

FY18 UPDATE ON MODELING ACTIVITIES FOR CRYSTALLINE WORK PACKAGE

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SFWST Working Group Meeting
University of Nevada, Las Vegas
May 22-24, 2018

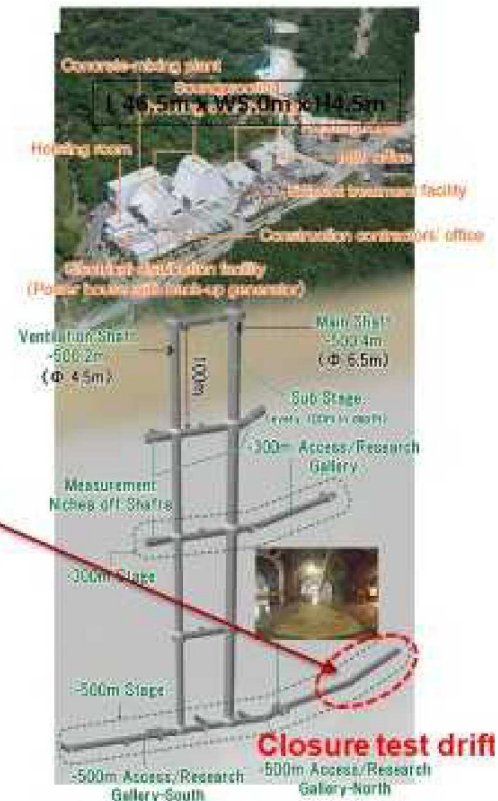
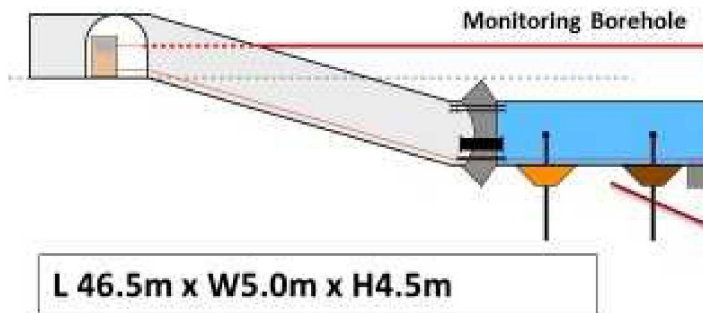
Summary of FY17-FY18 Work

- **Benchmark testing of fracture models (DFN and FCM) using relevant test case: Los Alamos – Sandia collaborative work**
- **Developing and testing of fracture models using experimental field data: DECOVALEX-19 Task C**
- **International Participation: DECOVALEX-19**
 - Tasks A: Modeling advective gas flow through low permeability materials
 - Task C Hydro-mechanical-chemical-biological processes during groundwater recovery
 - Task F: Fluid inclusion and movement in tight rock
- **Reports and Publications**
 - Evaluation of Spent Fuel Disposition in Crystalline Rocks: FY17 Progress Report
 - Presentations at 2017 AGU, DECOVALEX-19 (4th and 5th Workshops)
 - “Comparative Study of Discrete Fracture Network and Equivalent Continuum Models for Simulating Flow and Transport in Fractured Media”, published in Journal of Hydrology
 - Contributed to Crystalline Club (CRC) report
 - Two papers will be presented at DFNE-2018 conference, June 20-22, 2018

