

## Singapore Climate 2023: The Year in Numbers

2023 was the fourth warmest year on record for Singapore, tied with 1997 and 2015. At the Changi climate station, the last 9 months of the year saw above-average temperatures, with record-breaking temperatures in May and October.

A wet start to 2023 contributed to Singapore's rainfall being the seventh highest since 1980<sup>1</sup>. February and March were exceptionally wet. However, there were four months with below-average rainfall, including in October when Singapore briefly experienced transboundary haze.

The year's weather was influenced by prevailing La Niña conditions that weakened in early 2023 followed by El Niño conditions in the second half of the year.

### Temperature

At the Changi climate station, the annual mean temperature in 2023 was 28.2°C, 0.4°C above the long-term<sup>2</sup> average and the fourth warmest on record since 1929 (Figure 1). The year saw high daily maximum and minimum temperatures - the annual mean daily maximum and minimum temperature of 31.9°C and 25.7°C were ranked sixth (tied with 2005, 2010, and 2015) and fourth highest on record respectively.

The mean temperature for the last decade from 2014 to 2023 reached a new high of 28.06°C, 0.05°C above the previous record for the decade from 2013 to 2022. This is the third consecutive year that Singapore's decadal mean temperature record was broken, with 5 of the top 10 warmest years occurring in the last decade.

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<sup>1</sup> Singapore average rainfall is calculated based on 32 islandwide stations with continuous rainfall records since 1980.

<sup>2</sup> This refers to the 30-year climatological reference period from 1991 to 2020.

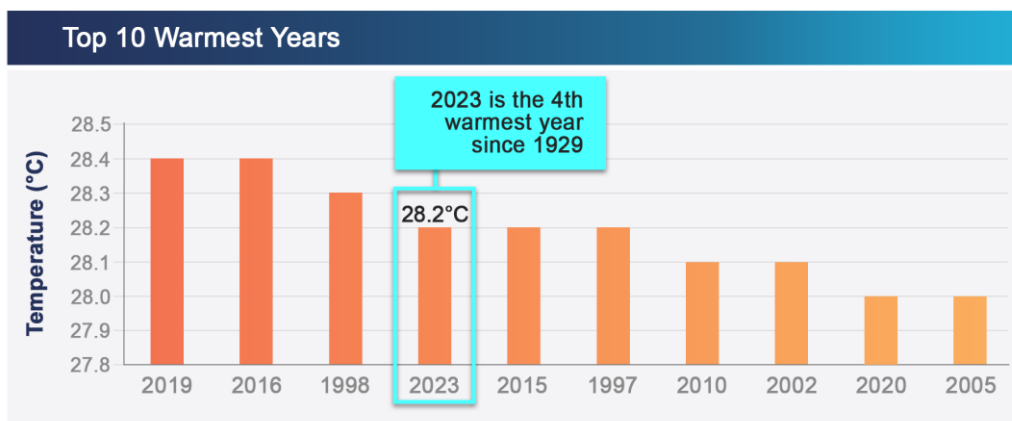


Figure 1: The ten warmest years on record at the Changi climate station since temperature records began in 1929.

Singapore experienced a cool start to 2023. Below average monthly temperatures were recorded at the Changi climate station from January to March. In particular, March (27.1°C) was 0.7°C below the month’s long-term mean and was the coolest March in the last 10 years.

From April, Singapore experienced warmer-than-average weather (Figures 2 - 4). The year’s warmest month was May with mean temperature of 29.5°C, 0.9°C above the long-term May average. Significantly, May 2023 was the warmest month on record, tying with March 1998. October was also exceptionally warm. The month’s mean temperature of 29.0°C was above the long-term average by a wide margin of 1.1°C, surpassing the previous warmest October on record in 2002 by 0.3°C. Other record-matching and record-breaking high temperatures during the year are listed in Table 2 (for the climate station) and Table 3 (for all stations), including the 37.0°C recorded on 13 May at Ang Mo Kio, which tied with 17 April 1983 at Tengah as the highest ever recorded temperature for all stations.

