Hydrological Yearbook of Switzerland 2023

Discharge, water level and water quality of Swiss waterbodies

Summary of the publication “Hydrologisches Jahrbuch der Schweiz 2023”
www.bafu.admin.ch/uz-2413-d

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Summary

Specific features of 2023
The year 2023 was marked by multiple changes between low water and high water situations. Water levels in November and December were unusually high. Snowfall, followed by heavy rain and snowmelt, led in many places to sharp rises in runoff and high water at levels that had rarely or never been seen previously in the winter months.

Weather conditions
2023 got off to an extremely mild start. There was record local precipitation in the spring. In some regions there was very little precipitation in June, followed by heatwaves in July and August and heavy precipitation in southern and eastSwitzerland. September and October were very similar, with record temperatures in the first half of the month and heavy precipitation in southern and western Switzerland during the second half. It was very wet north of the Alps in November and December.

Snow and glaciers
The winter of 2022/23 was exceptionally warm, with little snowfall. Between mid-February and mid-March, the Swiss Alps experienced the least amount of snow since records began. The glaciers lost four per cent of their volume in 2023, the second sharpest decline on record. In total, ten per cent of the ice volume across Switzerland disappeared in just two years.

Discharge, lake levels and water temperatures
Annual average discharge and water levels were largely within the normal range in many watercourses and lakes in Switzerland. However, a closer look at events over the course of the year reveals that there were considerable fluctuations between low and high water in 2023. Major floods occurred in southern and eastern Switzerland in August and in western and northern Switzerland in November and December. These variations are also visible in lake levels. The water levels of Lake Maggiore and Lake Constance were extremely low in summer. In the second half of the year, there were floods on Lake Maggiore, as well as on the lakes along the Jura and Lake Geneva. Meanwhile, water temperatures in 2023 were less remarkable. Although the year was again very warm, the limit values and average values were exceeded less frequently than in the previous year.

Stable isotopes
2023 was exceptionally warm and there were several dry spells, especially in the first half of the year. In contrast, there was a lot of precipitation in the second half of the year. The average annual deuterium and oxygen-18 values measured in precipitation were particularly high in Locarno. The seasonal trend of $\delta^{2}H$ and $\delta^{18}O$ values can also be observed in watercourses. However, mixing effects in the discharge within the catchment basin delay and distort the trend considerably.

Groundwater
In a long-term comparison, groundwater levels and spring discharges were low at around one in three monitoring sites in 2023. As a result of large amounts of rainfall in autumn, high groundwater levels and spring discharges were recorded at around every second monitoring point in November and December. High groundwater temperatures were also measured at around half of all sites in 2023.

Further information

Detailed information on the topics covered in the Hydrological Yearbook and the FOEN hydrometric monitoring networks and current and historical data can be found online:

Current and historical data:
www.hydrodaten.admin.ch

FOEN Hydrological Bulletin:
www.hydrodaten.admin.ch/de/bulletin

FOEN Groundwater Bulletin:
https://www.hydrodaten.admin.ch/en/grundwasser/bulletin

Results of the National Groundwater Monitoring (NAQUA):
www.bafu.admin.ch/naqua

Results of the National River Monitoring and Survey Programme (NADUF) – Data download:
https://opendata.eawag.ch/dataset/naduf-national-long-term-surveillance-of-swiss-rivers-2024-2

National River Monitoring and Survey Programme (NADUF) – Monitoring network:
www.bafu.admin.ch/naduf

Results of the National Surface Water Quality Monitoring Programme (NAWA) in maps:
https://s.geo.admin.ch/7902c509b7

National Surface Water Quality Monitoring Programme (NAWA) – Monitoring network:
www.bafu.admin.ch/nawa

Monitoring networks for sediment transport in bodies of water:
www.bafu.admin.ch > Topic Water > Data, maps and indicators > Monitoring networks > Sediment transport

Measurements of lake temperatures in selected lakes (pilot project):
https://www.bafu.admin.ch/bafu/en/home/topics/water/info-specialists/state-of-waterbodies/state-of-lakes/wassertemperatur-seen.html

Water indicators and further information on water:
www.bafu.admin.ch/water

Swiss Water Bodies in a Changing Climate – Hydro-CH2018 Hydrological Scenarios:
www.nccs.admin.ch/hydro

Hydrological Atlas of Switzerland HADES
https://hydrologicalatlas.ch

Gewässer in der Schweiz. Zustand und Massnahmen. FOEN publication, August 2022 (de/fr):
www.bafu.admin.ch/uz-2207-d

FOEN web dossiers on hydrological events in 2023
www.bafu.admin.ch > Topic Water > Dossiers