

Timothy A. 'Tip' Meckel

CURRICULUM VITA

Research Professor & Senior Research Scientist
The University of Texas at Austin
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ACADEMIC DEGREES

- Ph.D. Department of Geological Sciences and Institute for Geophysics, The University of Texas at Austin, 2003.
Dissertation: *Tectonics of the Hjort Region of the Macquarie Ridge Complex, Southernmost Australian-Pacific plate boundary, southwest Pacific Ocean*. Advisor: Dr. Sharon Mosher.
- M.S. Department of Geological Sciences, University of Montana, Missoula, MT, 1998. Thesis: *Assessing Sedimentary Architecture Using Ground-Penetrating Radar - the Cretaceous Bootlegger Member, Central Montana*. Advisor: Dr. Mark Hendrix.
- B.A., with Magna Cum Laude and Phi Beta Kappa, Department of Geology, Colby College, Waterville, ME, 1995.
Senior Thesis: *Emplacement mechanisms of the Moxie Pluton, central Maine*. Advisor: Dr. Don Allen.

PROFESSIONAL APPOINTMENTS

- A. **Senior Research Scientist**, Bureau of Economic Geology, The University of Texas at Austin (September 2018 – Present; 6 years).
Gulf Coast Carbon Center; Director of High-resolution 3D Marine Seismic Service Center.
- B. **Research Scientist**, Bureau of Economic Geology, The University of Texas at Austin (2011 – 2018; 7 years).
CO₂ sequestration research. Develop offshore CCS capabilities: Geologic characterization; Model fluid migration and structural controls; high-resolution 3D seismic acquisition, processing, and interpretation. Buoyancy-dominated two-phase flow in heterogeneous clastics – laboratory and numerical simulation.
- C. **Research Associate**, Bureau of Economic Geology, The University of Texas at Austin (2006 –2011; 5 years).
CO₂ sequestration research. Field demonstration projects: Frio II Pilot & SECARB Phase 2 & 3; Utilized subsurface pressure for monitoring CO₂ injections; Offshore CCS Geologic Characterization; Structural influences on CCS.
- D. **Mendenhall Postdoctoral Research Fellow**, U.S. Geological Survey, Woods Hole, MA (June 2004 - July 2006; 2 years).
Evaluated and numerically simulated geologic contributions to subsidence processes, Louisiana Coastal Plain; Generated synthetic stochastic stratigraphic models for numerical simulation and geostatistical analysis of Quaternary sediment compaction processes. Advised Federal regional restoration plans post hurricane Katrina.
- E. **Assistant Professor**, Colby College, Waterville, Maine (Aug. 2003 – June 2004; 10 months).
Sabbatical replacement position; Taught undergraduate introductory geology, structural geology, and GIS/GPS applications in geosciences. Supervised senior thesis research.
- F. **Exploration Geologist**, ExxonMobil (May 2001 - September 2001; 4 months).
Summer intern position. Interpreted time- and depth-converted 3D seismic data to identify near-field wildcat prospects in Mississippi Canyon, Gulf of Mexico; Proposed well sites and quantified resource potential.

PUBLICATIONS

<https://orcid.org/0000-0001-8817-9065>

Numbers preceding in parentheses are cumulative total since PhD in 2003;
indicates student/postdoc author.

Citation statistics from three databases are presented in the table below:

	ISI WOS	Google Scholar
H-index	17	24
Total citations	1052	2150
Highest # citations	126	195

Currently in review:

Maag, J., H. Bedle, T.A. **Meckel**, Elucidating Quaternary High-Frequency Depositional Sequences and Incised Valley Evolution using High-resolution 3D Seismic Data: Gulf of Mexico, USA, Interpretation

Ni, H., Sahar, B., Zuniga, A., **Meckel**, T.A., in review, Predicting CO₂ Buoyant Flow Saturation in Heterogeneous Geologic Formations with Machine Learning, Applied Energy, Special Issue.

Peer Reviewed Publications as Senior Research Scientist – 09/2018 to present

- (51) Leng J., et al., 2024, A comprehensive review of efficient capacity estimation for large-scale CO₂ geological storage, Gas Science and Engineering, <https://doi.org/10.1016/j.jgsce.2024.205339>
- (50) Ye J., et al., 2023, Evaluation of geological CO₂ storage potential in Saudi Arabian sedimentary basins, Earth-Science Reviews, V 244, 104539, ISSN 0012-8252, <https://doi.org/10.1016/j.earscirev.2023.104539>
- (49) Bump A.P., S. Bakhshian, H. Ni, S.D. Hovorka, M.I. Olariu, D. Dunlap, S.A. Hosseini, T.A. **Meckel**, 2023, Composite confining systems: Rethinking geologic seals for permanent CO₂ sequestration, International Journal of Greenhouse Gas Control, Volume 126, 103908, ISSN 1750-5836, <https://doi.org/10.1016/j.ijggc.2023.103908>
- (48) **Meckel**, T.A., Treviño, R.H., Hovorka, S.D. and Bump, A.P. (2023), Mapping existing wellbore locations to compare technical risks between onshore and offshore CCS activities in Texas. Greenhouse. Gas. Sci. Technol., 13: 493-504. <https://doi.org/10.1002/ghg.2220>
- (47) T.A. **Meckel**, E.C. Beckham, 2023, High-resolution geologic modeling and CO₂ flow simulation of a realistic clastic deltaic 3D model derived from a laboratory flume tank experiment, International Journal of Greenhouse Gas Control, V 125, 103892, ISSN 1750-5836, <https://doi.org/10.1016/j.ijggc.2023.103892>
- (46) Ni, H., Bakhshian, S. and **Meckel**, T.A., 2023, Effects of grain size and small-scale bedform architecture on CO₂ saturation from buoyancy-driven flow. *Sci Rep* **13**, 2474 <https://doi.org/10.1038/s41598-023-29360-y>
- (45) Krishnamurthy[#], P.G., D. DiCarlo, and T.A. **Meckel**, 2022, Geologic Heterogeneity Controls on Trapping and Migration of CO₂, Geophysical Research Letters, 49, e2022GL099104, <https://doi.org/10.1029/2022GL099104>
- (44) Ni[#], H., and T.A. **Meckel**, 2021, Characterizing the Effect of Capillary Heterogeneity on Multiphase Flow Pulsation in an Intermediate-Scale Beadpack Experiment Using Time Series Clustering and Frequency Analysis, Water Resources Research, e2021WR030876, <http://doi.org/10.1029/2021WR030876>
- (43) Bump, A. P., Hovorka, S. D., and **Meckel**, T. A., 2021, Common risk segment mapping: streamlining exploration for carbon storage sites, with application to coastal Texas and Louisiana: International Journal of Greenhouse Gas Control, v. 111, no. 103457, 13 p., <http://doi.org/10.1016/j.ijggc.2021.103457>

