CHAPTER 2

CLIMATE AND PHYSICAL GEOGRAPHY OF AUSTRALIA

General description of Australia

This chapter has been prepared by the Bureau of Meteorology, Department of Science and Technology. It is mainly concerned with the climate of Australia, although some geographic comparisons and a summary of landform features influencing climate have been included together with a summary of atmospheric climate controls.

Position and area

Position. Australia, including Tasmania, comprises a land area of 7,682,300 square kilometres. The land lies between latitudes 10° 41'S. (Cape York) and 43° 39'S. (South Cape, Tasmania) and between longitudes 113° 09'E. (Steep Point) and 153° 39'E. (Cape Byron). The most southerly point on the mainland is South Point (Wilson's Promontory) 39° 08'S. The latitudinal distance between Cape York and South Point, Wilson's Promontory (South East Cape, Tasmania) is about 3,180 kilometres (3,680 kilometres) respectively and the longitudinal distance between Steep Point and Cape Byron is about 4,000 kilometres.

Area of Australia compared with areas of other countries. The area of Australia is almost as great as that of the United States of America (excluding Alaska), about 50 per cent greater than Europe (excluding U.S.S.R.) and 32 times greater than the United Kingdom. The following table shows the area of Australia in relation to areas of other continents and selected countries.

AREAS OF CONTINENTS AND SELECTED COUNTRIES, *circa* 1970

(*'000 square kilometres*)

Country	*Area*	*Country*	*Area*
Continental divisions—		Country—	
Europe (*a*)	4,936	Australia	7,682
Asia (*a*)	27,532	Canada	9,976
U.S.S.R. (Europe and Asia)	22,402	Germany, Federal Republic of	248
Africa	30,319	Japan	372
North and Central America and West Indies	24,247	New Guinea (*b*)	462
South America	17,834	New Zealand	269
Oceania	8,504	United Kingdom	244
		United States of America (*c*)	9,363
Total, World excluding Arctic and Antarctic continents	**135,771**		

(*a*) Excludes U.S.S.R., shown below. (*b*) West Irian is included in other Asia. (*c*) Includes Hawaii and Alaska.

Land forms

The average altitude of the surface of the Australian land mass is only about 300 metres. Approximately 87 per cent of the total land mass is less than 500 metres and 99.5 per cent is less than 1,000 metres. The highest point is Mount Kosciusko (2,228 metres) and the lowest point is Lake Eyre (-15 metres).

Australia has three major landform features: the western plateau, the interior lowlands and the eastern uplands. The western half of the continent consists of a great plateau of altitude 300 to 600 metres. The interior lowlands include the channel country of southwest Queensland (drainage to Lake Eyre) and the Murray-Darling system to the south. The eastern uplands consist of a broad belt of varied width extending from north Queensland to Tasmania and consisting largely of tablelands, ranges and ridges with only limited mountain areas above 1,000 metres.

The rivers of Australia may be divided into two major classes, those of the coastal plains with moderate rates of fall and those of the central plains with very slight fall. Of the rivers of the northern part of the east coast, the longest are the Burdekin and the Fitzroy in Queensland. The Hunter is the largest coastal river of New South Wales, and the Murray River, with its great tributary the Darling, drains part of Queensland, the major part of New South Wales, and a large part of Victoria, finally flowing into the arm of the sea known as Lake Alexandrina, on the eastern side of the South Australian coast. The total length of the Murray is about 2,520 kilometres, about 650 being in South Australia and about 1,870 kilometres from South Australia to the source. The Darling from its junction with the Murray to its junction with the Culgoa is 1,390 kilometres. The Upper Darling (1,140 kilometres) incorporates the Barwon which commences at the junction of the Culgoa to its junction with the Weir River and the Macintyre River from its junction with the Weir to its source near Maybole. The rivers of the north-west coast of Australia (Western Australia) e.g. the Murchison, Gascoyne, Ashburton, Fortescue, De Grey, Fitzroy, Drysdale, and Ord are of considerable size. So also are those in the Northern Territory, e.g. the Victoria and Daly, and those on the Queensland side of the Gulf of Carpentaria, such as the Gregory, Leichhardt, Cloncurry, Gilbert, and Mitchell. The rivers of Tasmania have short and rapid courses, as might be expected from the configuration of the country.

The 'lakes' of Australia may be divided into three classes; true permanent lakes; lakes which being very shallow, become mere morasses in dry seasons or even dry up, and finally present a cracked surface of salt and dry mud; and lakes which are really inlets of the ocean, opening into a lake-like expanse. The second class, which are a characteristic of the interior lowlands are of considerable extent. The largest are Lake Eyre 9,500 square kilometres, Lake Torrens 5,900 square kilometres and Lake Gairdner 4,300 square kilometres.

For further information on the landforms and the geographical features of Australia earlier issues of the Year Book should be consulted. The list of special articles, etc., at the end of this volume indicates the nature of the information available and its position in the various issues.

Area, coastline, tropical and temperate zones, and standard times. The areas of the States and Territories and the length of the coastline were determined in 1973, by the Division of National Mapping, Department of National Resources, by manually digitising these features from the 1:250,000 map series of Australia. This means that only features of measurable size at this scale were considered. About 60,000 points were digitised at an approximate spacing of 0.5 kilometres. These points were joined by chords as the basis for calculation of areas and coastline lengths by computer.

The approximate high water mark coastline was digitised and included all bays, ports and estuaries which are open to the sea. In these cases, the shoreline was assumed to be where the seaward boundary of the title of ownership would be. In mangroves, the shoreline was assumed to be on the landward side. Rivers were considered in a similar manner but the decisions were rather more subjective, the line being across the river where it appeared to take its true form.

AREA, COASTLINE, TROPICAL AND TEMPERATE ZONES, AND STANDARD TIMES: AUSTRALIA

NOTE. *See* paragraphs above for methods of estimating area and coastline.

State or Territory	*Estimated area* — *Total*	*Estimated area* — *Percentage of total area*	*Length of coastline*	*Percentage of total area in* — *Tropical zone*	*Percentage of total area in* — *Temperate zone*	*Standard times* — *Meridian selected*	*Standard times* — *Ahead of G.M.T. (a)*
	km²		km				hours
New South Wales	801,600	10.43	1,900	..	100	150°E	(*b*)10.0
Victoria	227,600	2.96	1,800	..	100	150°E	(*b*)10.0
Queensland	1,727,200	22.48	7,400	54	46	150°E	10.0
South Australia	984,000	12.81	3,700	..	100	142°30'E	(*b*)9.5
Western Australia	2,525,500	32.87	12,500	37	63	120°E	8.0
Tasmania	67,800	0.88	3,200	..	100	150°E	(*b*)10.0
Northern Territory	1,346,200	17.52	6,200	81	19	142°30'E	9.5
Australian Capital Territory	2,400	0.03	35	..	100	150°E	(*b*)10.0
Australia	**7,682,300**	**100.00**	**36,735**	**39**	**61**	..	..

(*a*) Greenwich Mean Time. (*b*) Because of 'daylight saving' an hour should be added from late October to early March.

Climate of Australia

General

The following information has been prepared by the Bureau of Meteorology, Department of Science and Technology. Previously, this chapter of the Year Book also included information about the physical geography of Australia. The information appeared most recently in Year Book No. 61 of 1975–76.

The climate of Australia is predominantly continental but the insular nature of the land mass is significant in producing modification of the continental pattern.

The island continent of Australia is relatively dry with 50 per cent of the area having a median rainfall of less than 300 millimetres per year and 80 per cent less than 600 millimetres. Extreme minimum temperatures are not as low as those recorded in other continents because of the absence of extensive mountain masses and because of the expanse of ocean to the south. However, extreme maxima are comparatively high, reaching 50°C over the inland, mainly due to the great east-west extent of the continent in the vicinity of the Tropic of Capricorn.

Climatic discomfort, particularly heat discomfort, is significant over most of Australia. During summer, prolonged high temperatures and humidity around the northern coasts and high temperatures over the inland cause physical discomfort. In winter, low temperatures and strong cold winds over the interior and southern areas can be severe for relatively short periods.

Climatic controls

The generally low relief of Australia causes little obstruction to the atmospheric systems which control the climate. A notable exception is the eastern uplands which modify the atmospheric flow.

In the winter half of the year (May–October) anticyclones, or high pressure systems, pass from west to east across the continent and often remain almost stationary over the interior for several days. These anticyclones may extend to 4,000 kilometres along their west-east axes. Northern Australia is then influenced by mild, dry south-east trade winds, and southern Australia experiences cool, moist westerly winds. The westerlies and the frontal systems associated with extensive depressions travelling over the Southern Ocean have a controlling influence on the climate of southern Australia during the winter season, causing rainy periods. Cold outbreaks, particularly in south-east Australia occur when cold air of Southern Ocean origin is directed northwards by intense depressions having diameters up to 2,000 kilometres. Cold fronts associated with the southern depressions, or with secondary depressions over the Tasman Sea, may produce large day-to-day changes in temperature in southern areas, particularly in south-east coastal regions.

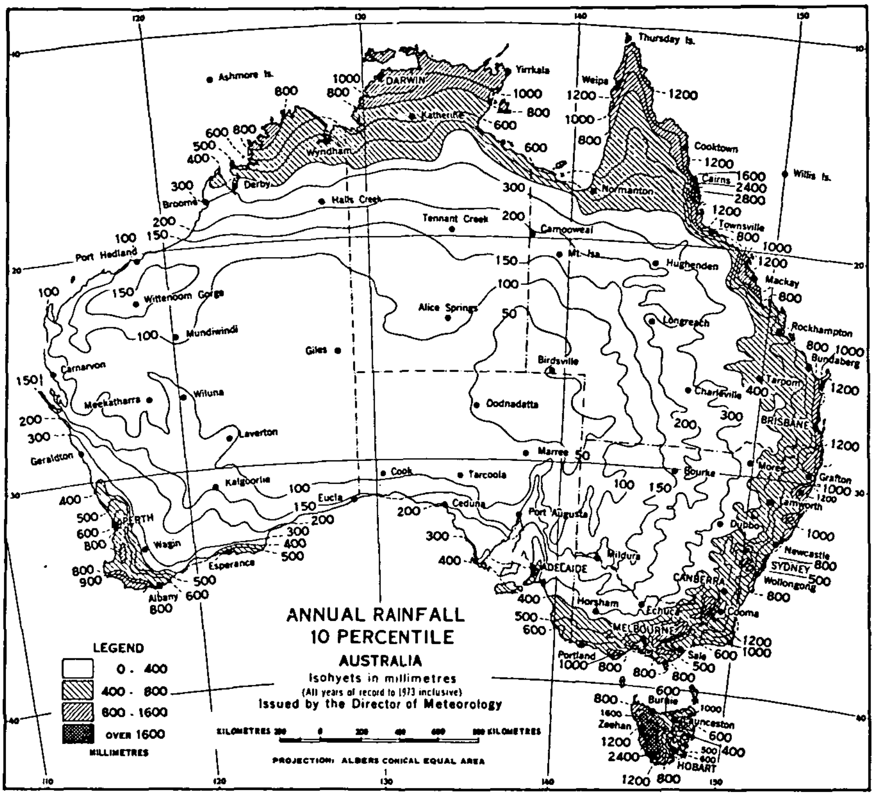
In the summer half of the year (November–April) the anticyclones travel from west to east on a more southerly track across the southern fringes of Australia directing easterly winds generally over the continent. Fine, warmer weather predominates in southern Australia with the passage of each anticyclone. Heat waves occur when there is an interruption to the eastward progression of the anticyclone (blocking) and winds back northerly and later north-westerly. Northern Australia comes under the influence of summer disturbances associated with the southward intrusion of warm moist monsoonal air from north of the inter-tropical covergence zone resulting in a hot rainy season.

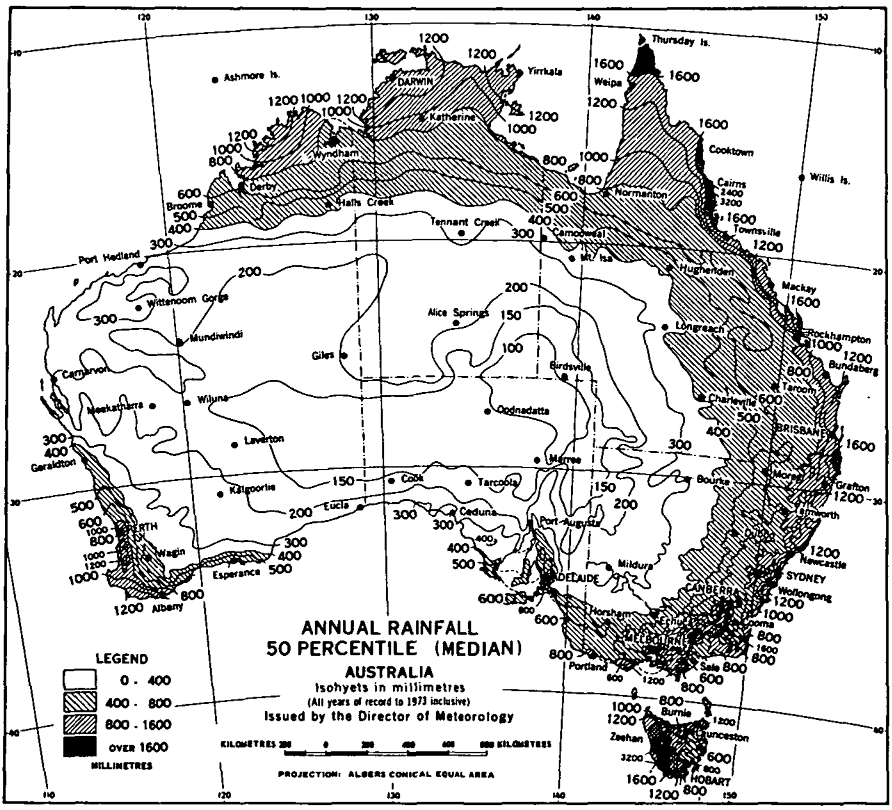
Tropical cyclones develop over the seas to the north-west and the north-east of Australia in summer between November and April. Their frequency of occurrence and the tracks they follow vary greatly from season to season. On the average, about three Coral Sea cyclones per season directly affect the Queensland coast, and about two Indian Ocean cyclones affect the north-western coast. Tropical cyclones approaching the coast usually produce very heavy rain in coastal areas. Some cyclones move inland, losing intensity but still producing widespread heavy rainfall. Individual cyclonic systems may control the weather over northern Australia for periods extending to three weeks.

Rainfall

Annual. The annual 10, 50 and 90 percentile* rainfall maps are shown on Plates 4–6 respectively. The area of lowest rainfall is east of Lake Eyre in South Australia, where the median (50 percentile) rainfall is only about 100 millimetres. Murnpeowie, with 70 years of record, has a median annual rainfall of 101 millimetres. Another very low rainfall area is in Western Australia in the Giles-Warburton Range region, which has a median annual rainfall of about 150 millimetres. A vast region extending from the west coast near Shark Bay across the interior of Western Australia and South Australia to south-west Queensland and north-west New South Wales has a median annual rainfall of less than 200 millimetres. This region is not normally exposed to moist air masses for extended periods and rainfall is irregular, averaging only one or two days per month. However, in favourable synoptic situations, which occur infrequently over extensive parts of the region, up to 400 millimetres of rain may fall within a few days and result in widespread flooding.

* The amounts that are not exceeded by 10, 50 and 90 per cent of all recordings are the 10, 50 and 90 percentiles or the first, fifth and ninth deciles respectively. The 50 percentile is usually called the median.





PLATES 4 and 5

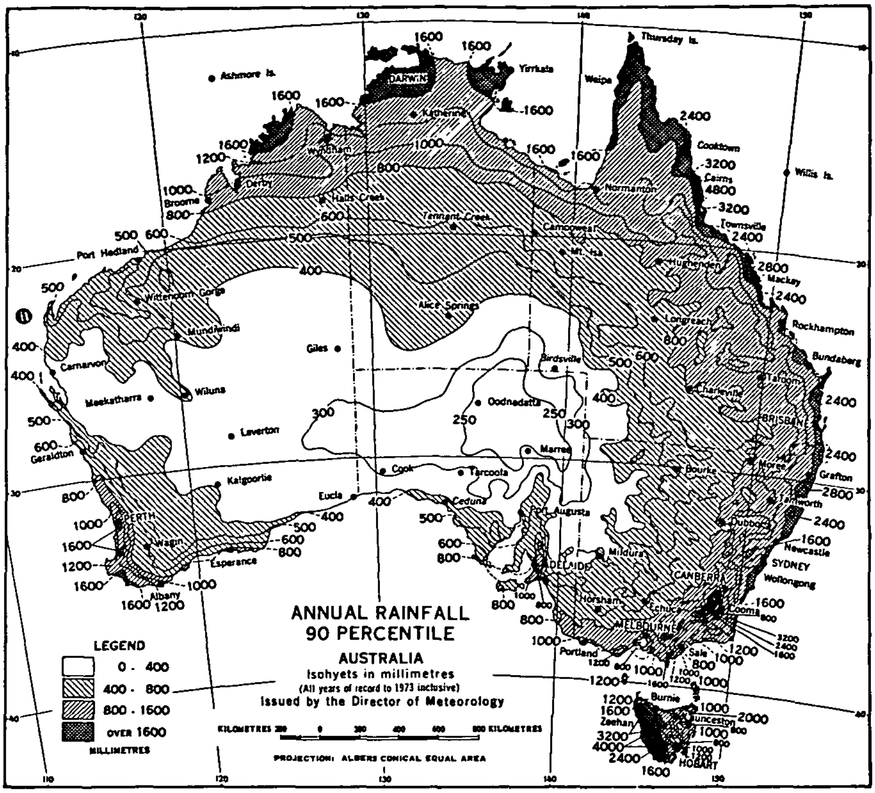


PLATE 6

The region with the highest median annual rainfall is the east coast of Queensland between Cairns and Cardwell, where Tully's median is highest (4,400 millimetres). The mountainous region of western Tasmania also has a high annual rainfall, with 3,600 millimetres at Lake Margaret. In the mountainous areas of north-east Victoria and some parts of the east coastal slopes there are small pockets with median annual rainfall greater than 2,500 millimetres, but the map scale is too small for these to be shown.

The Snowy Mountains area in New South Wales also has a particularly high rainfall. The highest median annual rainfall isohyet drawn for this region is 3,200 millimetres, and it is likely that small areas have a median annual rainfall approaching 4,000 millimetres on the western slopes above 2,000 metres elevation.

The following table shows the area distribution of the median annual rainfall derived from the map in Plate 5, page 14.