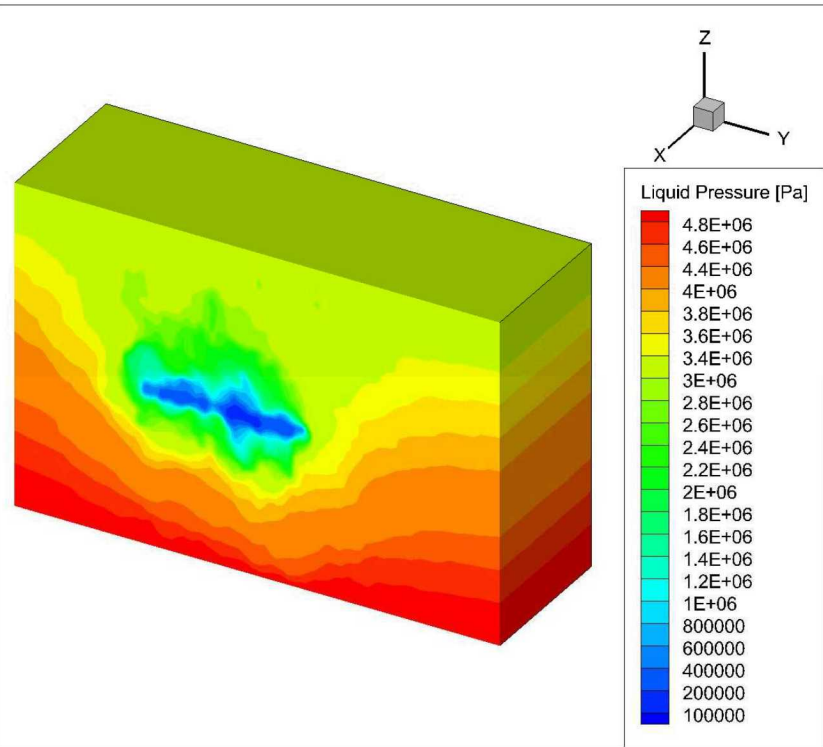
DECOVALEX Task C



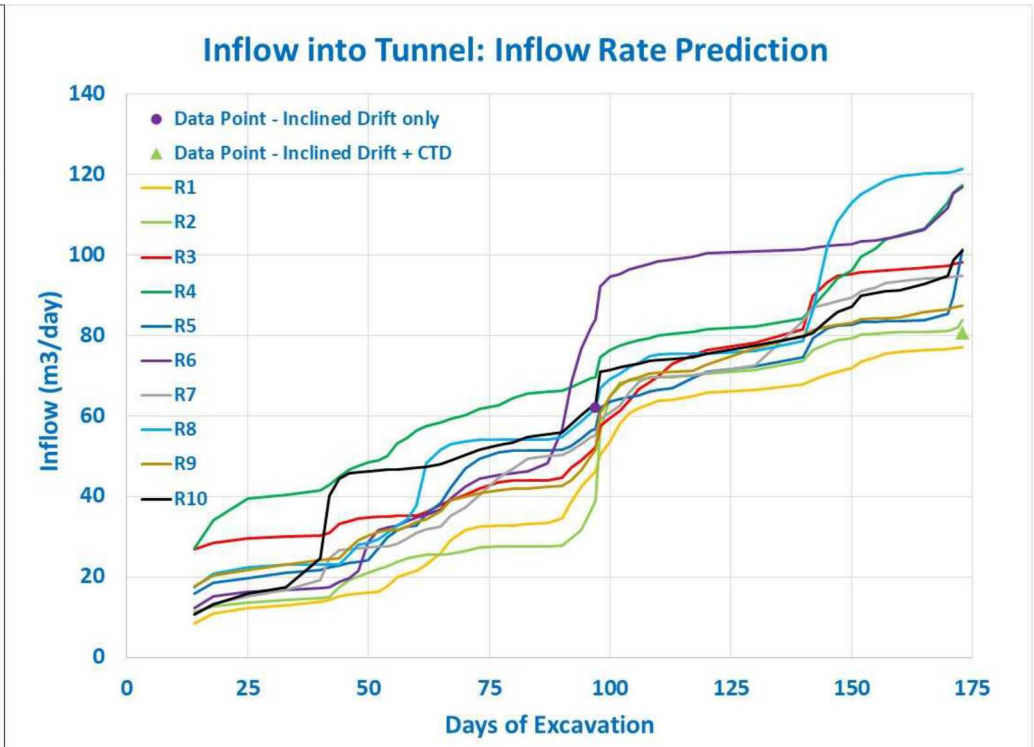
GREET (Groundwater REcovery Experiment in Tunnel) : Preliminary test (drift closure and water-filling) to estimate the recovery process in granitic rock



- **Domain: 200 m x 300 m x 200 m**
 - with cell size of: 2 m x 2 m x 2 m
- **Number of Elements: 1,500,000**
- **Porosity: Anisotropic**
- **Permeability: Anisotropic**
- **Initial Conditions: Hydrostatic pressure and chloride conc. gradient**
- **Boundary Conditions: specified pressure and chloride conc.**
- **Pressure prediction at observation points**
- **Inflow rate prediction**

