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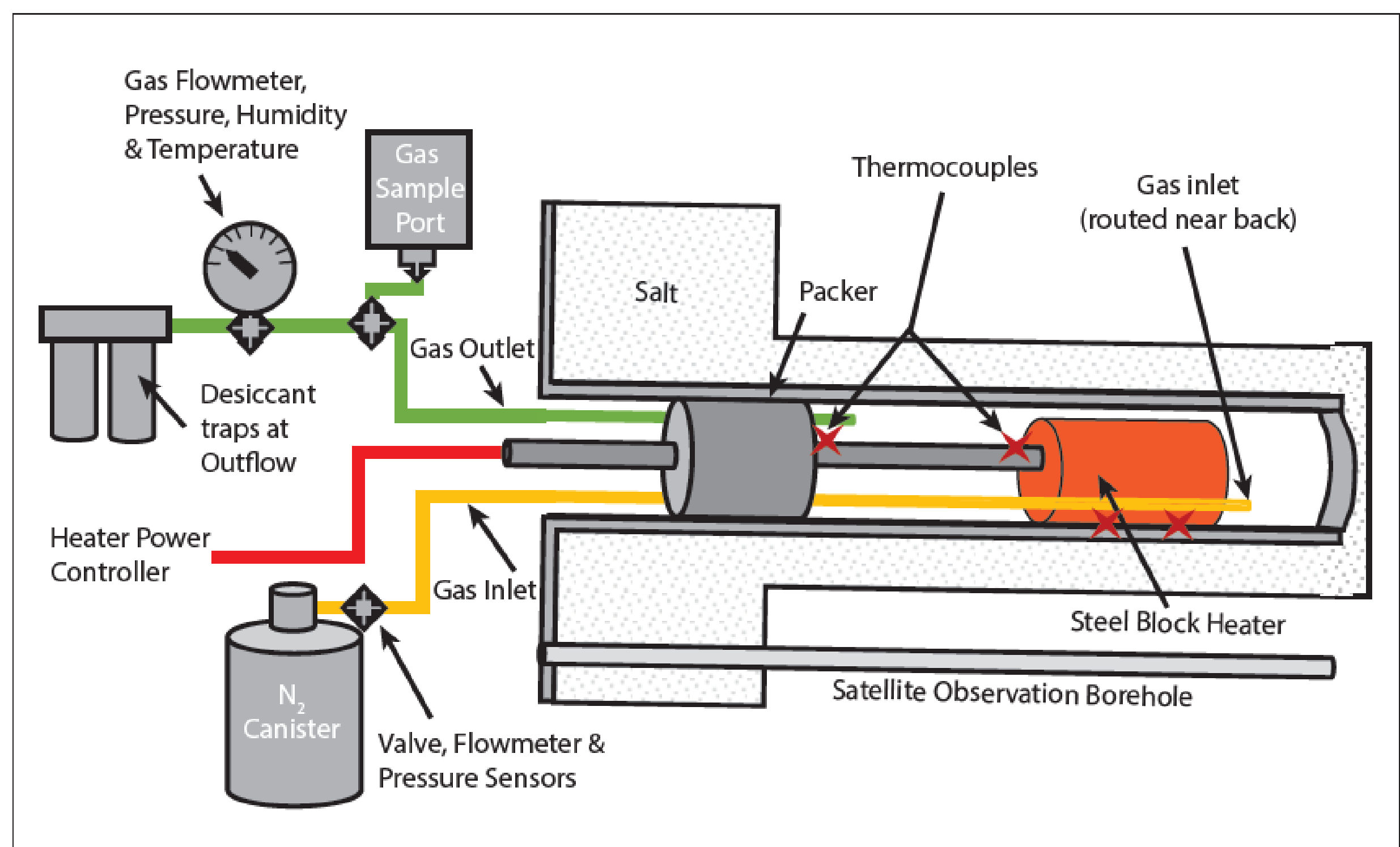
Brine Availability Test in Salt at WIPP (BATS)

Monitoring brine distribution, inflow, and chemistry from heated salt using geophysical methods and direct liquid & gas sampling.



BATS Test Phase 1s (preliminary testing)

- Packer
- Heater
- Existing borehole
- Nitrogen to extract water
- Thermocouples in nearby boreholes