- (42) Madugula[#], A. C. S., Sachde, D., Hovorka, S. D., **Meckel**, T. A., and Benson, T. J., 2021, Estimation of CO₂ emissions from petroleum refineries based on the total operable capacity for carbon capture applications: Chemical Engineering Journal Advances, v. 8, no. 100162, 9 p., <http://doi.org/10.1016/j.cej.2021.100162>
- (41) **Meckel**, T. A., Bump, A. P., Hovorka, S. D., and Treviño, R. H., 2021, Carbon capture, utilization, and storage hub development on the Gulf Coast: Greenhouse Gases: Science and Technology, v. 11, no. 4, p. 619-632, <http://doi.org/10.1002/ghg.2082>
- (40) Ni[#], H., and **Meckel**, T. A., 2021, Characterizing the effect of capillary heterogeneity on multiphase flow pulsation in an intermediate-scale beadpack experiment using time series clustering and frequency analysis: Water Resources Research, v. 57, no. 11, article no. e2021WR030876, 17 p., <http://doi.org/10.1029/2021WR030876>
- (39) Tavassoli[#], S., Krishnamurthy[#], P., Beckham[#], E., **Meckel**, T., and Sepehrnoori, K., 2021, Carbon dioxide storage in deltaic saline aquifers: invasion percolation and compositional simulation: Society of Petroleum Engineers Reservoir Evaluation & Engineering, v. 24, no. 3, article no. SPE-196723-PA, 13 p., <http://doi.org/10.2118/196723-PA>
- (38) Mehana[#], M., Hosseini, S. A., **Meckel**, T. A., and Viswanathan, H., 2020, Modeling CO₂ plume migration using an invasion-percolation approach that includes dissolution: Greenhouse Gases: Science and Technology, v. 10, no. 2, p. 283-295, <http://doi.org/10.1002/ghg.1976>
- (37) Alfi[#], M., Vasco, D. W., Hosseini, S. A., **Meckel**, T., and Hovorka, S. D., 2019, Validating compositional fluid flow simulations using 4D seismic interpretation and vice versa in the SECARB Early Test--a critical review: International Journal of Greenhouse Gas Control, v. 82, p. 162-174, <http://doi.org/10.1016/j.ijggc.2019.01.003>
- (36) DeAngelo, M. V., Fifariz[#], R., **Meckel**, T., and Treviño, R. H., 2019, A seismic-based CO₂-sequestration regional assessment of the Miocene section, northern Gulf of Mexico, Texas and Louisiana: International Journal of Greenhouse Gas Control, v. 81, p. 29-37, <http://doi.org/10.1016/j.ijggc.2018.12.009>
- (35) Ringrose, P. S., and **Meckel**, T. A., 2019, Maturing global CO₂ storage resources on offshore continental margins to achieve 2DS emissions reductions: Scientific Reports, v. 9, no. 17994, <http://doi.org/10.1038/s41598-019-54363-z>
- (34) Goudarzi[#], A., Meckel, T., Hosseini, S. A., and Treviño, R. H., 2019, Statistical analysis of historic hydrocarbon production data from Gulf of Mexico oil and gas fields and application to dynamic capacity assessment in CO₂ storage: International Journal of Greenhouse Gas Control, v. 80, p. 96-102, <http://doi.org/10.1016/j.ijggc.2018.11.014>
- (33) Krishnamurthy[#], P. G., **Meckel**, T. A., and Dicarolo, D., 2019, Mimicking geologic depositional fabrics for multiphase flow experiments: Water Resources Research, v. 55, p. 9623-9638, <http://doi.org/10.1029/2019WR02566>
- (32) **Meckel**, T., Feng[#], Y. E., Treviño, R. H., and Sava, D., 2019, High-resolution 3D marine seismic acquisition in the overburden at the Tomakomai CO₂ storage project, offshore Hokkaido, Japan: International Journal of Greenhouse Gas Control, v. 88, p. 124-133, <http://doi.org/10.1016/j.ijggc.2019.05.034>

Peer Reviewed Publications as Research Scientist – 09/2011 to 09/2018

- (31) Anderson[#], J. S., Romanak, K. D., and **Meckel**, T., 2018, Assessment of shallow subsea hydrocarbons as a proxy for leakage at offshore geologic CO₂ storage sites: International Journal of Greenhouse Gas Control, v. 74, p. 19-27, <http://doi.org/10.1016/j.ijggc.2018.04.01>
- (30) Klovov, A., **Meckel**, T., and Treviño, R. H., 2018, Confining system integrity assessment by detection of natural gas migration using seismic diffractions: International Journal of Greenhouse Gas Control, v. 75, p. 32-40, <http://doi.org/10.1016/j.ijggc.2018.05.001>

Geological CO₂ Sequestration Atlas of Miocene Strata, Offshore Texas State Waters, 2017, edited by R.H. Trevino and T.A. **Meckel**, Bureau of Economic Geology Report of Investigations No. 283, 74 p., 7 chapters, 1 appendix, ISSN: 0082-3309. <http://doi.org/10.23867/RI0283D>

(Externally Peer Reviewed Chapters)

