Integrated Pre-Feasibility Study for CO_2 Geological Storage in the Cascadia Basin, Offshore Washington State and British Columbia

Award Number: DE-FE0029219

Project Summary:

The focus of this project was to conduct a comprehensive assessment to determine the suitability of an ocean basalt reservoir in the Cascadia Basin offshore from Washington State and British Columbia for the safe and permanent storage of 50 million tons (MMT) of carbon dioxide (CO_2). The project team also worked to better understand the methods and feasibility for large-scale, permanent storage of CO_2 in deep basalt reservoirs in oceans around the world. This project leveraged a large collection of drilling, well log, and core sample data, as well as existing borehole and seafloor instrumentation, existing modeling studies, and new modeling capabilities. Finally, this project worked to establish reservoir and risk assessment methods and tools for reservoirs of this type.

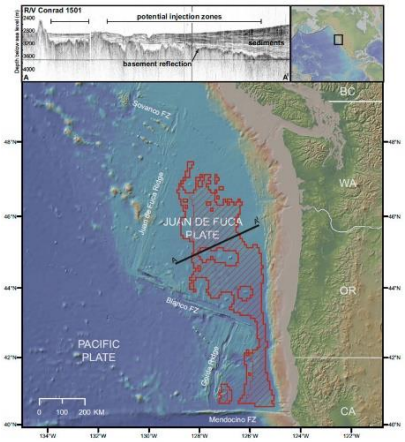

Figure 1: Potential deep-sea basalt targets in the Cascadia Basin for the safe and permanent storage of CO_2.

Prime Performer:
Columbia University

Key Performers:
Pacific Northwest National Laboratory

Principal Investigator:
Dr. David Goldberg

Project Duration:
2/1/2017 – 10/31/2018

Performer Location:
Palisades, New York

Field Sites:
Cascadia Basin, Washington/ British Columbia

Program:
Carbon Storage

Project Outcomes:

Researchers compiled a comprehensive inventory of existing petrophysical, hydrological, and regional geophysical data in the vicinity of the offshore reservoir. The characteristics of the basalt crust in this region are potentially beneficial to CO_2 storage. This project identified potential industry-sourced CO_2 streams in the U.S. and Canada and developed a source/transport workflow for their comprehensive evaluation, resulting in five scenarios to potentially provide 50 MMT of CO_2 to the reservoir. Researchers also assessed the viability and cost of potential CO_2 transportation options for each scenario. Simulations were conducted to assess the potential for safe, long-term storage. Simulations indicated that a 50 MMT CO_2 plume injected over a 20-year period would remain within the reservoir area for at least a 50-year period of post-injection monitoring. Furthermore, there is the potential for geochemical reactions in basalt rocks to convert the injected CO_2 into carbonate materials in about 135 years or less after injection ceases. A monitoring strategy to verify model predictions was also a part of the study.

Presentations, Papers, and Publications

Final Report: Integrated Pre-Feasibility Study for CO_2 Geological Storage in the Cascadia Basin, Offshore Washington State, British Columbia (December 2018) David Goldberg, Alain Bonneville, Martin Stute, Andrew Fisher, Ah-Hyung Park, Michael Gerrard, Kate Moran, Ken Hnottavange-Telleen, Angela Slagle, Inci Demirkanli, Mark White, Martin Scherwath, Martin Heesemann, Lara Aston, Romany Webb, Emily Hsu, Curtis Evans, Luke Zahn