



# 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 19 – November 25, 2018 (Phase 24)

### Distribution

#### Authorities

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#### Delegates of the Project Partners

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RWM: S. Thompson  
SCK•CEN: C. Bruggeman  
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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 Gallery18 and reached GM\_131.7 by Friday, November 23.

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

- From Monday to Wednesday Q. Wenning, A. Rinaldi and M. Grab (ETHZ) installed several geophones in Niche 8 as a part of the active seismic logging of the CS-D experiment (**Figure 1, Figure 2**).
- On Wednesday and Thursday J. Gisiger and L. Scheidecker (Solexperts) performed the saturation of boreholes BCS-D1 as well as BCS-D2 (**Figure 3**). Further, they filled up boreholes BCS-D4 and BCS-D5 using cement and resin. Also, they filled up the inner casing of BCS-D4 with Pearson water and they installed a downhole-pressure-sensor to monitor the water table in BCS-D4.

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

- On Monday, November 19, M. Jaquenoud (Nagra) started a scan of borehole BDR-B8. The scan was scheduled for last week, but was delayed due to a technical defect.
- On Friday, November 23, M. Jaquenoud (Nagra) collected the data gained by the scan of borehole BDR-B8.

## **FI (Fluid-Mineral Interactions in Opalinus Clay during Natural Faulting and Heating Tests) experiment**

- On Monday, November 19, the drilling company Schützeichel drilled borehole BFI-4. This borehole was drilled parallel to the bedding with the triple core technique and with a diameter of 131 mm. Samples were collected by A. Wiseall of British Geological Survey (BGS).

## **FS-B (Imaging the Long Term Loss of Faulted Host Rock Integrity) experiment**

- Monday to Friday, M. Robertson (LBNL) was on site and prepared for the fiber optical installations in the future borehole BFS-B5. The first spool of FO-cables has arrived on Thursday. The second spool will be delivered most probably on Monday.
- On Tuesday, the drilling company GeoSonic started drilling borehole BFS-B5 (**Figure 4**). The first 9 m were drilled conventionally with a diameter of 101 mm. Then the drilling technique was switched to wireline drilling with 96 mm diameter. Thursday afternoon and Friday morning drilling stopped due to a failure of the compressor. Friday at 11h00 the drilling resumed. The borehole reached a depth of 25 m and will be continued to the final depth of 58.70 m next week.

## **HM-C (Calibration and Validation of a New Constitutive Model for Opalinus Clay) experiment**

- From Tuesday to Wednesday, the drilling company Schützeichel installed the drill rig in the north part of Ga08 for borehole BHM-C1. The borehole is oriented parallel to bedding and exhibits a diameter of 131 mm. Only the first 1.5 m were drilled on Wednesday. Triple core drilling down to 30 m depth is planned for next Monday and Tuesday. The samples will be dedicated to a rock mechanical testing program of RWTH Aachen, group of Prof. F. Amann.

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

- On Friday N. Burzan (EPFL – EML) added two bio-reactors to the MA-A experiment. Those bioreactors were saturated with pore water. Additionally, he performed the regular Ar-gas-flushing of the pore water pipe system.

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

- On Wednesday and Thursday J. Gisiger and L. Scheidecker (Solexperts) removed dirt and water from boreholes BMB-A2 and BMB-A3. Afterwards they tested the accessibility of both boreholes with a dummy of 82 mm diameter. The dummy run proofed a successful cleaning of both boreholes.

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

- Tuesday night A. Vlasek (marmota engineering) installed successfully the 3<sup>rd</sup> fiber optical monitoring profile into the shotcrete lining of test section TS3. On Wednesday A. Vlasek (marmota engineering) performed the zero measurement of the 3<sup>rd</sup> monitoring profile.
- The test section TS3 was completed on Thursday. The installation of the floor sensors in the 3<sup>rd</sup> profile is planned for Friday, November 30, 2018.

### **Visits**

<b>Day</b>	<b>Date</b>	<b>Number of persons</b>	<b>Name of the group</b>	<b>Guide</b>
Mon	19.11.2018	1	M. Robertson, Director, Geosciences Measurement Facility (LBNL)	G. Fiedler
Tue	20.11.2018	34	Männerwandergruppe Binningen-Bottmingen	M. Rahn/ O. Moser
Tue	20.11.2018	2	Mr KODAMA, President of Japan Atomic Energy Agency (JAEA)	P. Bossart/ O. Leupin/ A. Martin
Tue	20.11.2018	26	Verein Geothermie Thurgau	P. Bossart/ D. Jaeggi
Thu	22.11.2018	13	BKW Energie SA, Projets Jura	M. Pretalli
Fri	23.11.2018	13	Entreprise Chapatte SA	M. Pretalli

C. Nussbaum, D. Jaeggi, G. Fiedler and R. Raselli, November 23, 2018



**Figure 1:** CS-D: Q. Wenning and M. Grab (ETHZ) preparing the installation of several geophones in Niche 8. (Photo: R. Raselli, swisstopo).



**Figure 2:** CS-D: A. Rinaldi (ETHZ) marking the spots where geophones will be installed. (Photo: R. Raselli, swisstopo).



**Figure 3: CS-D:** J. Gisiger (Solexperts) performing the saturation of boreholes BCS-D1 and BCS-D2 (Photo: R. Raselli, swisstopo).



**Figure 4: FS-B:** GeoSonic drilling the first 25 meters of borehole BFS-B5 in Gallery08 (Photo: R. Raselli, swisstopo).