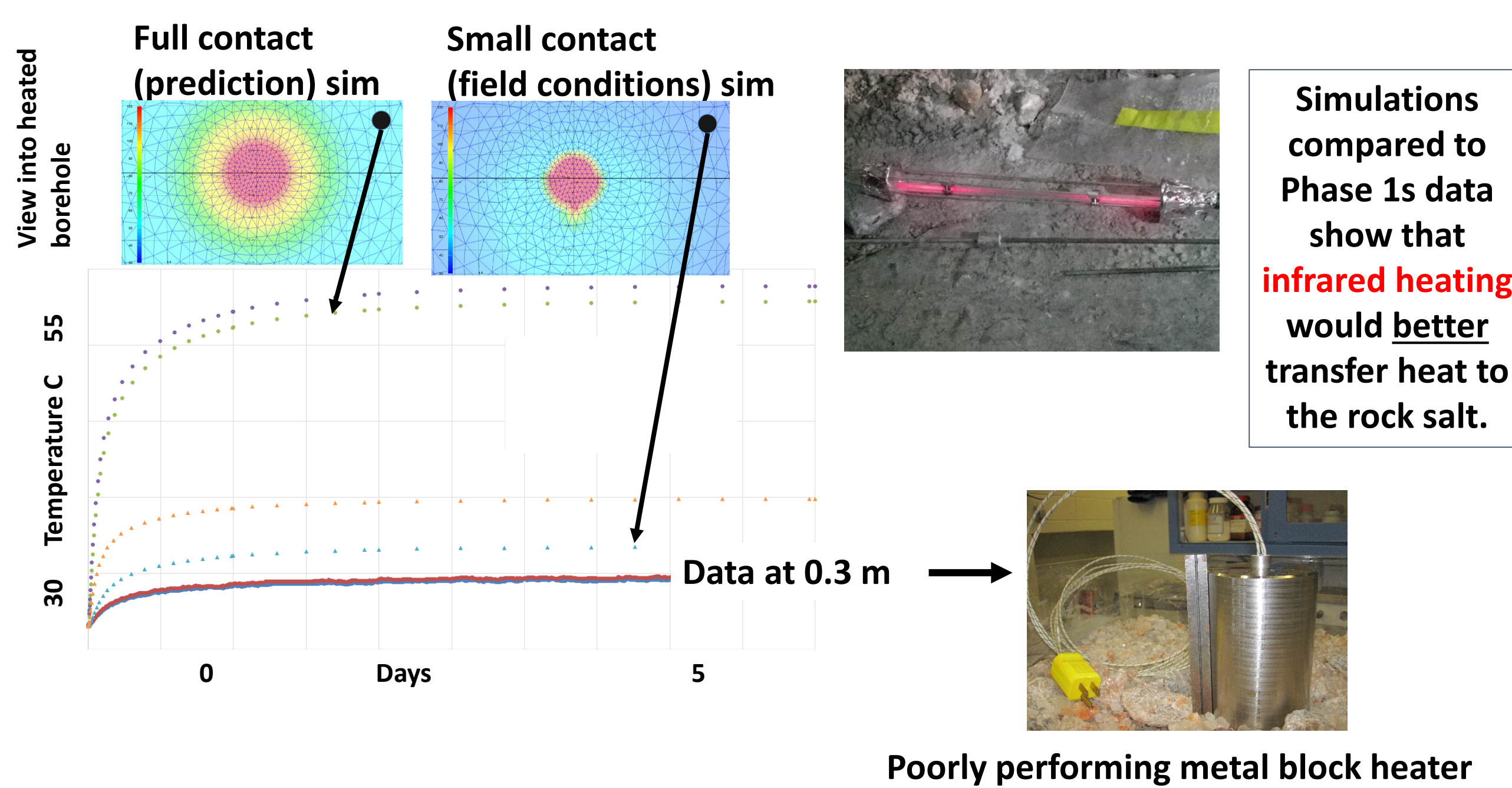


June 2018 – May 2019

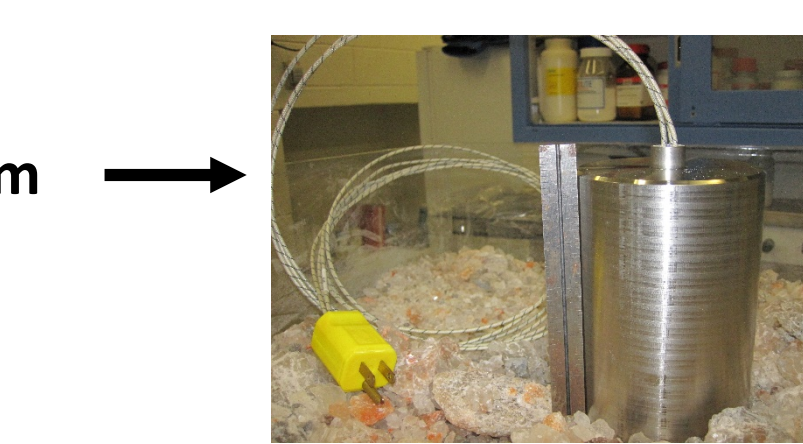
First thermal borehole test in salt in the USA since the early 1990s