AREA DISTRIBUTION OF MEDIAN ANNUAL RAINFALL: AUSTRALIA

(Per cent)

Median annual rainfall	*W.A.*	*N.T.*	*S.A.*	*Qld*	*N.S.W.(a)*	*Vic.*	*Tas.*	*Aust.*
Under 200 mm . . .	43.5	15.5	74.2	10.2	8.0	..	..	29.6
200 to 300 mm . .	29.6	35.6	13.5	13.0	20.3	6.3	..	22.9
300 „ 400 „ . . .	10.5	9.0	6.8	12.3	19.0	19.2	..	11.2
400 „ 500 „ . . .	4.3	6.6	3.2	13.5	12.4	11.8	..	7.6
500 „ 600 „ . . .	3.1	5.8	1.8	11.6	11.3	14.1	12.2	6.6
600 „ 800 „ . . .	4.6	11.6	0.5	20.5	15.1	24.5	18.2	10.7
800 „ 1,200 „ . . .	3.7	9.6	..	12.6	11.3	17.7	25.0	7.7
Above 1,200 „ . .	0.7	6.3	..	6.3	2.6	6.4	44.6	3.7
Total . . .	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(*a*) Includes Australian Capital Territory.

Seasonal. As outlined under the heading of Climatic controls, the rainfall pattern is strongly seasonal in character with a winter rainfall regime in the south and a summer regime in the north.

The dominance of rainfall over other climatic elements in determining the growth of specific plants in Australia has led to the development of a climatic classification based on two main parameters. These parameters are median annual rainfall and seasonal rainfall incidence. Plate 7, below, is a simplified version of the seasonal rainfall zones arising from this classification (*see* Bureau of Meteorology publication *Climatic Atlas of Australia, Map Set 5, Rainfall*, 1977).

Evaporation and the concept of rainfall effectiveness are taken into account to some extent in this classification by assigning higher median annual rainfall limits to the summer zones than the corresponding uniform and winter zones. The main features of the seasonal rainfall are:

(*a*) marked wet summer and dry winter of northern Australia;
(*b*) wet summer and relatively dry winter of south-eastern Queensland and north-eastern New South Wales;
(*c*) uniform rainfall in south-eastern Australia—much of New South Wales, parts of eastern Victoria and in southern Tasmania;
(*d*) marked wet winter and dry summer of south-west Western Australia and (to a lesser extent) of much of the remainder of southern Australia directly influenced by westerly circulation;
(*e*) arid area comprising about half of the continent extending from the north-west coast of Western Australia across the interior and reaching the south coast at the head of the Great Australian Bight.

Variability. The adequate presentation of rainfall variability over an extensive geographical area is difficult. Probably the best measures are found in tables compiled for a number of individual stations in some of the Climatic Survey districts. These tables show the percentage chances of receiving specified amounts of rainfall in monthly, seasonal or annual time spans. Statistical indexes of rainfall variation based on several techniques have been used to compile maps showing main features of the variability of annual rainfall over Australia.

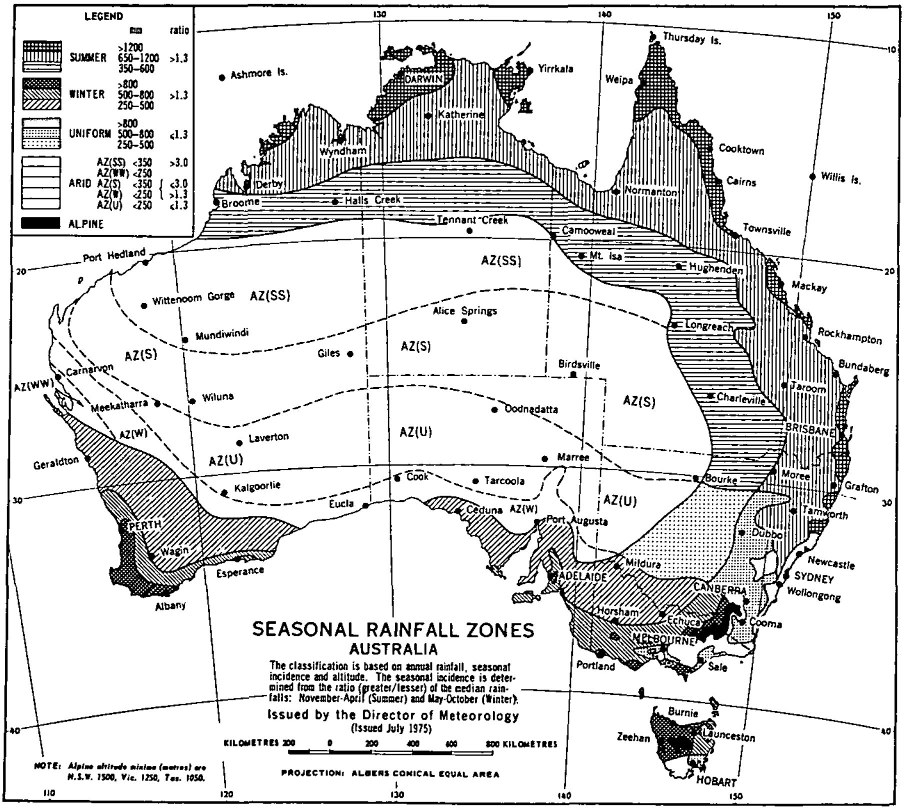


PLATE 7

One index for assessing the variability of annual rainfall is given by the ratio of the 90–10 percentile range to the 50 percentile (median value) i.e. Variability Index $= \left\{ \frac{90 - 10}{50} \right\}$ percentiles. Variability based on this relationship (Gaffney 1975) is shown in Plate 8, page 18. The region of high to extreme variability shown in Plate 8, lies mostly in the arid zone with summer rainfall incidence, AZ(S), defined on Plate 7, page 16. In the winter rainfall zones the variability is generally low to moderate as exemplified by the south-west of Western Australia. In the tropics, random cyclone visitations cause extremely great variations in rainfall from year to year: at Onslow (Western Australia), annual totals varied from 15 millimetres in 1912 to 1,085 millimetres in 1961 and, in the four consecutive years 1921 to 1924, the annual totals were 566, 69, 682 and 55 millimetres respectively. At Whim Creek (Western Australia), where 747 millimetres have been recorded in a single day, only 4 millimetres were received in the whole of 1924. Great variability can also occur in the heavy rainfall areas: at Tully (Queensland), the annual rainfalls have varied from 7,899 millimetres in 1950 to 2,489 millimetres in 1961.

Rainday frequency. The average number of days per year with rainfall of 0.2 millimetres or more is shown in Plate 9, page 18.

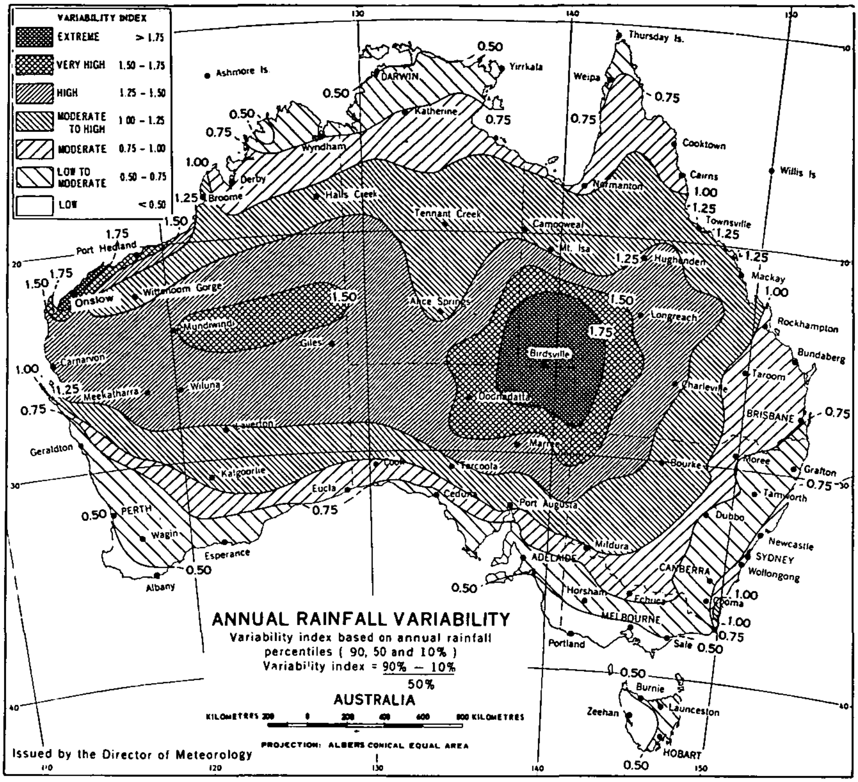
The frequency of rain-days exceed 150 per year in Tasmania (with a maximum of over 200 in western Tasmania), southern Victoria, parts of the north Queensland coast and in the extreme south-west of Western Australia. Over most of the continent the frequency is less than 50 rain-days per year. The area of low rainfall with high variability, extending from the north-west coast of Western Australia through the interior of the continent, has less than 25 rain-days per year. In the high rainfall areas of northern Australia the number of rain-days is about 80 per year, but heavier falls occur in this region than in southern regions.

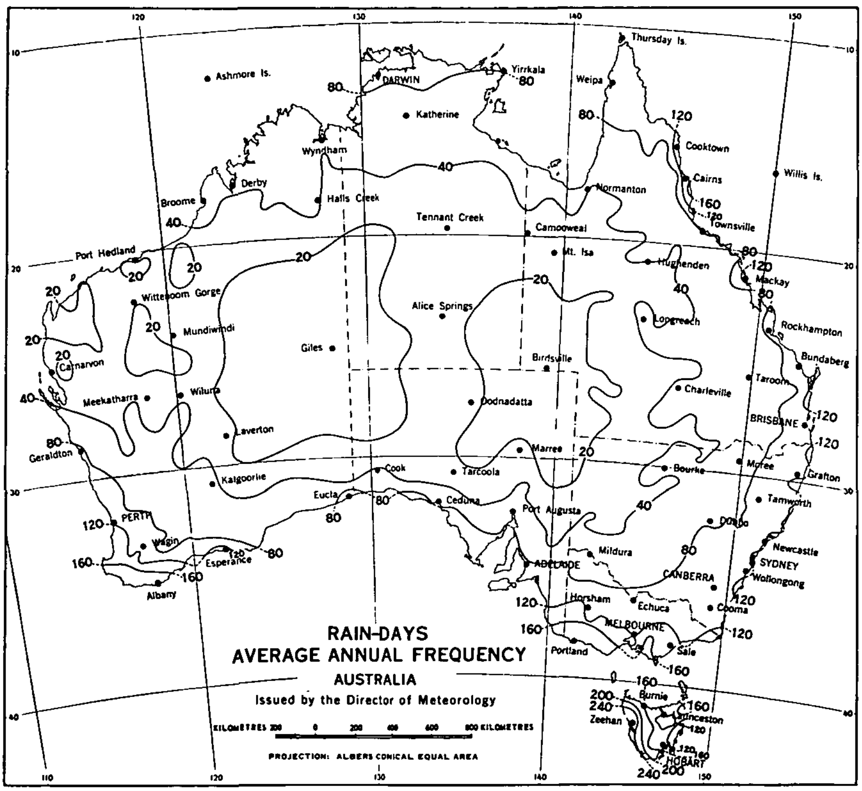
Intensity. The highest rainfall intensities for some localities are shown in the first table on page 19. These figures represent intensities over only small areas around the recording points because turbulence and exposure characteristics of the measuring gauge may vary over a distance of a few metres. The highest 24-hour (9 a.m. to 9 a.m.) falls are listed by States in the second table on page 19. Most of the very high 24-hour falls (above 700 millimetres) have occurred in the coastal strip of Queensland, where a tropical cyclone moving close to mountainous terrain provides ideal conditions for spectacular falls. The highest 24-hour fall (1,140 millimetres) occurred at Bellenden Ker (Top Station) on 4 January 1979. Bellenden Ker (Top Station) has also recorded the highest monthly rainfall in Australia (5,387 millimetres in January 1979).

The highest annual rainfalls are listed by States in the following table.

HIGHEST ANNUAL RAINFALLS
(All years to 1979 inclusive)

State	*Station*	*Year*	*Amount*
			mm
Queensland	Bellenden Ker (Top Station)	1979	11,251
New South Wales	Tallowwood Point	1950	4,540
Tasmania	Lake Margaret	1948	4,504
Victoria	Mt Buffalo Chalet	1917	3,342
Northern Territory	Elizabeth Downs	1973	2,966
Western Australia	Karnet	1964	2,601
South Australia	Aldgate State School	1917	1,851





PLATES 8 and 9

HIGHEST RAINFALL INTENSITIES IN SPECIFIED PERIODS

(millimetres)

(*Source:* Pluviograph records in Bureau of Meteorology archives.)

Station	*Period of record*	*Years of complete records*	*Period in hours* 1	3	6	12	24
			mm	mm	mm	mm	mm
Adelaide	1897-1974	74	69	133	141	141	141
Alice Springs	1951-1974	22	54	55	74	103	138
Brisbane	1911-1974	61	88	144	182	265	311
Broome	1948-1973	26	72	119	130	172	228
Canberra	1932-1970	35	51	68	71	89	139
Carnarvon	1956-1971	16	32	63	83	95	108
Charleville	1953-1974	22	42	66	75	111	142
Cloncurry	1953-1974	19	59	118	164	173	204
Darwin	1953-1973	18	88	101	109	152	191
Esperance	1963-1973	9	23	45	62	68	79
Hobart	1911-1976	63	28	56	87	117	168
Meekatharra	1953-1973	19	26	67	81	99	112
Melbourne	1878-1976	86	79	83	86	97	130
Mildura	1953-1976	22	49	60	65	65	91
Perth	1946-1974	27	32	38	47	64	93
Sydney	1913-1976	60	97	132	166	190	282
Townsville	1953-1974	20	87	145	165	168	275

HIGHEST DAILY RAINFALLS

(All years to June 1979)

State	*Station*	*Date*	*Amount*
			mm
Queensland	Bellenden Ker (Top Station)	4.1.1979	1140
	Crohamhurst	3.2.1893	907
	Finch Hatton	18.2.1958	878
	Mount Dangar	20.1.1970	869
Western Australia	Whim Creek	3.4.1898	747
	Kilto	4.12.1970	635
	Fortescue	3.5.1890	593
New South Wales	Dorrigo	21.2.1954	809
	Cordeaux River	14.2.1898	574
Northern Territory	Roper Valley	15.4.1963	545
	Groote Eylandt	28.3.1953	513
Tasmania	Cullenswood	22.3.1974	352
	Mathinna	5.4.1929	337
Victoria	Balook	18.2.1951	275
	Hazel Park	1.12.1934	267
South Australia	Stansbury	18.2.1946	222
	Stirling	17.4.1889	208

Thunderstorms and hail. A thunder-day at a given location is a calendar day on which thunder is heard at least once. Plate 10, page 20 shows isopleths (isobronts) of the average annual number of thunder-days which varies from 80 per year near Darwin to less than 10 per year over parts of the southern regions. Convectional processes during the summer wet season cause high thunderstorm incidence in northern Australia. The generally high incidence (40–60 annually) over the eastern upland areas is produced mainly by orographic uplift of moist air streams.

Hail, mostly of small size (less than 10 millimetres diameter), occurs with winter/spring cold frontal activity in southern Australia. Summer thunderstorms, particularly over the uplands of eastern Australia, sometimes produce large hail (greater than 10 millimetres diameter). Hail capable of piercing light gauge galvanised iron occurs at irregular intervals and sometimes causes widespread damage.

Snow. Generally, snow covers much of the Australian Alps above 1,500 metres for varying periods from late autumn to early spring. Similarly, in Tasmania the mountains are covered fairly frequently above 1,000 metres in these seasons. The area, depth and duration are highly variable and in the altitude range 500–1,000 metres no snow falls in some years. Snowfalls at levels below 500 metres are occasionally experienced in southern Australia, particularly in the foothill areas of Tasmania and Victoria, but falls are usually light and short-lived. In some seasons parts of the eastern uplands above

1,000 metres from Victoria to south-eastern Queensland have been covered with snow for serveral weeks. In ravines around Mt Kosciusko (2,228 metres) small areas of snow may persist through summer but there are no permanent snowfields.

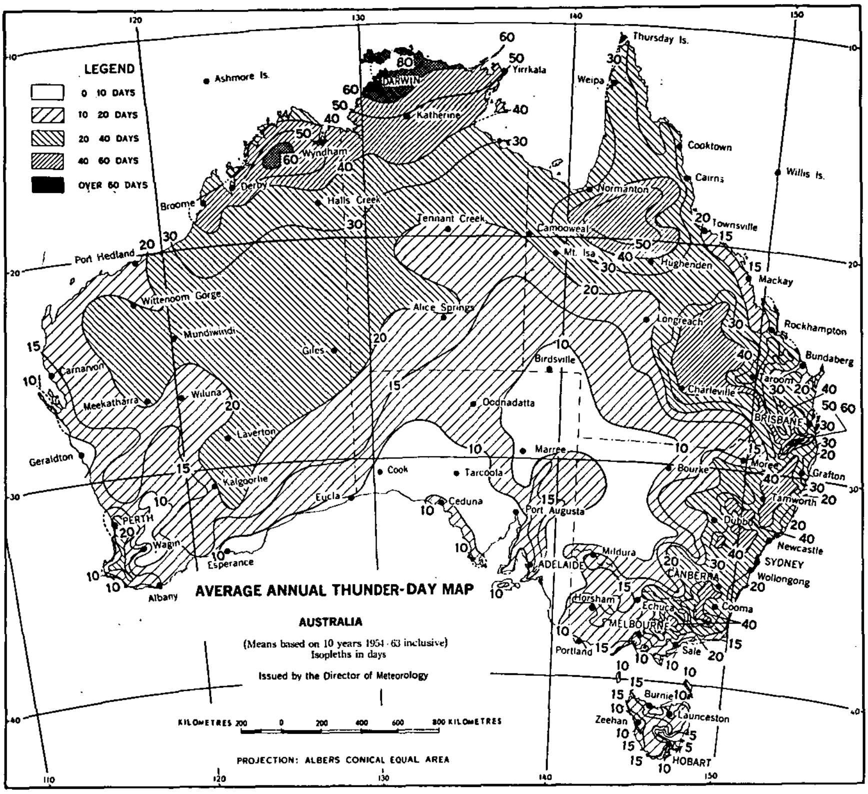


PLATE 10

Temperature

Average temperatures. Average annual air temperatures as shown in Plate 11, page 21 range from 28° C along the Kimberley coast in the extreme north of Western Australia to 4° C in the alpine areas of south-eastern Australia. Although annual temperature may be used for broad comparisons, monthly temperatures are required for detailed analyses.

