

guide to singapore's weather

NEA METEOROLOGICAL SERVICES







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guide to singapore's weather

introduction >>>



This weather guidebook aims to provide readers with a summary of the general weather patterns in Singapore. It begins with the characteristics of our monsoon seasons followed by a brief description of the different types of weather phenomena Singapore experiences. These include Northeast Monsoon surges, Sumatra Squalls, Haze episodes and Sea breeze effect. With this chapter, we hope our readers will have a better understanding of our local weather and to know what to expect when experiencing certain weather phenomena.

Chapter 2 describes our main local weather elements of surface winds,

temperature, relative humidity, rainfall, thunderstorms and lightning and visibility. Included in this chapter are some weather statistics such as the maximum temperature ever recorded in a day, and the period of the longest dry spell in Singapore.

A chapter on our monthly weather highlights (Chapter 3) provides a guide to the general weather conditions that one can expect during each month of the year.

Singapore's climate is characterised by uniform temperature, pressure, high humidity and abundant rainfall throughout the year.

These arise from Singapore being surrounded by water and by our geographical position near 1.5° North of the Equator. Chapter 4 gives a summary of our climate statistics collected from 1982 – 2006 at Changi Meteorological Station.

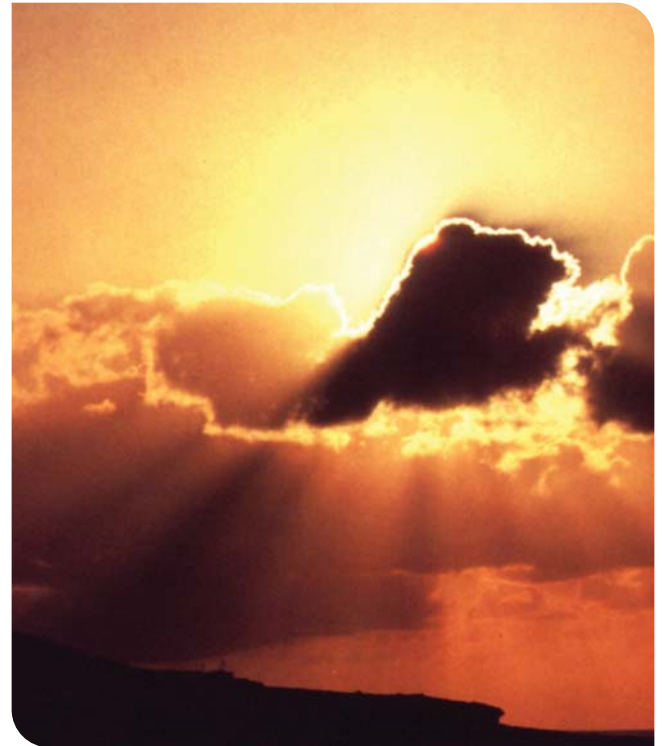
Lastly, we have included a listing of access to our weather products and services and contact information. We hope you will find this booklet interesting and educational.

Our monsoon characteristics >>>



Singapore has two main monsoon seasons, the Northeast Monsoon Season (December - March) and the Southwest Monsoon Season (June - September).

Separating these two monsoon seasons are two relatively short inter-monsoon periods (April - May and October - November). Although there are no distinct wet and dry periods, the mean monthly rainfall shows drier weather conditions from May to July and wetter conditions in the months of November to January.





The Northeast Monsoon Season can be divided into a wet phase and a dry phase. The wet phase of the Northeast Monsoon Season occurs in December and January while the later part of the Northeast Monsoon Season (late January and February) is in the dry phase where days are generally fair and occasionally windy with little or no rain.

The beginning and end of the monsoons are usually not very well-defined. Hence from year to year, there could be a delay in the onset and cessation of a monsoon period. This probably accounts for the monthly rainfall anomaly experienced from year to year.

Monsoon Season Prevailing Winds

Northeast Monsoon (Dec-Mar)

Northerly to northeasterly winds 6-8 m/s

Southwest Monsoon (June-Sept)

Southerly to southwesterly winds 6-8 m/s

Inter-Monsoon (April-May)

Light and variable

Inter-Monsoon (Oct-Nov)

