



Cold shock in Lake Geneva – Alplakes shows why

June 10, 2025 | Bärbel Zierl

Topics: Ecosystems | Pollutants | Climate Change & Energy

A sudden drop in temperature in Lake Geneva over the Whitsun weekend is leaving swimmers feeling chilly: within a few days, the surface water temperature near the city of Geneva fell by around 8 degrees. This is due to a natural phenomenon that can be observed impressively on the Alplakes platform.

In recent days, there has been a remarkable drop in temperature in Lake Geneva near the city of Geneva. Within a few days, the water temperature fell from 19 to 11 degrees – an abrupt cooling that can be clearly seen on the platform www.alplakes.eawag.ch. Damien Bouffard, head of the Aquatic Physics research group at Eawag and professor at the University of Lausanne, explains the natural phenomenon: “A strong and persistent south-westerly wind has pushed the warm surface water in the Lake Geneva basin to the north-east over the past few days. To compensate, cold deep water has risen to the surface – a process known as ‘upwelling’.”

This phenomenon occurs in Lake Geneva almost every year in early summer, when the warm water layer at the surface is still relatively thin. The strongest temperature drop recorded to date was observed in June 2017. At that time, the water temperature at the Bains des Pâquis lido in Geneva fell from 23 to just 8 degrees within two days – a shock for all bathers.

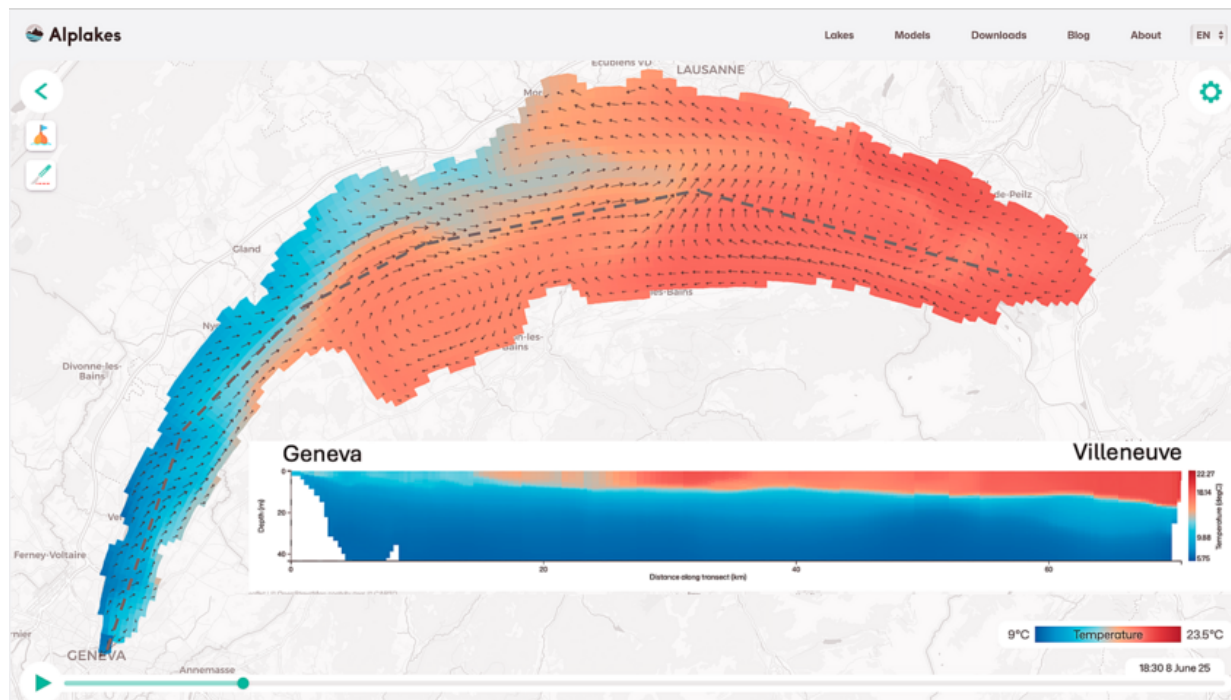


Illustration of the upwelling event recorded over the long weekend with a more than 8°C difference of surface temperature between the opposite ends of the lake. The upwelled cold water in the “petit lac” near the city of Geneva is particularly clear when looking at the temperature evolution over a lake transect. Visualisation www.alplakes.eawag.ch.