- (29) **Meckel**, T.A., and J-L.T. Rhatigan, Chapter 2: Implications of Miocene Petroleum Systems for Geologic CO₂ Sequestration beneath Texas Offshore Lands.
- (28) **Meckel**, T.A., A.J. Nicholson[#], and R. Trevino, Chapter 4: Capillary Aspects of Fault Seal Capacity for CO₂ Storage, Lower Miocene, Texas Gulf of Mexico.
- (27) Carr, D.L., C. Rhatigan, R. Trevino, T.A. **Meckel**, K.J. Wallace[#], A.J. Nicholson[#], and C. Yang, Chapter 6: Field-scale Example of Potential CO₂ Storage Sites in Miocene Reservoirs.
- (26) Wallace[#], K.J., C.H. Rhatigan, R.H. Trevino, and T.A. **Meckel**, Chapter 7: Estimating CO₂ Storage Capacity in Saline Aquifer using 3D Flow Models, Lower Miocene, Texas Gulf of Mexico.
- (25) Trevisan[#], L., T.H. Illangasekare, and T.A. **Meckel**, 2017, Modelling plume behavior through a heterogeneous sand pack using a commercial invasion percolation model, *Geomech. Geophys. Geo-ener. Geo-resour.*, 3(3): 327-337. <http://dx.doi.org/10.1007/s40948-017-0055-5>
- (24) **Meckel**, T.A., L. Trevisan[#], and P. Krishnamurthy[#], 2017, A method to generate small-scale, high-resolution sedimentary bedform architecture models representing realistic geologic facies, *Scientific Reports*, 7:9238. <http://dx.doi.org/10.1016/j.ijggc.2016.12.001>
- (23) Klokov, A., R. Trevino, and T.A. **Meckel**, 2017, Diffraction imaging for seal evaluation using ultra high resolution 3D seismic data, *Marine and Petroleum Geology*, 82: 85-96. <http://dx.doi.org/10.1016/j.marpetgeo.2017.02.002>
- (22) Trevisan[#], L., P.G. Krishnamurthy[#], and T.A. **Meckel**, 2017, Impact of 3D capillary heterogeneity and bedform architecture at the sub-meter scale on CO₂ saturation for buoyant flow in clastic aquifers, *Int. J. of Greenhouse Gas Control*, 56: 237-249 <http://dx.doi.org/10.1016/j.ijggc.2016.12.001>
- (21) Krishnamurthy[#], P.G., S. Senthilnathan[#], H. Yoon, D. Thomassen[#], T.A. **Meckel**, and D. DiCarlo, 2017, Comparison of Darcy's Law and Invasion Percolation Simulations with Buoyancy-Driven Vertical Core Flood Experiments in a Heterogeneous Sandstone Core, *Journal of Petroleum Science and Engineering*, 155:54-62. <http://dx.doi.org/10.1016/j.petrol.2016.10.022>
- (20) **Meckel**, T.A., and Mulcahy[#], F., 2016, Use of novel high-resolution 3D marine seismic technology to evaluate Quaternary fluvial valley development and geologic controls on shallow gas distribution, inner shelf, Gulf of Mexico: *Interpretation*, v. 4, no. 1, p. SC35-SC49, <http://doi.org/10.1190/INT-2015-0092.1>
- (19) Islam[#], A., **Meckel**, T., Sun, A. Y., and Krishnamurthy[#], P. G., 2016, Numerical experiments of density driven CO₂ saturated brine migration in heterogeneous two-dimensional geologic fabric materials: *International Communications in Heat and Mass Transfer*, v. 71, p. 148-156, <http://doi.org/10.1016/j.icheatmasstransfer.2015.12.019>
- (18) **Meckel**, T., Bryant, S. L., and Ravi Ganesh[#], P., 2015, Characterization and prediction of CO₂ saturation resulting from modeling buoyant fluid migration in 2D heterogeneous geologic fabrics: *International Journal of Greenhouse Gas Control*, v. 34, p. 85-96, <http://doi.org/10.1016/j.ijggc.2014.12.010>
- (17) Wallace[#], K. J., **Meckel**, T., Carr, D. L., Treviño, R. H., and Yang, C., 2014, Regional CO₂ sequestration capacity assessment for the coastal and offshore Texas Miocene interval: *Greenhouse Gases Science and Technology*, v. 4, p. 53-65, <http://doi.org/10.1002/ghg.1380>
- (16) **Meckel**, T.A., 2013, Digital rendering of sedimentary-relief peels: Implications for clastic facies characterization and fluid flow: *Journal of Sedimentary Research*, v. 83, no. 6, p. 495–501, <http://dx.doi.org/10.2110/jsr.2013.43>
- (15) Ditkof[#], J., E. Caspari, R. Pevzner, M. Urosevic, T.A. **Meckel**, and S.D. Hovorka, 2013, Time-lapse seismic signal analysis for enhanced oil recovery at Cranfield CO₂ sequestration site, Cranfield field, Mississippi, *Interpretation*, 1(2): T157-166, <https://doi.org/10.1190/INT-2013-0056.1>

- (14) **Meckel**, T.A., Zeidouni, M., Hovorka, S. D., and Hosseini, S. A., 2013, Assessing sensitivity to well leakage from three years of continuous reservoir pressure monitoring during CO₂ injection at Cranfield, MS, USA: *International Journal of Greenhouse Gas Control*, v. 18, p. 439-448. <http://doi.org/10.1016/j.ijggc.2013.01.019>
- (13) Lu, J., Kordi[#], M., Hovorka, S. D., **Meckel**, T.A., and Christopher, C., 2013, Reservoir characterization and complications for trapping mechanisms at Cranfield CO₂ injection site: *International Journal of Greenhouse Gas Control*, v. 18, p. 361-374, <http://doi.org/10.1016/j.ijggc.2012.10.007>
- (12) Hovorka, S. D., **Meckel**, T.A., and Treviño, R. H., 2013, Monitoring a large-volume injection at Cranfield, Mississippi—Project design and recommendations: *International Journal of Greenhouse Gas Control*, v. 18, p. 345-360, <http://doi.org/10.1016/j.ijggc.2013.03.021>
- (11) Tao[#], Q., Bryant, S., and **Meckel**, T.A., 2013, Modeling above-zone measurements of pressure and temperature for monitoring CCS sites: *International Journal of Greenhouse Gas Control*, v. 18, p. 523-530, <http://doi.org/10.1016/j.ijggc.2012.08.011>,
- (10) Middleton, R. S., Keating, G. N., Stauffer, P. H., Jordan, A. B., Viswanathan, H. S., Kang, Q. J. J., Carey, J. W., Mulkey, M. L., Sullivan, E. J., Chu, S. P. P., Esposito, R., and **Meckel**, T. A., 2012, The cross-scale science of CO₂ capture and storage: from pore scale to regional scale: *Energy & Environmental Science*, v. 5, no. 6, p. 2328-7345, <http://doi.org/10.1039/c2ee03227a>

