

2023 is marked by two distinct meteorological phenomena. This year's high temperatures persist beyond the summer season. This makes it the second hottest year after 2022. In addition, there has been a significant rainfall deficit for the third year running, well below normal levels.

An average annual temperature of 18°C in 2023

Since the early 1970s, every decade has shown a higher average temperature than the previous one. Readings taken since 2021 confirm this trend, and 2023 is no exception. It ranks as the second hottest year after 2022, which broke the absolute temperature record (35.10°C).

Over the period 2021-2023, the average maximum temperature has never been so high, at 20.3°C. Although there were no negative temperatures, the absolute minimum temperature was lower than the previous year, at 4.6°C compared with 5.3°C.

Temperatures continued to rise, deviating from the climate normal by 1.2°C.

For most of the year, temperatures remained above normal. Significant heat peaks are observed during the summer season. Indeed, the summer of 2023 was marked by periods of heatwave, as in the previous year. Temperatures remained high until early autumn. September and October were very mild in 2023, with average temperatures of 23.7°C and 20.3°C respectively.

For the second year running, the average temperature reached 18°C.

Following on from 2022, the average minimum temperature remained high in 2023 at 15.8°C. This is still lower than the previous year's record low of 16.2°C. Finally, in 2023, the average maximum temperature is 20.6°C. Although this is very warm, it is slightly lower than in 2022, when the peak was 20.8°C.

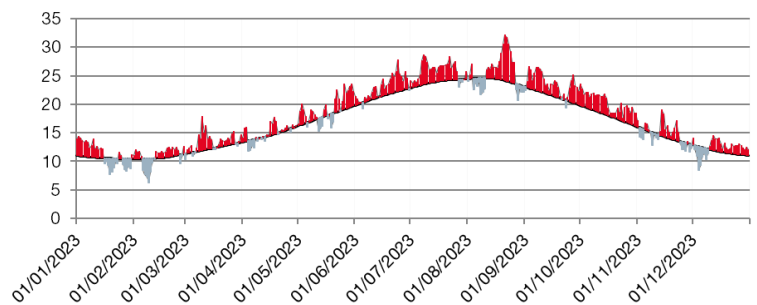
1. Ten-year temperature record

	Average	Average minimum	Average maximum	Absolute minimum	Absolute maximum
1971-1980	15.73	12.79	18.68		
1981-1990	16.23	13.37	19.08		
1991-2000	16.42	13.51	19.34	-1.50	33.70
2001-2010	16.77	13.96	19.57	-1.50	34.50
2011-2020	17.16	14.66	19.70	-0.80	34.70
2021-2023	17.66	15.64	20.27	4.10	35.10
2023	18.00	15.77	20.60	4.60	34.90

Unit: degree Celsius

Source: Department of the Environment, MSEE

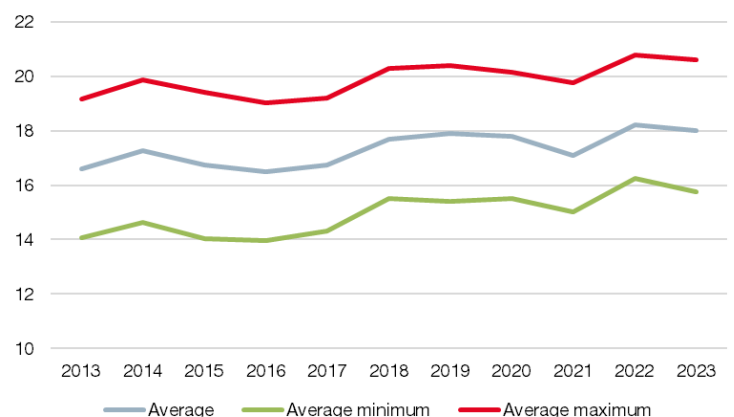
2. Departure of mean daily temperatures for 2023 from normal (1991-2020)



Unit: degree Celsius

Source: Department of the Environment, IMSEE

3. Average temperatures since 2013



Unit: degree Celsius

Source: Department of the Environment, IMSEE

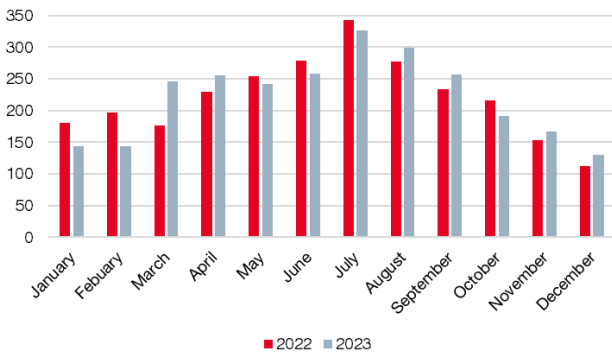
For the twelfth year running, Weather focus is analysing the Principality's weather and climate conditions. This study is based on data collected by the Jardin Exotique weather station, supplemented by sunshine and wind data collected by the Department of the Environment at the Oceanographic Museum.

