

# Mont Terri Project

Underground Rock Laboratory

ANDRA BGR CHEVRON CRIEPI DOE ENRESA ENSI FANC GRS HELMHOLTZ IRSN JAEA NAGRA NWMO OBAYASHI RWM SCK•CEN SWISSTOPO TOTAL

## Mont Terri Rock Laboratory

Field report: November 5 – November 11 2018 (Phase 24)

### Distribution

#### Authorities

Swisstopo: P. Bossart, O. Lateltin  
BfE: M. Stauffer, Ph. Schaub  
RCJU: P. Mertenat, Th. Flüeler, M. Giamboni, J. Fernex, J. Chapatte, A. Herrmann  
EC: Ch. Davies

#### Delegates of the Project Partners

ANDRA: E. Huret  
BGR: K. Schuster  
CHEVRON: R. Ewy  
CRIEPI: T. Oyama  
DOE: P. Nair, J. Birkholzer  
ENRESA: J.C. Mayor  
ENSI: M. Herfort  
FANC: F. Bernier  
GRS: K. Wieczorek  
Helmholtz: M. Kühn  
IRSN: J.-M. Matray  
NAGRA: O. Leupin  
NWMO: L. Kennell-Morrison  
JAEA: K. Tanai  
Obayashi: M. Fukaya  
RWM: S. Thompson  
SCK•CEN: C. Bruggeman  
Swisstopo: A. Möri  
TOTAL: A. Brisset

#### Principal Investigators and Experiment Delegates of Phase 24 experiments

ANDRA (E. Huret, G. Armand, A. Albrecht, J. Delay, Y. Linard, S. Necib, A. Vinsot, P. Henocq), BGR (K. Schuster, J. Massmann, S. Costabel, W. Graesle, C. Ostertag-Henning, H. Shao, A. Schippers, J. Hesser, T. Kneuker, G. Ziefle, D. Rebscher), CHEVRON (R. Ewy, H. Goodman), CRIEPI (T. Oyama, S. Yokoyama), DOE (P. Nair, J. Birkholzer, J. Rutqvist, Y. Guglielmi), ENRESA (J.C. Mayor), ENSI (M. Herfort, B. Graupner, J. Hansmann, E. Saraiva, M. Sentis), FANC (F. Bernier, P. De Cannière, B. Guiot, G. Pochet, M. Surkova), GRS (K. Wieczorek, O. Czaikowski), Helmholtz (M. Kuehn, S. Lueth, A. Cherkouk, A. Vieth), IRSN (J.-M. Matray, C. Wittebroodt, P. Dick), JAEA (K. Tanai, K. Aoki), NAGRA (O. Leupin, J. Becker, N. Diomidis, F. Kober, D. Traber, B. Garitte, V. Cloet, L. Cantieni, S. Giger, N. Giroud, G. Deplazes, S. Koehler, A. Reinicke), NWMO (L. Kennell-Morrison, S. Briggs, H. Kasani, K. Birch, J. Binns, P. Keech, T. Yang), OBAYASHI (M. Fukaya, Y. Kimura), RWM (S. Thompson, S. Norris, R. McLaverty, R. Hibberd, M. Bailey, J. Pearson, M. Cowley, H. Paireudeau), SCK•CEN (C. Bruggeman, D. Jacques, M. De Craen, N. Bleyen, N. Maes), Swisstopo (A. Moeri, P. Bossart, C. Nussbaum, D. Jaeggi, C. Minnig, S. Schefer), TOTAL (A. Brisset)

#### Supporting Research Organisations

Paul Scherrer Institute PSI: S. Churakov, M. Glaus, Th. Gimmi, L. van Loon  
ETHZ: S. Löw, M. Ziegler, S. Wiemer, A. Zappone  
EPFL: L. Laloui, R. Bernier-Latmani, M. Violay, B. Lecampion

#### Project Management

Swisstopo: C. Nussbaum (Project Manager), T. Theurillat (Site Manager), S. Schefer (Deputy Site Manager), D. Jaeggi (Research Associate)  
GGT: F. Burrus (Project Engineer), Th. Küttel, R. Daneluzzi

## **Construction of Gallery 18**

- The excavation continued along Gallery 18 and reached GM\_112.5 by Friday, November 9.
- Next week the TS-3 test section of the TS experiment will start. This section consists of 2 m daily advances, shotcrete lining and a delayed concreting of the invert about 2-3 tunnel diameters behind.

## **CI (Cement-Opalinus Clay Interaction) experiment**

- On Tuesday, November 6, U. Mäder (University of Bern) performed a system check and minor maintenance for the CI experiment (**Figure 1**).

## **CI-D (Diffusion across 10-Year Old Concrete/Claystone Interface) experiment**

- On Tuesday, November 6, U. Mäder (University of Bern) performed a system check and minor maintenance for the CI-D experiment (**Figure 1**). Samples of the Opalinus Clay pore water in the monitoring interval as well as cement pore water in the circulation interval were taken. The electrode is very stable. The injection of the radionuclide cocktail (36-Cl, 3-H) is postponed to January/February 2019.