Peer Reviewed Book Chapters

- (9) Oldenburg, C. M., Nicot, J.-P., Jordan, P. D., Zhang, Y., Pan, L., Houseworth, J. E., **Meckel**, T., Carr, D. L., and Bryant, S. L., 2015, Chapter 32: Health, safety, and environmental risk assessment of geologic carbon sequestration: Overview of the certification framework, example application, and selected special studies 2010-2014, in Karl F. Gerdes, ed., *Carbon dioxide capture for storage in deep geologic formations--Results from the CO₂ Capture Project, Volume 4: CCS Technology Development and Demonstration Results (2009-2014)*: UK, CPL Press, p. 569-592. http://www.co2captureproject.org/reports/CCP3v4_full_version.pdf

Publications as Research Associate - Prior to 09/01/2011

- (8) **Meckel**, T., 2010, Chapter 7. Capillary seals for trapping carbon dioxide (CO₂) in underground reservoirs, *in* Maroto-Valer, M. M. (ed.), *Developments and innovation in carbon dioxide (CO₂) capture and storage technology: Woodhead Publishing Series in Energy: Number 16, Volume 2: Carbon dioxide (CO₂) storage and utilisation*, p. 185–202. <https://doi.org/10.1533/9781845699581.2.185>
- (7) **Meckel**, T. A., 2008, An attempt to reconcile subsidence rates determined from various techniques in southern Louisiana: *Quaternary Science Reviews*, v. 27, p. 1517–1522. <https://doi.org/10.1016/j.quascirev.2008.04.013>
- (6) **Meckel**, T. A., ten Brink, U., and Williams, S. J., 2007, Sediment compaction rates in deltaic plains: numerical constraints and stratigraphic influences: *Basin Research*, v. 19, p. 19–31, <https://doi.org/10.1111/j.1365-2117.2006.00310.x>
- (5) **Meckel**, T. A., ten Brink, U., and Williams, S. J., 2006, Current subsidence rates due to compaction of Holocene sediments in southern Louisiana: *Geophysical Research Letters*, v. 33, L11403, <https://doi.org/10.1029/2006GL026300>
- (4) **Meckel**, T. A., Mann, P., Mosher, S., and Coffin, M., 2005, Influence of cumulative convergence on lithospheric thrust fault development and topography along the Australian-Pacific plate boundary south of New Zealand: *Geochemistry, Geophysics, Geosystems*, v. 6, no. 9, p. 1–20. <https://doi.org/10.1029/2005GC000914>
- (3) Daczko, N., Mosher, S., Coffin, M., and **Meckel**, T. A., 2005, Tectonic implications of fault-scarp-derived volcanoclastic deposits on Macquarie Island; sedimentation at a fossil ridge-transform intersection? *Geological Society of America Bulletin*, v. 117, no. 1/2, p. 18–31. <https://doi.org/10.1130/B25469.1>

- (2) **Meckel**, T. A., Coffin, M., Mosher, S., Symonds, G., Bernardel, G., and Mann, P., 2003, Underthrusting at the Hjort Trench, Australian-Pacific plate boundary: incipient subduction? *Geochemistry, Geophysics, Geosystems*, v. 4, no. 12, p. 1–30. <https://doi.org/10.1029/2002GC000498>
- (1) Daczko, N., Wertz, K., Mosher, S., Coffin, M., and **Meckel**, T. A., 2003, Extension along the Australian-Pacific transpressional transform plate boundary near Macquarie Island: *Geochemistry, Geophysics, Geosystems*, v. 4, no. 9, p. 1–22. <https://doi.org/10.1029/2003GC000523>

Non-Peer-Reviewed

- Merzlikin, D., **Meckel**, T., Fomel, S., and Sripanich, Y., 2017, Diffraction imaging of high-resolution 3D P-cable data from the Gulf of Mexico using azimuthal plane-wave destruction: *First Break*, v. 35, no. 2, p. 35-41, <http://doi.org/10.3997/1365-2397.2017002>.
- Ditkof, J., Caspari, E., Pevzner, R., Urosevic, M., **Meckel**, T., and Hovorka, S. D., 2013, Time-lapse seismic signal analysis for enhanced oil recovery at Cranfield sequestration site, Cranfield field: *Geoscience World*, v. 1, no. 2, p. T157-T166, <http://doi.org/10.1190/INT-2013-0056.1>.
- Meckel**, T., Hovorka, S. D., and Ambrose, W. A., 2011, Geologic factors controlling CO₂ storage capacity and permanence: *Exploration and Production*, v. 8, no. 2, p. 22 and 24.
- Meckel**, T.A., 2009, Gulf Coast storms, in Laubach, S. E., and Tinker, S. W., eds., 2009, *Earth's art: celebrating the Centennial of the Bureau of Economic Geology, 1909–2009: The University of Texas at Austin, Bureau of Economic Geology*, p. 92–93.

Edited Books

- Treviño, R. H., and **Meckel**, T., eds., 2017, *Geological CO₂ sequestration atlas of Miocene strata, offshore Texas state waters: Bureau of Economic Geology Report of Investigations No. 283*, 80 p.

