CO_2 *Mineralization* for *in situ* Storage and *ex situ* Enhanced Metals Recovery

GEO SCIENCES

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I am an igneous petrologist/geochemist specializing in mafic and ultramafics rocks – basalt, peridotite, serpentine. I was PI/PD of Project Hotspot, an geothermal exploration project in the Snake River Plain, ID, funded by DOE-EERE that cored 3 deep (2 km) holes across southern Idaho, coupled with detailed petrologic, geochemical and geophysical studies. We recently completed another DOE EERE geothermal project in Idaho. I have also worked extensively on ultramafic rocks in the Coast Ranges of California and Oregon, Europe, and the western Pacific (serpentine mud volcanoes), and sailed on two IODP expeditions.

Technology or focus area

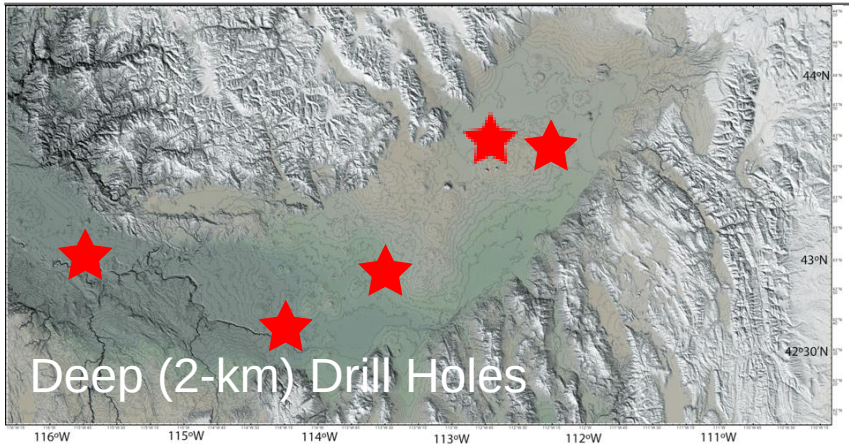
- *In situ* carbon mineralization of basalts and ultramafic rocks, with focus on western USA.
- Chemical, mineralogical, and structural aspects of *in situ* mineralization.
- Field-scale validation based on known basalt stratigraphy.

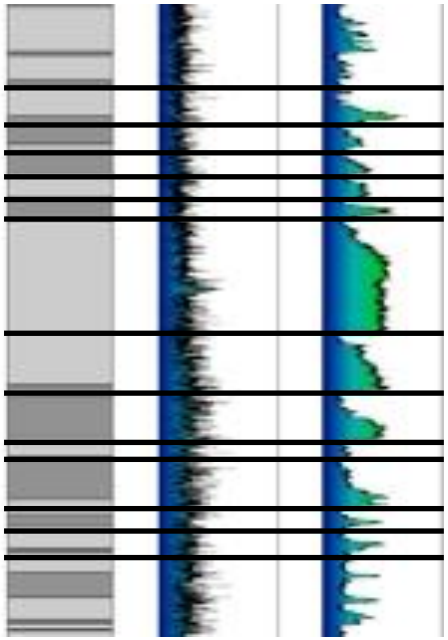
Ideas, Interests, Concepts to be Explored

We seek to understand the chemical dynamics and kinetics of *in situ* mineralization in basalts through static and flow-through experiments, detailed thermodynamic and fluid dynamic modeling using observed phases, and detailed characterization of existing core samples. These studies will guide our field-scale validation experiments, using knowledge gained from 5.3 km of core and detailed geophysical, petrologic and temperature logs obtained in our previous DOE-funded projects. Our goal is to maximize the mineralization potential of different basalt lithologies by exploiting fracture permeability, porous flow tops, and optimal thermal conditions.

arpa·e
CHANGING WHAT'S POSSIBLE

CO_2 MINERALIZATION IN BASALT: THERMODYNAMIC, EXPERIMENTAL, AND MATERIAL CONCEPT VALIDATION, SNAKE RIVER PLAIN BASALT, IDAHO

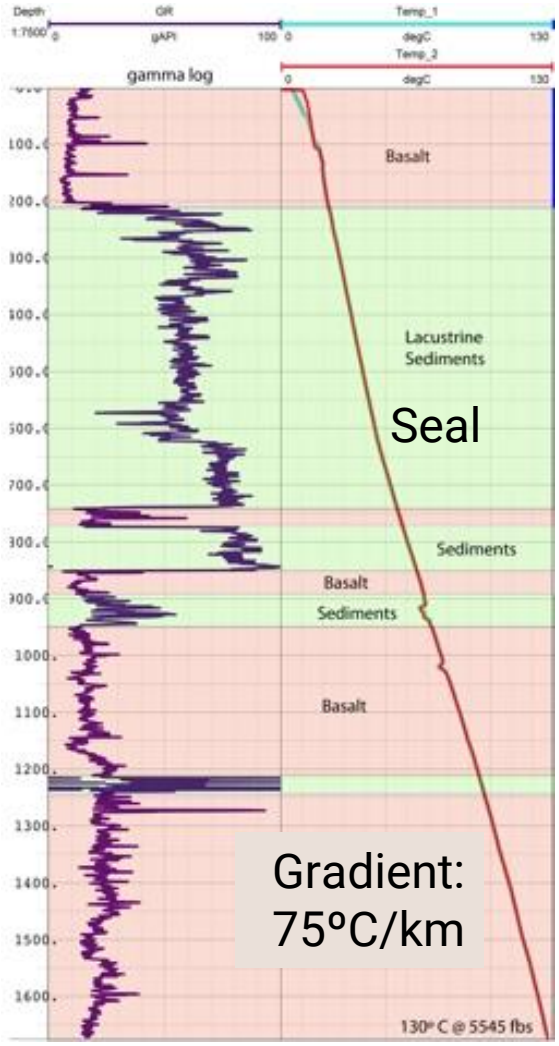




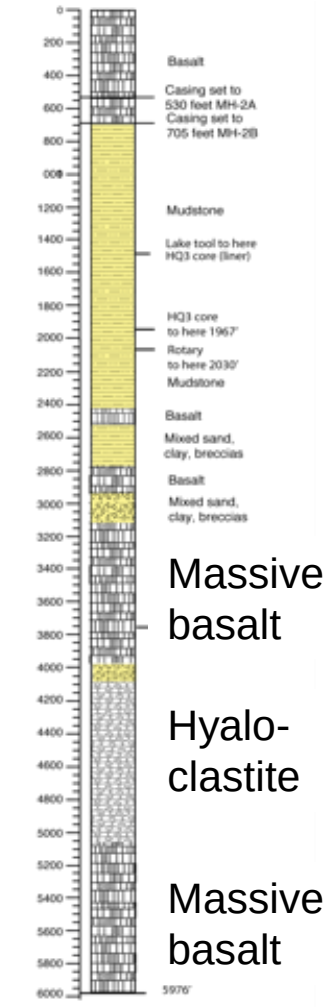
gamma neutron

Neutron log shows relative porosity of flow tops, interiors

Range in lithologies, temperatures selectable by depth



1.7 km



Massive basalt

Hyalo-clastite

Massive basalt

Snake River Plain Volcanic Province