Introduction to CO_2 Storage

The demonstration and research of CO_2 storage in geologic settings is gaining momentum as sequestration is recognized as an important strategy for reducing levels of CO2 emitted to the atmosphere. Countries and industries are assessing and characterizing geologic reservoirs for storage capacity, as well as supporting test sites. The primary geologic settings that have been considered for CO_2 storage are depleted oil and gas reservoirs, deep saline aquifers, and coal beds. In each of these settings, storage efficacy issues regarding appropriate seals, flow behavior, efficient methods for flow predictions, and monitoring systems remain major areas for research.

A project has been completed on the Rapid Prediction of CO_2 Movement in Aquifers, Coal beds, and Oil and Gas Reservoirs. The investigators (Kovscek, Orr, Tchelepi, Jessen) examined the physical mechanisms for CO_2 storage and the timescales associated with them to develop ultra-fast, advanced, computational tools that simulate CO_2 movement in the subsurface. They identify dominant forces for injection and adsorption in the various geologic settings and simulate CO_2 movement and effects with streamline methods. A comprehensive discussion of their work and findings are reported in the Carbon Storage section of Chapter 3.

Continuing projects examine the characters and properties of potential storage sites and CO_2 movement over time. Two of the projects that collaborated with the Kovscek team are investigating storage seal capacity (Zoback) and cost-effect methods for long-term, geophysical monitoring (Harris). Meanwhile another project is developing mathematical methods of predicting the flow of CO_2 over long timescales in CO_2 sequestration sites (Tchelepi, Durlofsky and Aziz). Individual project results are reported in the following pages.

Most recently, a project funded in February 2006 involves a team of four investigators on the geologic storage of CO_2 with a focus on the properties and geomechanics of deep coal beds as well as the prediction, simulation, and monitoring of CO_2 flow within the beds (Harris, Orr, Zoback, Kovscek). A summary of the progress to date and planned work is included.