temperature	Minimum °C Air Temperature	Number of Days \leq 0°C	Earth (0.3m) Temperature (0900)	Total Precipitation (mm)	Number of Days with Precipitation
January	5.9	0.5	13	3.0	98.1	19
February	6.3	0.7	12	2.8	(68.1)	16
March	8.7	1.7	9	4.4	76.0	18
April	11.7	3.1	4	7.6	37.8	11
May	15.1	5.4	2	11.4	55.8	15
June	17.5	8.0	0	14.5	52.6	14
July	19.6	10.5	0	16.4	60.5	14
August	18.9	9.9	0	16.3	57.3	14
September	16.1	8.4	0	13.7	83.9	16
October	12.6	5.6	4	10.0	83.1	16
November	8.8	2.3	9	6.0	99.9	18
December	6.8	1.2	12	(3.8)	83.5	17
Year	12.2	4.7	65	9.2	856.6	188

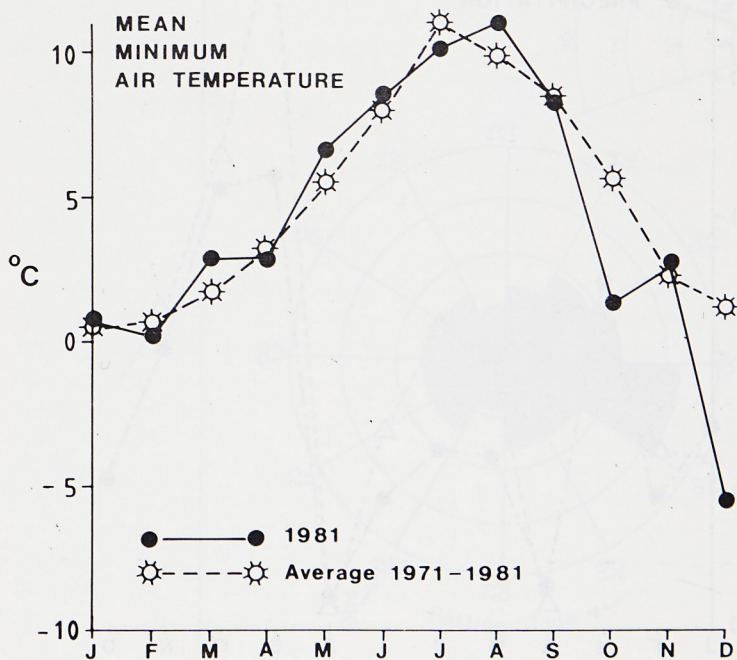
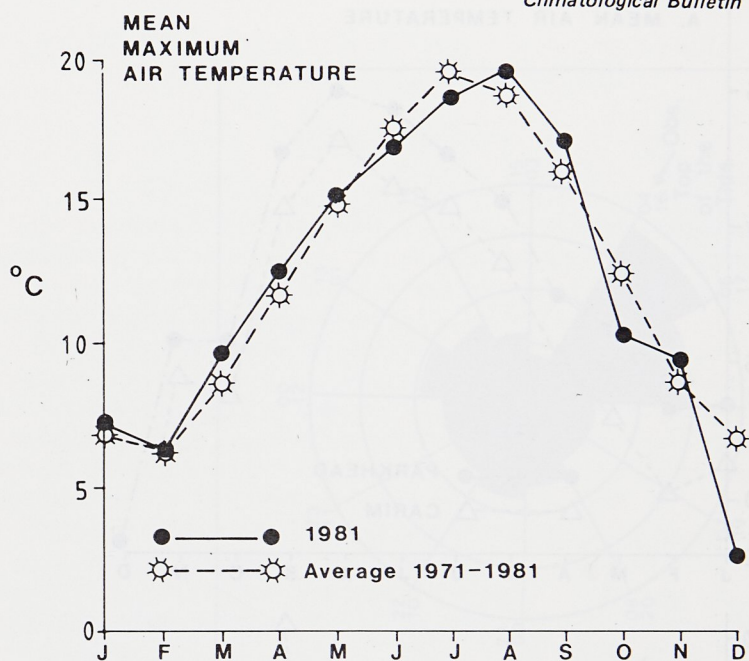


