

## Editorial: Mont Terri rock laboratory 20 years of experimentation and applied research

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Paul Bossart, director of the Mont Terri project, discussing the properties of the Opalinus Clay exposed in a tunnel window in the Mont Terri rock laboratory in front of a group of visiting scientists (Photo: Benedikt Galliker)

To celebrate the 20th anniversary of the Mont Terri rock laboratory, representatives from science, politics, and authorities met on 19 May, 2016, at the laboratory headquarters at St. Ursanne. Bundesrat Guy Parmelin, head of the Federal Department of Defence, Civil Protection, and Sport, opened the ceremony. He stressed the importance of the rock laboratory for the Swiss Confederation on the issue of safe nuclear disposal in Switzerland. In his words, “The rock laboratory in St. Ursanne, Canton Jura, plays a central role for the safety and construction of a deep geological repository in clay formations worldwide”.

In 2016 exactly 20 years have passed since what was then the SNHGS (Swiss National Hydrological and Geological Survey) launched a small project to characterize the Opalinus Clay in the Mont Terri exploration tunnel near St. Ursanne. Previously, the Canton of Jura had granted permission to open eight small niches to install measuring instruments. The project was initially intended to run for a maximum of three years. The aim was to clarify whether the Opalinus Clay, as an alternative to crystalline rock, could be considered for a deep geological repository of radioactive waste.

Twenty years later, the small exploration project has now become an international platform for applied research in the field of radioactive waste disposal, as well as in the field of carbon capture and sequestration (for instance, as CO<sub>2</sub>). Sixteen partners from 8 countries, including the USA, Canada, and Japan, are participating in the research at Mont Terri. Some 140 experiments have been carried out since 1996, almost 50 are still running. The question of whether Opalinus Clay is suitable as a host rock for a repository was definitively answered in 2011: investigations conducted by Nagra, and their verification by ENSI, show that Opalinus Clay is the only viable host rock for the deep geological storage of highly radioactive waste in Switzerland. This led to the main decision on Stage 1 (Selection of Geological Siting Areas) of the Sectoral Plan for Deep Geological Repositories. The Mont Terri research project contributed significantly to reaching this conclusion, and of this we are very proud.

Considering this contribution to Swiss research on the host rock for a permanent repository alone, however, would underestimate the full impact of the Mont Terri research. Together with its international research partners, the project has developed new measurement and evaluation methods and brought them to maturity. Among many, it has advanced the determination of rock parameters using

innovative borehole geophysics, improved the methodology for characterization pore-water and microbial activity in claystones, and gained a new understanding of diffusion and retention processes of radionuclides in and through claystones. These methods are also applicable to low-permeability rocks at other sites. Moreover, the many technicians and scientists who are involved, exchange data and knowledge with each other. In this way, the partners gain a substantial added value on their investments.

This special issue gives an selection of research results achieved over the last 20 years. On the occasion of the Technical Meeting TM-34 on 10–11 February, 2016, in the Jesuit Church in Porrentruy, 150 scientists, technicians and managers communicated and discussed these research results, and produced scientific publications from their investigations. These papers are now presented in this Special Issue of the Swiss Journal of Geosciences, offering a representative cross-section of the research at the Mont Terri rock laboratory over the last 20 years.

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