The response to the strong wind event over the weekend was not limited to Lake Geneva: Upwellings with cold water reaching the surface were also observed in Vierwaldstättersee near Luzern and in lake Thun with a significant drop in the Aare temperature.

Exciting insights into our lakes

The Alplakes platform, operated by Eawag, not only documents the historical upwelling events, but also predicted it several days in advance. So anyone who had taken a look at the platform was not surprised when they jumped into the cold water. Alplakes combines three-dimensional model calculations with satellite data to provide predictions of water temperatures at various depths – in 30-minute steps for the next five days. Alplakes has also been significantly expanded and made more user-friendly recently. The platform thus offers not only exciting insights for researchers, but also valuable information for water experts and citizens alike.

In addition to temperature trends, Alplakes also shows other dynamic processes for 116 lakes in and around the Alps, such as how blue-green algae are currently spreading in our waters. You can also conduct your own experiments: for example, substances can be introduced at any point in a lake – Alplakes then calculates where the substances will be transported by the current circulation. The consequences of climate change for Swiss lakes are also impressively demonstrated, for example how water temperatures have risen in the past and what developments can be expected in the coming decades. Or the effects of warming on lake stratification.

Climate change is altering the mixing of lakes

Depth profiles on Alplakes show, for example, how the upper layers of water heat up in summer and cool down in winter. In comparison, the deep water in deep lakes remains cool throughout the year at around 5 to 6 degrees. This stratification leads to low vertical circulation in summer. In winter, however, when the entire lake cools to a uniform temperature, an important exchange takes place between nutrient-rich deep water and oxygen-rich surface water. "This exchange is essential for the ecosystem of our lakes," emphasises Bouffard. "But with global warming, the surface water in some places no longer cools sufficiently in winter. The necessary circulation process is disrupted – with drastic consequences for life in the depths."

Alplakes: knowledge for the sustainable management of our lakes

Last year, the platform recorded around 150,000 hits – a huge success. However, there are still challenges to be overcome. "Our models are currently less accurate in the shore areas," admits Bouffard. "But that's where most people go swimming. We are currently investing specifically in improving these predictions."

The aim of Alplakes is to improve the understanding and management of lakes. The platform is aimed not only at researchers, but also at water management experts and interested members of the public. "In times of climate change, we want to help make informed decisions about lake management," says Bouffard, "And raise awareness of the value and vulnerability of our lakes."

Vision Alplakes

This platform aims to transform how lakes are studied and monitored by providing a unified, user-friendly data visualization interface for citizens, water professionals, and scientists. This broader access to hydrodynamic modeling and remote sensing data not only accelerates scientific research but enables evidence-based decisions in water resource management. What once required specialized expertise is now accessible through a seamless, user-friendly platform that combines scientific rigor with practical utility.

Eawag research projects on Alplakes

Alplakes Simstrat Digital lake indicators for the Alpine Region

Cover picture: Lake Geneva (Photo: Michael Heck/Pixabay).

Related Links

Eawag Research Group Aquatic Physics

Contact



Damien Bouffard

Deputy head of department

Tel. +41 58 765 2273

damien.bouffard@eawag.ch



Leonardo Biasio

Tel. +41 58 765 5610

leonardo.biasio@eawag.ch

<https://www.eawag.ch/en/info/portal/news/news-detail/cold-shock-in-lake-geneva-alplakes-shows-why>