Definition

Climate normals are made up of average rainfall and temperature values, calculated over a continuous period of thirty years at the end of each decade. The last normal was established for the period 1991-2020.

Sunshine stable compared with 2022

4. Monthly number of hours of sunshine in 2022 and 2023



Unit : hour

Source: Department of the Environment, IMSEE

2023, an even drier year than normal

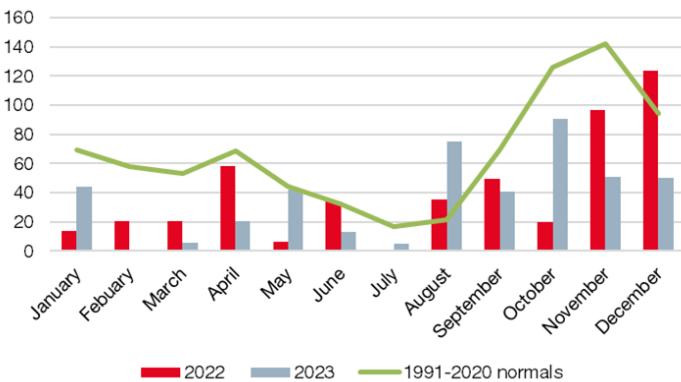
5. Ten-year rainfall record

	Average annual rainfall	Maximum annual rainfall	Date	Number of rainy days (≥ 1mm)	Absolute maximum in one day	Date
1971-1980	848	1,217	en 1979			
1981-1990	706	1,114	en 1984			
1991-2000	805	1,116	en 2000	64	115.2	on 25/10/1999
2001-2010	695	1,134	en 2008	63	110.0	on 05/11/2008
2011-2020	883	1,485	en 2014	63	148.4	on 04/10/2015
2011-2020	470			48	148.4	on 04/10/2015
2023	436			46	47.3	on 27/08/2023

Unit: millimetre

Source: Department of the Environment, IMSEE

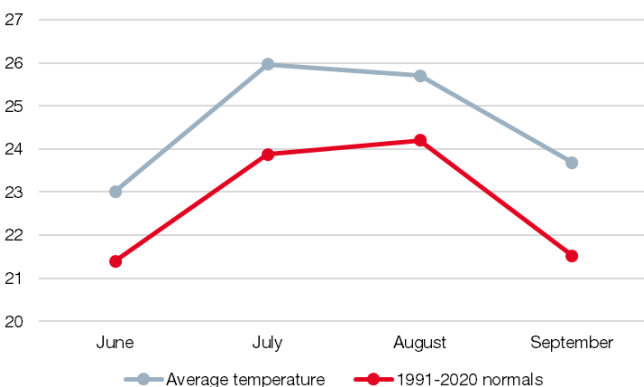
6. Cumulative rainfall 2023 and 2022 and 1991-20220 normals



Source: Department of the Environment, IMSEE

Summer 2023 ranked as the fourth hottest in the Principality

7. Average temperatures in 2023 and 91-20 normals during the summer period



Unit: degree Celsius

Source: Department of the Environment, IMSEE

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Sunshine contributes to Monaco's mild winters. There was an average of 7.3 hours of sunshine per day in 2023 (+0.3% compared with 2022), representing an annual total of 2,695 hours (9 more than the previous year). Sunshine levels vary from month to month. July has the most sunshine, with 326 hours (-17 hours compared with the same period in 2022).

By contrast, December has the fewest hours of sunshine, with 130 hours (+18 hours compared with 2022). February has the biggest drop compared with last year (-54 hours), while March has the biggest increase (+70 hours).

In 2023, average rainfall remains well below normal (436.4 mm compared with 794.5 mm). As a result, 2023 was one of the three driest years on record over the last two decades (355.6 mm in 2001 and 336.6 mm in 2007). What's more, this year saw only 46 days of rain, further underlining its exceptionally deficient nature. The number of rainy days was 17 days below normal. The absolute maximum in one day was 47.3 mm in August. This is almost the same as the previous year, with a daily maximum of 45.8 mm in December.

The first seven months of the year were very dry, with just 129.8 mm of rain, compared with 152.2 mm over the same period in 2022 (i.e. -22.4 mm of rain). The maximum monthly rainfall recorded was 90.2 mm in October 2023 (i.e. +70 mm compared with October 2022) and the lowest was 0 mm in February, compared with 20.2 mm for the same period the previous year. Only August, at +53.9 mm, showed cumulative rainfall above the 1991-2020 normal. The other months showed a deficit, particularly November, when 50.4 mm of rain fell, compared with a normal of 142.1 mm (-91.7 mm).

The year 2023 was marked by two heatwaves, from 22 to 24 July and from 19 to 25 August. The latter was one of the hottest on record since 1963, with an average temperature of 30.1°C. During the night of 21-22 August, the minimum temperature was 28.8°C.

The maximum temperature reached 34.9°C on 24 August 2023, making 2023 the second hottest year on record just after 2022 (with 35.1°C in July).

This makes the summer of 2023 the fourth hottest in the Principality, after 2003, 2019 and 2022. Between June and September, the average temperature was 24.6°C, representing 1.6°C of normal.