BATS Phase 1s : Simulations Assist Design

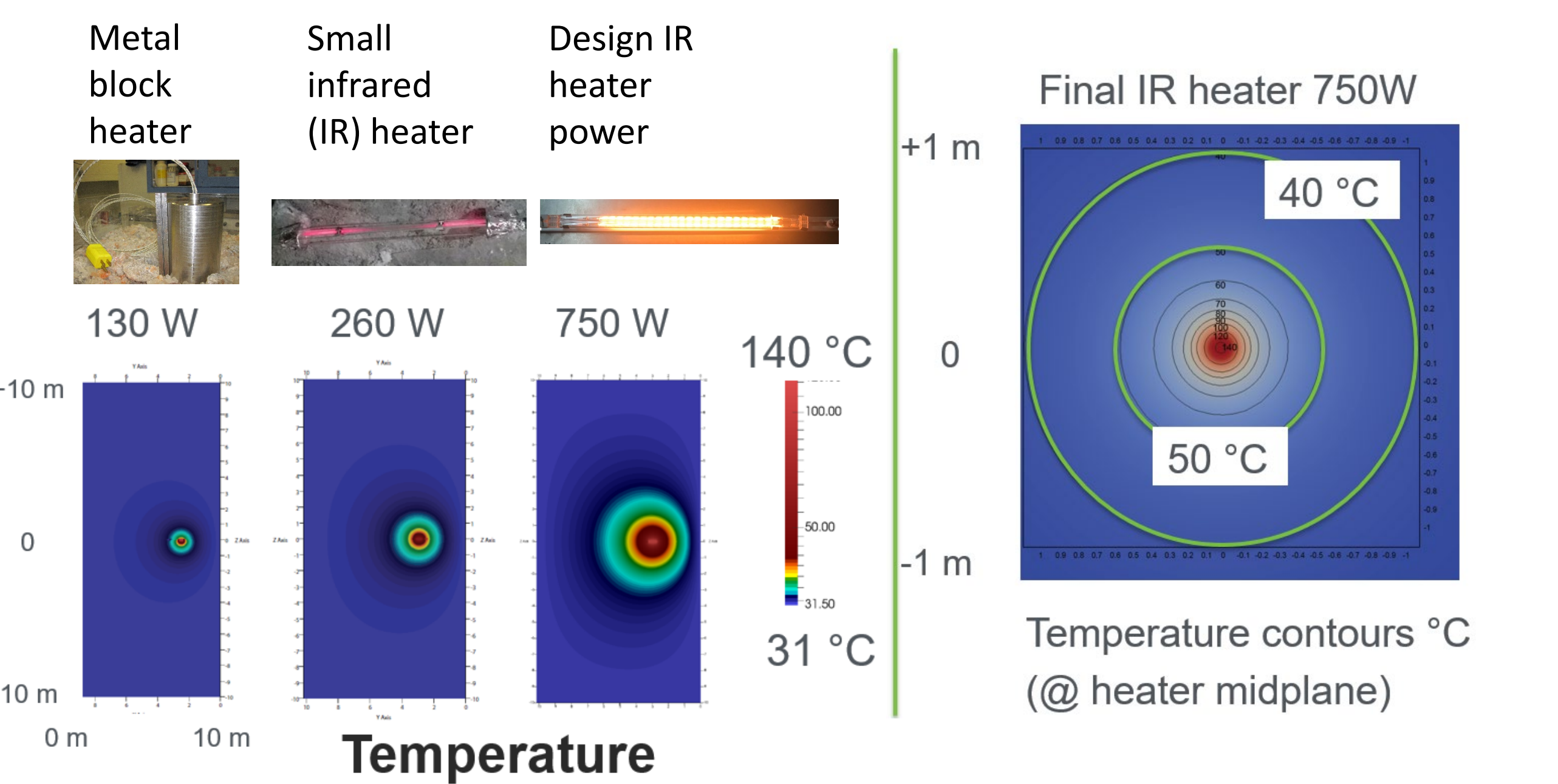


Simulations compared to Phase 1s data show that **infrared heating** would better transfer heat to the rock salt.



