

‘Forever chemicals’ found to accumulate in Antarctic Waters

- The levels of these chemical compounds in waters near the frozen continent are similar to those in the North Atlantic.
- The study, carried out by two CSIC research centers, shows that these persistent pollutants cross ocean current barriers through marine aerosols and are deposited in Antarctic waters as rain or snow.
- The results confirm the global distribution of these chemical compounds and highlight their long-term environmental risk.



Research Vessel *Hespérides* during the ANTOM-II oceanographic campaign, Bransfield Strait, January 2022 / Jon Iriarte (IDAEA-CSIC)

Barcelona, November 10, 2025. A study led by the [Institute of Environmental Assessment and Water Research \(IDAEA-CSIC\)](#) and the [Institute of General Organic Chemistry \(IQOG-CSIC\)](#) has discovered that perfluoroalkyl acids (PFAAs), synthetic compounds used in industry and consumer products, reach unexpectedly high levels in waters near Antarctica. The study, published in [Communications Earth & Environment](#), is the first to prove that PFAAs transported to Antarctica via marine aerosols and subsequently deposited through wet atmospheric deposition (rain or snow) accumulate

in the Southern Ocean near the Antarctic Peninsula. This research rewrites the dominant global transport mechanisms of these pollutants identified to date.

Per- and polyfluoroalkyl substances (PFAS) are a family of chemical compounds highly resistant to degradation. Due to their properties, they have been widely used as non-stick agents in products such as food packaging, a variety of textiles, construction and firefighting materials, cosmetics, and more. Some of them, such as perfluorooctanoic acid (PFOA), are carcinogenic to humans and other animals, while others, such as perfluorooctane sulfonate (PFOS), are considered possible carcinogens according to the International Agency for Research on Cancer (IARC) of the World Health Organization. Beyond their widespread presence, their extreme persistence in the environment is concerning, which is why these compounds are known as *forever chemicals*.

“Fifteen years ago, it was suggested that PFAS could not reach Antarctica via ocean currents. With this study, we have demonstrated that they do, but through atmospheric transport, via snow and rain. The key point is that concentrations are increasing even in a remote area like Antarctica,” explains **Jordi Dachs**, scientist at IDAEA-CSIC and principal investigator of the global pollution project.

These findings are based on two oceanographic campaigns conducted in 2021 and 2022, during which water samples were collected from the North Atlantic to the Antarctic Ocean using the same methodology. The research showed that PFAA concentrations are similar in both Atlantic and Antarctic regions, confirming their global distribution. The highest levels were found in ocean waters influenced by the coasts of Brazil and Argentina. “Using the same methodology across all oceanic regions allows concentration comparisons between areas, confirming that PFAA levels in Antarctica are comparable to those in the North Atlantic, a region much closer to anthropogenic pollution sources,” adds **Begoña Jiménez**, co-principal investigator of the project.

“Their long-range transport capacity and persistence mean that these compounds accumulate because there are no removal or outflow pathways to offset their input,” says **Núria Trilla-Prieto**, researcher at IDAEA-CSIC and first author of the scientific paper.

The researchers emphasize that the chemical persistence of these substances is the main factor determining their long-term environmental risk. The European Chemicals Agency (ECHA) is currently assessing the scientific basis for a proposal to restrict PFAS in the European Union. This research, led by IDAEA-CSIC and IQOG-CSIC, provides key scientific evidence to support the regulation of these compounds.

Trilla-Prieto, N., Dachs, J., Iriarte, J. *et al.* (2025). **Accumulation of perfluoroalkyl acids as forever chemicals in Antarctic waters**. *Communications Earth & Environment* 6, 545. DOI: [10.1038/s43247-025-02535-3](https://doi.org/10.1038/s43247-025-02535-3)

Fermín Grodira / Content produced under the CSIC – BBVA Foundation Scientific Communication Grants Programme, 2024 Call

Communication IDAEA-CSIC

comunicacion.idaea@cid.csic.es