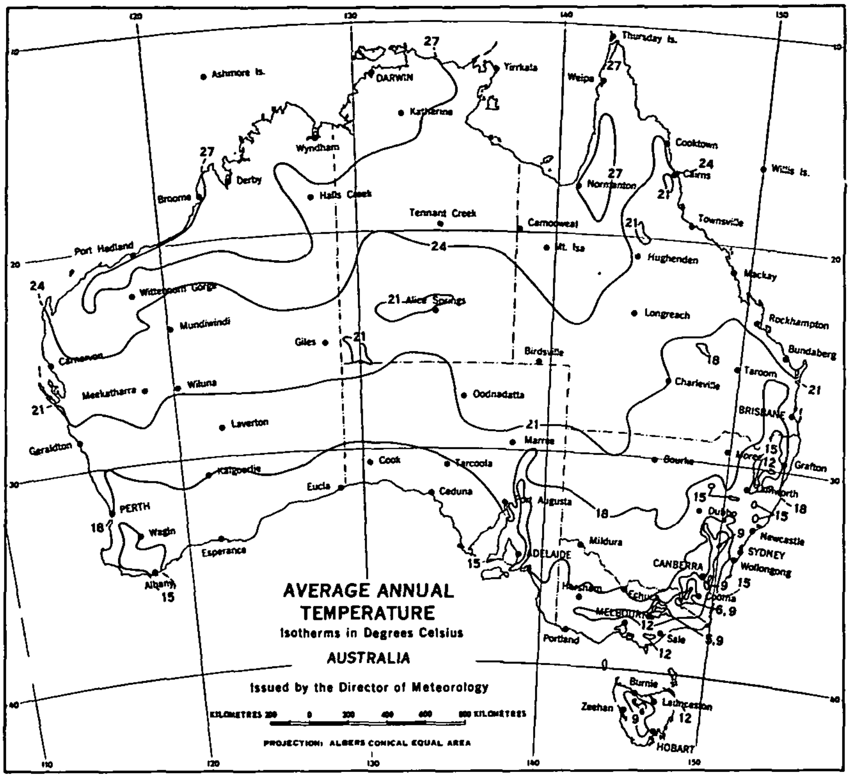
July is the month with the lowest average temperature in all parts of the continent. The months with the highest average temperature are January or February in the south and December in the north (except in the extreme north and north-west where it is November). The slightly lower temperatures of mid-summer in the north are due to the increase in cloud during the wet season.

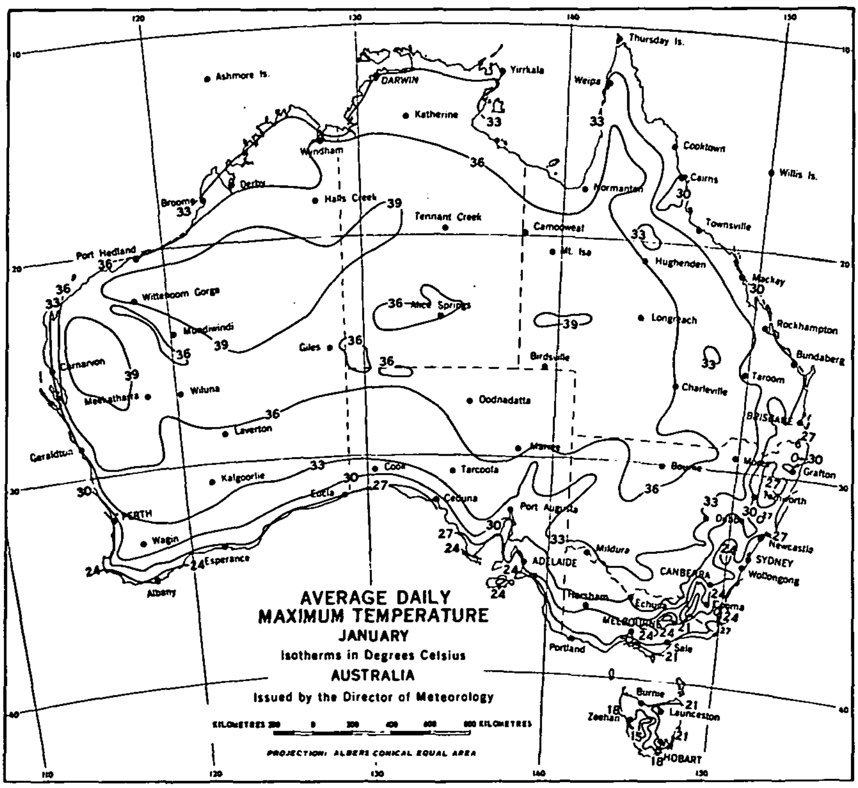
Average monthly maxima. Maps of average maximum and minimum temperatures for the months of January and July are shown in Plates 12–15 inclusive, pages 21–23.

In January, average maximum temperatures exceed 35° C over a vast area of the interior and exceed 40° C over appreciable areas of the north-west. The consistently hottest part of Australia is around Marble Bar, Western Australia (150 kilometres south-east of Port Hedland) where the average is 41° C and daily maxima during summer may exceed 40°C consecutively for several weeks at a time.

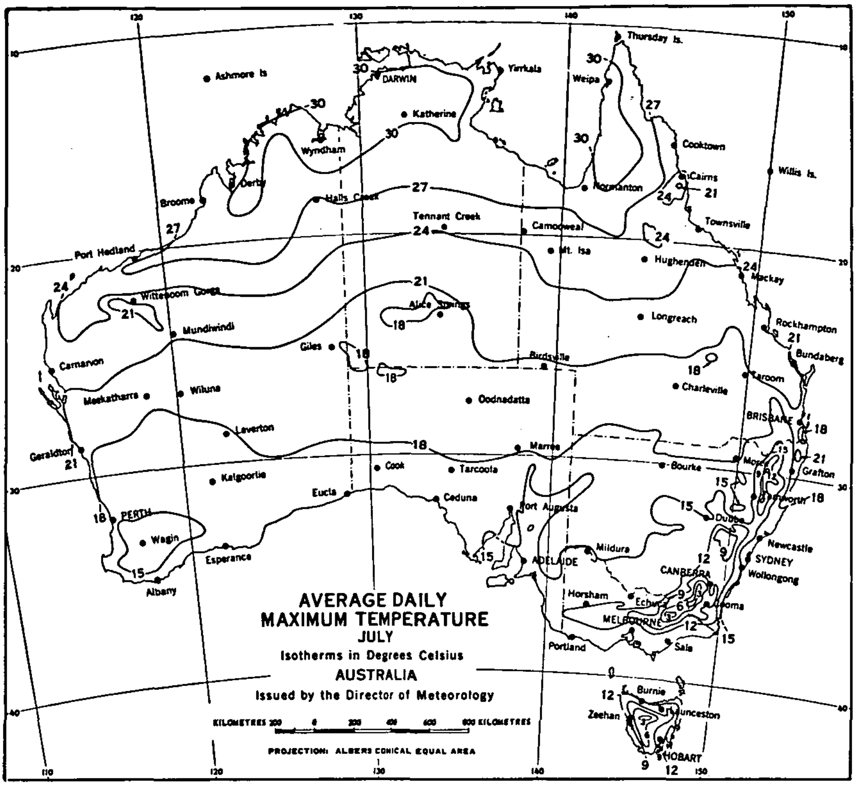
The marked gradients of isotherms of maximum temperature in summer in coastal areas, particularly along the south and west coasts, are due to the penetration inland of fresh sea breezes initiated by the sharp temperature discontinuities between the land and sea surfaces. There are also gradients of a complex nature in south-east coastal areas caused primarily by the uplands.

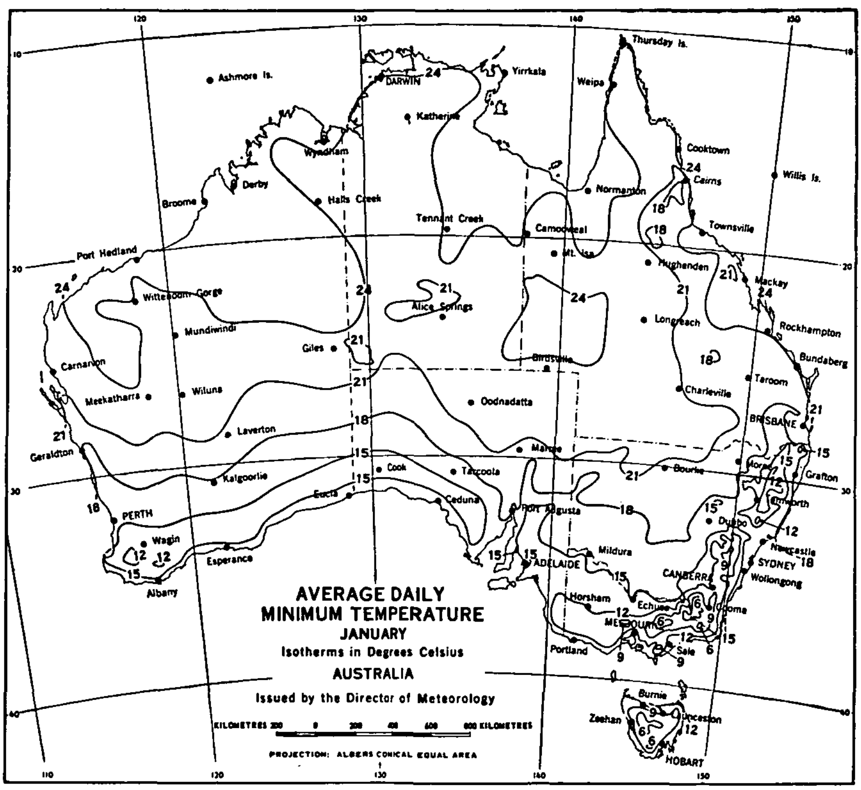
In July a more regular latitudinal distribution of average maxima is evident. Maxima range from 30°C near the north coast to 5° C in the alpine areas of the south-east.





PLATES 11 and 12





PLATES 13 and 14

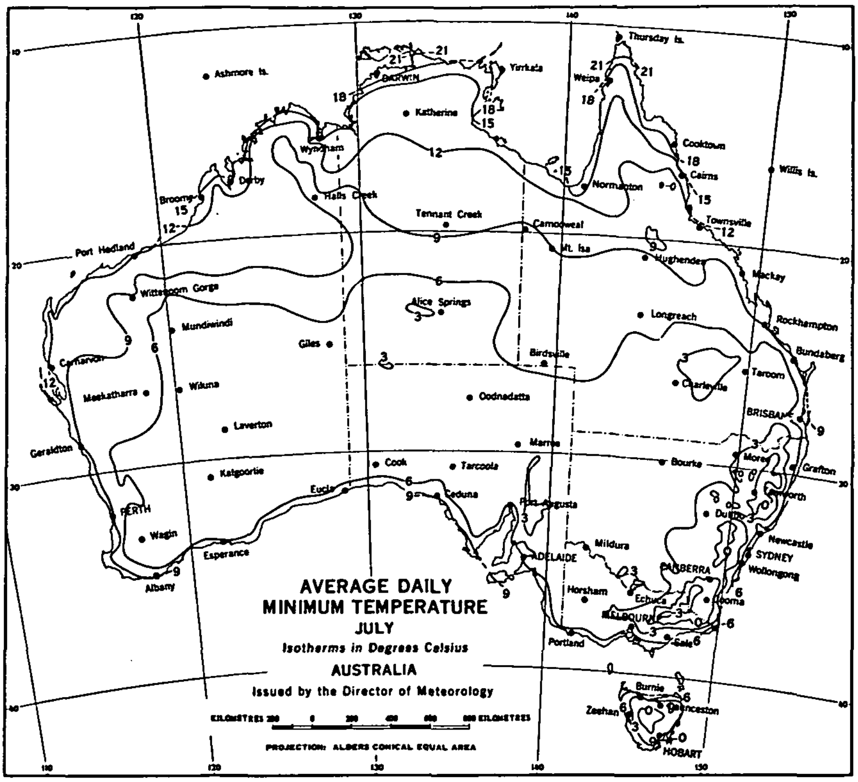


PLATE 15

Extreme maxima. Temperatures have exceeded 45°C at nearly all inland stations more than 150 kilometres from the coast and at many places on the north-west and south coasts. Temperatures have exceeded 50°C at some inland stations and at a few near the coast. It is noteworthy that Eucla on the south coast has recorded 50.7°C, the highest temperature in Western Australia. This is due to the long trajectory over land of hot north-west winds from the Marble Bar area. Although the highest temperature recorded in Australia was 53.1°C at Cloncurry (Queensland), more stations have exceeded 50°C in western New South Wales than in other areas due to the long land trajectory of hot winds from the north-west interior of the continent.

Extreme maximum temperatures recorded at selected stations, including the highest recorded in each State, are shown in the table below.

EXTREME MAXIMUM TEMPERATURES

(All years to June 1979)

Station	*°C*	*Station*	*°C*
Western Australia—		New South Wales—	
Eucla	50.7	Bourke	52.8
Mundrabilla	49.8	White Cliffs	51.1
Forrest	49.8	Walgett	50.1
Madara	49.4	Wilcannia	50.0
Northern Territory—		Menindee	49.7
Charlotte Waters (near Finke)	48.2	Australian Capital Territory—	
Woologarang	47.5	Canberra	42.2
Jervois	47.5	Victoria—	
South Australia—		Mildura	50.8
Oodnadatta	50.7	Tasmania—	
Kyancutta	49.3	Bushby Park	40.8
Queensland—		Hobart	40.8
Cloncurry	53.1		
Winton	50.7		
Birdsville	50.0		

Extreme minima. The lowest temperatures in Australia have been recorded in the Snowy Mountains, where Charlotte Pass (elevation 1,760 metres) has recorded -22.2°C. Temperatures have fallen below -5°C at most inland places south of the tropics and at some places within a few kilometres of southern coasts. At Eyre, on the south coast of Western Australia, a minimum of -3.9°C has been recorded, and at Swansea, on the east coast of Tasmania, the temperature has fallen as low as -4.4°C.

In the tropics, extreme minima below 0°C have been recorded at many places away from the coasts as far north as Herberton, Queensland (-3.3°C). Even very close to the tropical coastline temperatures have fallen to 0°C, a low recording being -0.8°C for Mackay.

The next table shows extreme minimum temperatures recorded at specified stations, including the lowest recorded in each State.

EXTREME MINIMUM TEMPERATURES

(All years to June 1979)

Station	*°C*	Station	°C
Western Australia—		New South Wales—	
Dwellingup	-7.0	Charlotte Pass	-22.2
Booylgoo	-6.7	Kiandra	-20.6
Wandering	-5.7	Kosciusko Hotel	-14.4
Northern Territory—		Cooma	-11.2
Alice Springs	-7.5	Australian Capital Territory—	
Tempe Downs	-6.9	Canberra	-10.0
South Australia—		Victoria—	
Yongala	-8.2	Mount Hotham	-12.8
Kyancutta	-7.0	Omeo	-11.7
Queensland—		Bairnsdale	-7.2
Stanthorpe	-11.0	Tasmania—	
Mitchell	-9.4	Oatlands	-12.8
Nanango	-9.3	Bothwell	-12.5

Heat waves. Periods with a number of successive days having a temperature higher than 40°C are relatively common in summer over parts of Australia. With the exception of the north-west coast of Western Australia, however, most coastal areas rarely experience more than three successive days of such conditions. The frequency increases inland, and periods of up to ten successive days have been recorded at many inland stations. This figure increases in western Queensland and north-western Western Australia to more than twenty days in places. The central part of the Northern Territory and the Marble Bar-Nullagine area of Western Australia have recorded the most prolonged heat waves.

Heat waves are experienced in the coastal areas from time to time. During 11-14 January 1939, for example, a severe heat wave affected south-eastern Australia: Adelaide had a record of 47.6°C on the 12th, Melbourne a record of 45.6°C on the 13th and Sydney a record of 45.3°C on the 14th.

Frost.

For details *see* Year Book No. 63.

Humidity

Australia is a dry continent in terms of the water vapour content or humidity of the air and this element may be compared with evaporation to which it is related (*see* page 28). Humidity is measured at Bureau of Meteorology observational stations by a pair of dry and wet bulb thermometers mounted in a standard instrument screen. These measurements enable moisture content to be expressed by a number of parameters, two of which are vapour pressure and relative humidity.

Vapour pressure is an actual quantitative measure whereas relative humidity is a ratio (expressed as a percentage). Both of these are included here showing their respective applications but more detailed treatment is given to relative humidity because of its wider usage.

Vapour pressure. Vapour pressure is defined as the pressure exerted by the water vapour in the air; and it is a measure of the actual amount of water vapour present. The amount of water vapour does not normally vary greatly during the day, although afternoon sea breezes at coastal stations may bring in moisture to increase the vapour pressure temporarily by amounts up to 5 millibars. The 9 a.m. vapour pressure may be taken to approximate the mean value for the day.

The table on page 28 contains average 9 a.m. vapour pressures for selected stations. The annual averages range from 9.5 millibars at Hobart to 27.9 millibars at Thursday Island. At the high level station Kiandra (1,400 metres) the annual average is 7.9 millibars. Excluding Kiandra, monthly averages range from 6.7 millibars at inland stations in winter months to 30.9 millibars at Broome in February.

Vapour pressure together with corresponding air temperature have been used to measure climatic discomfort affecting human beings. Comfortable conditions are generally accepted as being within the vapour pressure range 7–17 millibars with respective air temperatures in the range 15–30°C. Above these limits heat discomfort increases and below them cold discomfort increases. The wet bulb temperature may also be used as a simple measure of heat discomfort when this temperature rises above 20°C.

Relative humidity. Relative humidity at a given temperature is the ratio (expressed as a percentage) of actual vapour pressure to the saturated vapour pressure at that temperature. As a single measure of human discomfort relative humidity is of limited value because it must be related to the temperature at the time.

Since the temperature at 9 a.m. approximates the mean temperature for the day (24 hours), the relative humidity at 9 a.m. may be taken as an estimate of the mean relative humidity for the day. Relative humidity at 3 p.m. occurs around the warmest part of the day on the average and is representative of the lowest daily values. Relative humidity on the average is at a maximum in the early morning when air temperature is minimal.

Relative humidity isopleths for January and July at 9 a.m. and 3 p.m. are shown in Plates 16–19 on pages 26–27, extracted from the *Climatic Atlas of Australia, Map Set 6 Relative Humidity* (1978).

