

# PFAS

## Per- and polyfluoroalkyl substances

SNOW ANALYSIS IN SWISS SKI RESORTS

SUMMIT FOUNDATION

EPFL

NOVEMBER 2025

# THE PFAS STUDY IN SNOW



- PFAS, used for decades for their non-stick and water-repellent properties, are contaminating the environment, particularly mountain areas in Switzerland through fluorinated ski waxes.
- In the study conducted by the Summit Foundation and EPFL, 25 PFAS were analyzed in snow from several alpine resorts, and all were detected.
- Most compounds were at low concentrations, but 6:2 FTS reached up to 153 ng/L, and some resorts exceeded 200 ng/L in total.
- These results demonstrate the widespread contamination of PFAS in alpine snow and highlight the need to raise public awareness and promote responsible practices.

## INTRODUCTION

Per- and polyfluoroalkyl substances (PFAS), nicknamed “forever chemicals,” have been used since the 1950s in a wide range of products, including ski waxes. Their high chemical stability makes them nearly indestructible, promoting their accumulation in the environment and living organisms, with health effects such as cancer, hormonal disorders, and infertility. The risk is particularly high for ski technicians, who are exposed to PFAS-containing particles through inhalation.

Since the 2000s, international studies have revealed significant contamination of snow and soils in ski resorts. While some PFAS are now banned or prohibited in competitions by the FIS, they are often replaced by alternatives that are also harmful.

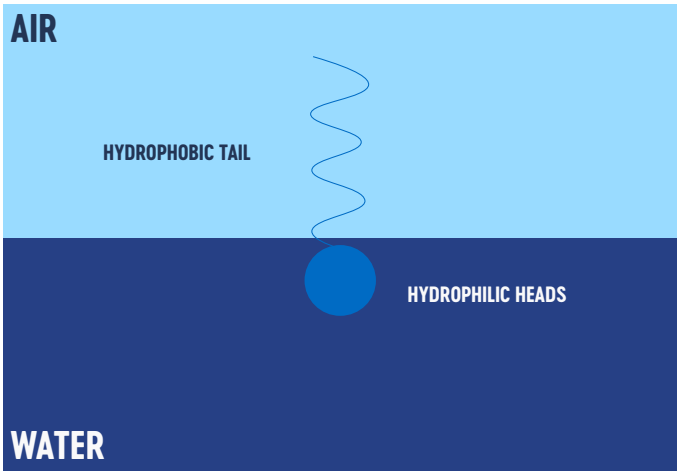


Figure 1 : Air-water interface partitioning of PFAS from ITRC (2023)

In Switzerland, the estimated annual use of fluorinated waxes (600 to 800 kg) contributes to pollution in mountain areas, especially during competitions. However, this pollution remains poorly documented, which is why an exploratory study was conducted to measure its presence and better understand its impact.

## THE STUDY

Between January and March 2025, volunteers from the NGO Summit Foundation, in collaboration with EPFL, collected snow samples from several ski resorts in Switzerland and France. In each resort, samples were taken from the most frequented slopes as well as off-piste areas, while noting sampling conditions (weather, altitude, crowd levels).

The samples were then analyzed in the laboratory to detect PFAS. A strict quality control protocol was applied, and the data were cross-referenced with local conditions to identify factors influencing PFAS presence.

# WHAT THE STUDY REVEALS



- SNOW CONTAINS PFAS, GENERALLY AT LOW CONCENTRATIONS, WITH ALMOST ALL 25 TARGETED COMPOUNDS DETECTED.
- 6:2 FTS ACCOUNTS FOR 98% OF PFAS DETECTED IN THE SNOW. THIS RECENT COMPOUND IS USED AS A SUBSTITUTE FOR OLDER, MORE TOXIC PFAS.
- PFOA AND PFOS, NOW BANNED, WERE DETECTED BUT AT LOW CONCENTRATIONS.
- PFAS CONCENTRATION IN SNOW IS HIGHER DURING COLD WEATHER, PROBABLY BECAUSE THEY DISPERSE WHEN THE SNOW MELTS.

