

2022 is marked by two meteorological phenomena. This year showed very high temperatures with an annual average of 18.2°C, 1.4°C above normal. There were also two heat waves. In addition, there was a significant rainfall deficit with 43 days of rain observed. This is 32% less than in a normal year.

### Record temperature of 35.1°C in 2022

For almost 50 years, each decade has been warmer than the previous one.

The year 2022 is not to be outdone and is in line with the trend of rising temperatures. The latter is significant for the minimum temperatures: there has been no negative temperature in the Principality and the absolute minimum temperature is the mildest ever recorded since the period 1991-2000 with 5.3°C.

The temperature has continued to rise over the last decade with a difference from the climate normal (see definition) of 1.4°C. This is the highest recorded since 1963.

Analysis of the daily data for 2022 shows that the majority of temperatures remained above the normal curve from May to September. The maximum temperature of 35.1°C was reached on 20 July 2022. In addition, the autumn was particularly warm.

Finally, only three months out of twelve had very slightly lower temperatures in 2022 than in 2021 namely February (-0.1 °C), March (-0.4 °C) and September (-0.3 °C).

The average temperature reached 18.2°C in 2022. This is the first time it has exceeded 18°C in the last ten years. In contrast, the lowest average temperature was in 2016 and 2017 (around 16 °C).

In 2022, the average minimum temperature was the highest ever at 16.2°C. The lowest average temperature was in 2016 with 14.0°C.

Finally, in 2022 the average maximum temperature is 20.8 °C. This is higher than in 2019, when the peak was 20.4°C.)

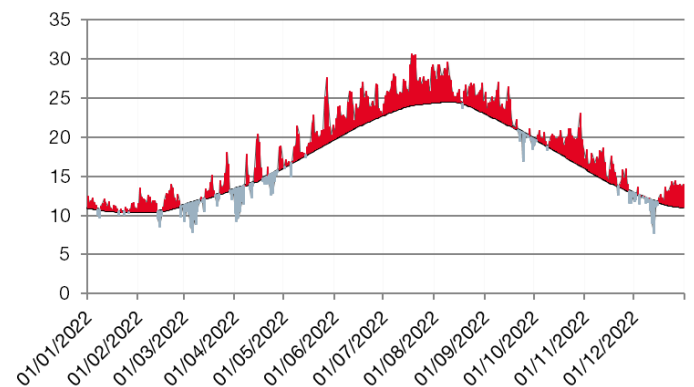
### 1. Ten-year temperature record

	Average	Average of minimums	Average of maximums	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	-1,5	33,7
2001-2010	16,77	13,96	19,57	-1,5	35,5
2011-2020	17,16	14,66	19,70	-0,8	34,7
2021-2022	17,66	15,64	20,27	5,3	35,1
2022	18,22	16,25	20,78	5,3	35,1

Unit: degree Celsius

Source: Department of the Environment

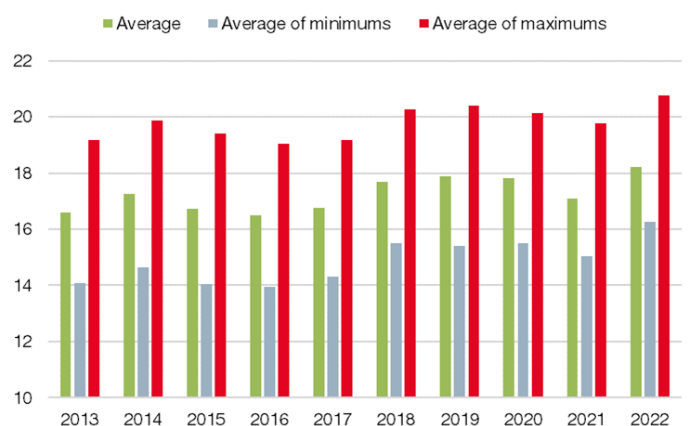
### 2. Daily average temperature difference from normal for the year 2022 (1991-2020)



Unit: degree Celsius

Source: Department of the Environment

### 3. Changes in average temperatures since 2013



Unit: degree Celsius

Source: Department of the Environment

- For the 11<sup>th</sup> consecutive year, the "Weather Focus" analyses the weather and climate conditions in the Principality. This study is based on data collected by the weather station at the Jardin Exotique and is completed by sunshine and wind data collected by the Department of the Environment at the Oceanographic Museum.

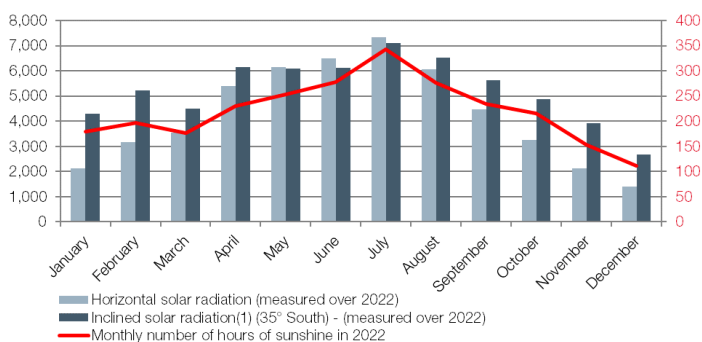
- Definitions**

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

- A 35° south-facing slope corresponds to an annual optimum for photovoltaic energy production.