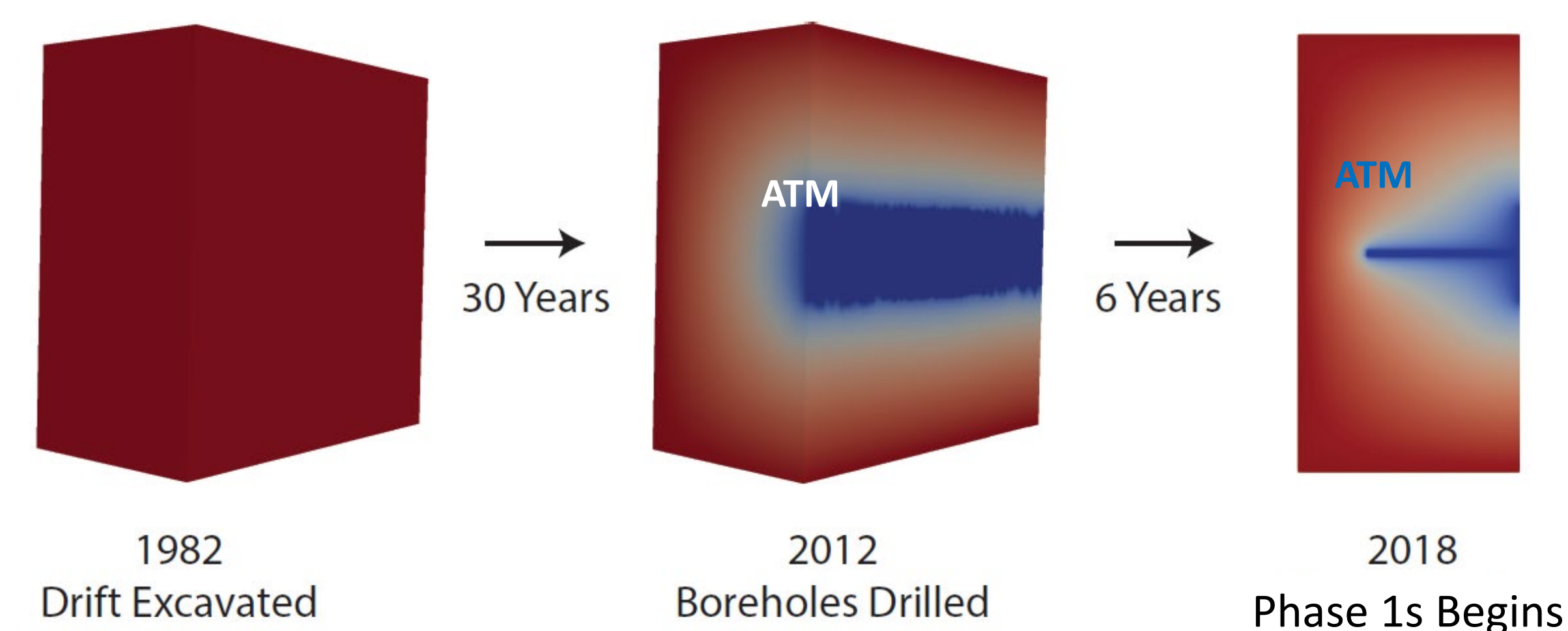
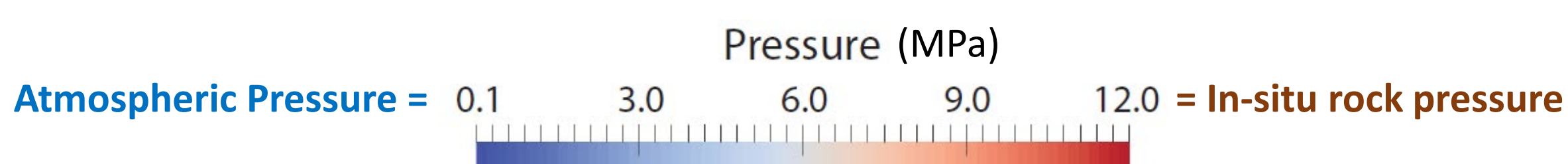
Poorly performing metal block heater