## **CS-D (CO<sub>2</sub>: Studying Caprock and Fault Sealing Integrity) experiment**

- Monday and Tuesday Y. Guglielmi, F. Soon and P. Cook (LBNL) finalized the installation of the SIMFIP probe in borehole BCS-D7. Wednesday and Thursday the probe was connected to the autonomous data acquisition system in order to be ready to measure while drilling in BCS-D1.
- From Wednesday to Friday the drilling company GeoSonic drilled the borehole BCS-D1, the final borehole of the CS-D campaign. The first 11.5 m were drilled with a double core barrel and then the borehole was continued with triple core barrel. In this borehole the Main Fault extends from 14.2 m to 19.6 m. The final depth of 23.5 m was reached on Friday at noon.
- M. Lukovic and Q. Wenning (ETHZ) continued with the mapping and scanning of the drillcores during the entire week.
- On Wednesday, November 7, J. Gisiger (Solexperts) did some maintenance works on the Geomonitor data acquisition system.
- On Thursday late afternoon when the drilling of BCS-D1 reached 17.5 m depth (in the base part of the Main Fault), a pressure response could be recorded with the SIMFIP probe installed in BCS-D7 borehole distant from about 2.5m from this latter.
- On Friday afternoon BCS-D1 was logged by G. Mühlebach (Terratec Geophysical Services). A. Zappone and A. Rinaldi (ETHZ) supported the team from ETH and defined the depths of the test intervals of BCS-D1 packer system to be installed by Solexperts on next Monday.
- On Friday evening, the team from Berkeley (LBNL) finished their work after three weeks of long hours and tedious work and went back home to the US.

## **DR-B (Long-Term Diffusion) experiment**

- On Monday, November 5, M. Jaquenoud (Nagra) started a new measuring campaign in BDR-B8 thanks to the reparation of the probe done last week. The measurement will take about 7 days.

## **FE-M (Long-term Monitoring of the Full-Scale Emplacement) experiment**

- On Wednesday, November 7, J. Gisiger (Solexperts) replaced the Neubrex computer.

### **GC-A (Characterization of EDZ Development (Focus “Sandy Facies”)) experiment**

- On Thursday, November 7, M. Pesendorfer and G. Vogel (Polymetra GMBH) downloaded the data from three pressure sensors in Borehole BGC-A1. Further, they rebooted the data logger into a 20 minutes interval measuring cycle.

### **HE-E (In-Situ Heater Experiment on Key THM Processes and Parameters) experiment**

- On Wednesday, November 7, J. Gisiger (Solexperts) performed maintenance and replaced the connector of the interval pressure sensor HE-E2-P2.

### **MA-A (Modular Platform for Microbial Studies) experiment**

- On Monday, November 5, N. Burzan and his master student (EPFL) performed the installation of bioreactors 1.1 and 1.2. They were filled up with pore water of BMA-A1. Further, he performed the flushing of water lines from interval to glovebox with argon gas and installed new gas flow regulator for the space between packer and gallery ceiling with a flow rate of 50 ml/h. Additionally he conducted the regeneration of the first copper reactor (glovebox).
- On Thursday, November 6, N. Burzan (EPFL) refilled the bioreactors 1.1 and 1.2 with pore water from BMA-A. Also, he performed the regeneration of the second copper reactor (glovebox).

### **MB-A (MineByTest 2018 Hydromechanical Characterization of the Sandy Facies) experiment**

- On Wednesday, November 7, J. Gisiger (Solexperts) performed maintenance and installed the interfaces for the extensimeter in boreholes BMB-A8 and BMB-A9.

### **MO-A (Long-term and multi-scale monitoring with passive geophysical methods) experiment**

- On Thursday and Friday, Y. Le Gonidec (Université de Rennes) repaired the network problems and did an update on the permanent seismic measuring setup installed in Gallery 08.

### **TS (Testing Different Tunneling Support in Sandy Facies During Extension of Ga18) experiment**

- On Wednesday, November 7, A. Vlasek (Marmota Engineering AG) performed measurements on the first two sections.
- By Friday, the section TS-2b was finalized. Next week, section TS-3 will start.

### **Varia:**

- On Monday, November 5, Chaocheng Dai from the East-China University of Technology (ECIT) started his internship on the Mont Terri Rock Laboratory (**Figure 2**). He will stay with us until Christmas (December 21).
- Nicola Dietler started his civil service at the Mont Terri Rock Laboratory on Monday as well (**Figure 3**). He has a MSc in Physics from ETHZ and will now fulfill his civil duty in Mont Terri until the end of February 2019.
- On Thursday, November 8, the “national future day” took place. We could welcome Lou and Stefan (5<sup>th</sup> grade) in our lab. They had an interesting day working along O. Leupin (Nagra) and S. Schefer (swisstopo).

