Outreach, Training, Policy, and Regulation: GCCC Student Overview

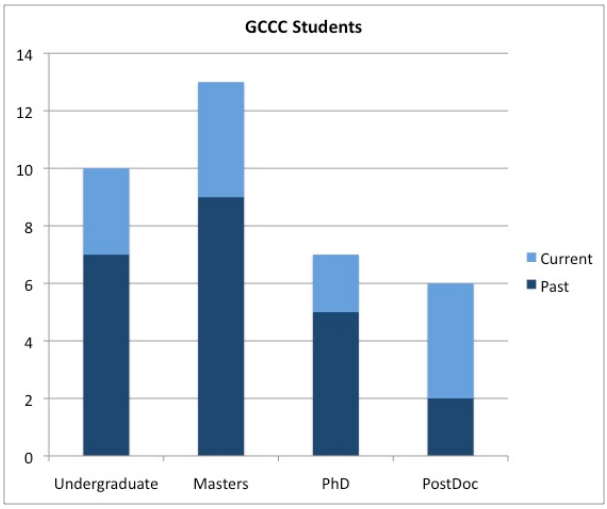
Project Description

GCCC is dedicated to educating the next generation of carbon sequestration professionals. We have trained and financially supported undergraduate, master's, and doctoral students, as well as postdoctoral fellows. We have also developed carbon capture and storage (CCS) curricula and continue to teach CCS courses at The University of Texas at Austin™.

Accomplishments

Between 2011 and 2014, the GCCC

- Graduated 9 masters and 2 Ph.D. students.
- Supported 6 postdoctoral fellows, 7 Ph.D. students, and 14 master's students.
- Provided 10 positions for undergraduate researchers.
- Developed a semester-long graduate course in carbon sequestration completed by eight students.
- Enrolled GCCC students in and provided faculty for the International Energy Agency Greenhouse Gas R&D Programme's (IEAGHG) summer course in carbon sequestration. In 2014 GCCC hosted and taught sections of the course at The University of Texas at Austin, which enrolled 50 international students.



GCCC currently supports four masters and two Ph.D. students.

Impacts

GCCC graduates and postdocs have

- Led successful careers at prominent oil and gas, and service companies in the United States and Mexico.
- Been awarded positions at academic institutions, where they continue to train the next generation of carbon sequestration professionals.
- Published their results in well-respected peer-reviewed journals.
- Collaborated with leading regional, U.S., and international researchers.
- Enhanced the overall reputation of the GCCC as a leader in geologic carbon sequestration.

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Dissertations

Kyung Won Chang

Carbon dioxide storage in geologically heterogeneous formations. The main constraints on storage capacity are the physical mechanisms of fluid flow in heterogeneous formations, which have not been studied sufficiently. This dissertation considers two related problems: (1) the evolution of injection-induced overpressure that determines the area affected by CO_2 storage and (2) the rate of buoyant fluid flow along faults that determines the potential for leakage of CO_2.

Advisors: Jean-Philippe Nicot and Marc A. Hesse

Chang is now a postdoctoral scientist at the Stanford Center for Induced and Triggered Seismicity.

Masoumeh Kordi

Characterization and prediction of reservoir quality in chlorite-coated sandstones: evidence from the Late Cretaceous lower Tuscaloosa Formation at Cranfield field, Mississippi, U.S.A. This study determines the depositional processes and diagenetic alterations affecting reservoir quality of the lower Tuscaloosa Formation at Cranfield field. It also determines the origin, time, and processes of the grain-coating chlorite and its impacts on reservoir quality.

Advisors: William Fisher and Susan Hovorka

Theses

Julie Ditkof

Time-lapse seismic monitoring for enhanced oil recovery and carbon capture and storage field site at Cranfield field, Mississippi. This study characterizes a time-lapse response between two seismic surveys to understand where injected CO_2 is migrating and to map the injected CO_2 plume edge.

Advisors: Nathan Bangs, Tip Meckel, Kyle Spikes, and Sean Gulick

Ditkof has taken a job at Shell in Houston, Texas.

