GSCO2 | Center for Geologic Storage of CO_2

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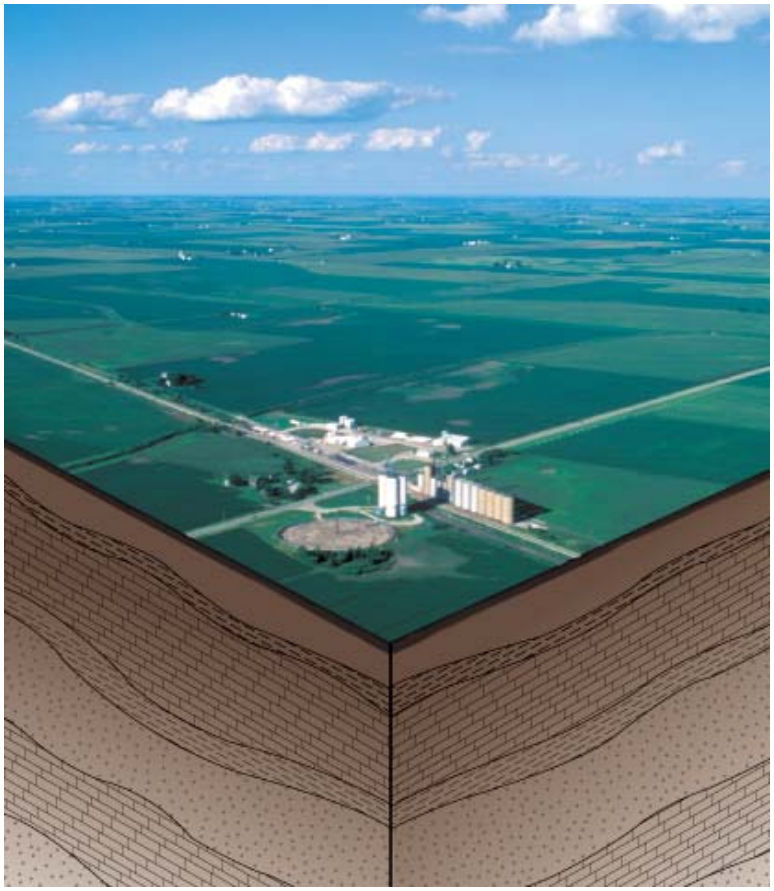
USDOE NETL
Annual Carbon Storage R&D Review Meeting
Pittsburg, PA
August 18 - 20, 2015

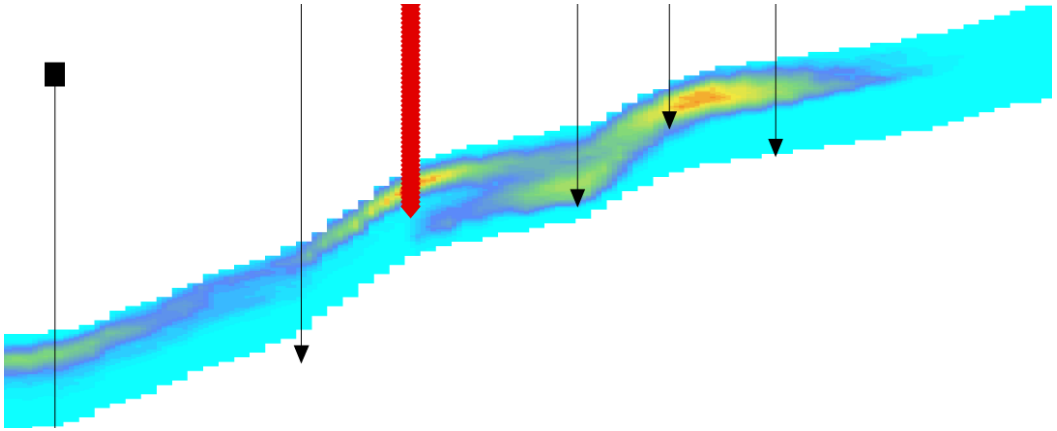
Midwest Geological Sequestration Consortium