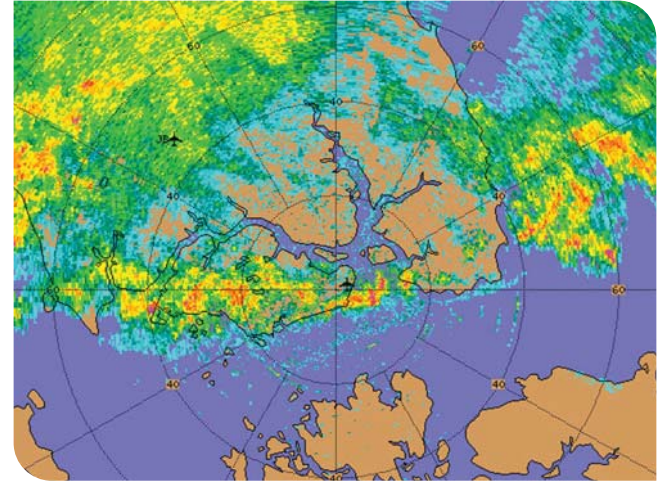
Light and variable, interacting with land and sea breezes

Weather Features

- Rapid development of afternoon and early evening showers.
- Monsoon Surges cause widespread continuous moderate to heavy rain, at times with 7-10 m/s winds in the first half of season.
- Windy and relatively dry towards end of season.
- Shower/thunderstorm activity occurs between predawn and midday. "Sumatra" squalls are common.
- Smoke haze is common during periods of widespread dry weather.
- Occasional wind gust of 12-22 m/s.
- Intense thunderstorm activity last < 30 minutes.
- Thunderstorms, at times severe, occur in the afternoon and early evening.
- Scattered thunderstorms, at times severe, occur in the afternoon and early evening.

Types of weather phenomena >>>





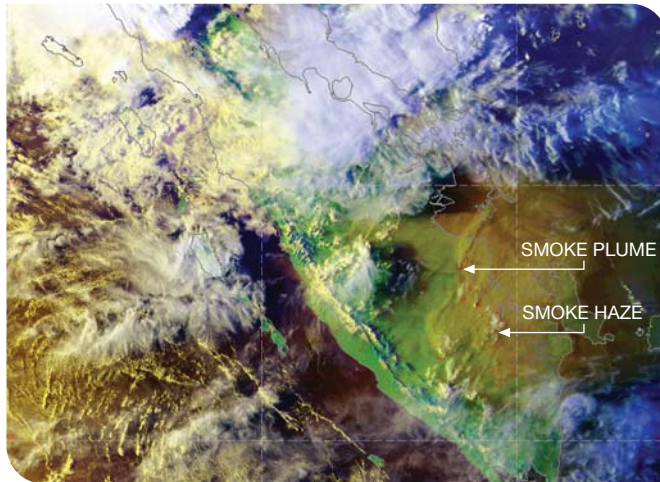
Northeast Monsoon Surge

A Northeast Monsoon surge is the surge of strong cold air from Central Asia turning clockwise as it extends southward. These produce strong, steady northeast winds over the South China Sea, extending equator-wards to Malaysia and Singapore. Locally, the surge causes prolonged widespread continuous moderate to heavy rain. Additionally, surface wind speeds of 10 to 12 m/s are not uncommon.



Sumatra Squalls

A “Sumatra” squall is an eastwards-moving line of thunderstorms. The line develops at night over Sumatra or the Malacca Straits and moves over the west coast of Peninsula Malaysia and Singapore in the pre-dawn and early morning hours during the Southwest Monsoon season. The squall is characterised by the onset of strong gusty surface winds accompanied by heavy rain over Singapore, lasting 1 to 2 hours. Following their passage, cloudy conditions with light rain sometimes persist till the early afternoon.



Widespread Prolonged Haze

Episodes of widespread prolonged haze usually over Singapore and the region occur during the latter part of the Southwest Monsoon season, particularly following a period of dry weather and persistent southeasterly/southwesterly winds. During a bad haze episode, visibility of four kilometres or less have been observed.



Sea Breeze Effect

Sea breeze is a steady wind that blows inland during the day from the sea. This is due to a temperature difference between the body of water and the land. The sea breeze carries humidity inland and mixes with the rising warm land air and in unstable conditions, form rain clouds in the afternoon.

Our weather elements >>>



Surface wind

The surface winds over Singapore generally follow the prevailing monsoon flow except where light winds are being modified by topography, showers or thunderstorms and land-sea breezes.

Mean surface wind speed is normally less than 20 km/h.

Maximum wind gust of up to 100 km/h have been recorded during a passage of a Sumatra squall.

Temperature

The diurnal temperature variation is small and is observed to reach highs of 31° to 33° Celsius during the day and lows of 23° to 25° Celsius during the night.

Based on climate records from 1929, the lowest temperature ever recorded was 19.4° Celsius on January 31, 1934 and the highest recorded temperature was on March 26, 1998 at 36.0° Celsius. The highest annual mean temperature was 28.3° Celsius (1997 and 1998) and the lowest annual mean temperature was 26.0° Celsius (1971 and 1974).