The main features of the relative humidity pattern are:

(a) over the interior of the continent there is a marked dryness during most of the year, notably towards the northern coasts in the dry season (May–October);

(b) the coastal fringes are comparatively moist, although this is less evident along the northwest coast of Western Australia where continental effects are marked;

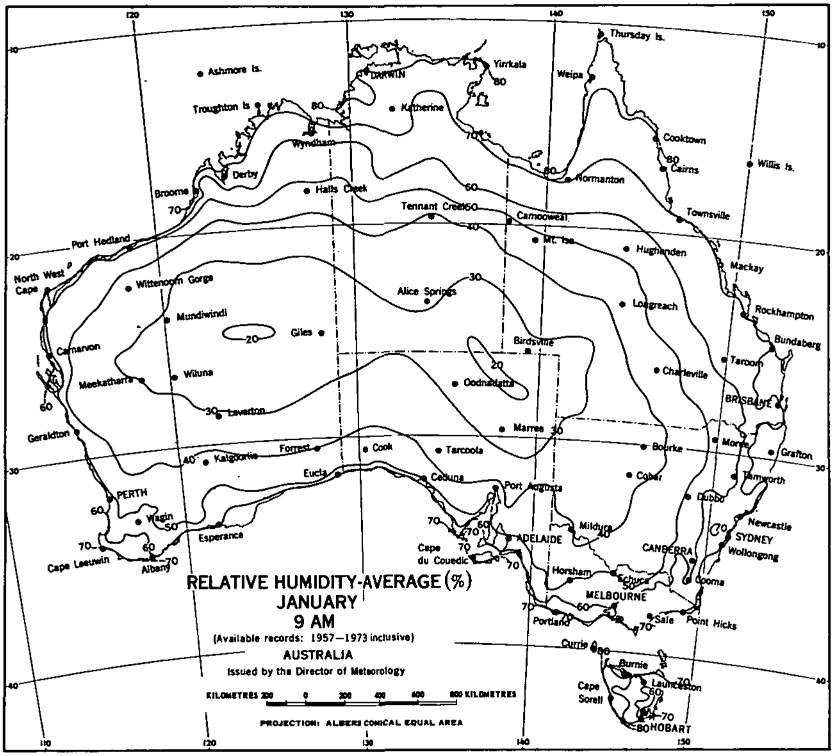
(c) in northern Australia the highest values occur during the summer wet season (December–February) and the lowest during the winter dry season (June–August);

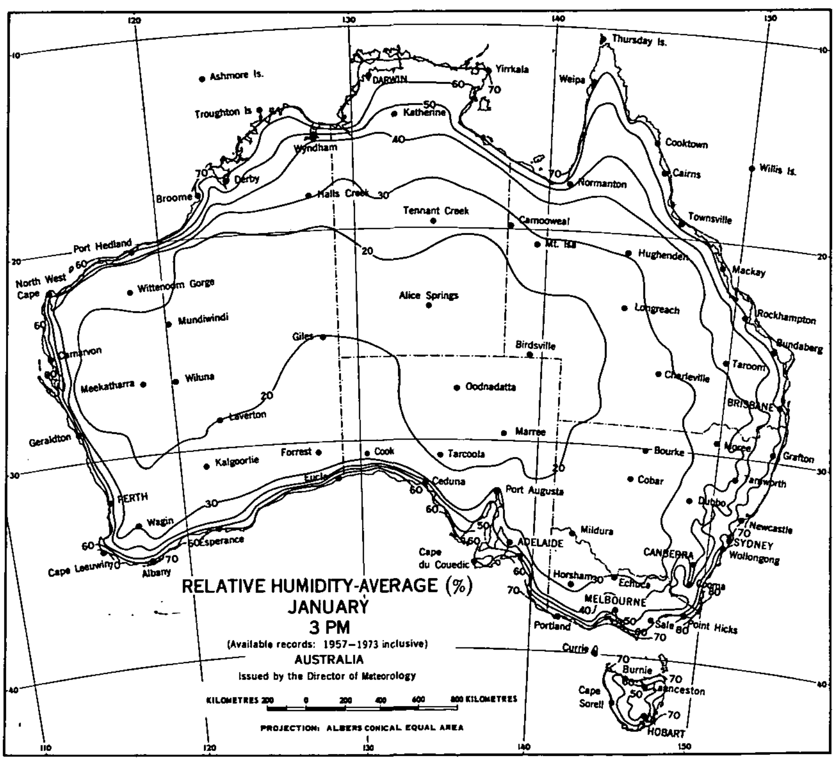
(d) in most of southern Australia the highest values are experienced in the winter rainy season (June–August) and the lowest in summer (December–February).

The table on page 28 contains average relative humidity at 9 a.m. for the year and for each month. Average annual figures on the table range from 34 per cent at Mundiwindi and Marble Bar to 79 per cent at Thursday Island illustrating the range of average relative humidity over Australia. Adelaide has the lowest value for a capital city with an annual average of 60 per cent, compared with Melbourne 69 per cent and Darwin 73 per cent.

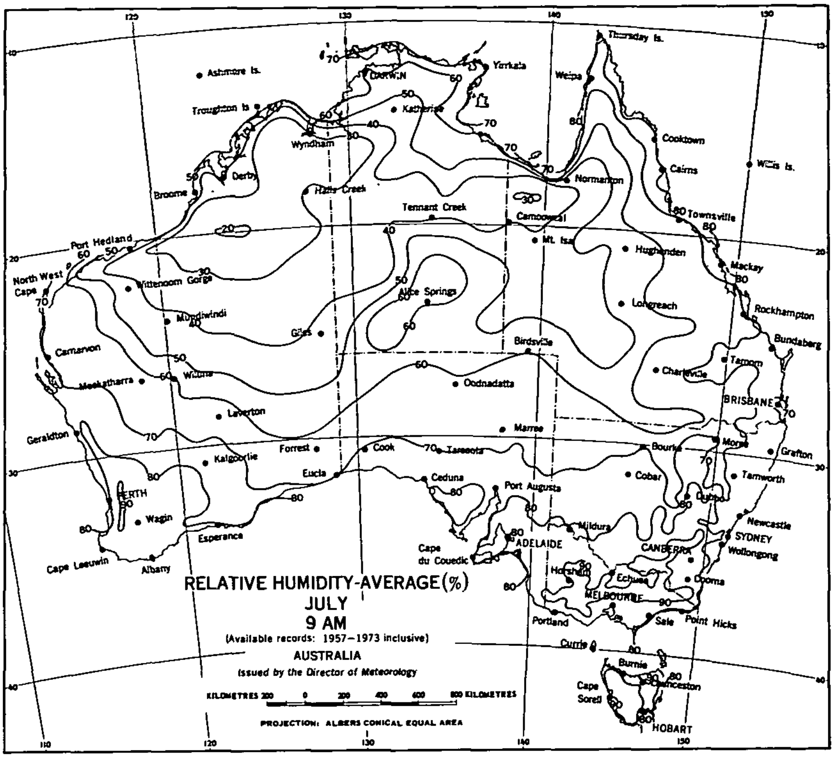
Monthly averages shown in the table range from 23 per cent at Mundiwindi in November to 89 per cent at Katanning in June and July. At Alice Springs monthly averages vary from 30 per cent in November to 66 per cent in the winter month of June when low temperatures have the effect of raising relative humidity over the interior. Broome varies from 46 per cent in August to 73 per cent in February, which is a marked seasonal change for a coastal station.

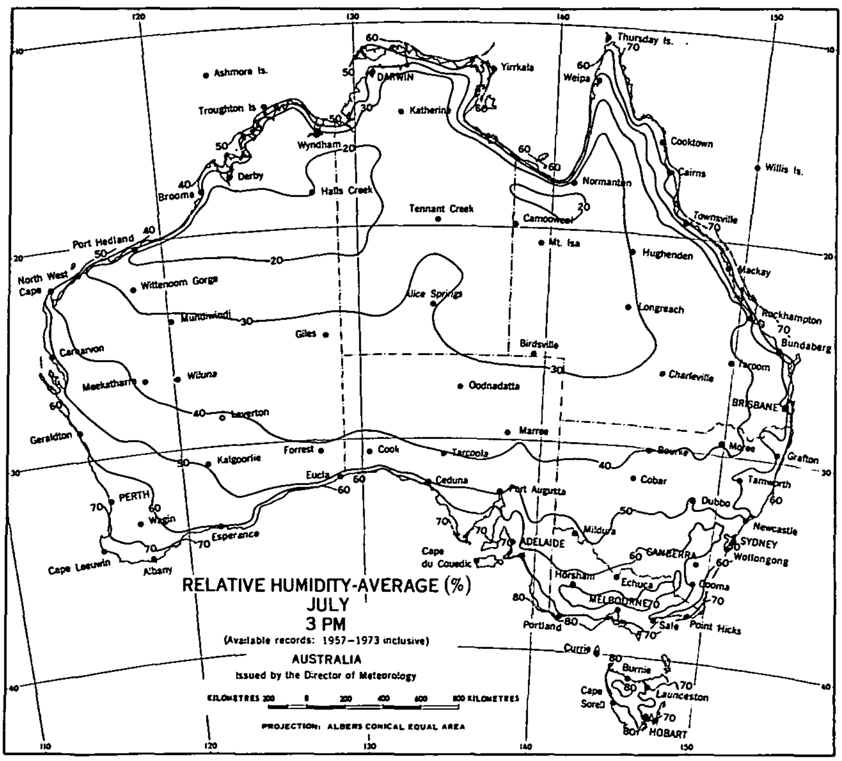
The pattern of variation of relative humidity differs from that of vapour pressure particularly in southern Australia. This is due to the difference in variation of the two parameters with temperature. If the amount of moisture in the air remains constant, vapour pressure decreases slightly with falling temperatures, whereas relative humidity increases. Perth for example has an average 9 a.m. vapour pressure of 14.7 millibars in January and 11.0 in August; and the respective average relative humidity figures (51 and 74 per cent respectively) show a reverse change.





PLATES 16 and 17





PLATES 18 and 19

AVERAGE VAPOUR PRESSURE AT 9 A.M.

(millibars)

NOTE. The averages in this and the next table may differ from previously published averages derived from average monthly and annual dry and wet bulb temperatures respectively. This is mainly due to the nature of psychometric formulae and also to differences in the period of record.

Station	*Period of record*	*Jan.*	*Feb.*	*Mar.*	*Apr.*	*May*	*June*	*July*	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*	*Year*
Adelaide	1955–78	13.1	13.6	12.9	11.7	10.9	9.9	9.6	9.6	9.8	10.4	10.9	11.9	11.2
Alice Springs . .	1940–78	12.8	13.7	11.7	9.9	8.8	7.9	7.0	6.7	7.0	8.5	9.5	11.0	9.6
Armidale . . .	1957–78	15.6	15.8	14.4	11.8	9.2	7.8	6.7	7.5	8.6	10.5	11.9	13.7	11.1
Brisbane	1951–78	21.7	22.2	21.3	18.1	14.1	11.9	10.7	11.1	13.1	15.5	17.7	19.8	16.4
Broome	1939–78	30.2	30.9	29.6	22.6	16.2	13.5	12.5	13.1	16.6	21.2	25.3	28.7	21.7
Canberra . . .	1939–78	13.5	14.2	13.1	10.6	8.6	7.3	6.7	7.2	8.4	10.0	10.9	12.1	10.2
Carnarvon . . .	1945–78	20.9	21.9	20.0	17.0	14.2	13.6	12.5	12.2	12.4	13.4	15.7	18.3	16.0
Ceduna	1939–78	14.0	14.5	13.8	12.4	11.2	9.9	9.4	9.8	10.4	10.8	11.6	12.9	11.7
Charleville . . .	1942–78	17.3	18.4	16.4	12.9	10.7	9.5	8.3	8.3	9.1	11.1	12.0	14.7	12.4
Cloncurry . . .	1939–75	21.2	22.8	18.7	13.8	11.0	9.4	8.0	7.7	8.6	11.2	13.2	17.3	13.6
Darwin	1941–78	30.4	30.5	30.2	26.8	21.5	17.8	17.4	20.1	24.4	27.2	28.9	29.9	25.4
Esperance . . .	1957–69	16.1	16.9	15.8	14.7	12.8	12.1	11.1	11.0	11.8	12.6	13.5	14.8	13.6
Halls Creek . . .	1944–78	21.7	22.2	18.6	13.0	10.8	8.8	7.5	7.4	8.4	11.5	14.4	18.7	13.5
Hobart	1944–78	11.3	11.6	11.2	10.0	9.0	8.1	7.7	7.7	8.2	9.0	9.6	10.7	9.5
Kalgoorlie . . .	1939–78	13.6	14.3	13.7	12.3	10.9	9.9	9.1	9.1	9.2	10.0	11.1	12.3	11.3
Katanning . . .	1957–78	13.6	14.4	13.6	12.9	11.5	10.6	9.7	10.0	10.4	10.9	11.2	12.2	11.7
Kiandra	1957–74	11.6	11.1	10.5	7.9	6.2	5.6	5.0	5.3	5.7	7.3	8.3	10.3	7.9
Marble Bar . . .	1957–78	22.1	21.8	19.0	13.3	10.3	10.0	8.5	8.1	8.2	10.0	11.7	17.2	13.3
Melbourne . . .	1955–78	13.7	14.7	13.8	11.9	10.5	9.5	8.8	9.0	9.7	10.6	11.4	12.4	11.3
Mildura	1946–78	13.5	14.3	13.4	11.8	10.6	9.3	8.7	9.1	9.8	10.7	11.2	12.1	11.2
Mundiwindi . .	1957–78	14.0	14.8	13.0	11.0	9.0	8.8	7.7	7.2	6.8	8.0	8.9	11.1	10.0
Perth	1942–78	14.7	15.2	14.7	13.6	12.4	11.9	11.1	11.0	11.4	11.2	12.4	13.6	12.8
Sydney	1955–78	19.1	20.0	18.8	15.1	11.8	10.5	9.0	9.6	11.0	13.1	14.9	17.2	14.2
Thursday Island .	1950–78	30.5	30.7	30.6	29.5	28.3	26.1	24.7	24.7	25.1	26.6	28.3	29.9	27.9
Townsville . . .	1939–78	27.2	27.7	26.3	22.4	18.8	15.6	15.2	15.9	17.7	20.7	23.5	25.5	21.4

AVERAGE RELATIVE HUMIDITY AT 9 A.M.

(per cent)

Station	*Period of record*	*Jan.*	*Feb.*	*Mar.*	*Apr.*	*May*	*June*	*July*	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*	*Year*
Adelaide	1955–78	49	51	54	59	69	73	75	71	63	56	53	51	60
Alice Springs . .	1940–78	36	41	42	46	57	66	61	50	36	33	30	31	44
Armidale . . .	1957–78	67	71	72	73	78	80	75	72	64	59	58	59	69
Brisbane	1951–78	67	68	70	69	68	69	66	62	60	59	58	60	64
Broome	1939–78	70	73	69	55	51	50	49	46	48	54	58	64	57
Canberra . . .	1939–78	60	65	68	74	81	84	84	78	72	65	60	56	70
Carnarvon . . .	1945–78	60	60	58	57	60	70	70	63	54	52	55	58	59
Ceduna	1939–78	55	59	62	68	77	82	81	77	66	56	54	54	65
Charleville . . .	1942–78	49	54	54	54	63	71	66	56	45	41	37	41	52
Cloncurry . . .	1939–75	53	61	53	45	47	50	45	37	31	30	32	41	43
Darwin	1941–78	82	84	83	76	67	63	64	68	71	70	73	77	73
Esperance . . .	1957–69	62	67	66	71	76	81	82	76	71	65	62	62	70
Halls Creek . . .	1944–78	51	55	44	33	36	35	31	25	22	25	30	40	35
Hobart	1944–78	58	62	65	69	75	78	78	73	65	62	60	55	67
Kalgoorlie . . .	1939–78	48	54	56	62	70	76	75	68	56	50	46	45	58
Katanning . . .	1957–78	59	65	69	77	85	89	89	87	82	70	60	57	74
Kiandra	1957–74	67	68	73	75	83	86	86	85	72	67	63	65	74
Melbourne . . .	1955–78	61	65	67	71	77	81	80	75	69	64	62	61	69
Marble Bar . . .	1957–78	47	48	41	33	35	41	37	30	24	24	24	34	34
Mildura	1946–78	50	56	61	70	82	88	86	79	68	59	53	49	66
Mundiwindi . .	1957–78	32	37	35	37	41	50	47	39	28	25	23	25	34
Perth	1942–78	51	53	57	65	72	78	78	74	68	50	54	51	63
Sydney	1955–78	68	71	72	70	70	73	68	66	63	61	62	65	67
Thursday Island .	1950–78	83	85	85	82	81	80	79	78	75	73	73	77	79
Townsville . . .	1939–78	73	76	74	69	67	66	66	63	60	61	64	66	67

Sunshine, cloud and fog

For details *see* Year Book No. 62.

Global radiation

For details *see* Year Book No. 63.

Evaporation

Evaporation is defined as the emission of water vapour by a free surface of water at a temperature below boiling point. Potential evaporation is the quantity of water vapour emitted by a free surface of pure water, per unit surface area and unit time, in the existing conditions. In climatology potential evaporation is normally referred to simply as evaporation.

Evaporation from a free water surface depends on a number of climatic elements, mainly temperture, humidity and wind. Evaporation data are useful in water conservation studies and in estimating potential evapotranspiration for irrigation and plant growth studies. In Australia, where surface water storage is vital over large areas, evaporation is a highly significant element.

The Australian Bureau of Meteorology measured evaporation prior to about 1966 by means of the sunken tank type of evaporimeter (Hounam 1961). Analyses based on these tank evaporation measurements are given in the Review of Australia's Water Resources: Monthly Rainfall and Evaporation (1968).

Evaporation measurements. In 1966, the Class-A Pan became the standard equipment used by the Bureau of Meteorology for measuring evaporation from a free water surface. The Class-A Pan network had been steadily increased to about 330 stations throughout Australia by 1979.

Screens to prevent the consumption of water by birds have been progressively fitted to instruments in the network since 1967 and by 1979 nearly all of them had been so fitted. Experiments have shown that measurements taken with an instrument after installation of a screen need to be increased on the average by 7 per cent to compensate for consequential reduction in evaporation. Corrections have been applied to station records as from the date of installation of a screen.

Class-A Pan data for the period January 1967 to May 1974 inclusive have been examined. Analyses have been prepared showing the distribution of average pan evaporation over Australia during this period (*see Climatic Atlas of Australia, Map Set 3, Evaporation*). Generally, instruments located near such water expanses as rivers, reservoirs or irrigation systems record lower evaporation due to the influence of water on local climatic elements, notably humidity (Hoy and Stephens 1975).

Average annual evaporation. The average annual Class-A Pan evaporation (mm) over Australia is shown in Plates 20–21, pages 30–31.

Annual pan evaporation over Australia is high, ranging from 4500 mm in the Great Sandy Desert region of Western Australia to 1200 mm in the alpine areas of south-eastern Australia, and 900 mm in south-west Tasmania. About 75 per cent of the continent has annual evaporation exceeding 2,500 mm. In central and north-west parts of the continent the annual evaporation is twenty times the annual rainfall. Evaporation on the arid north-west coast of Western Australia in the vicinity of Port Hedland (3600 mm) is comparable with upland areas of central Australia around Alice Springs.

Australian evaporation figures are high in comparison to those of North America. In the United States, for instance, the average pan evaporation varies from 3600 mm in the dry south-west (Arizona) to 600 mm in the extreme north-east and north-west, where conditions are relatively humid (Baldwin 1973).

In arid areas of Asia and the Middle East available pan evaporation measurements indicate that average annual values may be up to 20 per cent higher than in Australia. For example, average annual pan evaporation measured at Karga (Egypt) for the period 1964–1971 was 5300 mm (Egyptian Meteorological Authority).

Average evaporation in mid-seasonal months. Average pan evaporation analyses for the mid-seasonal months January and July are shown in Plates 20–21, pages 30–31.

In January, evaporation averages over most of the continent are the highest for any month and the extremely high figures of about 600 mm (19 mm daily) in the Gibson and Simpson Deserts are notable. It is estimated that January figures for individual months may reach as high as 700 mm in these desert regions.

In July, relatively high figures maintained in the north ($>$200 mm) contrast with low figures in the south ($<$100 mm). In higher mountain areas of south-eastern Australia evaporation in this month is as low as 20 mm.

Evaporation in relation to water studies. Class-A Pan evaporation measurements exceed the previous sunken tank measurements by amounts up to 60 per cent in the dry high radiation areas of the northwest interior of the continent (*Climatic Atlas, Map Set 3*).

The increase in pan evaporation in relation to sunken tank measurements is significant in such studies as water conservation, effective rainfall and drought. Earlier studies incorporating tank evaporation may need review in relation to the higher Class-A Pan figures.

