

Study documents dramatic loss of remaining Pyrenees glaciers

September 3 2021, by Aritz Parra



A view of the Petit Vignemale glacier, left, and the Oulettes, right, on the Vignemale massif's north face in the Pyrenean mountain range, as seen from the Gaube valley in southern France, Sunday, Aug. 3, 2020. Spanish scientists say Europe's southernmost glaciers will likely be reduced to ice patches in the next two decades due to climate change. The study also found that the shrinking of ice mass on the Pyrenees mountain range is continuing at the steady but rapid speed seen at least since the 1980s. Credit: AP Photo/Aritz Parra

Europe's southernmost glaciers will likely be reduced to ice patches in the next two decades due to climate change, as the shrinking of ice mass on the Pyrenees mountain range continues at the steady but rapid speed seen at least since the 1980s, Spanish scientists say [in a new study](#).

The Pyrenees, marking the natural border between Spain and France, saw three glaciers disappear or become reduced to stagnant strips of ice since 2011. In 17 of the two dozen remaining ice sheets, there's been an average loss of 6.3 meters (20 feet) of ice thickness.

Their mass also shrank over one-fifth on average, or 23%, in nearly one decade, according to the study published last week in the peer-reviewed *Geophysical Research Letters*. Its findings were announced to the media on Friday.

The Spanish scientists blamed [climate change](#) for the retreat, and in particular a 1.5-degree-Celsius (2.7 Fahrenheit) overall temperature increase in the Pyrenean region since the 19th century.

"What we are seeing here is an advance warning of what may happen in other mountains, like in the Alps," said Jesús Revuelto, one of the study's authors. "Their glaciers have much more mass and entity, but we are showing them the way."

Geologist Ixeia Vidaller, another leading author, said that the loss of ice mass was also a "tragedy" for the Pyrenean landscape, with yet-to-be-seen effects on biodiversity.



A view of the Petit Rock sediments from the Petit Vignemale glacier, left, and the Oulettes glacier on the Vignemale massif's north face in the Pyrenean mountain range, as seen from the Gaube valley in southern France, Sunday, Aug. 3, 2020. Spanish scientists say Europe's southernmost glaciers will likely be reduced to ice patches in the next two decades due to climate change. The study also found that the shrinking of ice mass on the Pyrenees mountain range is continuing at the steady but rapid speed seen at least since the 1980s. Credit: AP Photo/Aritz Parra

The researchers work for the Pyrenean Institute of Ecology, or IPE, a branch of Spain's main public scientific research body, the CSIC. They used high-resolution satellite imagery and visuals obtained by research flights in 2011 to map the ice mass evolution, comparing it with data obtained in field visits and 3D models of the mountain ridges produced

last summer with the help of drones.

The scientists found a loss of up to 20 meters (66 feet) of ice thickness in parts of some of the fastest-melting glaciers. The diminishing of the four largest of them is more consistent than that of the smaller-sized among the studied ice sheets, they said, as the ice in many cases has already retreated to the shade of ridges carved by centuries of erosion.

Comparing to other existing studies about past ice loss, IPE's research also found that the annual rate of ice mass loss has not slowed down since the 1980s.

"We can argue with confidence that Pyrenean glaciers are in extreme jeopardy and could disappear or become residual ice patches in about two decades," the scientists wrote.

A recent major report by scientists for the United Nations calls climate change clearly human-caused, "unequivocal" and "an established fact." It also says that temperatures in about a decade will probably blow past a level of warming that [world leaders](#) have sought to prevent.



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The Mediterranean basin, shared by southern Europe, the Middle East and northern Africa, is being identified by U.N. experts as a "climate change hot spot," likely to endure devastating heat waves, water shortages and loss of biodiversity, among other consequences.

More information: I. Vidaller et al, Toward an ice-free mountain range: demise of Pyrenean glaciers during 2011–2020, *Geophysical Research Letters* (2021). [DOI: 10.1029/2021GL094339](https://doi.org/10.1029/2021GL094339)

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Citation: Study documents dramatic loss of remaining Pyrenees glaciers (2021, September 3) retrieved 11 May 2024 from <https://phys.org/news/2021-09-documents-loss-pyrenees-glaciers.html>

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