IMSEE Monaco Statistics

FOCUS Weather

N° 117 — February 2022

Data as at 31 December 2021

In 2021, the trend of a rise in temperature is confirmed in the Principality. The annual rainfall report shows a particularly dry year with a deficit in the volume of precipitation recorded each month since May compared to normal, despite a fairly high number of rainy days (58 days compared to 63 on average). In terms of sunshine, the latter exceeds 2,500 hours.

Temperature: 2021, a particularly hot year during the summer season

Table 1. Temperatures by decade

	Average	Average of minimum values	Average of maximum values	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	17.09	15.03	19.76	4.1	34.2

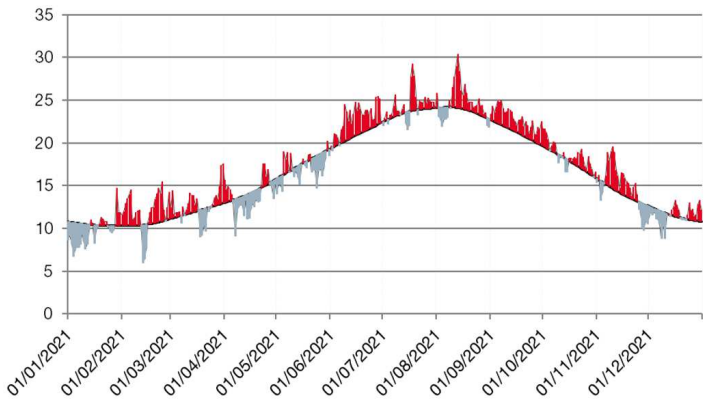
Unit: degree Celsius

Source: Department of the Environment

Since the early 1970s, each decade has shown a higher average temperature than the previous one. The values recorded over the last ten years confirm this trend.

The increase in temperatures is particularly significant for minimum temperatures. Indeed, as in the previous two years, no negative temperatures were recorded in 2021, where the absolute minimum for the year was 4.1°C.

Figure 1. Divergence of average daily temperatures in 2021 from climate normal (1981–2010)

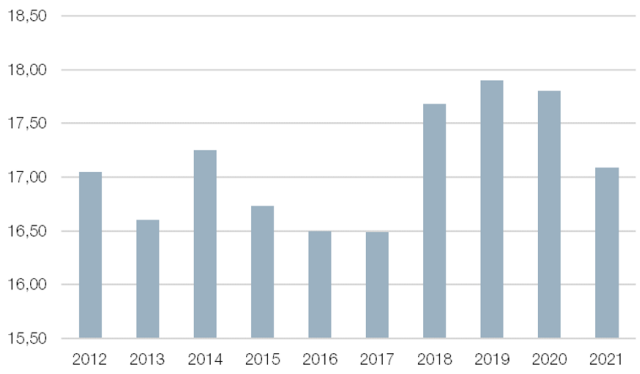


Unit: degree Celsius

Source: Department of the Environment

The year 2021 is in line with the last decade with + 0.66°C compared to the climate normal (see definition). Analysis of the daily data shows that 2021 was a particularly hot year, especially during the summer period when temperatures remained above normal for most of the season, with consecutive episodes of very high temperatures from June to September. It was during this period that the absolute maximum for the year was recorded with 34.20°C on 13 August 2021. In addition, the autumn was particularly warm, while the spring was cooler than usual.

Figure 2. Change in average temperature since 2012



Unit: degree Celsius

Source: Department of the Environment

The years 2018, 2019 and 2020 were the years with the highest average temperature, peaking in 2019 (17.90°C) and then decreasing in the following two years, reaching 17.09°C in 2021.

In contrast, the years with the lowest average temperature were 2016 and 2017 with 16.50°C and 16.48°C.

For the 10th 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 Environment Department at the Oceanographic Museum.

Definitions

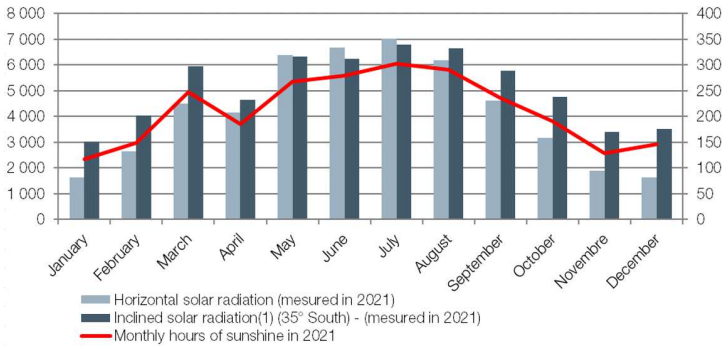
- The climate normals are the average values of rainfall and temperature, calculated over a continuous period of thirty years at the end of each decade, the last normal being established for the period 1981-2010.
- A south-facing slope of 35° corresponds to an annual optimum for photovoltaic energy production.