Contract Reports

- Treviño, R. H., and **Meckel**, T., 2019, Offshore CO₂ storage resource assessment of the northern Gulf of Mexico (Texas-Louisiana): final report prepared for U.S. Department of Energy National Energy Technology Laboratory, under contract no. DE-FE0026083, 151 p.
- Treviño, R. H., **Meckel**, T., and Hovorka, S. D., 2018, Final Research Performance Progress Report: CarbonSAFE Phase I: Integrated CCS Pre-Feasibility - Northwest Gulf of Mexico: Final Report prepared for U.S. Dept. of Energy, National Energy Technology Laboratory, under contract no. DE-FE0029487, 83 p.
- Nicot, J.-P., Gao, S. R., Sun, A. Y., **Meckel**, T., Lashgari, H. R., and Trevisan, L., 2015, Minimum dataset requirements and development of a modeling workflow for CO₂ migration during post-EOR storage: Case of Weyburn, SK: The University of Texas at Austin, Bureau of Economic Geology, Contract Report prepared for Petroleum Technology Research Centre (PTRC), Regina, Saskatchewan, 87 p.
- Treviño, R. H., **Meckel**, T., Carr, D. L., Yang, C., Lu, J., Mickler, P., Wallace, K. J., Nicholson, A. J., Bangs, N. L., Hornbach, M. J., Mulcahy, F. J., and Martinez, N., 2015, Gulf of Mexico Miocene CO₂ site characterization mega transect: Final report (revised) prepared for U.S. Department of Energy National Energy Technology Laboratory and Texas General Land Office, under contract no. DE-FE0001941 and GLO contract no. 10-205-000-4100, 583 p.
- Meckel**, T., and Treviño, R. H., 2014, Gulf of Mexico CO₂ site characterization mega-transect: The University of Texas, Bureau of Economic Geology, Final Technical Report prepared for U.S. Department of Energy National Energy Technology Laboratory, under contract no. DE-FE0001941; OSP 200902306-001, 583 p.
- Nicot, J. -P., **Meckel**, T. A., Carr, D. L., Costley, R., Zeidouni, M., Oldenburg, C. M., Fifariz, R., and Osmond, J., 2013, Critical Topics in Geologic Carbon Sequestration. Topic 1.1.1: Induced Seismicity and Topic 2.1.1: Storage Capacity: The University of Texas at Austin, Bureau of Economic Geology, contract report prepared for CO₂ Capture Project (CCP) Phase III, 35 p.

Carr, D. L., Treviño, R. H., **Meckel**, T., Breton, C., Yang, C., and Miller, Erin, 2011, SECARB "early" test, task 15: evaluation of offshore transport and storage of CO₂: unpublished preliminary report prepared for U.S. Dept. of Energy, National Energy Technology Lab, under contract no. DE-FC26-05NT42590, 19 p.

Clift, S. J., Hosseini, S. A., Hovorka, S. D., and **Meckel**, T., 2011, CO₂ injection and recycle: The University of Texas at Austin, Bureau of Economic Geology, contract report prepared for U.S. Department of Energy, under DOE Award Number DE-FC26-05NT42590 (Southeast Regional Carbon Sequestration Partnership), Phase III 7.1.b, 18p.

Choi, J. -W., Nicot, J. -P., Chang, K. -W., and **Meckel**, T. A., 2010, SECARB Phase II numerical modeling, Cranfield oilfield, MS: The University of Texas at Austin, Bureau of Economic Geology, milestone report prepared for Department of Energy Southeast Regional Carbon Sequestration Partnership Phase II, Task 1.5, 159 p.

Smyth, R. C., Hovorka, S. D., **Meckel**, T. A., Breton, C. A., Paine, J. G., and Hill, G. R., 2007, Potential sinks for geologic storage of CO₂ generated in the Carolinas: The University of Texas at Austin, Bureau of Economic Geology, final report prepared for Southern States Energy Board and Electric Power Research Institute, 14 p.

Other Published Reports

Dixon, T. E., Romanak, K. D., Hovorka, S. D., and **Meckel**, T., 2016, First International Workshop on Offshore Geologic CO₂ Storage: IEAGHG, Report 2016/TR2, 42 p.

Meckel, T., Hovorka, S. D., Romanak, K. D., Treviño, R. H., Smyth, R. C., and CSLF Task Force on Offshore Storage, 2015, Technical Barriers and R&D Opportunities for Offshore, Sub-seabed Geologic Storage of Carbon Dioxide: Carbon Sequestration Leadership Forum, 128 p.

ABSTRACTS (65, 40% first author)

Bump, A. P., Hovorka, S. D., **Meckel**, T. J., Nuñez-López, V., Olariu, M. I., and Treviño, R. H., 2020, Carbon capture and storage potential in southern Louisiana: a new business opportunity: GeoGulf Transactions, v. 70, p. 73-84.

Meckel, T., Feng, Y., and Treviño, R. H., 2018, High-resolution 3D seismic acquisition at the Tomakomai CO₂ storage project, offshore Hokkaido, Japan (ext. abs.): 14th International Conference on Greenhouse Gas Control Technologies (GHGT-14), 6 p., Melbourne, Australia

Treviño, R. H., **Meckel**, T., Olariu, M. I., Dunlap, D. B., DeAngelo, M., Lu, J., Sabbagh, R., and Klokov, A., 2018, Offshore CO₂ storage resource assessment of the northwest Gulf of Mexico Inner Continental Shelf, upper Texas - western Louisiana coast (ext. abs.): AAPG Datapages Search and Discovery, no. 80630, 27 p

Meckel, T., Trevisan, L., and Krishnamurthy, P., 2017, Saturations of migrating buoyant fluids from invasion percolation flow simulation using small-scale, high-resolution geologic models with realistic heterogeneity (abs.): AAPG Annual Convention and Exhibition, Search and Discovery Article #51409.

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PRESENTATIONS (130 over 134 months)

INVITED (26 since 2008; 8 US cities, 9 international countries)

- CCUS for Ports, American Association of Port Authorities – Inaugural POWERS Summit, Tampa, FL, January 2023.
- The role of Carbon Capture Utilization and Storage (CCUS) in the Energy Transition, Texas A&M University, January 21, 2021
- Evolving perspectives on CCS, King Abdullah University of Science and Technology, Jeddah, Saudi Arabia, October 22, 2019
- Impacts of clastic heterogeneity at different scales on saturation resulting from buoyancy-dominated fluid (CO₂) migration, University of Calgary, March 28, 2018; Heriot Watt University, July 19, 2018; University of Edinburgh, July 20, 2018
- Growing experience with high-resolution 3D marine seismic in research and industry: presented to Marine Seismic Research Oversight Committee (MSROC), New Orleans, La., December 10, 2017.
- Applications of short-offset high-resolution 3D seismic technology: Quaternary studies, gas migration systems, and carbon dioxide storage: presented to U.S. Geological Survey, Marine Science Center, Santa Cruz, Calif., January 18, 2017.
- Offshore Geologic CO₂ Storage: presented to US-Taiwan Geologic Storage Meeting, Taipei, Taiwan, December 9, 2016.