The warm temperatures coupled with other factors (humidity, wind speed and solar radiation) contributed to occurrences of high heat stress<sup>3</sup>. In 2023, Singapore experienced 37 days of high heat stress. Most of these days occurred in April, May, June, and October. The highest 15-min average Wet-Bulb Globe Temperature (WBGT) in 2023 was 34.8°C, recorded at Bishan Stadium on 24 October.

<sup>3</sup> Heat stress levels are based on Wet-Bulb Globe Temperature (WBGT). A day of high heat stress refers to a day when any station records at least one hourly-average WBGT value equal to or greater than 33°C. More information available at: <http://www.weather.gov.sg/learn-heat-stress/>.

### Singapore Monthly Mean Temperature for 2023

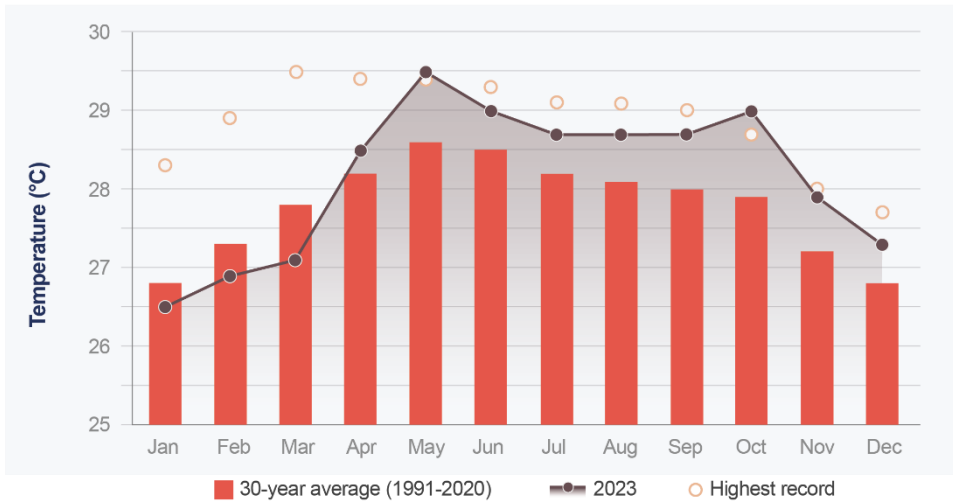


Figure 2: Climate station monthly mean temperature for 2023 (solid line), long-term average (bars, 1991– 2020) and the corresponding historical extremes (circle).

### Singapore Monthly Mean Daily Maximum Temperature for 2023

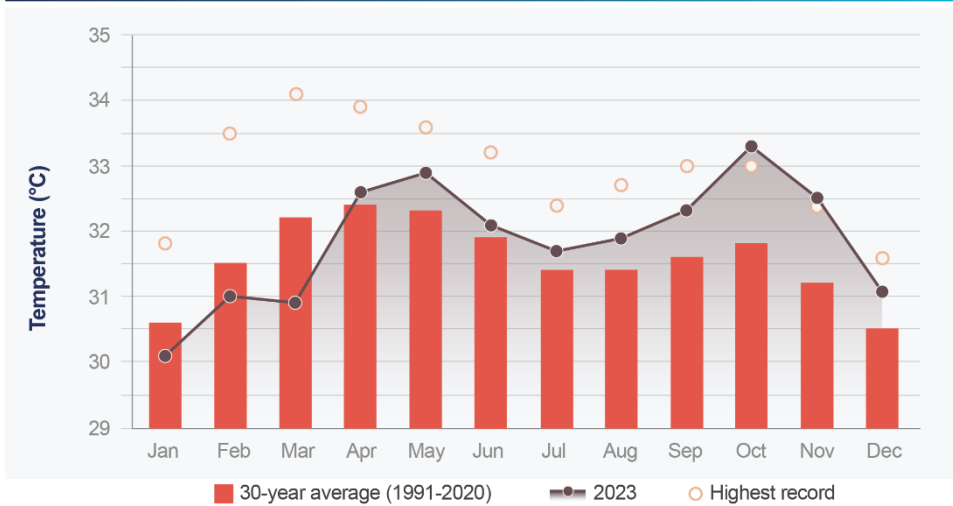


Figure 3: Climate station monthly mean daily maximum temperature for 2023 (solid line), long-term average (bars, 1991– 2020) and the corresponding historical extremes (circle).