BATS Phase 1s : Simulations Improved Heater Design

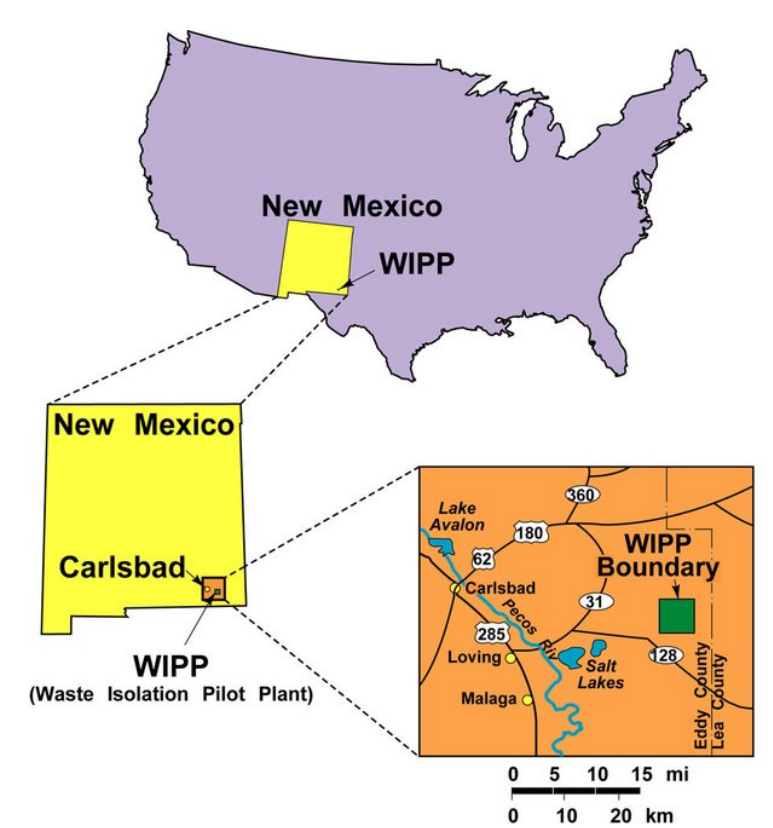
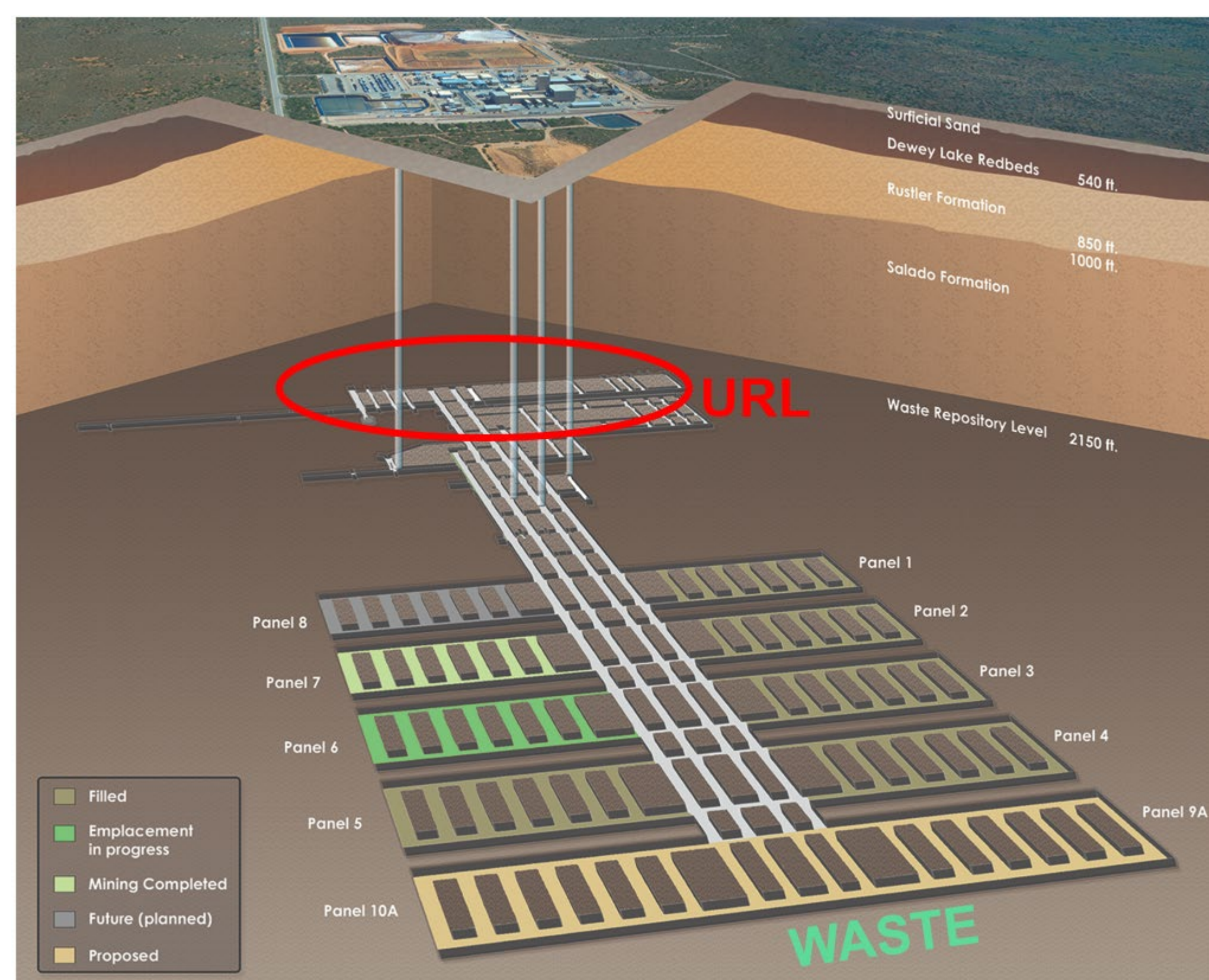