Relative Humidity

The relative humidity is high all year round and varies daily from more than 90% in the morning just before sunrise, and falling to around 60% in the mid afternoon on days when there is no rain. The mean annual relative humidity is 84.2%. Relative humidity reaches 100% frequently during periods of rain.

The lowest relative humidity recorded is 33% on April 1, 1966.



Rainfall

There is no distinct wet or dry season in Singapore. Rain falls every month of the year. There are two rainfall peaks - Northeast Monsoon month of December and the Inter-monsoon month of April. The Southwest Monsoon months from May to September are the drier period of the year.

Based on climate records between 1893 and 2006, the number of rain days is highest in the month of November and lowest in the month of February. In an average year, 2342.2 mm of rain falls in Singapore. January 1983 was the wettest month with 818.6 mm of rain recorded. February 1968 and February 2005 were the driest months with 8.4 mm of rain recorded.

The longest dry spell of 40 days occurred between 18 January and 20 February, 2005.

Thunderstorms and Lightning

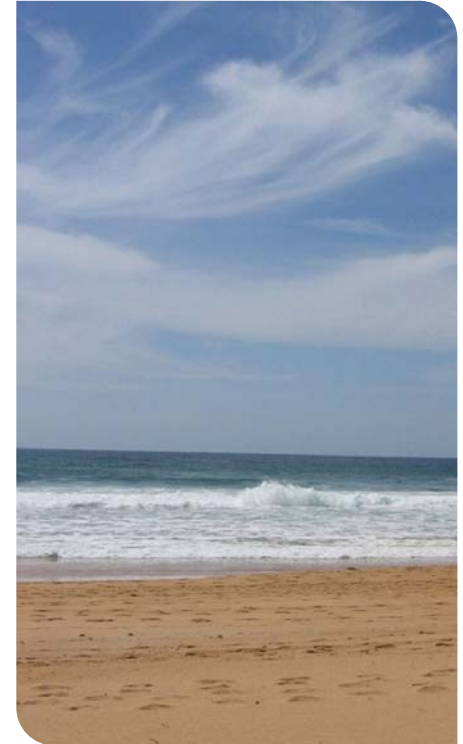
Thunderstorms occur all the year round, most frequently during the inter-monsoon months of April and November and least frequently during the Northeast Monsoon months of January and February. Lightning is one of the many hazards of thunderstorms.

Most thunderstorms occur between 1400 hrs and 1700 hrs. However, during the Southwest Monsoon season, thunderstorm occurrence is high between 0500 hrs and 0600 hrs. For the period from 1982 to 2006, there were an average of 166 thunderstorm days (days on which thunder is heard). Lightning often strikes outside of the heavy rain area and may occur as far as 16 km away from the rain area. 65% of lightning fatalities occur in open areas such as golf courses and 30% in unprotected areas such as under trees and open shelters.

Visibility

Visibility is generally good during the Northeast Monsoon months from late November to March except during showers/rain and thunderstorms. Slight to moderate haze is common during the Southwest Monsoon season and in light wind conditions during the inter-monsoon months. Generally, visibility is more than 10 km on most days of the year.

A bad episode of extensive smoke/haze can reduce visibility to below 4000 m. Poor visibility is often observed between 0500 hrs and 0900 hrs in light to calm wind conditions in mist. Following a few hours of rain in the afternoon, poor visibility is also sometimes observed in the early evening, particularly in almost calm wind conditions.



Our monthly weather highlights >>>



January

Scattered showers in the late morning and early afternoon on most days. Onset of Northeast Monsoon surge, widespread rain, heavy at times, can affect the island. Continuous rain for several days is not uncommon.

February

This is a generally dry month with moderate northeast winds and occasional gust of up to 14 m/s. Showers occur mostly in the afternoon and early evening. Occurrence of Northeast Monsoon surges are “dry” with gusty winds and little or no rain.

March

Northeast winds of 3-6 m/s continue to prevail and there is an increase in shower/thunderstorm activity. These occur mostly in the afternoon and early evening, frequently triggered by local sea breezes and solar heating of the land. Showers or thunderstorms through-out the day is not an uncommon occurrence.

April

Winds are generally light and variable. Solar heating, local land and sea breezes aid in the development of showers and thunderstorms which occur mostly in the afternoon and early evening. Days with west and southwest winds towards the end of the month usually bring “Sumatra-type” early morning thunderstorms on 2 to 3 days.