Figure 1 Temperatures — Parkhead

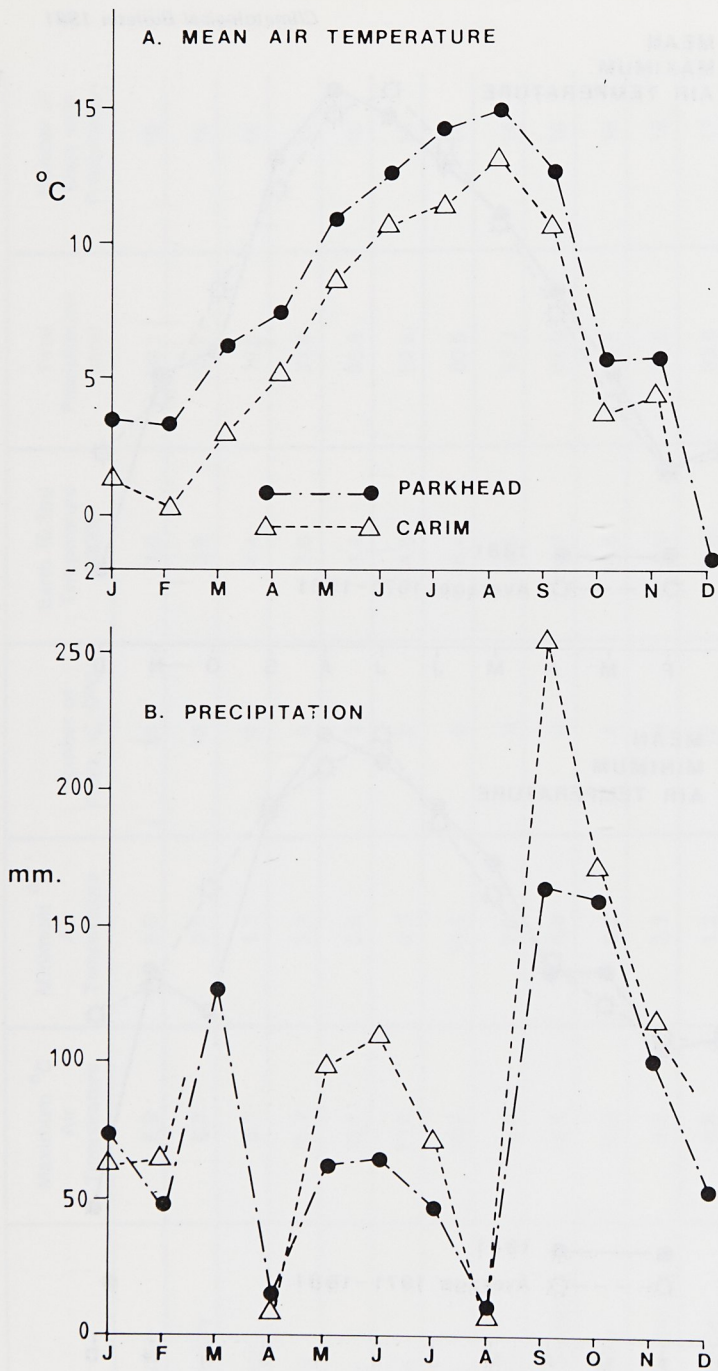


Figure 2 Elevation effects

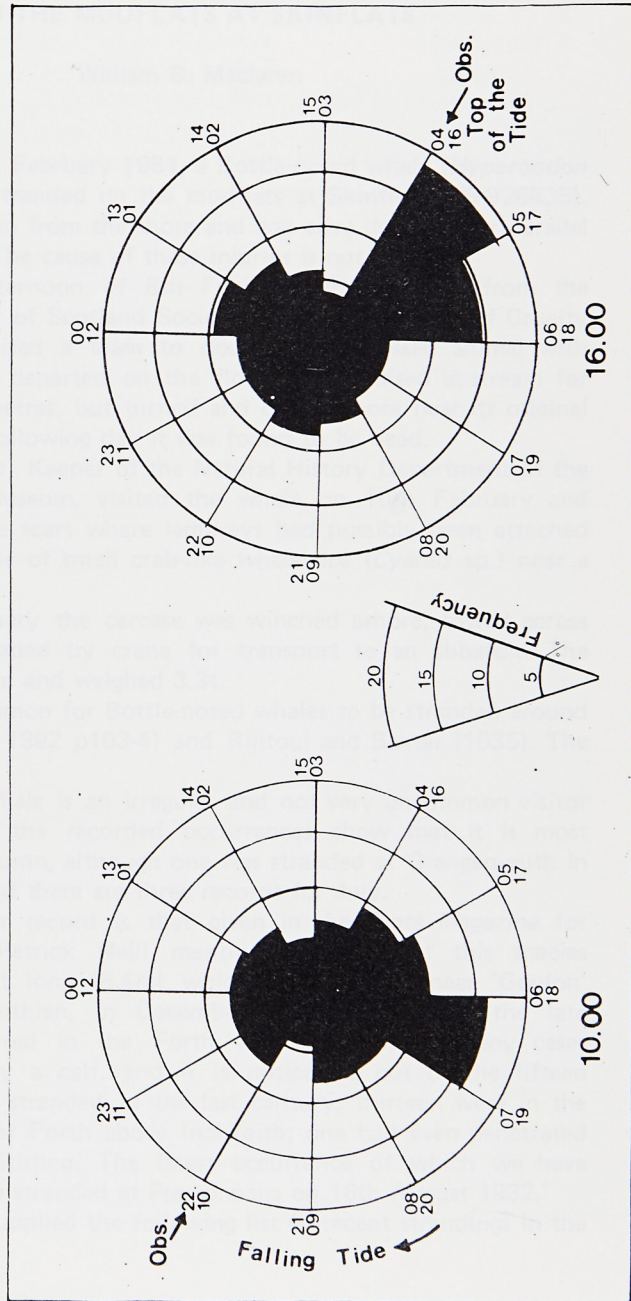