THESE EXPLORATORY RESULTS PAVE THE WAY FOR FURTHER RESEARCH.

# RESULTS ANALYSIS



## Discussion

PFAS contamination in snow from Swiss ski resorts is generally low, except for 6:2 FTS, a recent molecule used to replace older and banned PFAS such as PFOS. Fluorinated ski waxes could potentially contribute to contamination, although their exact role remains unclear and other sources, such as atmospheric deposition, should also be considered. The potential infiltration into soils suggests that further analyses are warranted.

For future studies, it would be useful to sample snow in high-abrasion areas, such as queues at ski lifts, while also examining complementary chemical markers to better understand the origin and transport of PFAS.

## Limitations of the study

- This exploratory study was limited by its short duration, as well as meteorological and logistical constraints.
- While volunteer involvement enabled broader data collection, differences in sampling may have contributed to variability.
- Lack of time prevented the study of soils under summer conditions.
- The presence of newer, less-studied PFAS (6:2 FTS) complicates comparison with other studies and understanding of their behavior.

## Conclusion

PFAS, being highly persistent, contaminate the environment and pose health risks. While some older compounds are banned, they are quickly replaced by new ones whose impacts are still poorly understood. This study detected several PFAS in snow from Swiss ski resorts, linked to human activities, but their origin and evolution remain unclear. To better understand this pollution, it would be necessary to analyze soils, high-wear areas of skis, and the composition of local fluorinated waxes. Finally, involving citizens in data collection would help advance research and raise public awareness.



# ACT FOR AN ENVIRONMENT FREE OF PFAS

## 1.STRENGTHENING REGULATION

Continue advocacy with authorities (FIS, national bodies) for a complete ban on all PFAS substances, including replacement products such as 6:2 FTS.

## 2. MONITORING SUBSTITUTES

Set up a monitoring program to systematically assess the environmental impact of new non-fluorinated waxing products, to prevent future contamination.

## 3.OFF-SEASON STUDIES

Expand research to include the analysis of alpine soils in summer. Understanding the migration of PFAS from snow to soil and water is crucial for assessing long-term risk.

## 4. AWARENESS AND EDUCATION

Launch a targeted campaign for skiers, resorts, and volunteers to inform them of the risks associated with PFAS and promote the use of environmentally friendly ski waxes.

## 5. PFAS-FREE WAX USE

Promote the use of fully PFAS-free waxes, favoring transparent formulations based on safe, plant- or mineral-derived ingredients to avoid introducing new persistent pollutants.

## Main References


1. Bossi, Beatrice, and Manon Bernard. https://www.epfl.ch/schools/enac/education/environmental-sciences-and-engineering/wp-content/uploads/2025/06/Poster-DP-25.pdf
2. Bouchex-Bellomie, Harold, and Andreas Buser. Utilisation des farts de ski fluorés en Suisse. 2025. https://www.bafu.admin.ch/dam/bafu/fr/dokumente/chemikalien/fachinfo-daten/Bericht%20Skiwachs.pdf.download.pdf/Rapport_farts_de_ski.pdf.
3. Gaillard, Lucas, Kévin Bernal, Xavier Coumoul, Karine Andréau, and Etienne B. Blanc. « Polluants éternels et contamination humaine : état des lieux et enjeux autour des substances per- et polyfluoroalkylées (PFAS)». Cahiers de Nutrition et de Diététique 59, n°6 (2024): 349- https://doi.org/10.1016/j.cnd.2024.10.003.
4. Müller, Viktoria, Larissa Cristine Andrade Costa, Filipe Soares Rondan, and al. « Per and Polyfluoroalkylated Substances (PFAS) Target and EOF Analyses in Ski Wax, Snowmelts, and Soil from Skiing Areas ». Environmental Science: Processes & Impacts 25, nº 12 (2023): 1926- https://doi.org/10.1039/D3EM00375B.


SUMMIT FOUNDATION

WORKING FOR CLEANER MOUNTAINS WWW.SUMMIT.NGO

EPFL