



Videos by Reuters

## The Floods This Time: In the Mediterranean, Climate Change Is Already Here

By Samuel Granados Jan. 14, 2025

Short, heavy rainfall is typical of the Mediterranean, but like many of the climate extremes in recent years, including the current fires in Los Angeles, nothing is typical about what has been happening there recently.

In the autumn, deadly floods wreaked havoc along an arc from Spain to the Balkans, and from Morocco to Libya. More than 200 people were killed in Valencia in October, not long after a deluge dumped five times the month's ordinary rainfall across Europe in a single week.

Scientists say climate change is increasing not just the strength of the Mediterranean's devastating storms but also the frequency — and they predict that it will get only worse.



The coastal areas of the Mediterranean basin have always been prone to extreme precipitation, especially in places where there are mountains near

the sea.

But it's gotten worse. More rain falls now during extreme precipitation



In some areas, disaster is beginning to feel like the new normal.

Sources: Euro-Mediterranean Center on Climate Change and the International Disaster Database • Note: The map shows daily accumulated precipitation for the 99th percentile (top 1 percent) of recorded wet days for the time period.

The intensity of these extreme precipitation events is likely to increase in the coming decades, said Leone Cavicchia, a scientist at the Euro-Mediterranean Center on Climate Change.

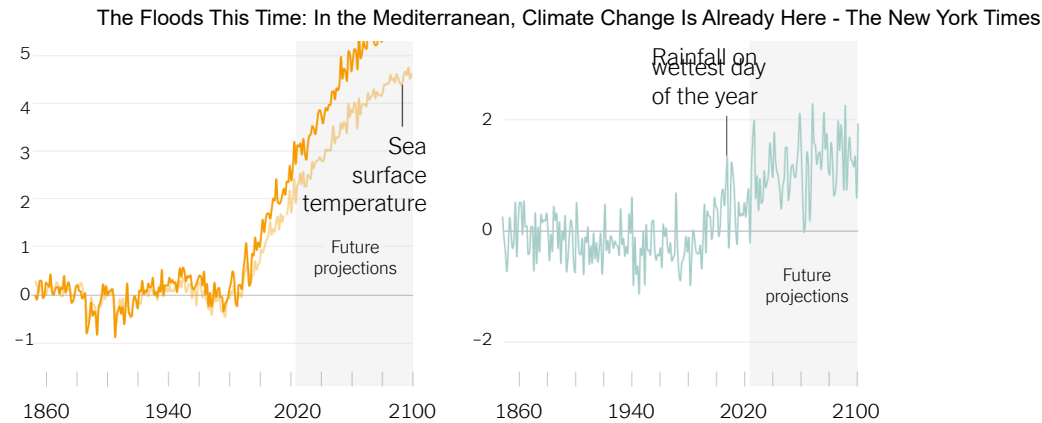
That is partly because the Mediterranean region is already warming 20 percent faster than the global average. And as the temperature of the air rises, so does its capacity to hold water.