### Singapore Monthly Mean Daily Minimum Temperature for 2023

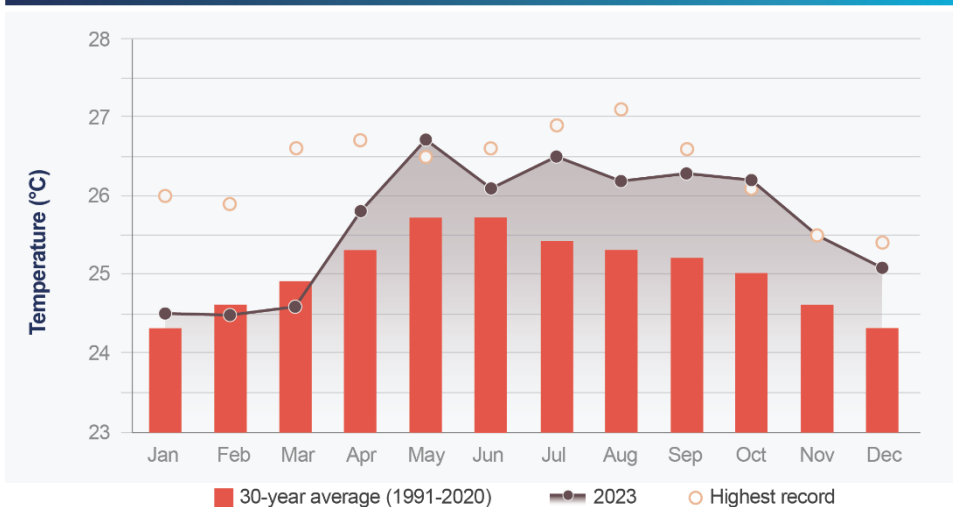


Figure 4: Climate station monthly mean daily minimum temperature for 2023 (solid line), long-term average (bars, 1991– 2020) and the corresponding historical extremes (circle).

## Rainfall

Singapore's annual total rainfall averaged across the islandwide stations<sup>4</sup> (2866.1 mm) was 13.1% above the long-term average of 2534.3 mm, making 2023 Singapore's seventh wettest year since 1980 (Figure 5). The Changi climate station recorded 2411.2 mm of rainfall in 2023, 14.1% above its long-term average of 2113.3 mm.

