

SUBLACUSTRINE GROUNDWATER DISCHARGE INTO LAKE NEUCHATEL VIA THE GIANT POCKMARKS

Context and objectives

High-resolution bathymetric maps have recently allowed the discovery of special features at the bottom of Swiss lakes (<http://map.geo.admin.ch> > SwissBATHY3D). One of the newly found structures are 'pockmarks' that are circular or ellipsoidal depressions on the lake floor. Pockmarks form due to the upward migration of groundwater or gas through the unconsolidated lake-sediment column.

In Lake Neuchatel, 4 giant pockmarks (80 to 150 m in diameter) are positioned along the northern shore. They are connected to the karst system of the Jura Mountains and thus represent a type of sublacustrine spring. Currently, it is still unknown how important this sublacustrine groundwater inflow is. The objective of this project is therefore to study the functioning of the pockmarks and to quantify the sublacustrine groundwater inflow into Lake Neuchatel. The latter allows evaluating the importance of this rather hidden segment of the water cycle.

Research approach and methodology

For the MSc thesis the student will, supported by the supervisors, elaborate a strategy to work on the aspects that interests her/him most. Topics include (non-exclusive): (a) water/mud sampling from pockmarks and comparison of chemical and physical water parameters with drinking water wells on shore for better constraining the flow path of the groundwater arriving at the pockmarks, (b) estimate the pressure change in the karst that is required to provoke one of the eruption events in the past, (c) inject a tracer into the chimney for defining the velocity of the upward flow of the groundwater through the mud, (d) ROV (Remotely Operated Vehicle) survey for better defining the morphology and the functioning of the pockmarks. Accordingly, a variety of methods may be used, some will require to the adaptation of field setups to the lake/pockmarks.

Partners and collaboration

The project will be supervised by Dr. Stefanie Wirth. It will be carried out in close collaboration with two postdocs (biogeochemistry, aquatic physics) and Dr. Damien Bouffard (Eawag). According to the chosen themes/methods collaboration with other collaborators of the CHYN (e.g. for modeling, hydrogeology of the La Lance fault zone) and with ISSKA are envisaged. Particularly exciting in this project are the interdisciplinarity as well as the non-standard approaches.

Contact for further information: Stefanie Wirth stefanie.wirth@unine.ch