Transferring 20 years of learning at Sleipner: presented to 13th Conference on Greenhouse Gas Control Technologies (GHGT-13), Lausanne, Switzerland, November 16, 2016.

Applications of short-offset high-resolution 3D seismic technology: Quaternary studies, gas migration systems, and carbon dioxide storage: presented to U.S. Geological Survey, Woods Hole Science Center, Woods Hole, MA, September 15, 2016.

Overburden Features: what do these represent and how do they affect risk? presented to National Oceanography Centre, Southampton, UK, October 1, 2015.

High-resolution 3D from the Gulf of Mexico inner shelf: Example of academic-industry partnership, presented to NSF Marine Seismic Data Workshop, San Francisco, CA, December 12, 2014.

Overburden imaging using high-resolution 3D seismic: perspectives from 3 surveys in the Gulf of Mexico using P-cable technology: presented to IEA-GHG Monitoring Network Meeting, Morgantown, Pa., August 4, 2014.

Role of CCS in diverse energy chain developments and the global significance of offshore storage: presented to U.S. Energy Agency (USEA), Washington, D.C., June 6, 2014.

On the origin, distribution, and size of natural CO₂ accumulations: implications for CH₄ exploration and development: presented to Society of Petroleum Engineers, presented at Advanced Technology Workshop, Penang, Malaysia, February 3, 2013.

Above-zone pressure monitoring at Cranfield, MS: presented to IEA-GHG, presented at Monitoring Network Meeting, Potsdam, Germany, June 7, 2011.

Summary of Current Regional Sequestration Partnership Activities, USA, presented to Research Institute of Innovative Technology for the Earth (RITE), Kyoto, Japan, December 9, 2010. (Keynote)

Offshore storage capabilities – new research at the Gulf Coast Carbon Center: presented to Society of Petroleum Engineers, presented at Training Course: Storage of CO₂ in Geologic Formations, New Orleans, La., November 8, 2010.

Developing Offshore CO₂ Storage for Texas: presented to Texas Commission on Environmental Quality (TCEQ), Austin, TX, May 4, 2010.

Developing Offshore CO₂ Storage for Texas: presented to Air & waste Management Association, Austin, TX, April 15, 2010.

Geological Storage of CO₂ in Texas: presented to Texas Public Power Association, Austin, TX, April 5, 2010.

Regional carbon sequestration partnership projects, USA: presented to Geoscience Australia, Canberra, Australia, January 20, 2010.

The Frio & Cranfield injection projects, USA: presented to China-Australia Geologic CO₂ Storage Partnership, Canberra, Australia, January 18, 2010.

The Texas Carbon Repository: presented to Texas Carbon Capture and Storage Association, presented at CO₂ Workshop & UT Law School Continuing Education, Austin, TX, February 12, 2009.

Current topics in geologic carbon capture and storage with examples from pilot field injections: presented to Colorado School of Mines, presented at Van Tuyl Invited Lecture Series, Golden, CO, May 1, 2008.

OTHER PRESENTATIONS (109 over 134 months; 14 U.S. cities, 4 international countries)

Advances in understanding buoyancy-dominated flow in heterogeneous clastic materials, presented at the Annual BEG Research Symposium, September 15, 2017.

Integrated CO₂ capture, transport, and storage for the Gulf Coast: presented to Second International Offshore CO₂ Storage Workshop, Beaumont, Tex., June 21, 2017.

Saturations of migrating buoyant fluids from invasion percolation flow simulation using small-scale, high-resolution geologic models with realistic heterogeneity: presented to AAPG Annual Meeting, Houston, Tex., April 3, 2017.

Experimentally tested invasion percolation modeling of buoyancy-driven flow: presented to Center for Subsurface Energy Security, Austin, Tex., February 17, 2017.

Applications of short-offset high-resolution 3D seismic technology: Quaternary studies, gas migration systems, and carbon dioxide storage: presented to Annual P-Cable Users Meeting, Oslo, Norway, February 8, 2017.

Offshore geologic carbon dioxide storage: presented to Bureau of Energy, Taipei, Taiwan, December 8, 2016.

Offshore geologic CO₂ storage & SECARB Cranfield Project: presented to Industrial Technology Research Institute, Taipei, Taiwan, December 8, 2016.

Current engineering and geologic challenges for achieving giga-ton scale carbon storage: presented to Center for Petroleum and Geosystems Engineering, Austin, TX, October 24, 2016.

High-resolution marine seismic imaging: presented to Earth Science Week Career Day, Austin, TX, October 7, 2016.

Applications of short-offset high-resolution 3D seismic technology: Quaternary studies, gas migration systems, and carbon dioxide storage: presented to U.S. Geological Survey, Woods Hole Science Center, Woods Hole, MA, September 15, 2016.

Offshore CO₂ Storage Resource Assessment of the Northern Gulf of Mexico (Upper Texas-Western Louisiana Coastal Areas): presented to National Energy Technology Laboratory, presented at Mastering the Subsurface Through Technology, Innovation and Collaboration: Carbon Storage and Oil and Natural Gas Technologies Review Meeting, Pittsburgh, PA, August 16, 2016.

Offshore CCS: presented to Secretary Ernest Moniz, presented at Mission Innovation roundtable, Austin, TX, May 9, 2016.

Geologic Storage & Utilization of CO₂: GCCC Experience & Leadership: presented to Exxon Mobil, Austin, TX, May 3, 2016.

High-resolution 3D Seismic (P-Cable) in the Gulf of Mexico: presented to ONEGulf Meeting, Houston, TX, April 21, 2016.