### Projected Mediterranean Climate Change

#### Air and sea temperatures

#### Extreme precipitation





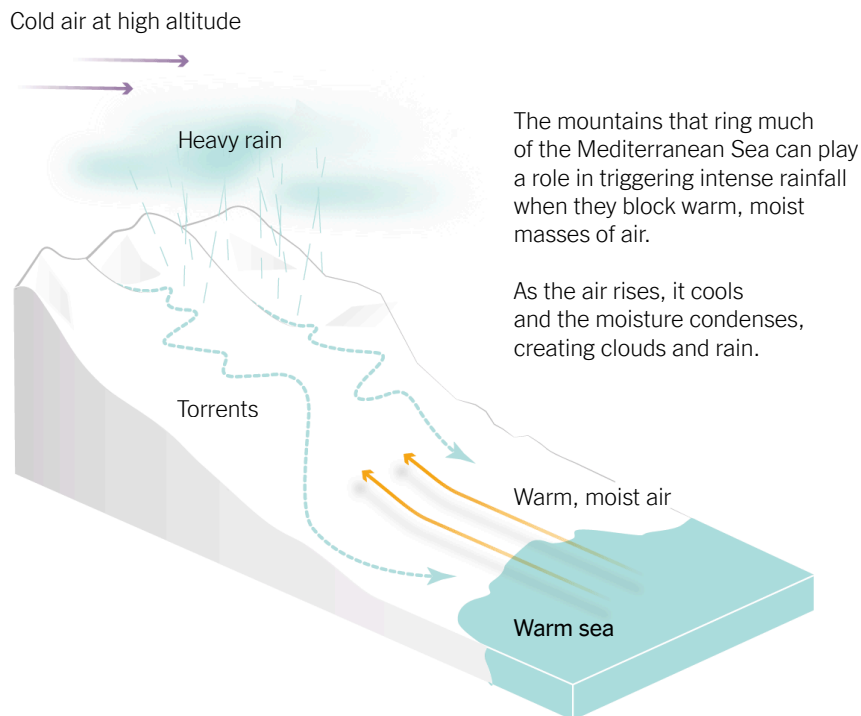
Source: CMIP6 data via C3S/ECMWF • Projections shown come from an intermediate emissions scenario and reflect changes compared to 1850-1900.

Climate models suggest that even as heavy rainfall events in the Mediterranean region intensify, average rainfall will decrease. In other words, dry areas will be drier, but when extreme rains come, they will be more intense.

### A geography tailor-made for flash floods

The mountains, closed sea and dry riverbeds around the Mediterranean Sea make the area particularly at risk of flash flooding.

Most waterways in the region are fairly dry for long periods of the year. When heavy rains come, the water quickly concentrates in steep river beds, and can rise several meters in just a few hours, said Francesco Dottori, an associate professor of hydrology at the University School for Advanced Studies in Pavia, Italy.

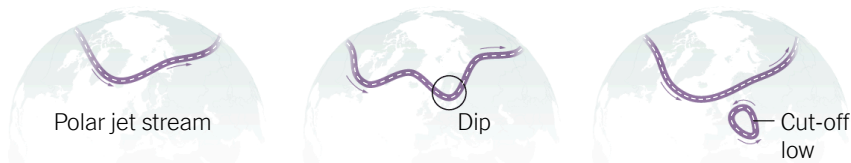




The Mediterranean Sea is warming faster than other bodies of water in part because it is a practically closed sea. That makes it a potent source of moisture that the winds can carry inland, feeding rainfall systems, often over the coastal areas in which much of the Mediterranean population is concentrated.

The strong atmospheric currents of the polar jet stream also play a role in the region's weather. As the currents oscillate, they make north-south waves whose crests send warm air to the north and whose troughs send cold air to the south.

Sometimes, when part of the jet stream breaks away, it forms a low-pressure system known as a cut-off low. That can linger for days, causing instability when it meets the warmer Mediterranean air.



That is what happened in September, when Storm Boris originated as one such low pressure system and went on to cause devastation in Central and Southern Europe, where it killed at least 24 people. It was another cut-off low that caused the flooding soon after in Valencia, where hundreds died. And last year, a cut-off low over Greece unleashed Storm Daniel, which strengthened as it crossed the Mediterranean into Libya, killing 13,200 after two dams burst.

### Growing populations mean even more people are at risk



Sources: European Commission, Joint Research Centre (JRC)

Over recent decades, most coastal and floodplain areas in the Mediterranean region have also become densely urbanized, leaving little space for waterways. Those changes don't just amplify the risk of flooding — they also put more people in harm's way.

Floods have become generally less deadly thanks to the improvements in flood protection structures and early warning systems. But more homes and properties are being hit because of urban development and population growth, said Mr. Dottori, who helped develop the European Flood Awareness System.

The population of Mediterranean countries has more than doubled since the 1960s. Today, about 250 million people in Mediterranean countries reside in river basins, where flooding is more likely.