## Sunshine in 2022 was higher than in 2021

### 4. Average daily sunshine (in Wh/m<sup>2</sup>) and monthly sunshine hours in 2022



Source: Department of the Environment

## 2022, another very dry year with a large deficit compared to normal

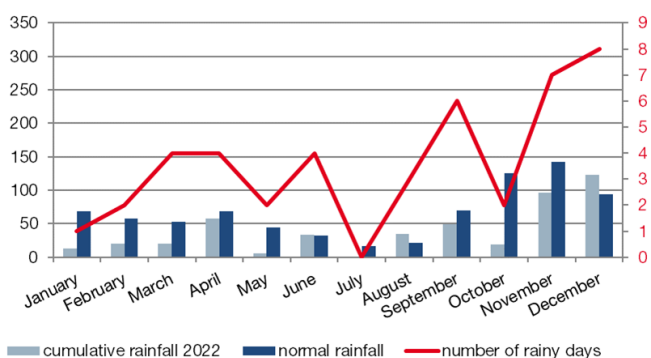
### 5. Ten-year rainfall balance

	Average annual rainfall	Annual maximum observed	Date	Number of rainy days (≥ 1mm)	Absolute max 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	le 25/10/1999
2001-2010	695	1 134	en 2008	63	110,0	le 05/11/2008
2011-2020	883	1 485	en 2014	63	148,4	le 04/10/2015
2021-2022	486	496	en 2021	51,0	45,8	le 15/12/2022
2022	476			43,0	45,8	le 15/12/2022

Unit: millimetre

Source: Department of the Environment

### 6. Number of rainy days and rainfall

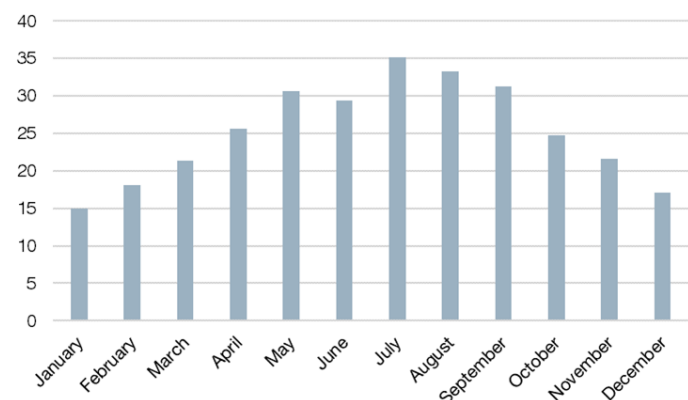


Unit: millimetre and number

Source: Department of the Environment

## An extremely hot year marked by heat waves during the summer season

### 7. Maximum daily temperatures reached per month in 2022



Unit: degree Celsius

Source: Department of the Environment

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Solar energy and sunshine contribute to the mild winters on the Côte d'Azur and in Monaco.

There were 7.26 hours of sunshine per day on average compared to 6.97 in 2021. This number increased by 4.2% with 2,650 cumulative hours compared to 2,543 hours of sunshine the previous year, i.e. 107 more in 2022. However, sunshine varies on a monthly basis. For example, July recorded 343 hours, 40 hours more than the same period in 2021. In January, there were 63 more hours of sunshine (180 hours compared to 117 in January 2021) while March had 70 fewer hours (176 hours compared to 247 in March 2021).

In 2022, average rainfall is significantly below normal (476.1 mm compared to 794.4 mm).

2022 is the fourth driest year in the Principality's history (336.6 mm of rain in 2007, 355.6 mm in 2001 and 465 mm in 1989). Moreover, the number of rainy days is 20 days less on average than what has been observed over the last thirty years. Finally, the absolute maximum in one day is 46 mm, whereas it was more than three times as much in the previous decade.

The first ten months of the year were very dry with only 256.2 mm of rain compared to 367.2 mm over the same period in 2021 (-111 mm of rain). The maximum monthly rainfall recorded was 123.5 mm in December 2022 and the lowest was 0.3 mm in July, the hottest period.

Only June and December show rainfall totals above the 1991-2020 normal with +1.7 mm and +29.5 mm respectively.

The other months were deficient, particularly October and January. In October, 19.5 mm of rain fell, compared to a normal of 125.7 mm, i.e. -106.3 mm. The same applies to January (13.5 mm of rain compared to 69.2 mm over the period 1991-2020, i.e. -55.7 mm of rain).

Two heat waves were observed during 2022. These occurred between 17 and 21 July and between 30 July and 10 August.

During these two periods, the minimum temperatures remained above 25.9°C and 24.9°C respectively. On the night of 19-20 July, the temperature remained at almost 29°C. During these hot days, daytime temperatures remained above 31°C.

The hottest temperatures were recorded on 27 May (30.6°C), 9 September (31.3°C), 4 August (33.3°C) and finally on 20 July with 35.1 °C, where the absolute maximum was reached.