Global Opportunities for Offshore CCS: Assessing Offshore Storage on Continental Shelves: presented to 1st International Offshore CO₂ Storage Workshop, Austin, TX, April 19, 2016.

High-resolution 3D Seismic (P-Cable) from the Gulf of Mexico inner shelf: presented to Bureau of Ocean Energy Management, Austin, TX, April 6, 2016.

Experimentally tested invasion percolation modeling of buoyancy-driven flow: presented to Center for Subsurface Energy Security, Washington, D.C., March 3, 2016.

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Integration of P-Cable HR3D seismic and shallow sediment coring for understanding gas migration, inner shelf, Gulf of Mexico: presented to Annual P-Cable users meeting, Oslo, Norway, February 2, 2016.

Summary of Active Offshore CO₂ Storage Assessments in the USA: presented to Offshore CO₂ Storage Roundtable, Beijing, China, January 13, 2016.

Understanding CO₂ storage capacity limitations: presented to Exxon Mobil, Houston, TX, January 7, 2016.

Global Opportunities for Offshore CCS on Continental Shelves: presented to AIChE – Carbon Management Technology Conference, Houston, TX, November 18, 2015.

Offshore CO₂ Storage Resource Assessment of the Northern Gulf of Mexico (Upper Texas-Western Louisiana Coastal Areas): presented to National Energy Technology Laboratory, Pittsburgh, PA, November 10, 2015.

Constraining the Influence of Meso-scale Heterogeneity on CO₂ Saturation resulting from Buoyant Flow: presented to Center for Frontiers in Subsurface Energy Security, Albuquerque, NM, October 27, 2015.

SaskCO₂ update on fluid migration modeling: presented to Petroleum Technology Research Council, June 4, 2015.

Offshore Texas Miocene CO₂ Storage Project: presented to Austin Geological Society, presented at Annual Poster Session, University of Texas at Austin, Bureau of Economic Geology, May 4, 2015.

Accelerating sustainability of diverse future clean energy developments through CCUS: presented to National Energy Technology Laboratory, Pittsburgh, PA, April 30, 2015.

Accelerating sustainability of diverse future clean energy developments through carbon capture, utilization, and storage: presented at Annual CCUS Conference, Pittsburgh, Pennsylvania, April 29, 2015.

Invasion percolation and meter-scale experiments: presented to Center for Frontiers of Subsurface Security, Austin, Texas, April 9, 2015.

Applying a petroleum systems approach to CCS: presented to Center for Frontiers of Subsurface Energy Security, Austin, March 26, 2015.

High-resolution 3D from the Gulf of Mexico inner shelf: current applications for fluid systems and CCS: presented to Annual P-Cable User Meeting, Oslo, Norway, January 28, 2015.

Buoyancy-driven multi-phase flow: presented to Center for Subsurface Energy Security, Austin, TX, January 14, 2015.

Fluid System Analysis Strategy using HR3D Seismic: presented to TDI Brooks, International, College Station, TX, December 16, 2014.

High-resolution 3D from the Gulf of Mexico inner shelf: example of academic–industry partnership: presented at National Science Foundation Marine Seismic Data Workshop, San Francisco, California, December 12, 2014.

Buoyancy-driven flow in heterogeneous materials: presented at Greenhouse Gas Control Technologies conference (GHGT-12), Austin, Texas, October 8, 2014.

High-resolution 3D seismic investigations of the overburden above potential CCS sites of the inner Texas shelf, Gulf of Mexico, USA: presented at Greenhouse Gas Control Technologies conference (GHGT-12), Austin, Texas, October 6, 2014.

Opportunities for High-Resolution 3D Marine Seismic Acquisition: presented to Annual Bureau Research Symposium, Austin, TX, September 12, 2014.

Role of CCS in diverse energy chain developments and the global significance of offshore storage: presented to IEA-GHG Summer School, Austin, TX, July 7, 2014.

Role of CCS in diverse energy chain developments and the global significance of offshore storage: presented to United States Energy Association, Washington, DC, June 10, 2014.

Carbon capture and offshore storage in the Gulf of Mexico: presented at Coastal Resilience: The Environment, Infrastructure, and Human Systems, technical conference, New Orleans, Louisiana, May 23, 2014.

Texas Offshore Miocene Project: Acquisition of high-resolution 3D seismic data: presented to Advisory Council, Jackson School of Geosciences, Austin, TX, April 25, 2014.

Results from the second high-resolution 3D seismic survey from the inner Texas shelf: presented to Bureau of Economic Geology, Austin, Texas, March 7, 2014.

P-Cable deployments in the Gulf of Mexico: presented at Annual P-Cable Users Meeting, Oslo, Norway, February 3, 2014.

Role of subsea geologic carbon storage in the U.S. and worldwide: presented at The University of Texas Conference on Carbon Capture and Storage (UTCCS-2), Austin, Texas, January 29, 2014.

New capabilities for high-resolution 3D marine seismic acquisition (P-cable technology) and recent applications in the Gulf of Mexico: presented to Statoil, Austin, Texas, January 23, 2014.

Monitoring Technologies Employed by the SECARB Partnership at Cranfield: presented to Joint US – Norway Workshop on CO₂ storage Demonstration Projects, Pittsburgh, PA, August 19, 2013.

CO₂ Storage Assessment on the Inner Texas Shelf: presented to TDI Brooks, Int., College Station, TX, June 6, 2013.

Determining Seal Effectiveness & Potential Fluid Migration Pathways Using HR3D seismic data: presented to AAPG Annual Meeting, Pittsburgh, PA, May 22, 2013.

Geologic Carbon Sequestration: presented to Center for Petroleum and Geosystems Engineering, Austin, TX, April 8, 2013.

Offshore CCS: presented to Geological Society of America, southeast regional meeting, April 3, 2013.

High resolution 3D seismic acquisition on the inner Texas shelf: P-Cable capabilities and applications: presented to Bureau of Economic Geology - weekly research seminar, Austin, TX, February 22, 2013.

CO2 Site Characterization Gulf of Mexico Miocene: presented to Annual P-Cable users meeting, Oslo, Norway, February 7, 2013.

