

# Exploration of natural hydrogen in the Lower Engadin window, Switzerland

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The area around Scuol, (Grisons, Switzerland), was chosen for a first hydrogen exploration because of the presence of a deep strike-slip fault, the Engadin line, associated to serpentinite. The area lies within the tectonic window of the Lower Engadin.

A special feature of this area are the carbogaseous spring waters and the dry CO<sub>2</sub> exhalations (mofettes) in the Scuol region. The  $d^{13}C_{CO_2}$  of exhaled gases (-4‰) is consistent with a deep mantle origin but could also be explained by other processes (Wexsteen *et al.*, 1988). The concentrations of hydrogen in the gas mixture of the outgassing springs and the dry exhalations have never been studied. A systematic degassing of the springs is still in progress. However, soil gases analyses obtained with a mobile gas analyser give promising data. For this purpose, holes with a depth of about 1 meter were drilled into the soil with a percussion drill and then the gas composition (O<sub>2</sub>, CO<sub>2</sub>, CO, CH<sub>4</sub>, H<sub>2</sub>S and H<sub>2</sub>) was measured.

On the northern slope of the village of Scuol, several spots of dry gas exhalations are known. The most famous spot is called "Mofetta Felix". Gas measurements in holes revealed reproducible H<sub>2</sub> concentrations of over 320 ppm. CO<sub>2</sub> is the main gas (90%) and traces of CH<sub>4</sub> (0.3%) are also detected. The origin of this significant hydrogen amount is unknown but could be related to a deep serpentinization process. The geological composition of the subsurface in the core of the Lower Engadin window is assumed to be the Bündnerschiefer series, which is about 10 kilometres thick. The ophiolite lenses trapped in it represent a possible origin of the hydrogen measured at the surface. Due to the high permeability of the Bündnerschiefer, deeper ultrabasic rocks may also be the hydrogen source. The origin and production of the hydrogen will continue to be investigated with a permanent monitoring of the mofettes.

## References

Wexsteen, P., Jaffé, F.C. and Mazor, E. (1988) Geochemistry of cold CO<sub>2</sub>-rich springs of the Scuol-Tarasp region, Lower Engadin, Swiss Alps. *Journal of Hydrology* 104, 77-92.