In southern Australia the marked seasonal variation in evaporation is significant in agriculture and pastoral drought appraisal. Drought existing in spring, for instance, intensifies rapidly as evaporation increases during summer before relief rains arrive.

In northern Australia evaporation reaches a maximum about November and a high level of evaporation is maintained if summer rains are delayed or are deficient. In this type of situation pastoral conditions may deteriorate rapidly.

As more Class-A Pan data become available in Australia improved evaporation analyses will enable more detailed water studies to be made.

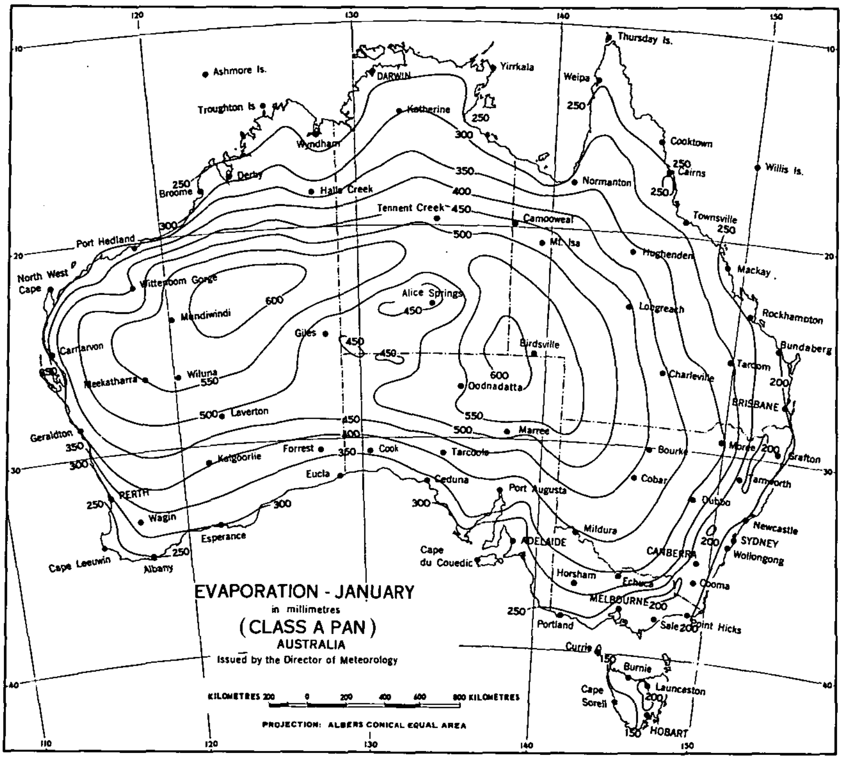


PLATE 20

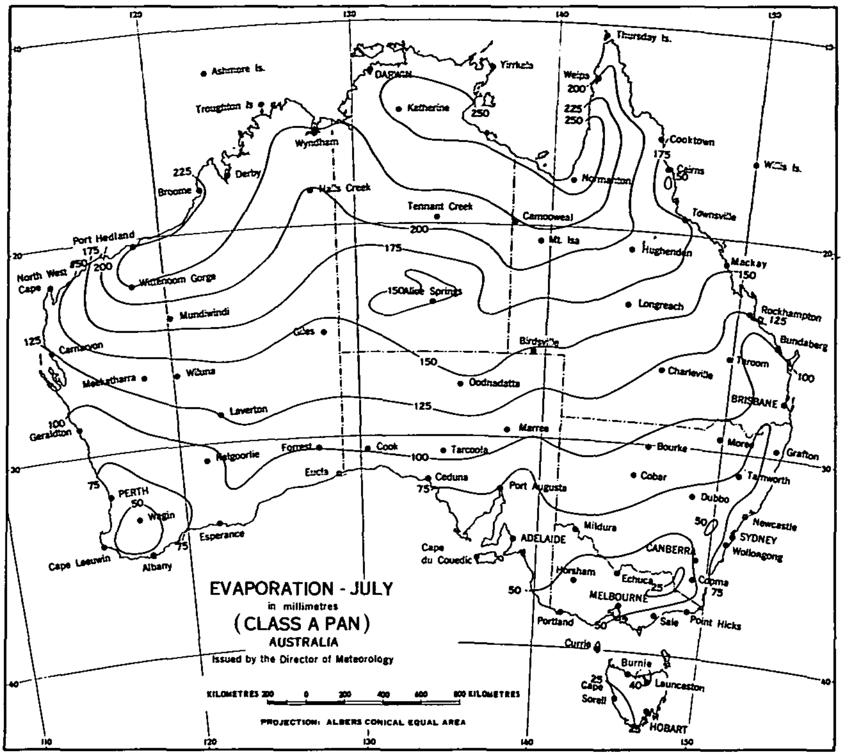


PLATE 21

Winds

The mid-latitude anticyclones are the chief determinants of Australia's two main prevailing wind streams. In relation to the west-east axes of the anticyclones these streams are easterly to the north and westerly to the south. The cycles of development, motion and decay of low pressure systems to the north and south of the anticyclones result in diversity of wind flow patterns. Wind variations are greatest around the coasts where diurnal land and sea breeze effects are important.

Wind roses for the months of January and July at 9 a.m. and 3 p.m. at selected stations are shown in Plates 22–25 inclusive, pages 32–33, extracted from *Climatic Atlas of Australia, Map Set 8* (1979). The wind roses show the percentage frequency of direction (eight points of compass) and speed ranges of winds.

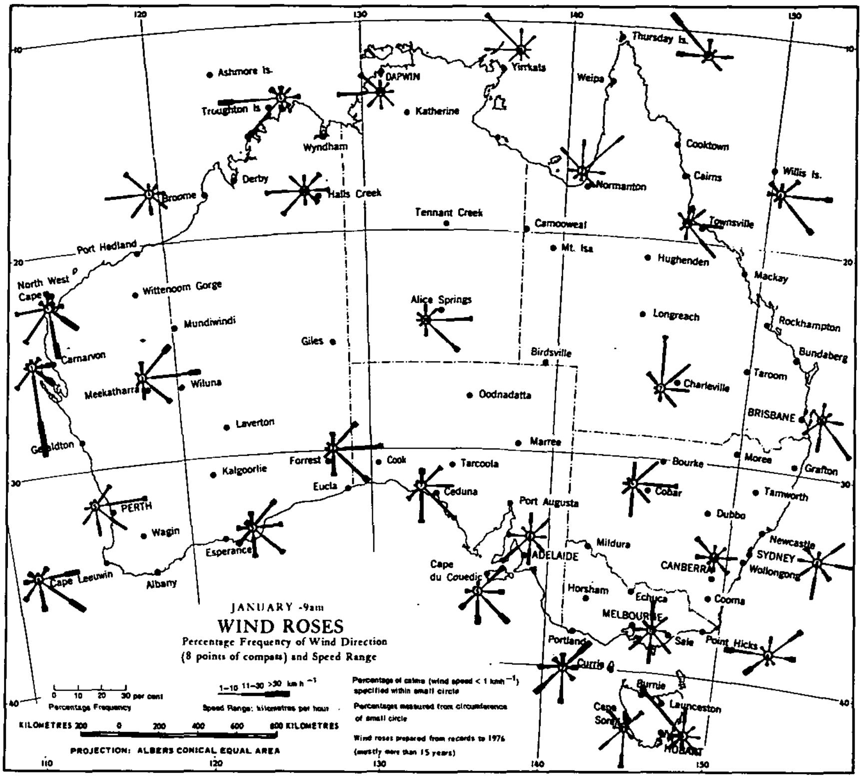
Orography affects the prevailing wind pattern in various ways such as the channelling of winds through valleys, deflection by mountains and cold air drainage from highland areas. An example of this channelling is the high frequency of north-west winds at Hobart caused by the north-west south-east orientation of the Derwent River Valley.

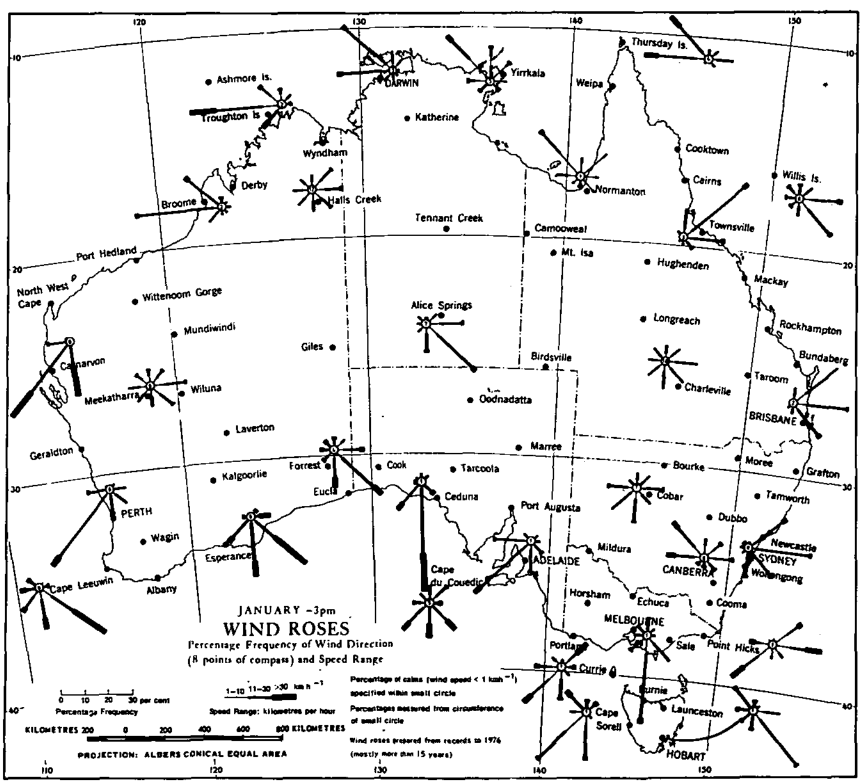
Average wind speeds and prevailing directions at Australian capitals are included in the climatic tables on pages 36–43. Perth is the windiest capital with an average wind speed of 15.6 kilometres per hour; Canberra is the least windy with an average speed of 5.8 kilometres per hour.

The highest wind speeds and wind gusts recorded in Australia have been associated with tropical cyclones. The highest recorded gust was 246 kilometres per hour during a cyclone at Onslow, Western Australia in 1975 and gusts reaching 200 kilometres per hour have been recorded on several occasions in northern Australia with cyclone visitations. The highest gusts recorded at Australian capitals were 217 kilometres per hour at Darwin and 156 kilometres per hour at Perth.

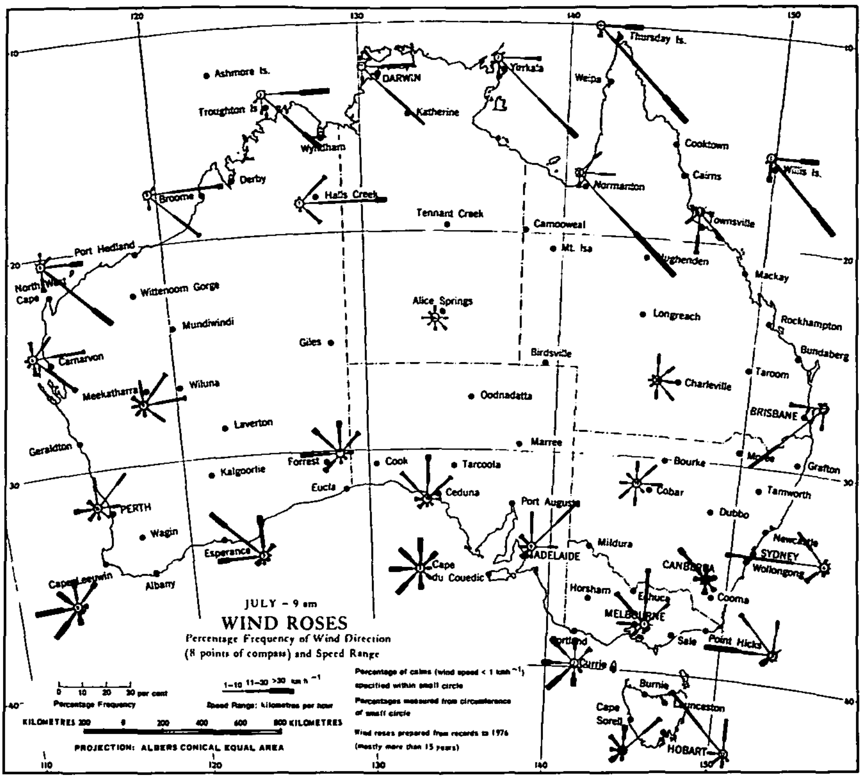
Estimates of the extreme wind gust expected in a given return period* have been derived for places through Australia (Whittingham, 1964). On this basis, for example, Darwin would have an extreme gust for a return period of 10 years of 140 kilometres per hour, Melbourne 135 and Perth 130.

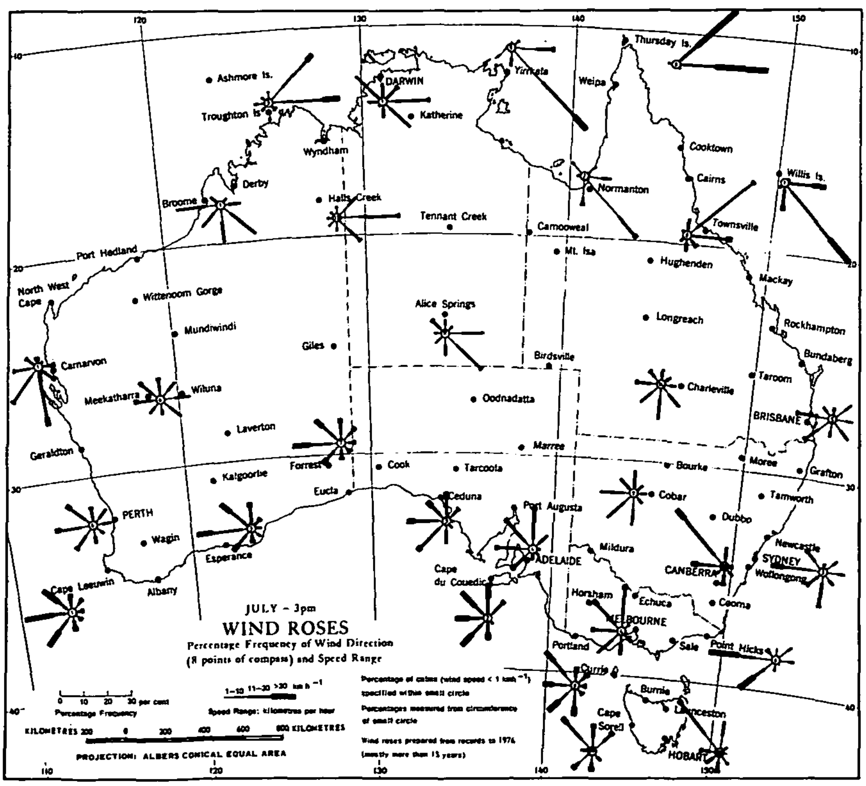
*Return period is the average period between successive occurrences equal to, or greater than, a given speed. For example the extreme wind gust for a return period of 10 years can be expected to occur once in 10 years on the average.





PLATES 22 and 23





PLATES 24 and 25

Floods

Widespread flood rainfall may occur anywhere in Australia but it has a higher incidence in the north and in the eastern coastal areas. It is most economically damaging along the shorter streams flowing from the eastern uplands eastward to the seaboard of Queensland and New South Wales. These flood rains are notably destructive in the more densely populated coastal river valleys of New South Wales—the Tweed, Richmond, Clarence, Macleay, Hunter and Nepean-Hawkesbury—all of which experience relatively frequent flooding. Although chiefly summer rains, they may occur in any season.

The great Fitzroy and Burdekin river basins of Queensland receive flood rains during the summer wet season. Much of the run-off due to heavy rain in north Queensland west of the eastern uplands flows southward through the normally dry channels of the network of rivers draining the interior lowlands into Lake Eyre. This widespread rain may cause floods over an extensive area, but it soon seeps away or evaporates, occasionally reaching the lake in quantity. The Condamine and other northern tributaries of the Darling also carry large volumes of water from flood rains south through western New South Wales to the Murray and flooding occurs along their courses at times.

Flood rains occur at irregular intervals in the Murray-Murrumbidgee system of New South Wales and Victoria, the coastal streams of southern Victoria and the north coast streams of Tasmania.

Droughts

Drought, in general terms, refers to an acute water shortage. This is normally due to rainfall deficiency but with other parameters contributing to the actual water availability. The best single measure of water availability in Australia is rainfall, although parameters such as evaporation and soil moisture are significant, or even dominant, in some situations.

Droughts have severe economic effects in Australia and during the years 1864–1973 inclusive there have been at least eight major droughts affecting the greater part of Australia and at least seven other droughts of lesser severity affecting extensive areas (Foley 1957 (ii)). The droughts of 1895–1903 and 1958–68 were probably the most disastrous in their effects on primary industry.

Gibbs and Maher (1967), having defined a drought year at a certain station as one with the year's rainfall in the first decile range, concluded that the occurrence of areas in the first decile range on annual decile maps for the period 1885–1965 corresponded rather well with drought areas discussed by Foley (1957).

One method of assessing the incidence of rainfall deficiency is the analysis of the distribution of annual rainfalls less than the median (Gaffney 1975). The range between the 50 percentile (median) and the 10 percentile gives a measure of the variation in magnitude of annual rainfalls less than the median. The ratio of this range to the 30 percentile value may be used as an index of rainfall deficiency incidence or drought incidence, i.e.:

$$\text{Index of drought incidence} = \left\{\frac{50\text{–}10}{30}\right\} \text{ percentile}$$

For example, the indexes for Onslow (north-west coast of Western Australia) and similarly, for Cape Otway (south coast of Victoria) are derived thus:

$$\text{Index for Onslow} = \left\{\frac{222\text{–}64}{145}\right\} \text{ mm} = 1.09$$

$$\text{Index for Cape Otway} = \left\{\frac{865\text{–}716}{801}\right\} \text{ mm} = 0.19$$

Plate 26, on the following page, shows the distribution of the index of drought incidence over Australia. The intrusions of high index values from the interior to the central coast of Queensland and across western New South Wales are noteworthy. The extreme values on the north-west coast of Western Australia are among the highest in Australia (e.g. Onslow 1.09) due to the dependence of the rainfall on random cyclone tracks.

The Bureau of Meteorology commenced the issue of *Drought Reviews* in June 1965. These reviews provide a summary of serious rainfall deficiencies and are issued monthly when serious or severe deficiencies exist in any of the rainfall districts. The deficiency criteria are based on monthly rainfall decile analyses. A review of droughts in Australia to 1968 is included in Year Book No. 54, 1968. Summaries of subsequent drought periods may be obtained from the *Drought Reviews*.

