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GEOCHEMICAL AND REACTIVE-TRANSPORT EVALUATIONS WITH RELEVANCE TO THE GREET FIELD EXPERIMENT (TASK C)

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U.S. DEPARTMENT OF ENERGY | NNSA National Nuclear Security Administration

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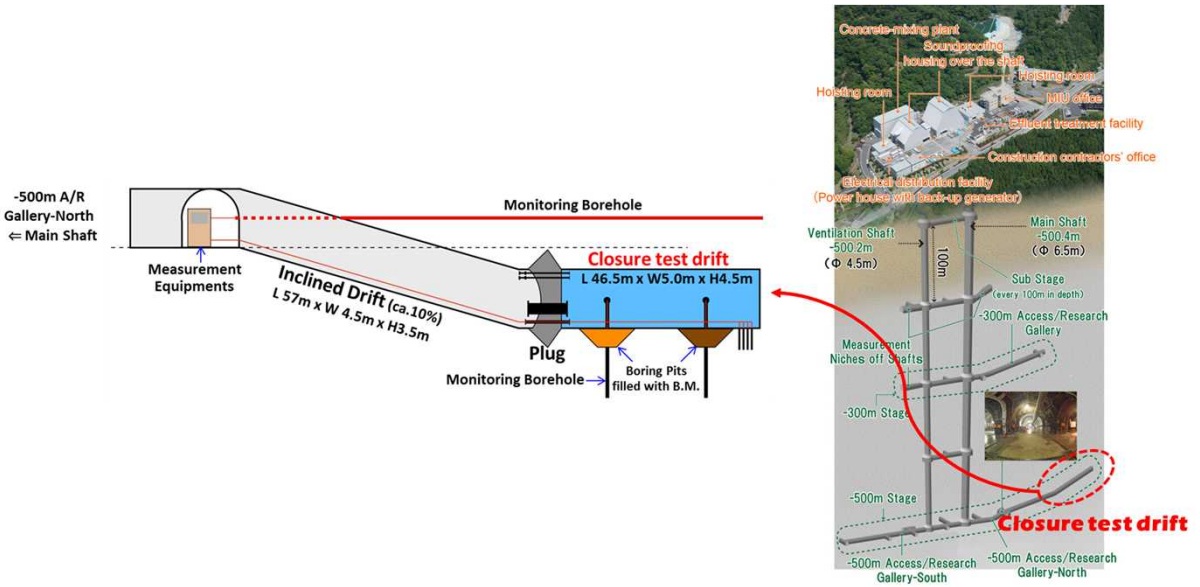
Evaluation of Geochemical Trends in Groundwater Chemistries in Crystalline Rock

- GREET (Groundwater REcovery Experiment in Tunnel)
- Geochemical evaluation of groundwater site data (JAEA GREET website; Iwatsuki et al., 2005 & 2015)

- DECOVALEX-19 Task C:
  - Evaluation of monitoring hydrological and geochemical site data (e.g., Closure Test Drift - CTD)
  - Focus on geochemical evaluation of groundwater chemistry trends
  - Interactions with host-rock and barrier materials

