

## Scientific context

The site of the HydroGeochemical Observatory of the Environment (OHGE) is the Strengbach watershed (80 ha), located in the commune of Aubure (60 km southwest of Strasbourg). It is in a mid-altitude mountainous area (between 880 and 1,150 m) in the Vosges massif with steep slopes (from 10° to 30°). More than 80% of the vegetation cover is made of managed forests (80% spruce and 20% beech) growing on a Hercynian acidic granite substratum. The trees have shown signs of forest dieback since the 1980s. The soils range from acid brown soils mainly on the north-facing slope to podzolic ochre soils.

The climate is temperate oceanic with an average annual temperature of 6°C and an average rainfall of 1,400 mm/year (including 1 to 3 months of snow). The average water level at the outlet is 800 mm/year. Interannual variations are important and vary by a factor of two between dry and wet years. Four springs used for drinking water are located on this site.

Major floods can occur at the end of winter when the snowpack melts or can be due to summer thunderstorms. The low-water period is between late summer and mid-autumn.

## Website

<http://ohge.unistra.fr/>

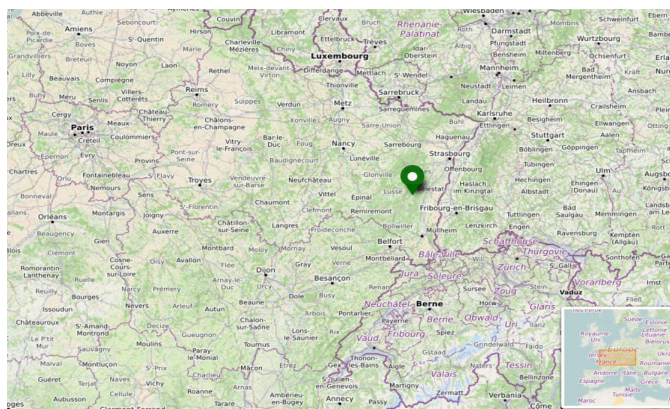


## Summary

Starting year: 1985

Keywords: mid-altitude mountain, granite, temperate climate, managed forest, acid rain, climate change.

## Location



Upper meteorological station under snow





Monitoring of rainfall, soil solutions, soils, vegetation under beech plantation (HP Plot)

## Sites and measurements

The different compartments (atmosphere, surface and ground waters, soil, vegetation) are intensively instrumented and monitored over time. Deep drilling has allowed the exploration of up to 120 m of rock. Soils and forest stands are monitored through pedological and ecological analyses. The acquired variables are:

- Meteorological (rain, temperature, humidity, pressure, wind, radiation, etc.) thanks to 2 complete weather stations. The spatialization of rainfall is studied via a network of 7 rain gauges,
- Hydrological (flows at several points of the main stream and on different springs and creeks) and hydro-geological thanks to gauging stations and water level probes in a network of 6 boreholes, 12 piezometers including 4 in the wet area at the bottom of the watershed,
- Geochemical (pH, conductivity, alkalinity, cations and major anions, silica, dissolved organic carbon, trace elements) in rain, throughfall, soil solutions, springs, groundwater, streams with manual or automatic sampling (400 to 500 samples/year).

Two new instruments, a “RiverLab” and a superconducting gravimeter acquired within the framework of the equipment of excellence “CRITEX” – 2012-2022 (National Park of innovative equipment for the spatial and temporal study of the Critical Zone of watersheds) were installed in June 2017 to allow for high frequency measurements of hydro-geochemical variables and the fine-scale variation of gravity field.

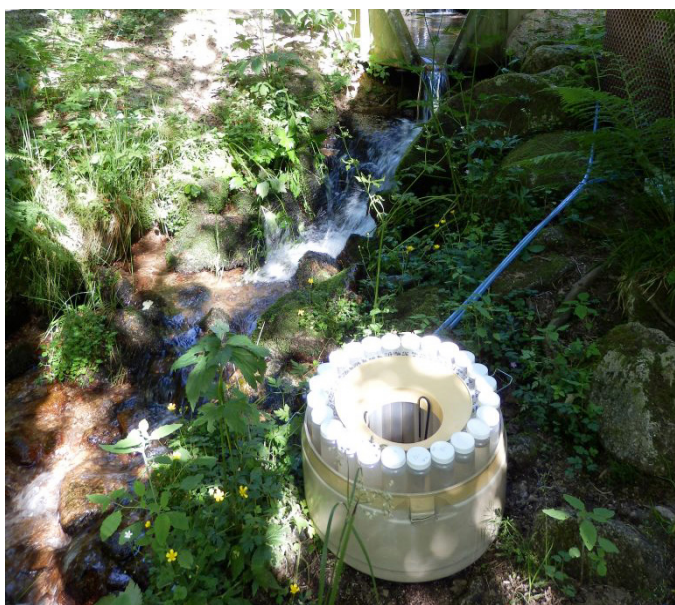
## Partners and further information

The monitoring of the watershed is carried out by ITES – *Institut Terre et Environnement de Strasbourg* (UMR 7063 CNRS/University of Strasbourg – UNISTRA) part of the *École et Observatoire des Sciences de la Terre* (EOST). The OHGE has been labeled since 1997 by the EOST and since 2007 by the CNRS as a *Service National d’Observation* (SNO). The site is distinguished by its close collaboration with the commune of Aubure, the inhabitants, the local community and the ONF who manages the local forest. Numerous multidisciplinary research projects (geochemistry, hydrology, geophysics, ecology, geology, sociology, art, etc.) are carried out, leading to collaborations at the national level and with European and international laboratories and networks.

## Scientific questions

The observatory was created in 1985 to study the link between acid rains and forest dieback thanks to three research teams CNRS-University of Strasbourg (geography and geochemistry) and INRAE Nancy (forest ecology). It has become a true natural laboratory whose scientific orientations focus on the issues of water and soil conservation and the sustainability of forests. The aims are:

- To study and better evaluate the dynamics of water and chemical elements at the interface atmosphere/water/soil/plants,
- To understand the responses of this particular environment to local and global, natural and anthropogenic perturbations (climate change, air pollution, logging, game growth),
- To model the bio-hydrogeochemical function at the scale of the watershed to predict/anticipate future changes in ecosystems.



Outlet Hydrological Station