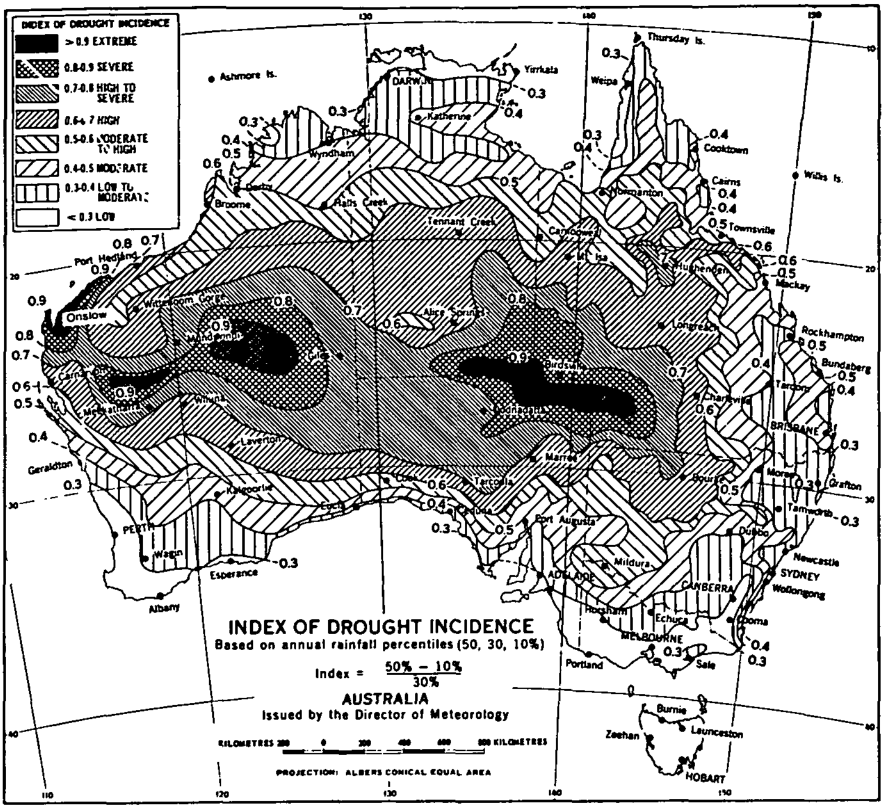


PLATE 26

Climatic discomfort

For details *see* Year Book No. 62.

Climatic data for capital cities

The averages for a number of elements determined from long-period observations at the Australian capitals to 1976 inclusive, are given in the following pages. Extremes generally cover all available data to 1978 inclusive, whereas averages may only refer to present sites.

CLIMATIC DATA: PERTH, WESTERN AUSTRALIA

(Lat. 31° 57′ S., Long. 115° 51′ E. Height above M.S.L. 19.5 metres)

BAROMETER, WIND, EVAPORATION, THUNDER, CLOUDS, AND CLEAR DAYS

Month	Mean of 9 a.m. and 3 p.m. atmospheric pressure reduced to mean sea level (mb)	Wind (height of anemometer 22 metres): Average (km/h)	Highest mean speed in one day (km/h)		Highest gust speed (km/h)	Prevailing direction: 9 a.m.	3 p.m.	Mean amt evaporation (mm)	No. days thunder	Mean daily amt clouds 9 a.m., 3 p.m., 9 p.m. (a)	No. clear days
No. of years of record	91	30(b)		77	63	30(b)	30(b)	9(c)	79	30(b)	30(b)
January	1012.6	17.5	48.2	26/76*	81	E	SSW	280	0.9	2.3	14
February	1013.0	17.2	40.8	4/73	113	ENE	SSW	241	0.7	2.5	13
March	1015.2	16.2	51.9	28/75	113	E	SSW	214	0.7	2.8	12
April	1017.9	13.7	50.7	25/00	130	ENE	SSW	124	0.9	3.4	9
May	1017.9	13.5	44.5	8/73	119	NE	WSW	83	1.8	4.3	6
June	1017.5	13.5	48.6	17/27	129	N	NW	59	1.8	4.7	5
July	1018.8	14.2	53.9	20/26	137	NNE	W	58	1.5	4.5	5
August	1018.8	15.1	51.3	15/03	156	N	WNW	75	1.3	4.5	6
September	1018.4	15.1	45.9	11/05	109	ENE	SSW	105	0.7	3.9	8
October	1017.0	16.1	43.0	6/16	105	SE	SW	158	0.8	3.8	8
November	1015.5	17.2	48.2	26/75*	101	E	SW	205	0.8	3.1	9
December	1013.4	17.7	44.5	24/75	103	E	SSW	241	0.9	2.6	13
Year – Totals	..	..	..	..	..	..	..	**1,843**	**12.8**	..	**108**
Year – Averages	**1016.3**	**15.6**	..	..	..	**E**	**SSW**	..	..	**3.5**	..
Year – Extremes	..	..	**53.9**	.. **20/7/26**	**156**	..	..	..	..	..	..

(a) Scale 0–8. (b) Standard thirty years normal (1911–1940). (c) Class-A Pan.

TEMPERATURE AND SUNSHINE

Month	Air temperature daily readings (°Celsius): Mean max.	Mean min.	Mean	Extreme air temperature (°Celsius): Highest		Lowest		Extreme temperature (°Celsius): Highest in sun		Lowest on grass		Mean daily hours sunshine
No. of years of record	82	82	82		84		84		63(a)		82	78
January	29.6	17.7	23.5	44.7	12/78	9.2	20/25	80.7	22/14	4.2	20/25	10.5
February	29.9	17.9	23.7	44.6	8/33	8.7	1/02	78.7	4/34	4.3	1/13	10.0
March	27.8	16.6	22.2	41.3	14/22	7.7	8/03	75.0	19/18	2.6	(b)	8.9
April	24.5	14.1	19.2	37.6	9/10	4.1	20/14	69.4	8/16	-0.7	26/60	7.2
May	20.7	11.6	16.1	32.4	2/07	1.3	11/14	63.3	4/25	-3.9	31/64	5.9
June	18.2	9.9	14.1	28.1	5/75	1.6	22/55	57.5	9/14	-3.4	27/46	4.8
July	17.3	9.0	13.2	26.3	17/76	1.2	7/16	56.2	13/15	-3.8	30/20	5.3
August	17.9	9.1	13.5	27.8	21/40	1.9	31/08	62.3	29/21	-3.0	18/66	6.2
September	19.4	10.1	14.8	32.7	30/18	2.6	6/56	67.5	29/16	-2.7	(c)	7.2
October	21.2	11.5	16.3	37.3	29/67	4.2	6/68	71.8	19/54	-1.2	16/31	8.3
November	24.6	14.0	19.2	40.3	24/13	5.6	1/04	75.0	30/25	-1.1	6/71	9.7
December	27.3	16.2	21.7	42.3	31/68	8.6	29/57	76.0	11/27	3.3	29/57	10.8
Year – Averages	**23.2**	**13.1**	**18.2**	..	..	..	..	..	..	..	..	**7.9**
Year – Extremes	..	..	..	**44.7**	.. **12/1/78**	**1.2**	.. **7/7/16**	**80.7**	.. **22/1/14**	**-3.9**	.. **31/5/64**	..

(a) Records discontinued 1963. (b) 8/1903 and 16/1967. (c) 8/1952 and 6/1956.

HUMIDITY, RAINFALL, AND FOG

Month	Vapour pressure mean 9 a.m. (mb)	Rel. hum. (%) at 9 a.m.: Mean	Highest mean	Lowest mean	Rainfall (millimetres): Mean mthly	Mean No. of days of rain	Greatest monthly		Least monthly		Greatest in one day		Fog mean No. days
No. of years of record	30(a)	30(a)	79	79	100	100		103		100		100	79
January	14.8	51	63	41	8	3	55	1879	Nil	(b)	44	27/79*	0.2
February	14.7	51	65	43	11	3	166	1955	Nil	(b)	87	17/55	0.3
March	14.7	57	66	46	20	4	145	1934	Nil	(b)	77	9/34	0.6
April	13.4	61	75	51	46	8	149	1926	Nil	1920	67	30/04	0.9
May	12.4	70	81	60	125	14	308	1879	14	1964	76	17/42	1.3
June	11.4	75	85	68	185	17	476	1945	55	1877	99	10/20	1.4
July	10.9	76	88	69	175	18	425	1958	61	1876	76	4/91*	1.6
August	10.7	71	83	62	138	18	318	1945	12	1902	74	14/45	1.0
September	11.6	66	75	58	81	14	199	1923	9	1916	47	18/66	0.3
October	11.7	60	75	52	55	11	200	1890	1	1969	55	1/75	0.4
November	12.7	52	66	41	21	6	71	1916	Nil	1891	39	29/56	0.2
December	13.9	51	63	39	14	4	81	1951	Nil	(b)	47	3/51	0.2
Year – Totals	..	..	..	..	**879**	**120**	..	..	..	..	..	..	**8.1**
Year – Averages	**12.7**	**62**	..	..	..	..	..	..	..	..	..	..	..
Year – Extremes	..	..	**88**	**39**	..	..	**476**	.. **6/1945**	**Nil**	(b)	**99**	.. **10/6/20**	..

(a) Standard thirty years normal (1911–1940). (b) Various years.

Figures such as 26/76, 29/56, etc. indicate, in respect of the month of reference, the day and year of the occurrence. Dates marked with an asterisk (*) relate to nineteenth century.

CLIMATIC DATA: DARWIN, NORTHERN TERRITORY

(Lat. 12° 28' S., Long. 130° 51' E. Height above M.S.L. 30 metres)

BAROMETER, WIND, EVAPORATION, THUNDER, CLOUDS, AND CLEAR DAYS

Month	Mean of 9 a.m. and 3 p.m. atmospheric pressure reduced to mean sea level (mb)	Wind (height of anemometer 36 metres) Average (km/h)	Highest mean speed in one day (km/h)	Highest gust speed (km/h)	Prevailing direction 9 a.m.	Prevailing direction 3 p.m.	Mean amt evaporation (mm)	No. days thunder	Mean daily amt clouds 9 a.m., 3 p.m., 9 p.m. (a)	No. of clear days
No. of years of record	90	20	..	24(b)	..	..	8(c)	35	35	35
January	1,006.2	9.3	..	106	W	NW	225	12.9	5.9	1
February	1,006.3	10.6	..	101	W	NW	187	10.2	5.8	1
March	1,007.2	7.5	..	157	W	NW	190	10.6	5.2	3
April	1,009.3	8.8	..	67	SE	NW	218	4.0	2.9	10
May	1,010.9	9.6	..	62	SE	E	223	0.5	2.0	16
June	1,012.2	10.1	..	64	SE	E	206	0.0	1.4	19
July	1,012.8	8.9	..	62	SE	E	229	0.0	1.3	20
August	1,012.6	8.6	..	72	SE	NW	238	0.0	1.1	20
September	1,011.7	8.6	..	64	ENE	NW	270	1.0	1.8	16
October	1,010.5	9.8	..	85	NE	NW	285	5.3	2.7	9
November	1,008.7	8.6	..	117	NW	NW	260	11.8	3.9	4
December	1,006.9	9.8	..	217	NW	NW	240	14.2	4.9	2
Year: Totals	..	..	..	..	..	..	**2,773**	**70.5**	..	**121**
Year: Averages	**1,009.6**	**9.2**	..	..	**SE**	**NW**	..	..	**3.2**	..
Year: Extremes	..	..	..	**217**	..	..	..	..	..	..

(a) Scale 0–8. (b) Several incomplete years. (c) Class-A Pan.

TEMPERATURE AND SUNSHINE

Month	Air temperature daily readings (°Celsius) Mean max.	Mean min.	Mean	Extreme air temperature (°Celsius) Highest		Lowest		Extreme temperature (°Celsius) Highest in sun		Lowest on grass	Mean daily hours sunshine
No. of years of record	90	90	90	94(a)		94(a)		26(b)		..	21
January	32.2	25.0	28.6	37.8	2/82*	20.0	20/92*	75.6	26/42	..	5.9
February	31.9	24.8	28.4	38.3	20/87*	17.2	25/49	73.2	(c)	..	5.9
March	32.4	24.8	28.6	38.9	(d)	19.2	31/45	74.3	23/38	..	6.8
April	33.1	24.2	28.7	40.0	7/83*	16.0	11/43	72.8	1/38	..	8.6
May	32.3	22.4	27.4	39.1	8/84*	(e)14.2	28/67	71.2	5/20	..	9.3
June	30.9	20.4	25.7	39.0	17/37	12.1	23/63	68.5	2/16	..	9.7
July	30.4	19.6	25.1	36.7	17/88*	10.4	29/42	68.9	28/17	..	9.8
August	31.4	20.8	26.1	37.0	30/71*	13.6	11/63	69.1	28/16	..	10.4
September	32.7	23.2	27.9	38.9	20/82*	16.7	9/63	69.5	(f)	..	10.0
October	33.6	25.0	29.3	40.5	17/92*	19.4	8/66	71.4	30/38	..	9.5
November	33.8	25.3	29.6	39.6	9/84*	19.3	4/50	77.0	14/37	..	8.6
December	33.2	25.3	29.3	38.9	20/82*	18.3	4/60	76.2	26/23	..	7.1
Year: Averages	**32.3**	**23.3**	**27.9**	..	..	..	..	..	..	..	**8.5**
Year: Extremes	..	..	..	**40.5** 17/10/1892	..	**10.4** 29/7/1942	..	**77.0** 14/11/37	..	..	..

(a) Years 1882–1941 at Post Office; 1942–1966 at Aerodrome; 1967–1978 at Regional office; sites not strictly comparable. (b) Records discontinued 1942. (c) 5/1938 and 23/1938. (d) 26/1883 and 27/1883. (e) Recorded at Darwin Aerodrome. All other Statistics from 1967 to 1971 at Regional Office. (f) 28/1916 and 3/1921.

HUMIDITY, RAINFALL AND FOG

Month	Vapour pressure mean 9 a.m. (mb)	Rel. hum. (%) at 9 a.m. Mean	Highest mean	Lowest mean	Rainfall (millimetres) Mean mthly	Mean No. of days of rain	Greatest monthly		Least monthly		Greatest in one day		Fog mean No. days
No. of years of record	85(a)	90	57(b)	57(b)	86(c)	74	109(d)		109(d)		109(d)		35
January	31.1	81	89	69	391	19	746	1974	68	1906	296	7/97*	0.0
February	31.1	81	88	71	330	18	815	1969	13	1931	279	18/55	0.0
March	30.7	80	84	69	260	17	1014	1977	21	1911	241	16/77	0.0
April	27.0	72	80	60	103	8	603	1891	Nil	1950	158	4/59	0.0
May	21.8	65	76	49	14	1	356	1968	Nil	(e)	58	23/79	0.0
June	18.7	63	75	52	3	0	76	1973	Nil	(e)	36	0/02	0.4
July	17.6	62	71	47	1	0	65	1900	Nil	(e)	43	12/00	1.1
August	20.6	66	73	53	2	0	84	1947	Nil	(e)	80	2/47	0.8
September	24.7	68	73	54	13	2	108	1942	Nil	(e)	71	21/42	0.2
October	27.7	68	72	60	50	5	339	1954	Nil	(e)	95	28/56	0.0
November	29.3	70	75	62	126	11	399	1938	10	1870	120	19/51	0.0
December	30.5	75	83	65	243	16	665	1974	25	1934	279	25/74	0.0
Year: Totals	..	..	..	..	**1,536**	**97**	..	..	..	..	..	..	**2.5**
Year: Averages	**25.9**	**71**	..	..	..	..	..	..	..	..	..	..	..
Year: Extremes	..	..	**89**	**47**	..	..	**1014**	**3/77**	**Nil**	**(f)**	**296** 7/1/1897	..	..

(a) Records to 1966 at Aerodrome. (b) 1882 to 1938 at Post Office. (c) 1869 to 1962 at Post Office; 8 years missing. (d) Highest or lowest at either Post Office, Aerodrome or Regional Office Sites. (e) Various years. (f) April to October. Various years.

Figures such as 2/82, 26/42, etc., indicate in respect of the month of reference, the day and year of occurrence. Dates marked with an asterisk (*) relate to nineteenth century.

CLIMATIC DATA: ADELAIDE, SOUTH AUSTRALIA

(Lat. 34° 46' S., Long. 138° 35' E. Height above M.S.L. 43 metres)

BAROMETER, WIND, EVAPORATION, THUNDER, CLOUDS, AND CLEAR DAYS

Month	Mean of 9 a.m. and 3 p.m. atmospheric pressure reduced to mean sea level (mb)	Wind (height of anemometer 22 metres) Average (km/h)	Highest mean speed in one day (km/h)		Highest gust speed (km/h)	Prevailing direction 9 a.m.	Prevailing direction 3 p.m.	Mean amt evaporation (mm)	No. days thunder	Mean daily amt clouds 9 a.m., 3 p.m., 9 p.m. (a)	No. of clear days
No. of years of record	119	20(b)	20(b)		61	30(c)	30(c)	9(d)	104	108	61
January	1,013.2	12.8	32.2	12/70	116	SW	SW	261	1.5	3.0	12.0
February	1,014.3	12.1	28.8	25/67	106	NE	SW	224	1.1	3.0	10.7
March	1,017.2	11.4	30.7	24/64	126	S	SW	180	0.8	3.3	10.7
April	1,019.8	11.4	37.4	10/56	130	NE	SW	126	1.0	4.2	6.8
May	1,020.1	11.3	37.8	19/53	113	NE	NW	80	1.0	4.7	4.5
June	1,019.8	11.6	29.7	16/70	108	NE	N	57	0.9	5.0	3.8
July	1,019.9	11.8	32.9	13/64	148	NE	NW	61	0.8	4.9	3.5
August	1,019.0	12.8	38.2	8/55	121	NE	SW	76	1.1	4.2	4.7
September	1,017.6	13.2	34.9	16/65	111	NNE	SW	113	1.3	4.3	5.5
October	1,016.0	13.6	35.4	1/68	121	NNE	SW	169	1.9	4.2	5.6
November	1,015.1	13.9	36.3	14/68	130	SW	SW	202	2.0	3.9	6.5
December	1,013.3	13.5	31.1	18/69	121	SW	SW	247	1.5	3.4	8.8
Year: **Totals**	..	..	..	..	..	..	..	**1,795**	**14.9**	..	**83.1**
Year: **Averages**	**1,017.1**	..	..	..	..	**NE**	**SW**	..	..	**4.0**	..
Year: **Extremes**	..	..	**38.2**	**8/8/65**	**148**	..	..	..	..	..	..

(a) Scale 0–8. (b) Records of cup anemometer. (c) Standard 30 years normal (1931–1960). (d) Class-A Pan.