- Three CO_2 enhanced oil recovery pilot projects:
  - Sugar Creek, Mumford Hills, and Loudon
- A CO_2 enhanced coalbed methane pilot project:
  - Tanquary
- A saline demonstration project:
  - IBDP
- Uncertainty and limitations in applied technology observed in several field projects



GSCO2 Aims

- Predicting the location and distribution of the injected CO_2 within the storage reservoir
- Identifying the mechanism(s) of injection-induced microseismicity, and controlling, locating, and predicting its occurrence



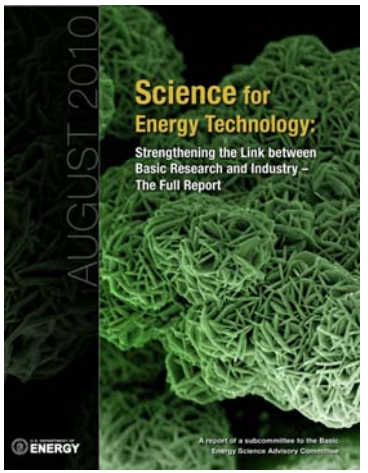
GSCO2 Objective and Theme

- Overarching Objective:

  Pursue basic science solutions to recognized uncertainty in CO_2 storage technology

- Overarching Theme:

  Use-Inspired Basic Research

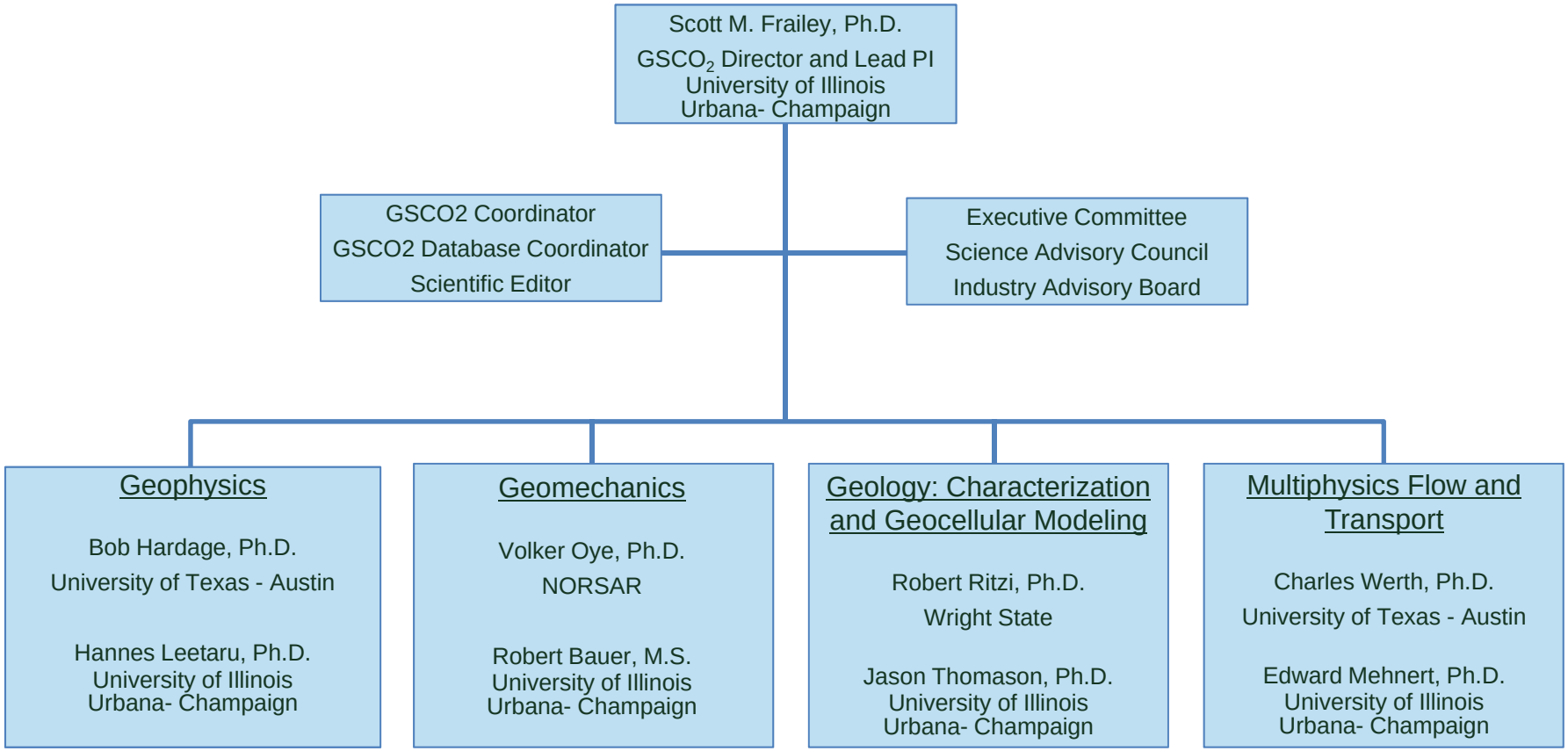


Research Themes and Scales

- Geology
- Geophysics
- Geomechanics
- Multiphysics Flow and Transport

- Molecular simulations
- Pore-scale modeling
- Macro-scale modeling
- Site-scale

GSCO2 Organizational Structure



Research Theme: Statements and Collaborators

- Geology (ISGS, UIUC, WSU):

Identify and predict geologic properties that control CO_2 distribution and brine displacement

- Geophysics (UTA, SINTEF):

Image and locate injected CO_2 in the subsurface with greater certainty to reduce risk of CO_2 storage

- Geomechanics (NORSAR, SINTEF, Schlumberger):

Identify and characterize the geologic features that cause microseismicity so that it can be predicted and controlled

- Multiphysics Flow (ISGS, USC, UTA, UIUC, NETL, ND)

Predict the three-dimensional distribution of CO_2 within the storage reservoir

GSCO2 Poster Highlights

Research Theme Posters

- Geology and Geocellular Modeling
  - Scales of sedimentary architecture characterized and defined
