

**CLIMATE  
AND  
AIR QUALITY**



## 2 CLIMATE AND AIR QUALITY

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### Geography

The Republic of Singapore is located between latitudes 1° 09'N and 1° 29'N and longitudes 103° 36'E and 104° 25'E.

The land area of Singapore is approximately 710.2 square kilometres in 2008. This area comprises the mainland and other islands. The mainland measures 47.2 kilometres from east to west and 23.2 kilometres from north to south with a coastline of 182.4 kilometres. The figures are based on 2.515m High Water Mark cadastral survey boundaries.

Singapore can be geographically divided into three major areas – the central hilly area with heavy deposits of granite in Bukit Timah, Bukit Panjang, Bukit Mandai and Bukit Batok; the western undulating area comprising Mount Faber Ridge and Pasir Panjang Ridge and the eastern coastal area consisting of alluvium and sediment stretches from Katong to Bedok and Changi.

### Climate

The main features of the climate of Singapore are the relatively stable temperature throughout the year due to its close proximity to the Equator and high humidity and abundant rainfall due to the maritime exposure of the island. The average daily maximum and minimum temperatures are around 31.1°C and 24.7°C respectively. The relative humidity is usually between 61 and 65 per cent on dry afternoons but frequently exceeds 90 per cent in the early hours of the morning before sunrise.

Although rain falls throughout the year, the wettest months are usually during the first part of the Northeast Monsoon season from November to January. During the Southwest Monsoon season, from May to September, early morning line squalls occasionally hit the island.

### Air Pollution

The ambient air quality in Singapore is monitored by the National Environment Agency through the Telemetric Air Quality Monitoring and Management System. The system comprises remote air monitoring stations linked to a Central Control Station via dial-up telephone lines.

These stations monitor both ambient and roadside air quality. Automatic analysers and equipment are deployed at the stations to measure the concentrations of major air pollutants such as sulphur dioxide (SO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>), carbon monoxide (CO), ozone (O<sub>3</sub>) and respirable suspended particles (PM 10).

The air quality in terms of the Pollutant Standards Index (PSI) was 'Good' on 96 per cent of the days and 'Moderate' on 4 per cent of the days in 2008. The air pollutants levels for SO<sub>2</sub>, NO<sub>x</sub>, CO, O<sub>3</sub> and PM10 in 2008 were also within the United States Environmental Protection Agency (USEPA) standards.

## 2.1 AIR TEMPERATURE AND SUNSHINE

	1998	2003	2004	2005	2006	2007	2008
Air Temperature in Degree Celsius							
Means							
Daily Maximum	32.1	31.4	31.7	31.9	31.5	31.1	31.1
Daily Minimum	25.3	25.1	25.1	25.1	25.0	24.8	24.7
Absolute Extremes							
Maximum	36.0	34.3	35.1	35.4	34.6	34.0	34.1
Minimum	22.5	22.0	21.1	21.3	22.1	21.8	21.8
Bright Sunshine							
Daily Mean Hours	5.7	5.4	6.0	6.1	5.6	5.3	5.2

Source : National Environment Agency

## 2.2 MEAN RELATIVE HUMIDITY AND RAINFALL

	1998	2003	2004	2005	2006	2007	2008
Mean Relative Humidity <sup>1</sup> at 2.00 pm (Per Cent)							
	71	73	71	71	73	74	72
Rainfall							
Total (mm)	2,623	2,391	2,136	1,931	2,753	2,886	2,325
Maximum in a Day (mm)	84	194	178	134	198	159	134
Number of Rainy Days	177	186	147	175	174	195	182

Source : National Environment Agency

<sup>1</sup> The ratio of the actual amount of water vapour in a given volume of air to the amount that would be present were the air saturated at the same temperature, expressed in percentages.

## 2.3 AIR POLLUTION LEVELS

	1998	2003	2004	2005	2006	2007	2008
Sulphur Dioxide ( $\mu\text{g} / \text{m}^3$ ) (mean)							
Industrial	30	19	19	17	17	17	15
Urban	21	15	12	14	9	11	10
Sub-Urban	10	12	11	10	9	9	8
Nitrogen Dioxide ( $\mu\text{g} / \text{m}^3$ ) (mean)							
Industrial	38	23	25	30	26	23	22
Urban	40	28	26	24	24	24	25
Sub-Urban	24	22	26	21	21	19	17
PM 10 ( $\mu\text{g} / \text{m}^3$ ) <sup>1</sup>							
(2nd Maximum 24-hourly mean)							
Industrial	95	83	80	92	228	60	56
Urban	77	80	79	90	221	69	56
Sub-Urban	85	80	85	101	203	55	50
Carbon Monoxide ( $\text{mg} / \text{m}^3$ )							
(2nd Maximum 8-hourly mean)							
Industrial	3.6	3.1	2.1	2.0	2.6	1.7	1.5
Urban	3.8	2.9	2.8	2.0	2.5	1.7	1.5
Sub-Urban	3.3	2.4	2.2	2.4	1.9	1.4	1.4
Ozone ( $\mu\text{g} / \text{m}^3$ )							
(4th Maximum 8-hourly mean)							
Industrial	94	105	117	137	123	103	93
Urban	103	97	143	153	108	120	96
Sub-Urban	34	99	127	125	125	140	85

Source : National Environment Agency

Notes : United States Environmental Protection Agency (USEPA) Standards for Air Quality

Sulphur Dioxide  $\leq 80 \mu\text{g}/\text{m}^3$  (annual mean)

Nitrogen Dioxide  $\leq 100 \mu\text{g}/\text{m}^3$  (annual mean)

PM 10 (Particulate Matter  $\leq 10$  microns)  $\leq 150 \mu\text{g}/\text{m}^3$  (2nd Maximum 24-hourly mean)

Carbon Monoxide  $\leq 10 \text{mg}/\text{m}^3$  (2nd Maximum 8-hourly mean)

Ozone  $\leq 157 \mu\text{g}/\text{m}^3$  (4th Maximum 8-hourly mean)

All measurements of air quality are corrected to reference temperature of 25 °C and pressure of 760 mm of mercury.

1 PM10 levels in 2006 were affected by transboundary smoke haze from the land and forest fires in Indonesia.