TEMPERATURE AND SUNSHINE

Month	Air temperature daily readings (°Celsius) Mean max.	Mean min.	Mean	Extreme air temperature (°Celsius) Highest		Lowest		Extreme temperature (°Celsius) Highest in sun		Lowest on grass		Mean daily hours sunshine
No. of years of record	119	119	119		122		122		54(a)		117	94
January	29.6	16.4	23.0	47.6	12/39	7.3	21/84*	82.3	18/82*	1.8	3/77	9.9
February	29.4	16.6	23.0	45.3	12/99*	7.5	23/18	76.9	10/00	2.1	23/26	9.3
March	26.9	15.1	21.0	43.6	9/34	6.6	21/33	78.9	17/83*	0.1	21/33	7.9
April	22.7	12.7	17.7	37.0	5/38	4.2	15/59*	68.3	1/83*	-3.5	30/77	6.0
May	18.7	10.3	14.5	31.9	4/21	2.7	(b)	64.6	12/79*	-3.6	19/28	4.8
June	15.8	8.3	12.1	25.6	4/57	0.3	(c)	59.3	18/79*	-6.1	24/44	4.2
July	15.0	7.3	11.1	26.6	29/75	0.0	24/08	56.9	26/90*	-5.5	30/29	4.3
August	16.4	7.8	12.1	29.4	31/11	0.2	17/59*	60.0	31/92*	-5.1	11/29	5.3
September	18.9	9.0	14.0	35.1	30/61	0.4	4/58*	71.4	23/82*	-3.9	25/27	6.2
October	22.0	10.9	16.5	39.4	21/22	2.3	20/58*	72.2	30/21	-3.0	22/66	7.2
November	25.2	12.9	19.1	45.3	21/65*	4.9	2/09	74.9	20/78*	-0.6	17/76	8.6
December	27.8	14.9	21.4	45.9	29/31	6.1	(d)	79.8	7/99*	-1.0	19/76*	9.4
Year: **Averages**	**22.4**	**11.8**	**17.1**	..	..	..	..	..	..	..	..	**6.9**
Year: **Extremes**	..	..	..	**47.6**	**12/1/39**	**0.0**	**24/7/08**	**82.3**	**18/1/62**	**-6.1**	**24/6/44**	..

(a) Discontinued 1934 incomplete 1931–1934. (b) 26/1895 and 24/04. (c) 27/1876 and 24/44. (d) 16/1861 and 4/06.

HUMIDITY, RAINFALL, AND FOG

Month	Vapour pressure mean 9 a.m. (mb)	Rel. hum. (%) at 9 a.m. Mean	Highest mean	Lowest mean	Rainfall (millimetres) Mean mthly	Mean No. of days of rain	Greatest monthly		Least monthly		Greatest in one day		Fog mean no. days
No. of years of record	108	108	108	108	137	137		140		140		140	76
January	11.9	41	59	29	20	4	84	1941	Nil	(a)	58	2/89*	0.0
February	12.5	44	61	30	21	4	155	1925	Nil	(a)	141	7/25	0.0
March	12.0	47	62	29	24	5	117	1878	Nil	(a)	89	5/78*	0.0
April	11.5	57	72	37	44	9	154	1971	Nil	1945	80	5/60*	0.0
May	10.8	67	77	49	69	13	197	1875	3	1934	70	1/53*	0.4
June	10.0	75	84	63	72	15	218	1916	6	1958	54	1/20	1.1
July	9.5	76	87	66	67	16	138	1890	10	1899	44	10/65*	1.3
August	9.7	70	80	54	62	16	157	1852	8	1944	57	19/51*	0.6
September	10.0	61	72	44	51	13	148	1923	7	1951	40	20/23	0.2
October	10.2	52	67	29	44	11	133	1949	1	1969	57	16/08	0.0
November	10.5	45	64	31	31	8	113	1839	1	1967	75	12/60	0.0
December	11.3	42	56	31	26	6	101	1861	Nil	1904	61	23/13	0.0
Year: **Totals**	..	..	..	..	**531**	**120**	..	..	..	..	..	..	**3.6**
Year: **Averages**	**10.5**	**56**	..	..	..	..	..	..	..	..	..	..	..
Year: **Extremes**	..	..	**87**	**29**	..	..	**218**	.. **6/1916**	**Nil**	(b)	**141**	.. **7/1/25**	..

(a) Various years. (b) December to April, various years.

Figures such as 3/55, 21/84, etc. indicate, in respect of the month of reference, the day and year of the occurrence. Dates marked with an asterisk (*) relate to nineteenth century.

CLIMATIC DATA: BRISBANE, QUEENSLAND

(Lat. 27° 28' S., Long. 153° 2' E. Height above M.S.L. 41 metres)

BAROMETER, WIND, EVAPORATION, THUNDER, CLOUDS, AND CLEAR DAYS

Month	Mean of 9 a.m. and 3 p.m. atmospheric pressure reduced to mean sea level (mb)	Wind (height of anemometer 32 metres) Average (km/h)	Highest mean speed in one day (km/h)		Highest gust speed (km/h)	Prevailing direction 9 a.m.	Prevailing direction 3 p.m.	Mean amt evaporation (mm)	No. days thunder	Mean daily amt clouds 9 a.m., 3 p.m., 9 p.m. (a)	No. clear days
No. of years of record	89	60		61	61	25(b)	25(b)	9(c)	89	84	68
January	1,011.7	12.1	31.8	23/47	109	SE	ENE	189	4.6	4.6	3.3
February	1,012.5	11.9	37.3	21/52	108	SSW	ENE	150	3.7	4.8	2.4
March	1,014.6	11.4	32.7	1/29	106	SSW	ESE	149	2.3	4.3	5.6
April	1,017.3	10.5	26.8	3/25	104	SW	ESE	127	1.4	3.6	7.8
May	1,018.3	9.8	28.8	17/26	87	SW	WSW	89	0.6	3.3	10.0
June	1,018.5	10.0	30.5	14/28	95	SW	WSW	70	0.5	3.3	10.5
July	1,018.8	9.7	35.4	13/54	111	SW	WSW	77	0.4	2.9	13.3
August	1,018.8	10.0	23.8	4/35	100	SW	NE	105	1.4	2.6	13.5
September	1,017.6	10.5	25.9	1/48	102	SW	NE	133	2.8	2.8	12.4
October	1,015.9	11.1	25.3	1/41	100	SSW	NE	168	4.4	3.5	8.5
November	1,014.1	11.4	24.9	10/28	111	SE	NE	191	5.7	3.9	6.1
December	1,012.1	11.9	31.3	15/26	127	SSE	NE	209	6.6	4.3	4.5
Year — Totals	..	..	..	..	..	..	..	**1,656**	**34.2**	..	**97.7**
Year — Averages	**1,015.9**	**10.8**	..	..	..	**SW**	**ENE**	..	..	**3.6**	..
Year — Extremes	..	..	**37.3**	..	**127**	..	..	..	..	..	..
			21/2/52								

(a) Scale 0–8. (b) 1950–1974. (c) Class-A Pan.

TEMPERATURE AND SUNSHINE

Month	Air temperature daily readings (°Celsius) Mean max.	Mean min.	Mean	Extreme air temperature (°Celsius) Highest		Lowest		Extreme temperature (°Celsius) Highest in sun		Lowest on grass		Mean daily hours sunshine
No. of years of record	89	89	89		90		90		50(a)		90	67
January	29.4	20.6	25.0	43.2	26/40	14.9	4/93*	76.2	2/37	9.9	4/93*	7.5
February	28.9	20.4	24.7	40.9	21/25	14.7	21/31	74.0	6/10	9.5	22/31	7.0
March	27.8	19.2	23.5	38.8	13/65	11.3	29/13	72.5	6/39	7.4	29/13	6.8
April	26.0	16.4	21.2	36.1	19/73	6.9	25/25	67.7	11/16	2.6	24/25	7.1
May	23.1	13.1	18.0	32.4	21/23	4.8	30/51	63.9	1/10	-1.2	8/97*	6.8
June	20.8	10.7	15.7	31.6	19/18	2.4	29/08	57.8	3/18	-3.7	23/88*	6.6
July	20.3	9.4	14.9	29.1	23/46	2.3	(b)	63.4	20/15	-4.5	11/90	7.0
August	21.8	10.0	15.9	32.8	14/46	2.7	13/64	61.1	20/17	-2.7	9/99*	7.8
September	24.0	12.7	18.3	38.3	22/43	4.8	1/96	68.6	26/03	-0.9	1/89*	8.3
October	26.1	15.8	20.9	40.7	30/58	6.3	3/99*	69.7	31/18	1.6	8/89*	8.2
November	27.8	17.9	22.9	41.2	18/13	9.2	2/05	72.4	7/89*	3.8	1/05	8.2
December	29.1	19.6	24.5	41.1	26/93*	13.5	5/55	74.4	28/42	9.5	3/94*	8.1
Year — Averages	**25.4**	**15.5**	**20.5**	..	..	..	..	..	..	..	..	**7.5**
Year — Extremes	..	..	..	**43.2**	..	**2.3**	..	**76.2**	..	**-4.5**	..	..
					26/1/1940				**2/1/1937**		**11/7/1890**	

(a) 1887–1926, 1936–March 1947. (b) 12/1894 and 2/1896.

HUMIDITY, RAINFALL, AND FOG

Month	Vapour pressure mean 9 a.m. (mb)	Rel. hum. (%) at 9 a.m. Mean	Highest mean	Lowest mean	Rainfall (millimetres) Mean mthly	Mean No. of days of rain	Greatest monthly		Least monthly		Greatest in one day		Fog mean No. days
No. of years of record	64	89	90	90	124	116		124		124		124	89
January	21.7	65	79	53	167	13	872	1974	8	1919	465	21/87*	0.5
February	22.0	69	82	55	161	14	1,026	1893	15	1849	270	6/31	0.6
March	20.9	71	85	56	144	15	865	1870	Nil	1849	284	14/08	1.1
April	17.5	70	80	56	88	11	388	1867	1	1944	178	3/72	2.1
May	14.3	71	85	59	69	9	352	1876	Nil	1846	149	9/80	3.0
June	12.1	72	84	54	69	8	647	1967	Nil	1847	283	12/67	2.9
July	11.1	70	88	53	54	7	330	1973	Nil	(a)	193	20/65	3.0
August	11.7	66	80	53	48	7	373	1879	Nil	(b)	124	12/87*	3.6
September	13.8	63	76	47	48	8	138	1886	Nil	1979	79	12/65	2.5
October	16.0	60	72	48	74	9	456	1972	(c)	1948	136	25/49	1.2
November	18.1	59	72	45	95	10	315	1917	Nil	1842	143	8/66*	0.5
December	20.1	61	70	51	129	12	441	1942	9	1865	168	28/71*	0.3
Year — Totals	..	..	..	..	**1,157**	**123**	..	..	..	..	..	..	**21.3**
Year — Averages	**16.6**	**66**	..	..	..	..	..	..	..	..	..	..	..
Year — Extremes	..	..	**88**	**45**	..	..	**1,026**	..	**Nil**	..	**465**	..	..
								2/1893		**Various**		**21/1/1887**	

(a) 1841 and 1951. (b) 1862, 1869, 1880 and 1977. (c) Less than 1 mm.

Figures such as 23/47, 4/93, etc. indicate, in respect of the month of reference, the day and year of the occurrence. Dates marked with an asterisk (*) relate to nineteenth century.

CLIMATIC DATA: SYDNEY, NEW SOUTH WALES

(Lat. 33° 52' S., Long. 151° 12' E. Height above M.S.L. 42 metres)

BAROMETER, WIND, EVAPORATION, THUNDER, CLOUDS, AND CLEAR DAYS

Month	Mean of 9 a.m. and 3 p.m. atmospheric pressure reduced to mean sea level (mb)	Wind (height of anemometer 22 metres) Average (km/h)	Highest mean speed in one day (km/h)		Highest gust speed (km/h)	Prevailing direction 9 a.m.	Prevailing direction 3 p.m.	Mean amt evaporation (mm)	No. days thunder	Mean daily amt clouds 9 a.m., 3 p.m., 9 p.m. (a)	No. clear days
No. of years of record	66	25(b)		25(b)	25(b)	25(b)	25(b)	6(c)	56	114	65
January	1,012.7	12.3	30.3	10/49	150	NE	NE	186	3.3	4.7	4.9
February	1,014.2	11.6	30.3	18/57	101	NE	ENE	169	2.5	4.8	4.5
March	1,016.4	10.5	33.3	10/44	93	WNW	ENE	186	1.7	4.4	5.7
April	1,018.3	10.2	36.2	24/44	116	W	ENE	180	1.3	4.1	7.3
May	1,018.7	10.5	33.8	18/55	101	W	ENE	186	0.9	3.9	7.7
June	1,018.9	11.6	36.0	10/47	135	W	WSW	180	0.8	4.0	8.0
July	1,018.5	11.5	34.3	20/51	106	W	WSW	186	0.8	3.5	10.5
August	1,017.9	12.1	39.6	9/51	109	WNW	WNW	155	1.4	3.3	10.4
September	1,017.0	11.6	35.1	23/42	113	WNW	NE	150	1.8	3.5	9.1
October	1,015.1	12.3	39.4	1/57	153	WNW	ENE	155	2.7	4.1	6.5
November	1,013.4	12.4	31.9	21/54	114	WNW	ENE	150	3.6	4.5	5.2
December	1,012.1	12.3	36.2	11/52	121	NE	ENE	155	3.8	4.6	4.8
Year — Totals	..	..	..	..	..	..	..	**2,038**	**24.7**	..	**84.7**
Year — Averages	**1,016.1**	**11.6**	..	..	..	**WNW**	**ENE**	..	..	**4.2**	..
Year — Extremes	..	..	**39.6**	**9/8/51**	**153**	..	..	..	..	..	..

(a) Scale 0–8. (b) Years 1938-1962 inclusive. (c) Sydney Airport, Class-A Pan.

TEMPERATURE AND SUNSHINE

Month	Air temperature daily readings (°Celsius) Mean max.	Mean min.	Mean	Extreme air temperature (°Celsius) Highest		Lowest		Extreme temperature (°Celsius) Highest in sun		Lowest on grass		Mean daily hours sunshine
No. of years of record	117	117	117		118	118	118		84(a)		118	55
January	25.7	18.3	22.0	45.3	14/39	10.6	18/49	73.5	26/15	6.5	6/25	7.2
February	25.4	18.4	21.9	42.1	8/26	9.6	28/63*	76.3	14/39	6.0	22/33	6.8
March	24.5	17.3	20.9	39.2	3/69*	9.3	14/86*	70.2	10/26	4.4	17/13	6.3
April	22.1	14.5	18.3	33.0	(b)	7.0	27/64*	62.3	10/77*	0.7	24/09	6.2
May	19.2	11.2	15.2	30.0	1/19	4.4	30/62*	54.3	1/96*	-1.5	25/17	5.8
June	16.6	9.1	12.8	26.9	11/31	2.1	22/32	52.1	2/23	-2.2	22/32	5.2
July	15.8	7.8	11.8	25.7	22/26	2.2	12/90*	51.9	19/77*	-4.4	4/93*	6.2
August	17.4	8.7	13.1	30.4	24/54	2.7	3/72*	65.0	30/78*	-3.3	4/09	6.8
September	19.6	10.8	15.2	34.6	26/65	4.9	2/45	61.2	12/78*	-1.1	17/05	7.1
October	21.9	13.3	17.6	37.4	4/42	5.7	6/27	66.8	20/33	0.4	9/05	7.3
November	23.5	15.3	19.4	40.3	6/46	7.7	1/05	70.3	28/99*	1.9	21/67	7.6
December	24.9	17.2	21.1	42.2	20/57	9.1	3/24	73.5	27/89*	5.2	3/24	7.4
Year — Averages	**21.4**	**13.6**	**17.4**	..	..	..	..	..	..	..	..	**6.7**
Year — Extremes	..	..	..	**45.3**	**14/1/39**	**2.1**	**22/6/32**	**76.3**	**14/2/39**	**-4.4**	**4/7/1893**	..

(a) Records discontinued 1946. (b) 1/36 and 10/69.

HUMIDITY, RAINFALL, AND FOG

Month	Vapour pressure mean 9 a.m. (mb)	Rel. hum. (%) at 9 a.m. Mean	Highest mean	Lowest mean	Rainfall (millimetres) Mean mthly	Mean No. of days of rain	Greatest monthly		Least monthly		Greatest in one day		Fog mean No. days
No. of years of record	100	100	101	101	117	117		118		118		118	55
January	18.8	68	78	58	100	13	388	1911	6	1932	180	13/11	0.3
February	19.2	70	81	60	115	13	564	1954	3	1939	226	25/73*	0.6
March	18.3	74	85	62	131	14	521	1942	8	1965	281	28/42	1.5
April	15.0	74	87	63	126	13	622	1861	2	1868	191	29/60*	2.1
May	11.9	75	90	63	123	13	585	1919	4	1957	212	28/89*	3.1
June	10.2	76	89	63	133	12	643	1950	4	1962	131	16/84*	2.7
July	9.6	74	88	59	104	11	336	1950	2	1970	198	7/31	2.1
August	9.5	68	84	54	81	11	378	1899	1	1885	140	22/71	1.7
September	11.3	66	79	49	69	11	357	1879	2	1882	145	10/79*	0.9
October	13.0	62	77	46	76	12	283	(a)	2	1971	162	13/02	0.6
November	15.0	62	79	42	78	12	577	1961	2	1915	133	27/55	0.5
December	17.6	64	77	51	79	13	402	1920	6	1913	121	13/10	0.4
Year — Totals	..	..	..	..	**1,215**	**148**	..	..	..	..	..	..	**16.3**
Year — Averages	**14.1**	**69**	..	..	..	..	..	..	..	..	..	..	..
Year — Extremes	..	..	**90**	**42**	..	..	**643**	**6/1950**	**1**	**8/1885**	**281**	**28/3/1942**	..

(a) 1916 and 1959.

Figures such as 10/49, 28/63, etc. indicate, in respect of the month of reference, the day and year of the occurrence. Dates marked with an asterisk (*) relate to nineteenth century.

CLIMATIC DATA: CANBERRA, AUSTRALIAN CAPITAL TERRITORY

(Lat. 35° 19' S., Long. 149° 11' E. Height above M.S.L. 577 metres)

BAROMETER, WIND, EVAPORATION, THUNDER, CLOUDS, AND CLEAR DAYS

Month	Mean of 9 a.m. and 3 p.m. atmospheric pressure reduced to mean sea level (mb)	Wind (height of anemometer 10 metres): Average (km/h)	Highest mean speed in one day (km/h)		Highest gust speed (km/h)	Prevailing direction: 9 a.m.	Prevailing direction: 3 p.m.	Mean amt evaporation (mm)	No. days thunder	Mean daily amt clouds 9 a.m., 3 p.m., 9 p.m. (a)	No. clear days
No. of years of record	36	44(b)		47(b)	40(c)	36(c)	36(c)	8(d)	36	36	36(e)
January	1,012.1	6.6	24	24/33	121	NW	NW	242	3.3	4.1	7.7
February	1,013.1	6.1	25	24/33	104	NW	NW	194	3.0	4.4	6.5
March	1,016.0	5.3	29	28/42	111	SE	NW	165	1.7	4.2	7.6
April	1,018.8	5.0	30	8/45	106	NW	NW	109	0.8	4.2	6.9
May	1,019.0	4.4	21	27/58	104	NW	NW	71	0.4	4.5	6.7
June	1,021.0	4.8	26	2/30	96	NW	NW	46	0.2	4.6	6.5
July	1,020.2	5.0	38	7/31	102	NW	NW	54	0.1	4.4	7.0
August	1,018.5	5.9	25	25/36	113	NW	NW	77	0.8	4.4	6.7
September	1,017.4	6.0	28	28/34	107	NW	NW	115	1.1	4.1	7.9
October	1,014.8	6.5	23	12/57	119	NW	NW	165	2.2	4.4	6.1
November	1,011.9	6.9	28	28/42	128	NW	NW	200	3.3	4.4	5.7
December	1,010.7	6.9	26	11/38	106	NW	NW	259	3.4	4.1	7.5
Year: Totals	..	..	..	..	..	..	..	**1,697**	**20.3**	..	**82.8**
Year: Averages	**1,016.1**	**5.8**	..	..	..	**NW**	**NW**	..	..	**4.3**	**6.9**
Year: Extremes	..	..	**38**	**7/7/31**	**128**	..	..	..	..	..	..