May

Winds are generally light and variable, with increasingly persistent southwesterly winds. The major rain-bearing systems over Singapore are the “Sumatras”. Scattered showers and thunderstorms occur in the late morning and afternoon and slightly hazy conditions are also experienced on some days.

June

Sumatras are the significant rain-bearing systems in June. Scattered showers and thunderstorms will usually occur in the late morning and early afternoon in the absence of Sumatras. Hazy conditions are experienced in periods of dry weather.

July

Sumatras are common and may last into the late afternoon on some days. In the absence of Sumatras, scattered showers/ thunderstorms occur in the late morning and early afternoon. Most afternoons are generally fair. Under favourable wind conditions, hazy conditions can be expected from time to time.

August

Other than the passage of Sumatra squalls across the island, showers/thunderstorms occur in the late morning, clearing by early afternoon. Periods of widespread hazy conditions are common. Poor visibility, caused by local early morning mist are also common during periods of light winds.

September

Generally hazy, with scattered showers/thunderstorms in the late morning and early afternoon. Sumatra-type early morning thunderstorms can still be experienced and during temporary incursions of northwesterly winds, late afternoon and early evening showers or thunderstorms are likely.

October

Generally hazy with variable winds. The effects of sea breezes often bring about afternoon showers/thunderstorms. Episodes of persistent and thick haze may be experienced.

November

Generally a wet month with light winds and high occurrence of thunderstorms. Showers/thunderstorms occur mainly over land in the afternoon and over sea areas in the night and early morning. Sumatra squalls can still be expected on 2 to 3 days. Slightly hazy conditions still likely in the first half of November.

December

The wettest month of the year, with scattered showers/thunderstorms occurring inland on most afternoons and over coastal and sea areas at night. Periodic outbreaks of continuous moderate to heavy rain for 2 to 3 days are common, with the onset of Northeast Monsoon surges.



Our month by month climate statistics >>>



Temperature

Month	Mean Daily Min ¹ (°C)	Daily Mean ² (°C)	Mean Daily Max ³ (°C)
January	23.9	26.5	30.4
February	24.3	27.1	31.6
March	24.6	27.6	32.1
April	25.0	27.9	32.3
May	25.4	28.3	32.2
June	25.4	28.3	31.9
July	25.1	27.9	31.4
August	25.0	27.8	31.4
September	24.8	27.6	31.4
October	24.6	27.6	31.7
November	24.3	27.0	31.1
December	24.0	26.4	30.2

¹ Calculated by averaging the daily minimum temperature for each month for the 25 year period (1982-2006)

² Calculated by averaging the daily temperature for each month for the 25 year period (1982-2006)

³ Calculated by averaging the daily maximum temperature for each month for the 25 year period (1982-2006)

Rainfall

Month	Mean total raindays ⁴	Occurrence of highest hourly mean ⁵ (hrs)	Monthly mean ⁶ (mm)
January	11.3	1500	247.7
February	6.9	1700	106.6
March	10.3	1500	162.1
April	11.6	1800	150.2
May	10.8	1300	166.9
June	10.1	0800	132.6
July	10.5	1300	152.8
August	11.2	1300	143.4
September	10.8	1400	157.4
October	12.3	1400	155.6
November	14.8	1600	255.7
December	16.5	1700	327.3

⁴ Calculated by averaging the total number of raindays for each month for the 25 year period (1982-2006)

⁵ Time of day for which the mean rainfall occurs for each month for the 25 year period (1982-2006) is the highest

⁶ Calculated by averaging the monthly total rainfall for each month for the 25 year period (1982-2006)

Surface wind

Month	Direction	Mean speed (m/s)	Max gust speed (m/s)
January	N/NE	2.7	20.3
February	N	2.8	17.8
March	NE	2.2	21.9
April	Variable	1.6	23.9
May	Variable	1.6	18.1
June	S	2.0	21.4
July	S	2.4	23.9
August	S	2.5	21.9
September	S/SE	2.0	21.4
October	Variable	1.5	20.3
November	Variable	1.4	21.1
December	N	2.0	17.2

Thunderstorms and Lightning

Month	Mean thunder days ⁷	Mean lightning days ⁸
January	4.4	5.5
February	5.4	5.2
March	11.9	13.9
April	19.2	22.6
May	19.2	22.3
June	15.0	17.3
July	13.4	14.6
August	13.4	12.4
September	14.9	13.6
October	18.1	19.5
November	18.6	23.6
December	12.5	16.0

⁷ Calculated by averaging the total number of days thunder is heard for each month for the 25 year period (1982-2006)

⁸ Calculated by averaging the total number of days lightning is detected for each month for the 25 year period (1982-2006)

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