BATS Phase 1s : Initial State Pressure Decay

Simulations require long-term pressure decay due to drifts + boreholes



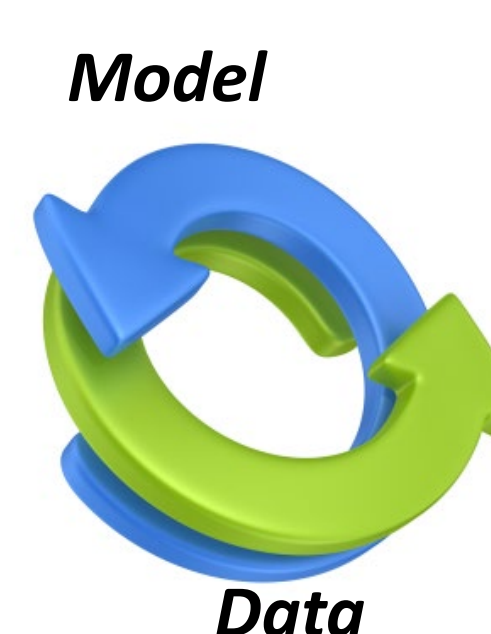
WIPP details



2150 ft bgs
1 mile long
0.5 miles wide
12 miles of drifts

Process-level Modeling Goals

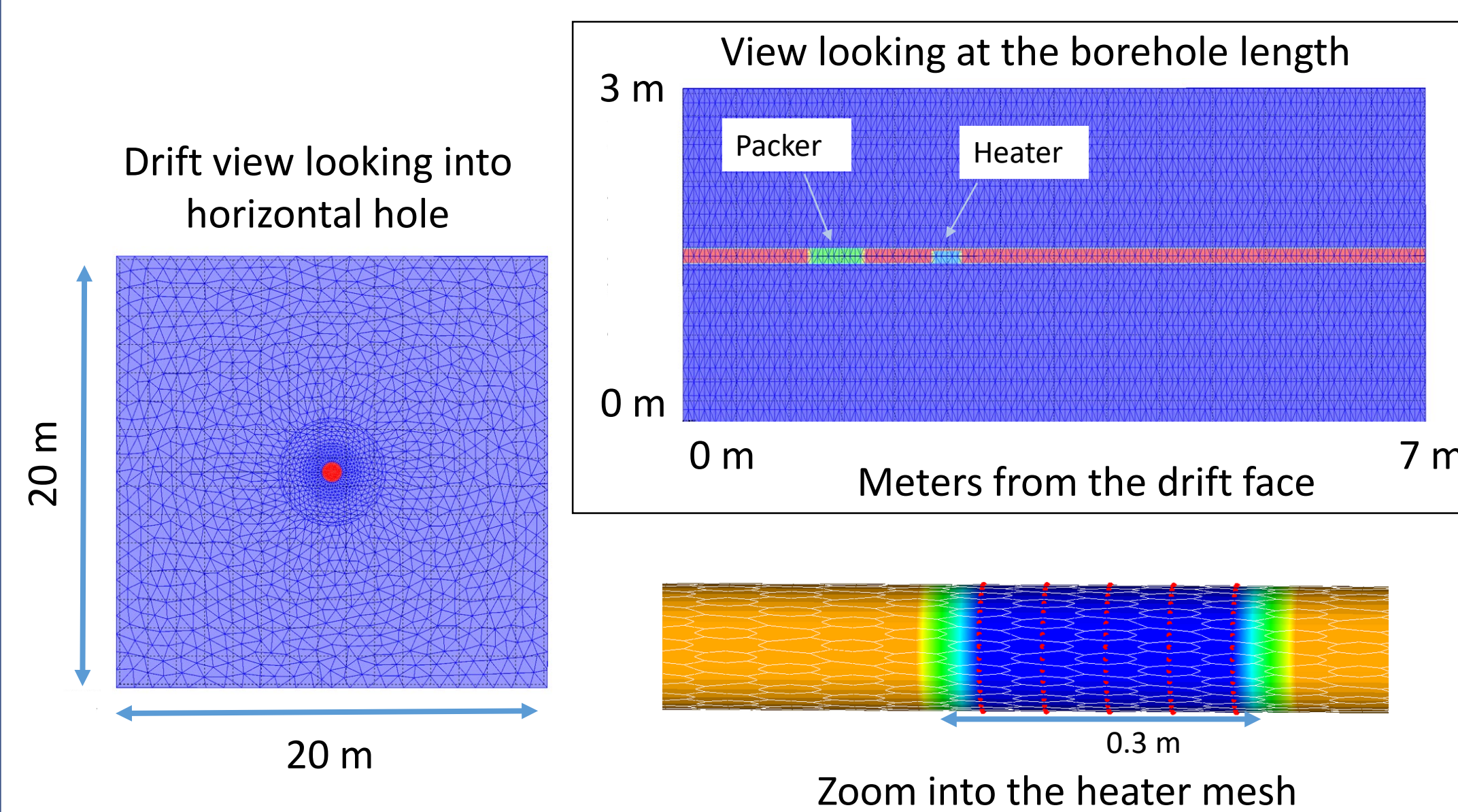
- Demonstrate understanding of repository processes
- Gain confidence in long-term predictions
- Uncertainty reduction
- Integrate process-level physics into performance assessment
- Understand the role of pore water, fluid inclusions, and mineral dehydration