(a) Scale 0–8. (b) Recorded at Forestry and Timber Bureau, Yarralumla, where a cup anemometer is installed. (c) Recorded at Meteorological office, R.A.A.F. Fairbairn, where a Dines Pressure Tube anemometer is installed. (d) Class-A Pan. (e) 1940–75. Formerly assessed over 37-year period at Yarralumla.

TEMPERATURE AND SUNSHINE

Month	Air temperature daily readings (°Celsius): Mean max.	Mean min.	Mean	Extreme air temperature (°Celsius): Highest		Lowest		Extreme temperature (°Celsius): Highest in sun	Lowest on grass		Mean daily hours sunshine
No. of years of record	36	36	36		40		40	..		28	37(a)
January	27.5	12.9	20.2	41.4	31/68	1.8	1/56	..	-0.4	1/56	8.9
February	26.6	12.6	19.6	42.2	1/68	3.0	16/62	..	0.2	17/70	8.2
March	24.3	10.4	17.3	36.4	9/40	-1.1	24/67	..	-4.0	(b)	7.5
April	19.6	6.5	13.1	32.6	12/68	-3.6	27/78	..	-8.3	24/69	6.9
May	14.9	2.8	8.9	24.5	10/67	-7.5	30/76	..	-10.4	26/69	5.6
June	12.0	0.8	6.4	20.1	3/57	-8.5	8/57	..	-13.4	25/71	4.8
July	11.1	-0.3	5.4	19.7	29/75	-10.0	11/71	..	-15.1	11/71	5.1
August	12.6	0.8	6.7	21.7	24/54	-7.8	6/74	..	-12.8	11/69	6.1
September	15.8	2.7	9.3	28.6	26/65	-5.6	5/40	..	-10.6	12/71	7.4
October	19.0	5.8	12.4	32.7	13/46	-3.3	4/57	..	-6.2	4/57	7.9
November	22.2	8.2	15.1	38.8	19/44	-1.8	28/67	..	-6.3	28/67	8.7
December	26.0	11.1	18.6	38.8	21/53	1.1	18/64	..	-3.9	18/64	9.1
Year: Averages	**19.3**	**6.2**	**12.7**	..	..	..	..	..	..	..	**7.2**
Year: Extremes	..	..	..	**42.2**	**1/2/68**	**-10.0**	**11/7/71**	..	**-15.1**	**11/7/71**	..

(a) Recorded at Forestry and Timber Bureau, Yarralumla. (b) 30/58 and 24/67.

HUMIDITY, RAINFALL, AND FOG

Month	Vapour pressure mean 9 a.m. (mb)	Rel. hum (%) at 9 a.m.: Mean	Highest mean	Lowest mean	Rainfall (millimetres): Mean mthly	Mean No. of days of rain	Greatest monthly		Least monthly		Greatest in one day		Fog mean No. days
No. of years of record	36(a)	36	36	36	36	36		40		40		39	36
January	13.1	60	75	42	61	8	164	1941	1	1947	95	12/45	1.1
February	14.0	65	81	53	59	7	148	1977	Nil	1968	69	20/74	1.2
March	13.1	69	81	53	51	7	312	1950	1	1954	66	5/59	2.8
April	10.7	75	84	38	50	8	164	1974	1	1980	75	2/59	4.1
May	8.7	84	96	73	51	9	150	1953	1	1976	96	3/48	7.5
June	7.1	85	97	73	39	9	126	1956	4	1979	45	25/56	7.6
July	6.6	84	93	68	38	10	103	1960	4	1970	35	10/57	7.7
August	7.1	80	92	58	47	12	156	1974	7	1944	48	29/74	5.0
September	8.1	74	82	55	50	10	151	1978	6	1946	41	16/62	4.1
October	10.0	67	82	50	73	12	161	1976	2	1977	105	21/59	3.1
November	10.7	59	76	38	64	10	135	1961	4	1977	64	9/50	1.4
December	12.3	59	74	43	56	8	215	1947	Nil	1967	87	30/48	0.6
Year: Totals	..	..	..	..	**639**	**110**	..	..	..	..	..	..	**46.2**
Year: Averages	**9.3**	**72**	..	..	..	..	..	..	..	..	..	..	..
Year: Extremes	..	..	**97**	**38**	..	..	**312**	**3/50**	**Nil**	(a)	**105**	**21/10/59**	..

(a) 12/67 and 2/68.

Data shown in the above tables relate to the Meteorological Office, R.A.A.F., Fairbairn, except where otherwise indicated, and generally cover years up to 1980.

Figures such as 24/33, 31/68, etc., indicate, in respect of the month of reference, the day and year of the occurrence.

CLIMATIC DATA: MELBOURNE, VICTORIA

(Lat. 37° 49′ S., Long. 144° 58′ E. Height above M.S.L. 35 metres)

BAROMETER, WIND, EVAPORATION, THUNDER, CLOUDS, AND CLEAR DAYS

Month	Mean of 9 a.m. and 3 p.m. atmospheric pressure reduced to mean sea level (mb)	Wind (height of anemometer 28 metres): Average (km/h)	Wind: Highest mean speed in one day (km/h)		Wind: Highest gust speed (km/h)	Wind: Prevailing direction 9 a.m.	Wind: Prevailing direction 3 p.m.	Mean amt evaporation (mm)	No. days thunder	Mean daily amt clouds 9 a.m., 3 p.m., 9 p.m. (a)	No. clear days
No. of years of record	119	36(b)		66	69	57	57	9(c)	68	119	68
January	1,012.8	12.8	34.0	27/41	106	S	S	228	1.7	4.1	6.7
February	1,014.3	12.4	30.6	13/47	119	S	S	198	1.9	4.0	6.1
March	1,016.8	11.3	29.0	3/61	106	N	S	155	1.3	4.3	5.5
April	1,018.9	10.9	33.7	27/71	108	N	S	97	0.7	4.7	4.2
May	1,019.1	11.4	33.0	4/61	116	N	N	59	0.4	5.2	2.9
June	1,019.0	11.4	36.7	16/47	103	N	N	38	0.2	5.3	2.8
July	1,018.6	12.8	36.9	24/70	109	N	N	47	0.2	5.2	2.5
August	1,017.5	12.5	34.3	20/42	108	N	N	60	0.6	5.0	2.7
September	1,016.0	12.7	34.0	15/64	111	N	S	91	0.8	4.8	3.6
October	1,014.7	12.8	30.4	6/68	111	N	S	130	1.6	4.8	3.4
November	1,013.9	13.3	35.8	8/71	114	SW	S	161	1.9	4.9	3.2
December	1,012.4	13.1	33.8	12/52	100	S	S	209	2.2	4.5	4.4
Year: **Totals**	..	..	..	..	..	..	..	**1,468**	**13.4**	..	**48.0**
Year: **Averages**	**1,016.2**	**12.3**	..	..	..	**N**	**S**	..	..	**4.7**	..
Year: **Extremes**	..	..	**36.9**	.. **24/7/70**	**119**	..	..	..	..	..	..

(*a*) Scale 0–8. (*b*) Early records not comparable. (*c*) Class-A Pan.

TEMPERATURE AND SUNSHINE

Month	Air temperature daily readings (°Celsius): Mean max.	Mean min.	Mean	Extreme air temperature (°Celsius): Highest		Lowest		Extreme temperature (°Celsius): Highest in sun		Lowest on grass		Mean daily hours sunshine
No. of years of record	120	120	120		123		123		86(a)		119	52(b)
January	25.8	13.9	19.9	45.6	13/39	5.6	28/85*	81.4	14/62*	-1.0	28/85*	8.1
February	25.7	14.2	19.9	43.1	7/01	4.6	24/24	75.3	15/70*	-0.6	6/91*	7.5
March	23.7	12.8	18.3	41.7	11/40	2.8	17/84*	73.6	1/68*	-1.7	(c)	6.6
April	20.1	10.5	15.3	34.9	5/38	1.6	24/88*	66.7	8/61*	-3.9	23/97*	5.1
May	16.5	8.3	12.4	28.7	7/05	-1.2	29/16	61.4	2/59*	-6.1	26/16	3.9
June	13.9	6.6	10.3	22.4	2/57	-2.2	11/66	53.9	11/61*	-6.7	30/29	3.4
July	13.3	5.7	9.5	23.1	30/75	-2.8	21/69*	52.1	27/80*	-6.4	12/03	3.7
August	14.8	6.4	10.6	25.0	20/85*	-2.1	11/63*	58.6	29/69*	-5.9	14/02	4.6
September	17.1	7.6	12.4	31.4	28/28	-0.6	3/40	61.2	20/67*	-5.1	8/18	5.5
October	19.5	9.2	14.4	36.9	24/14	0.1	3/71*	67.9	28/68*	-4.0	22/18	5.9
November	21.8	10.8	16.3	40.9	27/94*	2.4	2/96*	70.9	29/65*	-4.1	2/96*	6.5
December	24.1	12.6	18.4	43.7	15/76	4.4	4/70*	76.8	20/69*	0.7	1/04	7.3
Year: **Averages**	**19.9**	**9.9**	**14.8**	..	..	..	..	..	..	..	..	**5.7**
Year: **Extremes**	..	..	..	**45.6**	.. **13/1/39**	**-2.8**	.. **21/7/69**	**81.4**	.. **14/1/62**	**-6.7**	.. **30/6/29**	..

(*a*) Discontinued 1946. (*b*) Discontinued 1967. (*c*) 17/1884 and 20/1897.

HUMIDITY, RAINFALL, AND FOG

Month	Vapour pressure mean 9 a.m. (mb)	Rel. hum. (%) at 9 a.m.: Mean	Highest mean	Lowest mean	Rainfall (millimetres): Mean mthly	Mean no. of days of rain	Greatest monthly		Least monthly		Greatest in one day		Fog mean no. days
No. of years of record	68	68	71	71	120	120		123		123		122	118
January	13.1	61	68	50	48	8	176	1963	(a)	1932	108	29/63	0.1
February	14.1	63	77	48	50	7	238	1972	(a)	1965	87	26/46	0.3
March	13.3	66	79	50	54	9	191	1911	4	1934	90	5/19	0.7
April	11.7	72	82	66	59	11	195	1960	Nil	1923	80	23/60	1.8
May	10.3	79	88	69	57	14	142	1942	4	1934	51	15/74	3.6
June	9.3	83	92	73	50	14	115	1859	8	1858	43	21/04	4.6
July	8.9	81	87	73	49	15	178	1891	15	1902	74	12/91*	4.3
August	9.1	75	82	64	50	15	111	1939	12	1903	54	17/81*	2.3
September	9.5	68	76	60	59	14	201	1916	13	1907	59	23/16	0.8
October	10.5	63	72	52	68	14	193	1869	7	1914	61	21/53	0.4
November	11.3	61	73	52	59	12	206	1954	6	1895	73	21/54	0.2
December	12.5	60	72	48	58	10	182	1863	1	1972	100	4/54	0.2
Year: **Totals**	..	..	..	..	**661**	**143**	..	..	..	..	..	..	**19.3**
Year: **Averages**	**11.1**	**69**	..	..	..	..	..	..	..	..	..	..	..
Year: **Extremes**	..	..	**92**	**43**	..	..	**238**	**2/72**	**Nil**	**4/23**	**108**	.. **29/1/63**	..

(*a*) Less than 1 mm.

Figures such as 27/41, 28/85, etc., indicate, in respect of the month of reference, the day and year of the occurrence. Dates marked with an asterisk (*) relate to nineteenth century.

CLIMATIC DATA: HOBART, TASMANIA

(Lat. 42° 53' S., Long. 147° 20' E. Height above M.S.L. 54 metres)

BAROMETER, WIND, EVAPORATION, THUNDER, CLOUDS, AND CLEAR DAYS

Month	Mean of 9 a.m. and 3 p.m. atmospheric pressure reduced to mean sea level (mb)	Wind (height of anemometer 12 metres) Average (km/h)	Highest mean speed in one day (km/h)		Highest gust speed (km/h)	Prevailing direction 9 a.m.	Prevailing direction 3 p.m.	Mean amt evaporation (mm)	No. days thunder	Mean daily amt clouds 9 a.m., 3 p.m., 9 p.m. (a)	No. of clear days
No. of years of record	90	63		69	94	30(b)	30(b)	10(c)	64	90	30(b)
January	1,010.6	12.6	33.5	30/16	130	NNW	SSE	167	1.0	5.0	1.9
February	1,012.9	11.5	40.6	4/27	121	NNW	SSE	135	1.0	4.9	2.3
March	1,014.3	11.0	34.4	13/38	127	NW	SSE	109	0.7	4.8	2.4
April	1,015.5	10.9	38.8	9/52	141	NW	W	70	0.3	5.0	1.7
May	1,015.4	10.4	35.4	21/65	135	NNW	NW	38	0.0	5.0	2.4
June	1,015.2	10.2	38.2	27/20	132	NW	NW	22	0.0	5.0	2.4
July	1,014.0	10.7	36.9	22/53	129	NNW	NNW	26	0.0	4.8	2.0
August	1,012.8	10.9	41.0	19/26	140	NNW	NW	44	0.1	4.8	2.1
September	1,011.4	12.5	43.0	28/65	150	NNW	NW	73	0.1	4.9	1.5
October	1,010.3	12.6	32.4	3/65	140	NNW	SW	107	0.4	5.2	1.0
November	1,009.8	12.8	34.1	18/15	135	NNW	S	123	0.6	5.3	1.3
December	1,009.4	12.4	37.7	1/34	122	NNW	SSE	150	0.8	5.3	1.1
Year — **Totals**	..	..	..	..	..	..	..	**1,064**	**5.1**	..	**22.1**
Year — **Averages**	**1,012.6**	**11.5**	..	..	..	**NNW**	**W**	..	..	**5.0**	..
Year — **Extremes**	..	..	**43.0** **28/9/65**	..	**150**	..	..	..	..	..	..

(a) Scale 0–8. (b) Standard thirty years normal (1911-1940). (c) Class-A Pan.

TEMPERATURE AND SUNSHINE

Month	Air temperature daily readings (°Celsius) Mean max.	Mean min.	Mean	Extreme air temperature (°Celsius) Highest		Lowest		Extreme temperature (°Celsius) Highest in sun		Lowest on grass		Mean daily hours sunshine
No. of years of record	92	92	92		96		96		57(a)		92	79
January	21.4	11.5	16.5	40.8	4/76	4.5	(b)	71.1	(c)	-0.8	19/97*	7.9
February	21.5	11.8	16.7	40.2	12/99*	3.9	20/87*	73.9	24/68*	-2.0	—/87*	7.0
March	20.0	10.6	15.3	37.3	13/40	1.8	31/26	66.1	26/44	-2.5	30/02	6.4
April	17.1	8.7	12.9	30.6	1/41	0.6	14/63	61.1	18/93*	-3.9	—/86*	5.0
May	14.2	6.7	10.5	25.5	5/21	-1.6	30/02	53.3	(d)	-6.7	19/02	4.3
June	11.8	5.1	8.5	20.6	1/07	-2.8	25/72	50.0	12/94*	-7.7	24/63	3.9
July	11.4	4.4	7.9	21.0	30/75	-2.4	(f)	49.4	12/93*	-7.5	1/78	4.3
August	12.8	5.0	8.9	24.5	26/77	-1.8	5/62	54.4	—/87*	-6.6	7/09	5.0
September	14.9	6.2	10.6	28.2	29/73	-0.6	16/97*	58.9	23/93*	-7.6	16/26	5.9
October	16.7	7.5	12.1	33.4	24/14	0.0	12/89*	68.9	9/93*	-4.6	(e)	6.3
November	18.5	9.0	13.8	36.8	26/37	1.6	16/41	55.6	19/92*	-3.4	1/08	7.0
December	20.2	10.5	15.4	40.7	30/97*	3.3	3/06	71.9	10/39	-2.6	—/86*	7.2
Year — **Averages**	**16.7**	**8.1**	**12.4**	..	..	..	..	..	..	..	..	**5.9**
Year — **Extremes**	..	..	..	**40.8**	**4/1/1976**	**-2.8**	**25/6/72**	**73.9**	**24/2/1868**	**-7.7**	**24/6/1963**	..

(a) Period 1934-1938 not comparable; records discontinued 1946. (b) 09/1937 and 11/1937. (c) 05/1886 and 13/1905. (d) —/1899 and —/1893. (e) 1/1886 and 1/1899. (f) 11/1895 and 7/1973.

HUMIDITY, RAINFALL, AND FOG

Month	Vapour pressure mean 9 a.m. (mb)	Rel. hum. (%) at 9 a.m. Mean	Highest mean	Lowest mean	Rainfall (millimetres) Mean mthly	Mean No. of days of rain	Greatest monthly		Least monthly		Greatest in one day		Fog mean No. days
No. of years of record	77(a)	81	86	86	93	93		97		97		97(f)	64
January	11.0	58	81	45	49	11	150	1893	4	1958	75	30/16	0.3
February	11.7	62	83	49	42	10	171	1964	3	1914	56	1/54	0.1
March	11.0	65	78	52	47	11	255	1946	7	1943	88	17/46	0.3
April	10.0	70	84	57	55	12	248	1960	2	1904	133	23/60	0.3
May	8.8	75	86	61	49	14	214	1958	4	1913	47	3/73	1.1
June	7.9	78	91	61	59	14	238	1954	2	1979	147	7/54	1.7
July	7.6	78	87	72	54	15	157	1974	4	1950	64	18/22	1.4
August	7.9	73	86	59	49	16	161	1946	8	1892	65	2/76	0.7
September	8.3	66	81	52	52	15	201	1957	10	1951	156	15/57	0.2
October	9.1	62	74	52	64	17	193	1947	10	1914	66	4/06	0.1
November	9.6	59	73	49	56	14	188	1885	9	(d)	94	30/85*	0.1
December	10.6	58	73	42	57	13	196	(b)	5	(e)	85	5/41	0.1
Year — **Totals**	..	..	..	..	**633**	**162**	..	..	..	..	..	..	**6.1**
Year — **Averages**	**9.5**	**67**	..	..	..	..	..	..	..	..	..	..	..
Year — **Extremes**	..	..	**91**	**42**	..	..	**255**	**3/1946**	**2**	**(c)**	**156**	**15/9/57**	..

(a) 1894–1970. (b) 1897 and 1916. (c) 4/1904 and 6/1979. (d) 1919 and 1921. (e) 1897, 1915 and 1931. (f) Includes earlier records at Botanical Gardens.

Figures such as 30/16, 12/99, etc. indicate, in respect of the month of reference, the day and year of the occurrence. Dates marked with an asterisk (*) relate to nineteenth century.

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