Sunshine: nearly 7 hours of sunshine per day on average

Solar energy and sunshine contribute to the mildness of the Côte d'Azur and Monaco winters. There were nearly 7 hours of sunshine per day on average in 2021.

The number of hours of sunshine decreased slightly compared to 2020 (-1.8%) with 2,543 cumulative hours compared to 2,590 hours, i.e. 47 fewer hours of sunshine. However, sunshine varies according to the period. There were 73 more hours of sunshine in March, while April had 61 fewer hours and November and February had 35 fewer hours.

Figure 3. Average daily sunshine (in Wh/m²) and number of hours of sunshine per month in 2021



Source: Department of the Environment

Rainfall: 2021, a very dry year

Average rainfall over the decade 2011-2020 remains above normal (883 mm compared to 735.4 mm). The record year was 2014 with very heavy rainfall (1,485 mm).

In cumulative terms, it rained 496 mm in Monaco in 2021. This is well below the normal level. The number of rainy days is also 5 days less than what has been observed over the last thirty years (58 days in 2021 compared with 63 days on average). This deficit in precipitation can be explained in particular by the absence of very intense meteorological episodes over the whole year. Indeed, the highest cumulative daily rainfall recorded was 34.6 mm on 9 February 2021 at the Jardin Exotique station.

January, February, April and May show higher than expected rainfall totals.

The other months were below their normal values, particularly March, June and October. In fact, 9.20 mm fell in March compared to a normal of 41.90 mm (-32.7 mm). The same is true for June, when 2.50 mm of rain fell instead of the average of 34.60 mm (-32.1 mm of rain). It is also the month with the least rainfall. Finally, October had the greatest deficit with -101.4 mm of rain compared to normal.

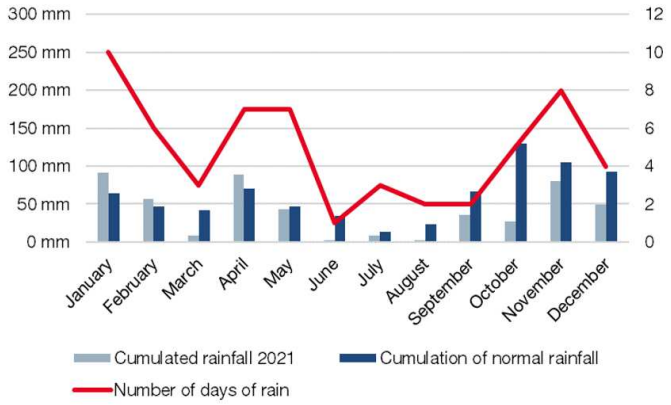
Table 2. Rainfall by decade

	Annual average rainfall	Observed maximum average rainfall	Date	Number of days of rain (≥ 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	on 10/25/1999
2001-2010	695	1.134	en 2008	63	110,0	on 11/05/2008
2011-2020	883	1.485	en 2014	63	148,4	on 10/04/2015
2021	496			58	34.6	on 02/09/2021

Unit: millimeter

Source: Department of the Environment

Figure 4. Number of days of rain and rainfall



Source: Department of the Environment

Wind: a gust of more than 93 km/h

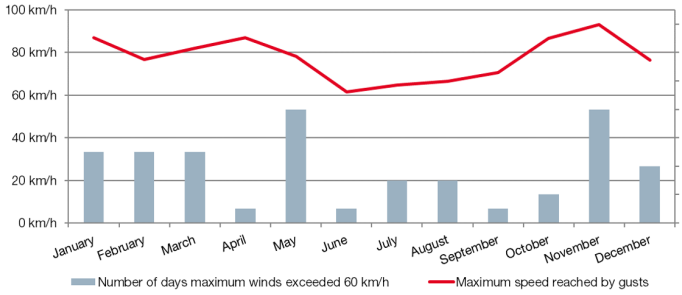
In 2021, wind gusts exceeded 60 km/h on 46 days (compared to 40 days in 2020 and 50 in 2019).

The strongest wind gust recorded during 2021 was 93.20 km/h on 15 November at the weather station on the roof of the Oceanographic Museum. In the same month, the wind blew at over 60 km/h for 8 days.

January also recorded a strong gust of 87.10 km/h on the 23rd. This month the wind blew at more than 60 km/h on 5 days.

During the summer, the wind blew at more than 60 km/h for 8 days.

Figure 5. Number of windy days and maximum gust



Source: Department of the Environment

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