

Trends in International Collaboration at Mont Terri Rock Laboratory (Switzerland) for Radioactive Waste Disposal

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1. Outlines of Mont Terri Rock Laboratory

Mont Terri Rock Laboratory is located in the northwest of Switzerland (Figure 1) and is expanded from the evacuation tunnel of A16 motorway (Figure 2). This laboratory was constructed in approximately 300m deep underground (Figure 3).

As Figure 3 shows, the geology around this laboratory is the Opalinus Clay. In many countries, sedimentary rock formation is considered as a potential host rock for a radioactive waste disposal site so far. Therefore, in this laboratory, various international joint projects are implemented to understand the geological, hydrogeological, geochemical and geotechnical characterization of the Opalinus Clay formation and to verify the feasibility of the geological disposal of radioactive waste. The various organizations from lots of countries are involved in the Mont Terri project (Table 1). The knowledge obtained through experiments at the Mont Terri is shared by these organizations and is applied to plan a radioactive waste disposal facility in each own countries.

The mineral composition of the Opalinus Clay consists mainly of clay minerals (approx. 65%), quartz (approx. 20%) and calcite (approx. 10%) (Figure 4).

2. International Collaboration in Experiments in Mont Terri Lock Laboratory

In this report, the outline and present status of two experiments which are performed internationally in the active phase are shown.



Figure 1 Map of Laboratory

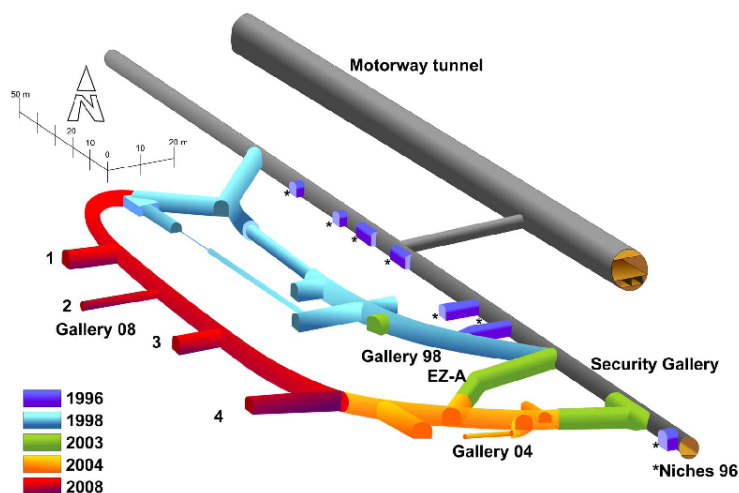


Figure 2 3D View of Laboratory

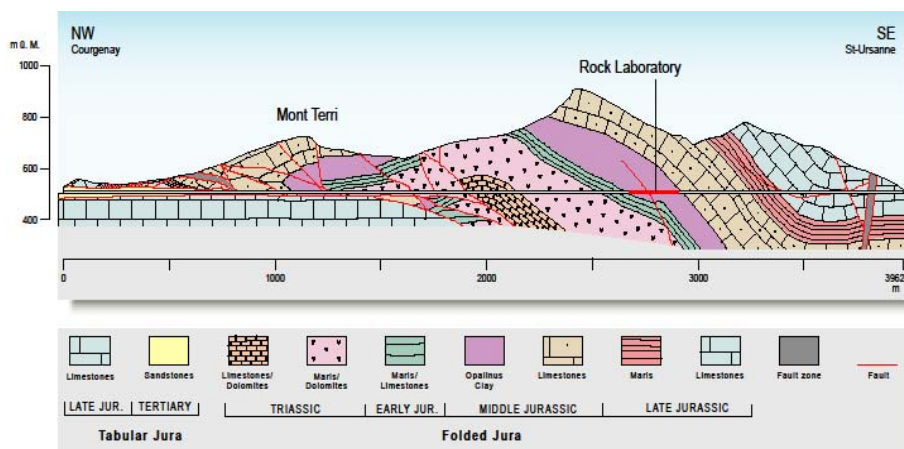


Figure 2 Geological Profile

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2.1 Mine-by Experiment (MB)