DECOVALEX-19 Task C: GREET Data from the Mizunami URL, Japan



GREET: Groundwater Chemistry Site Data

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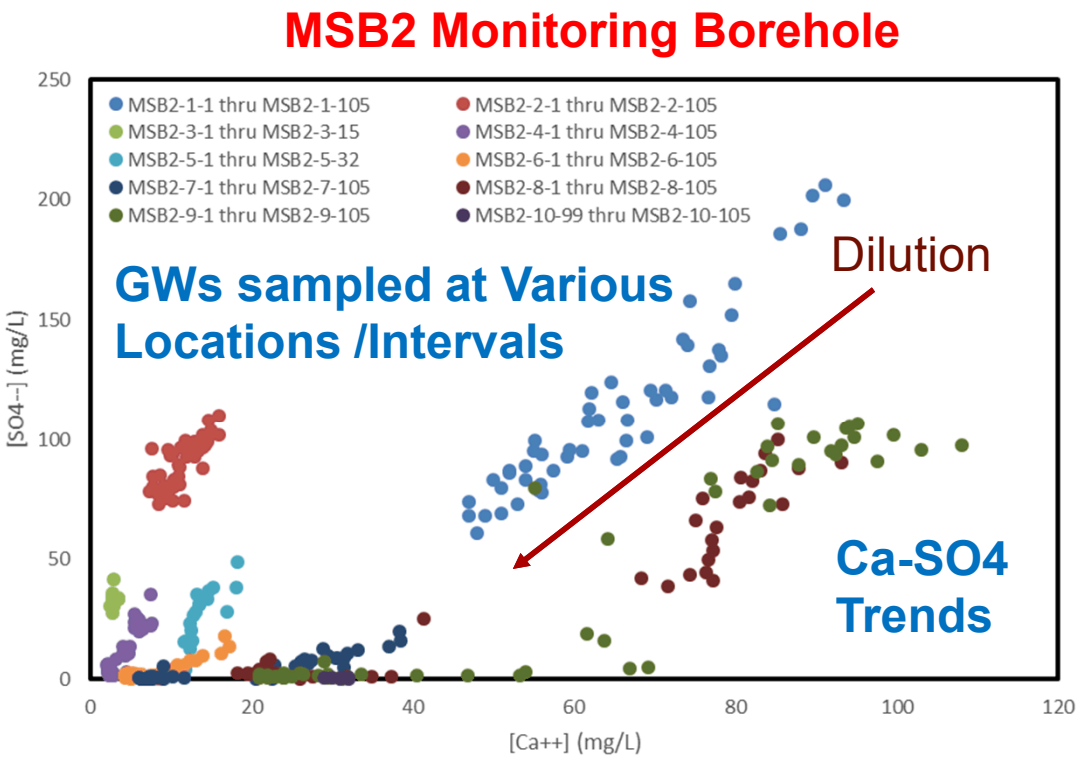
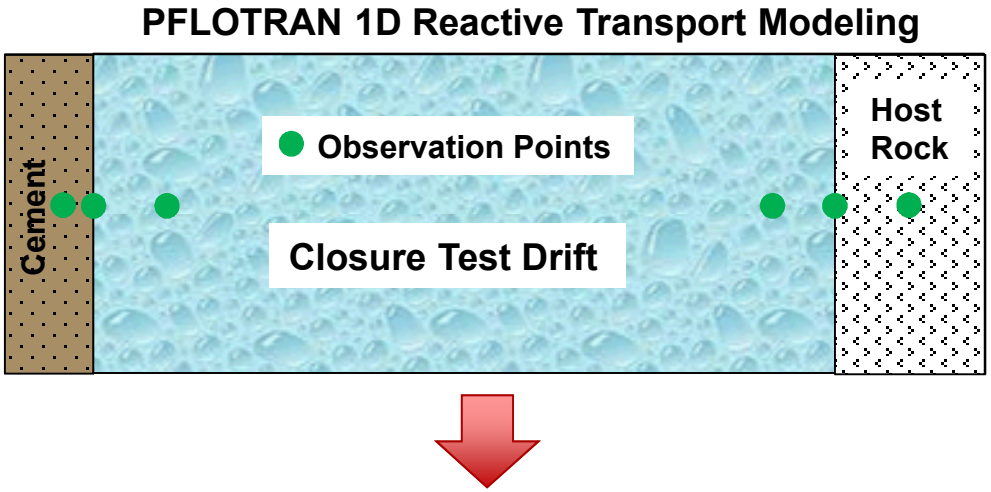


Effects of tunnel excavation:

- Dilution/Evaporation?
- Mixing?
- Mineral dissolution?

- Evaluate geochemical trends:
  - Time
  - Location
- Geochemical modeling
  - EQ3/6 code simulations
    - Reaction path modeling (dilution, evaporation, mixing)
    - Aqueous speciation
    - Cation/anion charge balances
    - GW saturation state
    - Mineralogic interactions affecting groundwater chemistry

Closure Test Drift (CTD)



- **1D Model**
  - Scope key chemical feedbacks from solid phase interactions
  - Test updated cement thermodynamic database
  - Evaluate hydrological couplings informed from monitoring data
  - Evaluate progression towards a 2D H-C modeling
  - Evaluate feasibility of mechanical coupling

- Proposed H-C (Reactive-transport) modeling
  - PFLOTRAN reactive-transport simulation tool
  - 1D/2D H-C model
  - Effect of host-rock and barrier (e.g., cement) material interactions