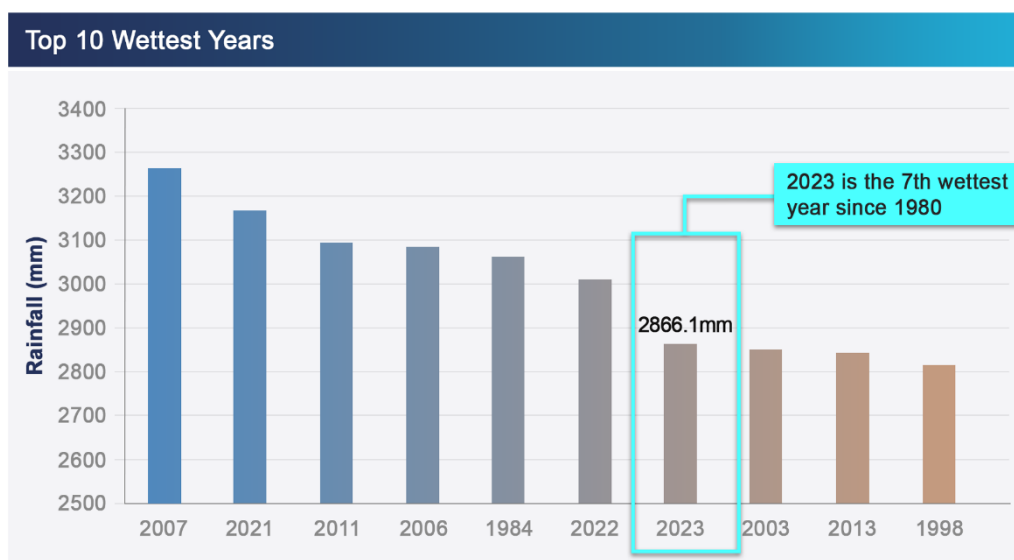


Figure 5: The ten wettest years on record at the islandwide stations since 1980.

February's islandwide average rainfall (342.0 mm) was more than twice the month's long-term average of 132.1 mm (Figure 6). Similarly, at the Changi climate station, February's rainfall was about three times the monthly long-term average (Figure 7). This makes February the fourth wettest February since 1980, both islandwide and at the climate station. The daily total rainfall of 225.5 mm recorded at Kallang on 28 February broke the previous record of 159.3 mm for the wettest February day by a wide margin. The exceptionally wet weather extended into March, with islandwide average rainfall 52.7% above the long-term monthly average, ranking it the fifth wettest March since 1980.

Although 2023 was generally wet, there were drier than normal months in April, May, August, and October (Figure 6). These months also turned out to be the top 10 driest for their respective months since 1980.

<sup>4</sup> The 32 stations with continuous rainfall records starting from 1980.

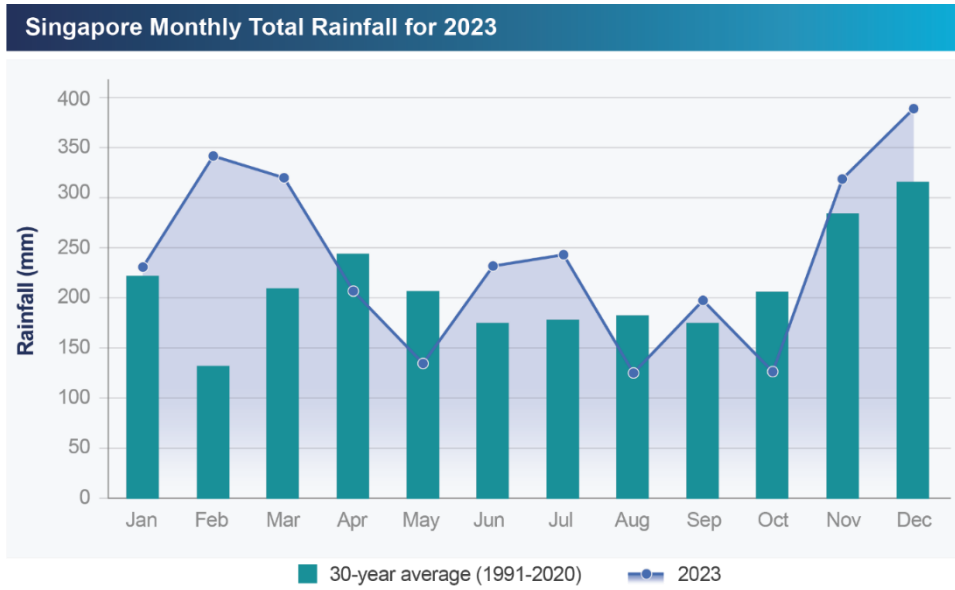


Figure 6: Singapore average monthly total rainfall for 2023 (solid line) and long-term average (bars, 1991 – 2020).