Process-level Simulators

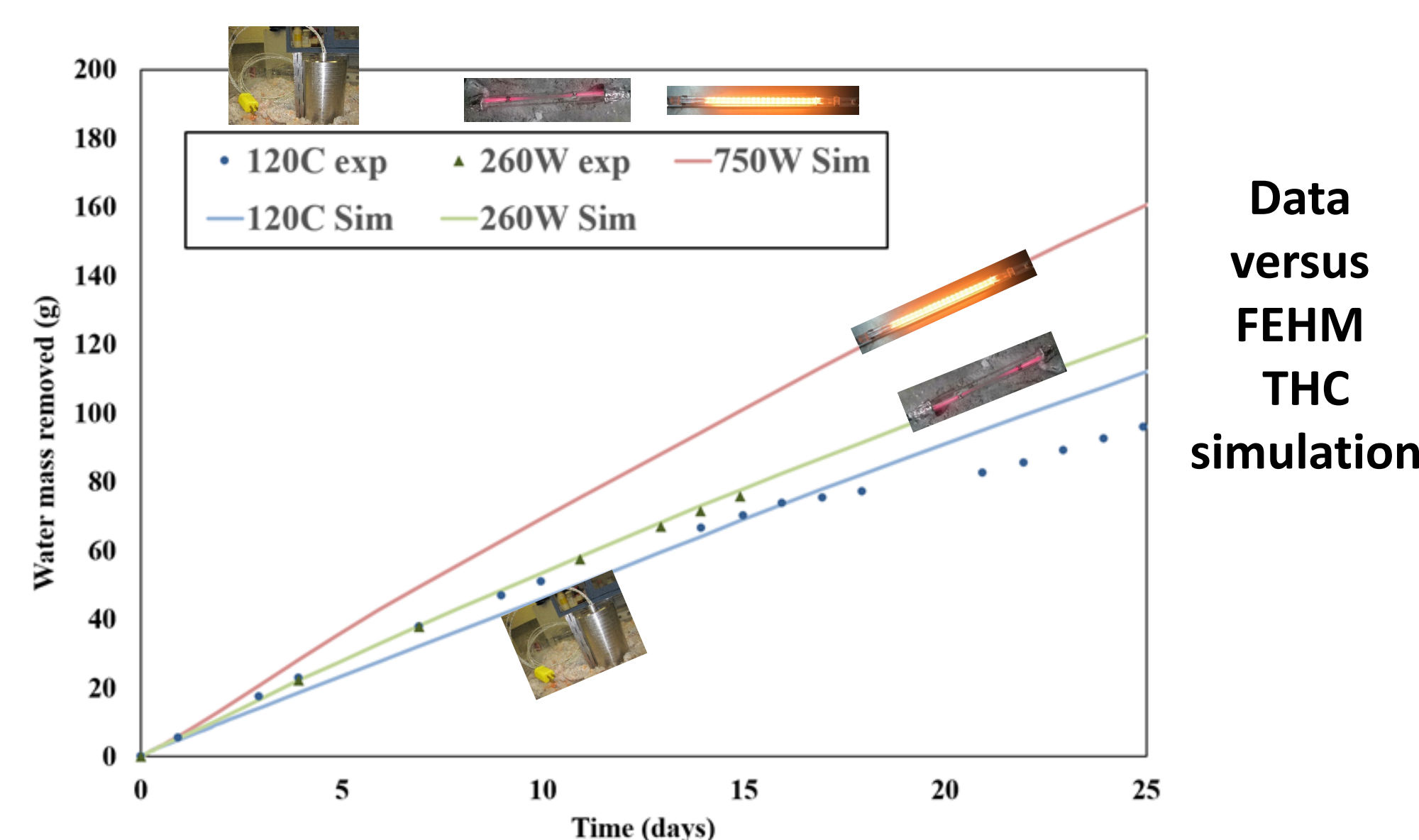
- Thermal-Hydrological-Mechanical-Chemical (THMC)
- TOUGH-FLAC simulates large-deformation THMC (<https://tough.lbl.gov/software/>)
- FEHM numerical model simulates small-deformation THMC (<https://fehm.lanl.gov/>)
- Mesh Generation in LaGriT (<https://lagrit.lanl.gov>)