Figure 3 Frequency distribution of fogs: Inchkeith Lighthouse, Forth Estuary: 1969-80

2. WIND AND TEMPERATURE

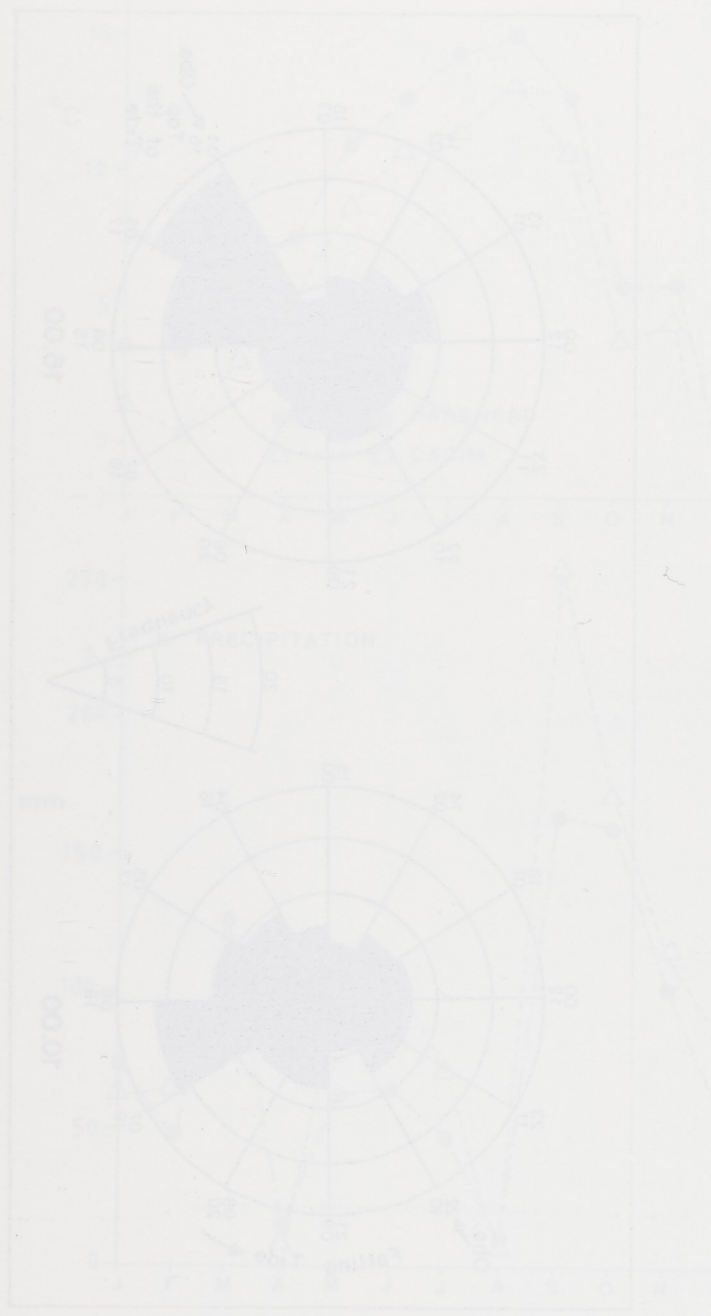


Figure 2. Location effects.