MB experiment is implemented to understand the effect of excavation on mechanical properties of the Opalinus Clay. Observed and measured data have been recorded during the excavation of Gallery 8 (Figure 5), such as total pressures, inclinations, stresses and strains. And analytical simulations were performed to predict monitored data at given sensor positions. As the results of the simulations, some of the numerical analysis values show good agreements with monitored data in terms of trend. However, some of others show different magnitudes. For one thing, which is likely caused by not taking account the post-failure behavior of excavation. The same characteristic value is not applicable because of difference of geological conditions in Japan, however, modeling techniques and evaluation methods are considered available. This experiment will help to improve the accuracy of design for facilities.

2.2 Hydrogeologic Analyses and Synthesis Experiment (HA)

HA experiment is implemented to develop a conceptual hydrogeological model on the basis of interpretation of hydrogeological data obtained from the Mont Terri project. This experiment was started in 2000, and the immense data have been acquired through various different test methods during subsequent 10 years. Therefore, the applied methodology of the evaluation and classification of the immense data was considered. The evaluation method is divided in the following three steps: 1: Identify the relevant hydraulic test, 2 : Assignment of the suitability level, 3 : Decision for future additional interpretation. This method is considered applicable to evaluate and classify other data.

3. Conclusion

Radioactive waste disposal has become a key issue not only in Japan but also in many countries of the world that own nuclear power plants. In order to achieve long-term safety of geological disposal, international cooperation is essential. The Mont Terri project gives relevant countries a valuable opportunity to share information and knowledge.

Reference

• Mont Terri Project HP : [http:// www.mont-terri.ch/](http://www.mont-terri.ch/)

Table 1 Involved Organizations


Country	Organization	
 Switzerland	swisstoppo	Federal Office for Topography / Swiss Geological Survey
	ENSI	Swiss Federal Nuclear Safety Inspectorate
	NAGRA	National Genossenschaft für die Lagerung radioactiver Abfälle
 Belgium	SCK-CEN	Studiecentrum voor Kernenergie / Centre d'étude de l'énergie nucléaire
	ANDRA	Agence Nationale pour la Gestion des Déchets Radioactifs
 France	IRSN	Institut de Radioprotection et de Sécurité Nucléaire
	BGR	Bundesanstalt für Geowissenschaften und Rohstoffe
 Germany	GRS	Gesellschaft für Reaktorforschung und Sicherheit
	JAEA	Japan Atomic Energy Agency
 Japan	CRIEPI	Central Research Institute of Electric Power
	OBAYASHI	Obayashi Corporation
 Spain	ENRESA	Empresa Nacional de Residuos Radioactivos S.A.
 Canada	NWMO	Nuclear Waste Management Organization
 USA	CHEVRON	Drilling and completions Technology Department
 EU	EC	European Community



Figure 4 Appearance of Opalinus Clay

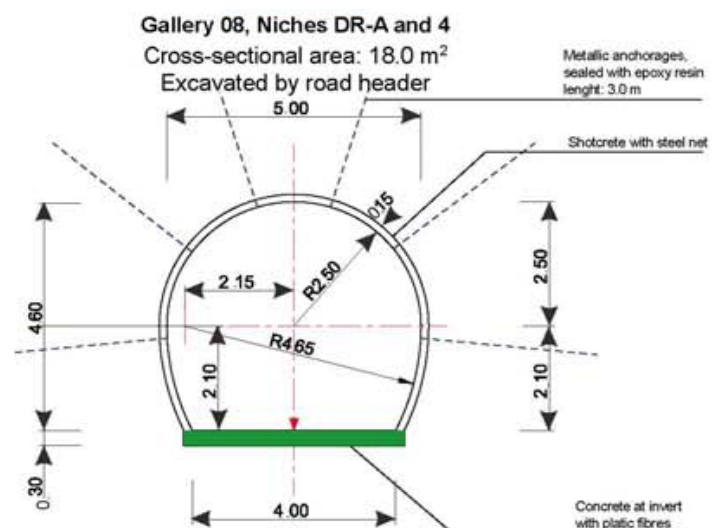


Figure 5 Cross Section of Gallery 8