BATS Phase 1s: 3-D Simulation Domain



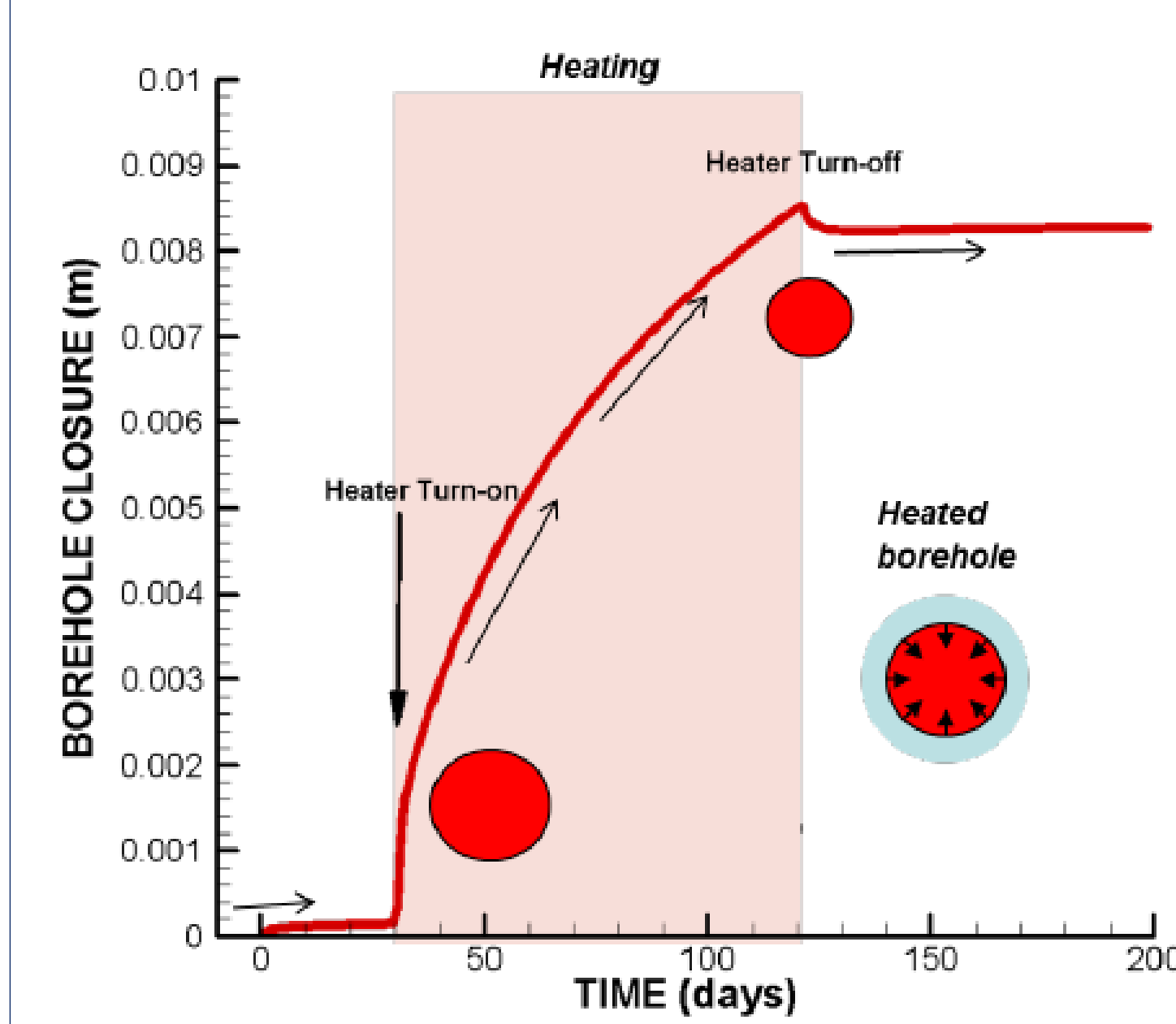
BATS Phase 1s : Water Production

Water flowing into the borehole is extracted by dry nitrogen gas

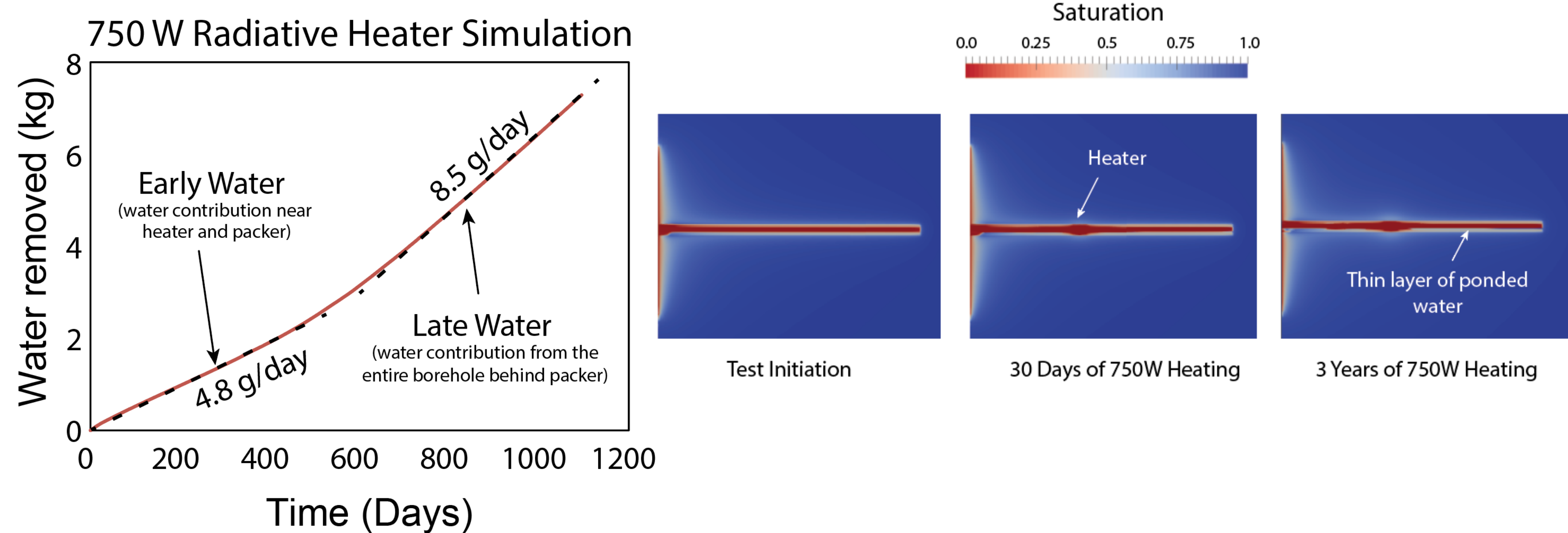


Data versus FEHM THC simulation

TOUGH-FLAC Simulation



BATS Phase 1s : Long-term Water Production Predictions



BATS Phase 1 : Simultaneous Heated and Unheated tests : Fall 2019