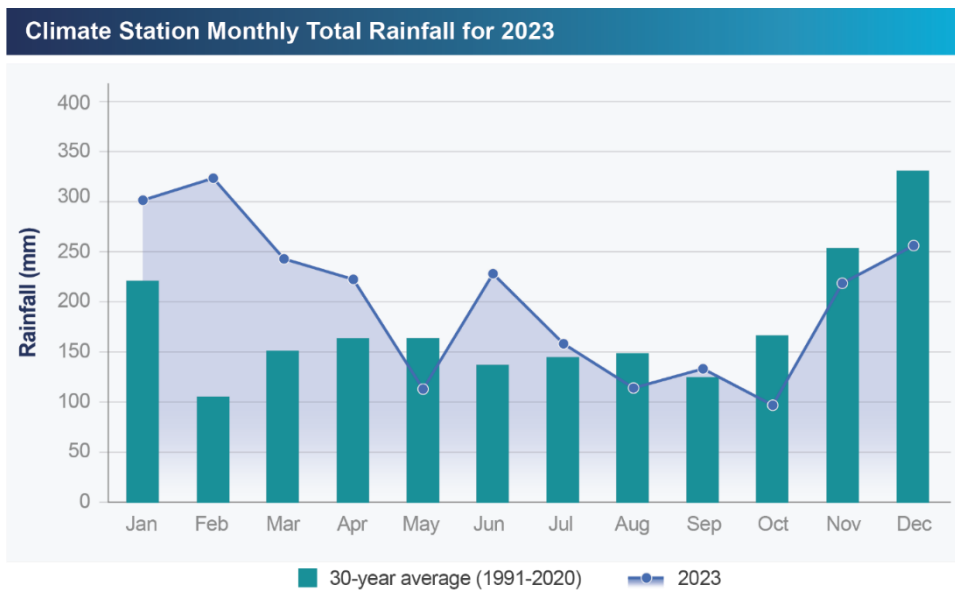


Figure 7: Climate station monthly total rainfall for 2023 (solid line) and long-term average (bars, 1991 – 2020).

## Weather Extremes and Records in 2023

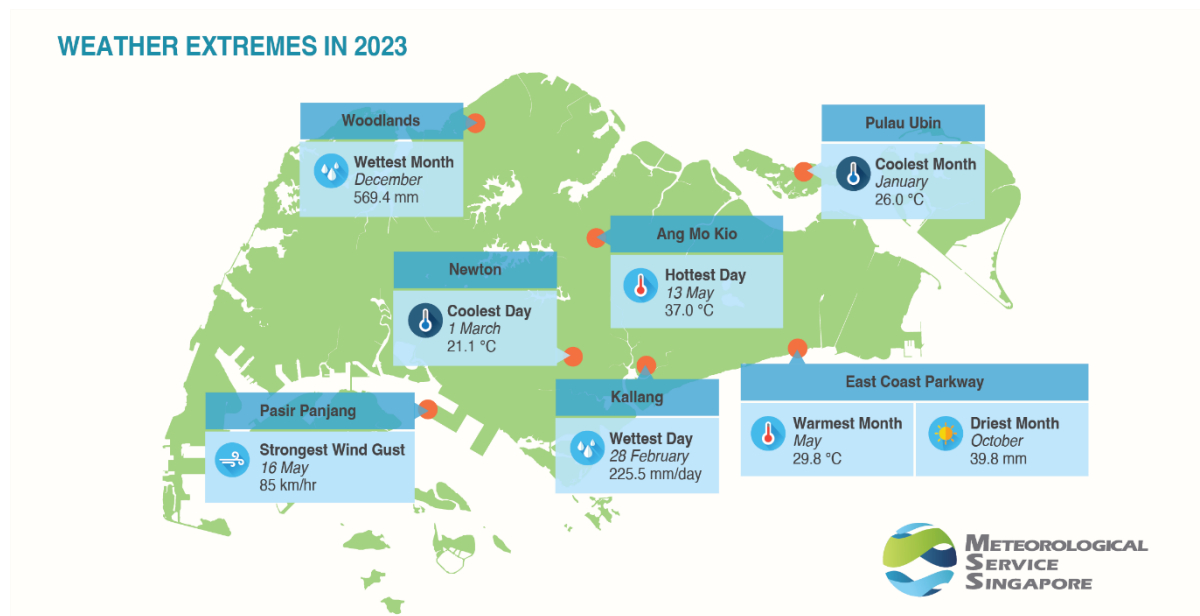


Figure 8: Extreme weather records based on all available stations in 2023.