Kerstan Wallace

Use of 3-dimensional dynamic modeling of CO_2 injection for comparison to regional static capacity assessments of Miocene sandstone reservoirs in the Texas State waters, Gulf of Mexico. Wallace determined the effectiveness of regional capacity assessments by performing refinement techniques that include simple analytical and complex reservoir injection simulations

Advisors: Michael Young, Tip Meckel, and Marc A. Hesse

Wallace is now working at Encana in Denver, Colorado.

Theses (continued)

Mary Hingst

Geochemical effects of elevated methane and carbon dioxide in near-surface sediments above an EOR/CCUS site. This study evaluates the potential for metal mobilization through soil pore water to increase as a result of CO_2 and CH_4 and assesses the potential impact to aquifers and/or the biosphere.

Advisors: Michael Young, Katherine Romanak, and Daniel Breecker

Hingst is working as a hydrologist at GSI Water Solutions in Portland, Oregon.

Andrew Nicholson

Empirical analysis of fault seal capacity for CO_2 sequestration, Lower Miocene, Texas Gulf Coast. To reduce uncertainty of fault performance, a fault seal calibration has been performed on six Miocene natural gas traps in the Texas State waters in order to constrain the capillary entry pressures of the modeled fault gouge.

Advisors: Scott Tinker, Tip Meckel, Ramon Treviño, and Ronald Steel

Nicholson is working at Anadarko Petroleum Corporation in The Woodlands, Texas.

Erin Miller

A question of capacity: Assessing CO_2 sequestration potential in Texas offshore lands. This paper discusses the methods for calculating capacity, presents an analysis of the benefits and drawbacks of the various methods, and develops a process for future projects to utilize in determining which methodology to employ.

Advisors: Scott Tinker, Tip Meckel, and Peter Flemings

Marlo Gawey

Experimental analysis and modeling of perfluorocarbon transport in the vadose zone: implications for monitoring CO_2 leakage at CCS sites. The objective of this study is to identify substrates in which perfluorocarbon tracers (PFTs) behave conservatively and quantify nonconservative behavior. These results show that PFT retardation in the vadose zone has not been adequately considered for interpretation of PFT data for CCS monitoring.

Advisors: Michael Young, Toti Larson, Katherine Romanak, and Daniel Breecker

Gawey is now a Foundation Geologist at Hess Corporation in Houston, Texas.

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Theses (continued)

Stuart Coleman

The geologic and economic analysis of stacked CO_2 storage systems: a carbon management strategy for the Texas Gulf Coast. A stacked storage system is implemented with an enhanced oil recovery (EOR) project to manage the temporal differences between the operation of a coal-fired power plant and EOR production. Of the 11 oil fields analyzed on a net present value basis, the Hastings field has the greatest potential for both EOR and stacked storage operations.

Advisors: Christopher J. Jablonowski , Susan Hovorka, and Carey King

Coleman is employed by Chevron as a petroleum engineer in Houston, Texas.

Sean Porse

Using analytical and numerical modeling to assess deep groundwater monitoring parameters at carbon capture, utilization, and storage sites. Differences in signal breakthrough indicate that pressure monitoring is a better choice for early migration signal detection. However, both pressure and geochemical parameters should be considered as part of an integrated monitoring program on a site-specific basis, depending on regulatory requirements for longer term (i.e., >50 years) monitoring.

Advisors: Michael Young, Susan Hovorka, and Jack Sharp

Porse is continuing research as a post-master's research associate at Pacific Northwest National Laboratory.

Carlos Puerta

A value of information analysis of permeability data in a carbon, capture and storage project. The main objective of this study is to provide a decision-analysis framework to quantify the value of information (VOI) in a CCS project that faces uncertainties about permeability values in the reservoir.

Advisors: Eric Bickel, Susan Hovorka, and Varun Rai

Puerta is now working for Schlumberger Business Consulting in Mexico City.

Contact

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