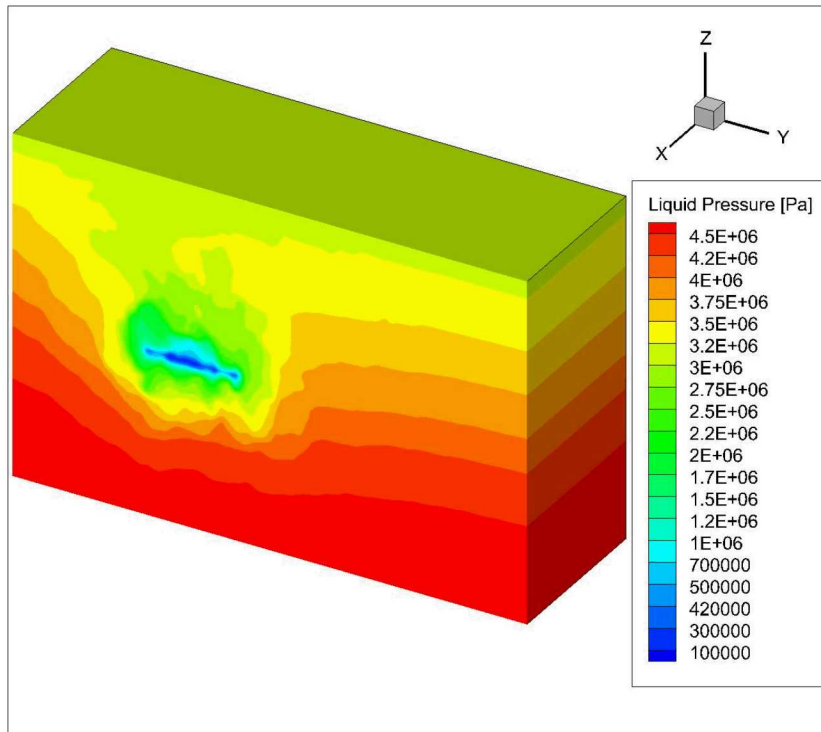


Realization 2: Pressure distribution at
 $t = 173$ days

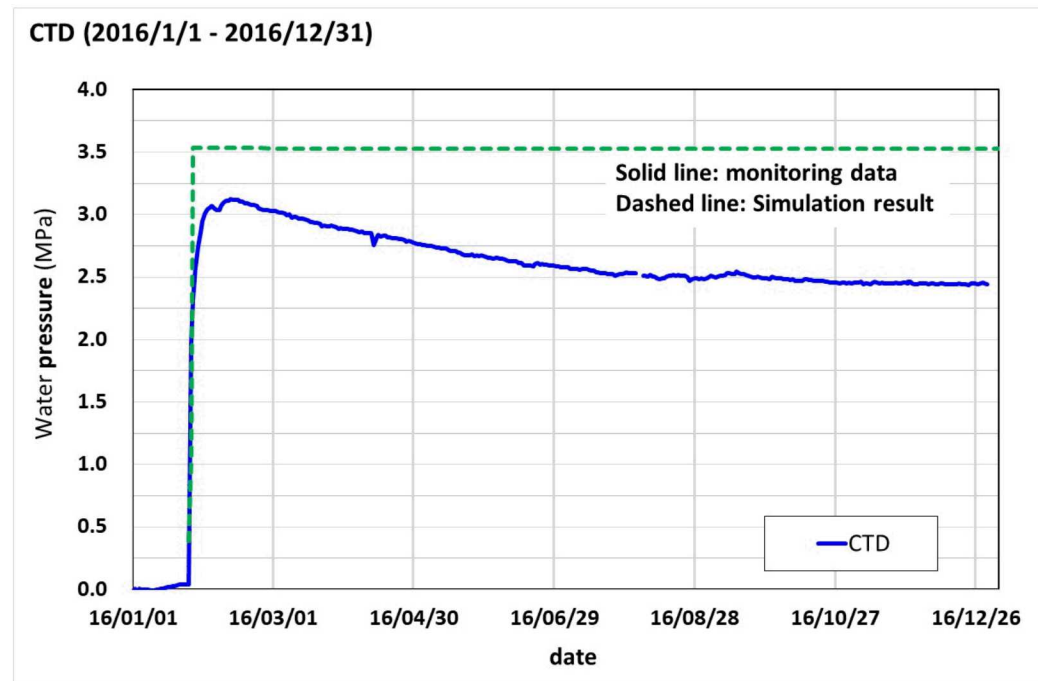


Inflow rate predictions of 10 realizations

- Preliminary predictions of Closure Test Drift filling and post-filling period
- Used Realization 2 upscaled fracture permeability and porosity fields
- Initial condition:
 - Pressure at Closure Test Drift (CTD) = 1 atm.
 - Pressure at observation sections:
 - $P1 = 3.822 \text{ MPa}$, $P2 = 1.286 \text{ MPa}$, $P3 = 1.76 \text{ MPa}$, $P4 = 3.48 \text{ MPa}$,
 $P5 = 3.79 \text{ MPa}$, $P6 = 3.357 \text{ MPa}$
- Ran flow model to one year applying 0.0 flux boundary condition at CTD walls



*Realization 2: Pressure distribution
at $t = 358$ days*



Pressure predictions at Closure Test Drift (CTD)

■ **DECOVALEX19 Task C**

- Update fracture model using additional data from boreholes. Conduct flow and non-reactive transport
- Calibrate Step 2b predictions using experimental data
- Finalize Task C interim report

■ **Parametric Study**

■ **Publications**

■ **Crystalline WP progress report**