	Climate Station Records	
	2023	Historical Extremes*
<b>Hottest Day (°C)</b>	35.0 13 May	<b>36.0</b> 26 Mar 1998
<b>Coolest Day (°C)</b>	21.7 15 Feb	<b>19.4</b> 30 – 31 Jan 1934
<b>Warmest Month (°C)</b>	29.5 May	<b>29.5</b> Mar 1998
<b>Coolest Month (°C)</b>	26.5 Jan	<b>24.2</b> Jan 1934
<b>Wettest Day (mm)</b>	154.8 28 Feb	<b>512.4</b> 2 Dec 1978
<b>Wettest Month (mm)</b>	324.4 Feb	<b>818.6</b> Jan 1893
<b>Driest Month (mm)</b>	96.6 Oct	<b>0.2</b> Feb 2014
<b>Strongest Wind Gust (km/h)</b>	59.3 19 Aug	<b>90.7</b> 29 Nov 2010

\*Rainfall records since 1869; temperature records since 1929; wind records since 1984

Table 1: Temperature, rainfall and wind extremes recorded at the climate station in 2023 and the corresponding historical extremes.

Record Temperatures for Climate Station			
Climate Extreme	2023	Previous Record (Year)	New Record
Highest Monthly Mean Temperature for May (°C)	May	29.4 (1998)	<b>29.5</b>
Highest Monthly Mean Daily Minimum Temperature for May (°C)	May	26.5 (2003, 2016 and 2019)	<b>26.7</b>
Highest Daily Minimum Temperature for August (°C)	10 Aug	28.2 (2020)	28.2
Highest Daily Minimum Temperature for September (°C)	4 Sep	27.9 (2015)	27.9
Highest Monthly Mean Temperature for October (°C)	Oct	28.7 (2002 and 2015)	<b>29.0</b>
Highest Monthly Mean Daily Maximum Temperature for October (°C)	Oct	33.0 (2002)	<b>33.3</b>
Highest Monthly Mean Daily Minimum Temperature for October (°C)	Oct	26.1 (2015)	<b>26.2</b>
Highest Daily Maximum Temperature for October (°C)	17 Oct	34.6 (2002, 2016, 2017 and 2022)	34.6
Highest Monthly Mean Daily Maximum Temperature for November (°C)	Nov	32.4 (2019)	<b>32.5</b>
Highest Monthly Mean Daily Minimum Temperature for November (°C)	Nov	25.5 (2015)	25.5
Highest Daily Maximum Temperature for November (°C)	11 Nov	34.4 (2019)	<b>34.6</b>

Table 2: Summary of record-matching and record-breaking (in bold) temperatures at the climate station in 2023.

Record Temperatures for All Stations				
Climate Extreme	Location	2023	Previous Record (Location, Year)	New Record
Highest Daily Maximum Temperature for May (°C)	Ang Mo Kio	13 May	36.7 (Admiralty, 2022)	<b>37.0</b>
Highest Daily Minimum Temperature for May (°C)	East Coast Parkway	25 May	29.5 (East Coast Parkway, 2022)	<b>29.7</b>
Highest Daily Minimum Temperature for September (°C)	East Coast Parkway	3 Sep	28.9 (Tengah, 2022)	28.9
Highest Monthly Mean Temperature for October (°C)	Tai Seng	Oct	29.4 (Marina Barrage, 2015)	29.4
Highest Daily Maximum Temperature for October (°C)	Admiralty	9 Oct	35.7 (Tengah, 2001; Clementi, 2019)	<b>36.3</b>
Highest Daily Minimum Temperature for October (°C)	East Coast Parkway	16 Oct	29.0 (Pasir Panjang, 2021)	<b>29.4</b>
Highest Daily Maximum Temperature for November (°C)	Newton	3 Nov	35.8 (Admiralty, 2019)	35.8

Table 3: Summary of record-matching and record-breaking (in bold) temperatures at all stations in 2023.