## Visits

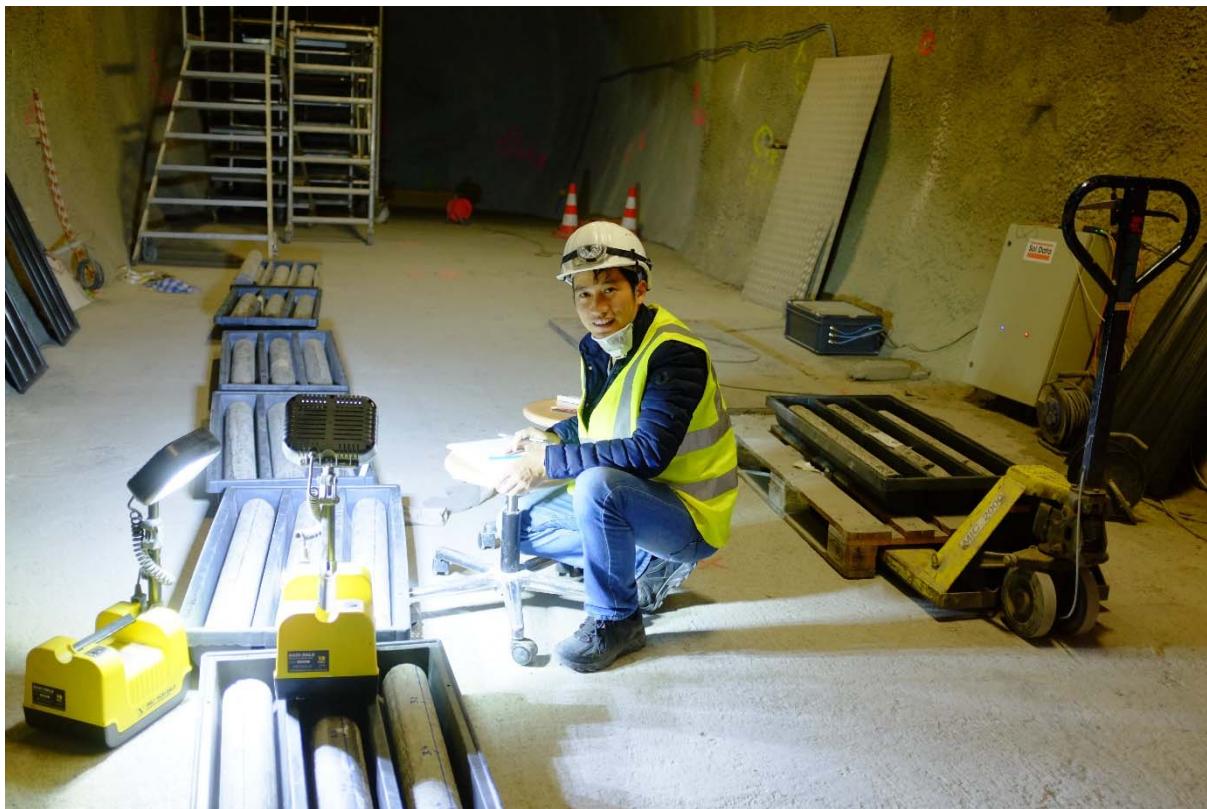
Day	Date	Number of persons	Name of the group	Guide
Tue	06.11.2018	19	Verein 60+ Aarau (org. v. Born-Reisen) & Lernende Elektroinstallateur EFZ	H. Sager G. Fiedler
Thu	08.11.2018	74	Elus des territoires d'accueil des centres de l'Andra, France	P. Bossart/ O. Leupin/ M. Giamboni / C. Nussbaum / M. Pretalli
Thu	08.11.2018	22	Ecole Tremplin, Delémont & ATB SA – journée des métiers	G. Fiedler/ N. Artho/ F. Burrus
Fri	09.11.2018	10	Les Chevaliers du Pinceau	M. Pretalli
Fri	09.11.2018	1	ECAL (Ecole Cantonale d'Art de Lausanne)	M. Pretalli G. Fiedler
Sat	10.11.2018	14	Verein Leben in Arisdorf	G. Fiedler

C. Nussbaum, D. Jaeggi, S. Schefer and R. Raselli, November 9, 2018



**Figure 1:** CI/CI-D: U. Mäder (University of Bern) performed a system check and minor maintenance for the CI and CI-D experiments (Photo: R. Raselli, swisstopo).





**Figure 2: Varia:** C. Dai (East-China University of Technology) using his sedimentological expertise to support us on the mapping of drillcores (Photo: R. Raselli, swisstopo).



**Figure 3: Varia:** N. Dietler (swisstopo) started his civil service at the Mont Terri Rock Laboratory (Photo: R. Raselli, swisstopo).