  - Geocellular modeling method development that scales and represents geologic models
- Geomechanics
  - Development of algorithms to locate measured microseismic events
  - Geologic laboratory experiments scaled to reservoir/site scale

Research Theme Posters, contd.

- Geophysics
  - Core-scale mechanical properties validate new pore-scale modeling
  - Pore and core integrated in site-scale seismic
- Multiphysics Flow and Transport Modeling
  - Molecular scale adsorption and wetting behavior analyzed at reservoir temperature and pressure
  - Microfluidic, pore-scale lab experiments with a pore network computational model
  - Site scale modeling: high resolution geocellular model, lab/model based rel perm and cap press

Specific Research Posters

- Integration of Seismic Measurements
  - Direct use of S-waves for seismic imaging (vs. traditional P-wave only analyses)
  - Differentiating seismic interpretation models
- Pore-Scale Modeling
  - Synergistic experiments of wettability and pore-scale heterogeneity of water-CO2 flow dynamics
  - Pore-scale model development informed and validated by wettability and flow experiments
  - Upscale pore-scale models to reservoir-scale

Center for Geologic Storage of CO_2
Our Collaborators

This presentation was supported as part of the Center of Geological Storage of CO_2,
an Energy Frontier Research Center funded by
the U.S. Department of Energy, Office of Science.

Data for this project were provided, in part, by work supported by
the U.S. Department of Energy under award number DE-FC26-05NT42588
and the Illinois Department of Commerce and Economic Opportunity.

Schlumberger

THE UNIVERSITY OF TEXAS AT AUSTIN

NETL

NORSAR

UNIVERSITY OF NOTRE DAME

SINTEF

WRIGHT STATE UNIVERSITY

USC University of Southern California

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