

Pressure-Based Inversion and Data Assimilation System (PIDAS) for CO₂ Leakage Detection

Award Number: DE-FE0012231

Project Summary:

The objective of this project was to develop a pressure-based inversion and data assimilation system (PIDAS) for detecting carbon dioxide (CO₂) leakage from storage formations. The research objectives included: (1) demonstrating the utility of the proposed well testing technique for leakage detection through integrated theoretical and numerical analysis, laboratory experiments, and field demonstration; (2) developing effective data assimilation and inversion algorithms for identifying leakage pathways by fusing data generated during well testing; and (3) designing the developed PIDAS tool for early leakage detection.

Prime Performer:
University of Texas at Austin

Principal Investigator:
Alexander Sun

Project Duration:
10/1/2013 – 9/30/2018

Performer Location:
Austin, Texas

Field Sites:
Cranfield site, Mississippi

Program:
Carbon Storage

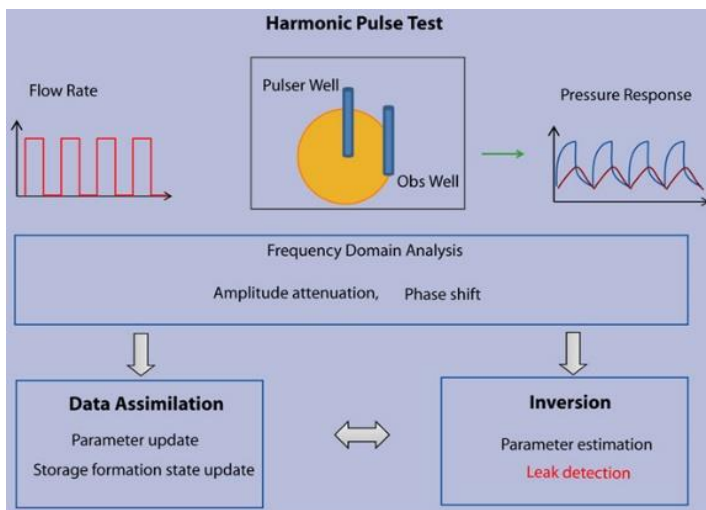


Figure 1: Conceptual sketch of major components of the PIDAS tool.

Project Outcomes:

The outcomes of the project included the development of the PIDAS tool for detecting CO₂ leakage from storage formations as well as a workflow to determine the most probable leak location using harmonic pulse testing results. The project involved theoretical and numerical analysis, laboratory validation/proof-of-concept testing, and validation of basic technology components in a field laboratory experiment. Field experiments were conducted at the Regional Carbon Sequestration Partnership Cranfield Development Phase site in Mississippi, utilizing the one injector and two monitoring wells at the detailed area of study site. The field campaign consisted of baseline and leak experiments, which were conducted sequentially.

Presentations, Papers, and Publications

Final Report: [Pressure-Based Inversion and Data Assimilation System \(PIDAS\) for CO₂ Leakage Detection](#) (December 2018) Alexander Sun