Offshore Gulf of Mexico CCS Summary: presented to Environmental Protection Agency, November 27, 2012.

On the origin, distribution, and size of natural CO2 accumulations: implications for CH4 exploration and development: presented to Gulf Coast Association of Geological Societies, Austin, TX, October 24, 2012.

CO2 Storage Capacity Estimation: presented to GCCC Sponsors, Houston, TX, January 25, 2012.

Structural Compartmentalization and CCS: presented to Gulf Coast Carbon Center, Austin, TX, January 14, 2012.

Overview of CCS Research at GCCC: presented to UT-CCS Meeting, Austin, TX, December 3, 2011.

Offshore CO2 Storage in the Gulf of Mexico: presented to National Energy Technology Laboratory, Morgantown, PA, November 15, 2011.

Above-Zone Pressure Monitoring as a Surveillance Tool for Carbon Sequestration Projects: presented to Society of Petroleum Engineers CO2 Conference, New Orleans, LA, November 9, 2011.

Geological Sequestration for Greenhouse Gas Emission Reductions: presented to Texas Railroad Commission, Austin, TX, June 15, 2011.

Offshore CCS in the Gulf of Mexico and risks posed by existing wells: presented to National Energy Technology Laboratory, Morgantown, PA, May 4, 2011.

Microseismic Monitoring of Carbon Sequestration: presented to RITE, Austin, TX, April 29, 2011.

Research at the Gulf Coast Carbon Center: presented to Seismic Exchange, Inc., Houston, TX, April 27, 2011.

Gulf of Mexico Miocene CO2 Site Characterization: presented to Petrobras, Houston, TX, April 18, 2011.

Carbon Capture and Storage: presented to West Lake High School, Austin, TX, April 5, 2011.

Buoyant fluid migration within heterogeneous geologic media: presented to Bureau of Economic Geology, Austin, TX, March 25, 2011.

Put it Back: Geologic Sequestration for Greenhouse Gas Emissions Reductions: presented to Austin Forum, Austin, TX, March 1, 2011.

Southern Louisiana's subsidence & the Mississippi River: geologic processes and anthropogenic aspects: presented to Environmental Science Symposium, New Orleans, LA, February 25, 2011.

Gulf Coast Carbon Center Field Experiments: presented to Advanced Energy Consortium, Austin, TX, February 16, 2011.

Gulf of Mexico Miocene CO2 Site Characterization: presented to Texas Carbon Capture and Storage Association, Austin, TX, February 8, 2011.

Pore to continuum scale processes in CCS: presented to GCCC Sponsors, Austin, TX, January 27, 2011.

Gulf of Mexico Miocene Mega-Transect CO2 Site Characterization: presented to GCCC Sponsors, Austin, TX, November 16, 2010.

Gulf of Mexico Miocene Mega-Transect CO2 Site Characterization: presented to National Energy Technology Laboratory, Pittsburgh, PA, November 7, 2010.

Above-Zone Pressure Monitoring as a Surveillance Tool for Carbon Sequestration Projects: presented to BP, Austin, TX, October 28, 2010.

Texas Offshore Miocene Characterization Project: presented to CGAGS Short Course, San Antonio, TX, October 11, 2010.

Geological Storage of CO2 in Texas: presented to Texas Public Power Association, Austin, TX, July 19, 2010.

Preparing astronauts for Lunar and Martian geologic field work: NASA training exercise in the Valles Caldera deposits of New Mexico: presented to Bureau of Economic Geology, Austin, TX, July 16, 2010.

Developing Offshore CO2 Storage for Texas: presented to Texas Commission on Environmental Quality (TCEQ), Austin, TX, May 4, 2010.

Developing Offshore CO2 Storage for Texas: presented to Central Texas Chapter Air and Waste Management Association, Austin, TX, April 15, 2010.

Monitoring of Carbon Sequestration: presented to AAPG Annual Meeting, New Orleans, LA, April 13, 2010.

Monitoring CCS: presented to GCCC Sponsors, Houston, TX, January 21, 2010.

Offshore CCS in the Gulf of Mexico: presented to GCCC Sponsors, Houston, TX, January 21, 2010.

Developing Offshore Storage for Texas: presented for the United Kingdom-Texas CCS Workshop, December 7, 2009.

CCS at Cranfield Project, MS, USA: presented to Society of Petroleum Engineers, Vancouver, B.C., October 6, 2009.

Monitoring of Pilot Brine Injection Projects: presented to Environmental Protection Agency, Region VI, Austin, TX, October 4, 2009.

Monitoring of Carbon Sequestration: presented to Institute for Geophysics, presented at University of Texas at Austin, Austin, TX, September 11, 2009.

CO2 Considerations for LCRA: presented to Lower Colorado River Authority, Austin, TX, May 1, 2009.

CCS on Texas Offshore State Lands: presented to GCCC Sponsors, Houston, TX, January 14, 2009.

Field demonstration projects led by GCCC: presented at UK-Texas Carbon Capture & Storage Technical Workshop, Houston, Texas, December 8, 2008.

Comparing carbon sequestration in an oil reservoir to sequestration in a brine formation- field study: presented at the GHGT-9 (Green House Gas Technology) Conference, Washington, D.C., November 16–20, 2008.

Continuous pressure monitoring for large volume CO2 injections: presented at the GHGT-9 (Green House Gas Technology) Conference, Washington, D.C., November 16–20, 2008.

SECARB Pilot Demonstration Project: presented at Southern Company Open House, Escatawpa, Mississippi, October 15, 2008.

Integrated monitoring design for a large volume commercial injection: presented at 7th Annual Conference on Carbon Capture and Sequestration, Pittsburgh, Pennsylvania, May 6, 2008.

An attempt to reconcile subsidence rates determined from various techniques: presented at Colorado School of Mines-AAPG Student Chapter Luncheon, Golden, Colorado, May 2, 2008.

Optimizing CO2 injections for both seal integrity and economic return: presented at the AAPG Annual Convention, San Antonio, Texas, April 2008.

Gulf Coast Stacked Storage SECARB Phase II Test #1: presented at SECARB Stakeholders Meeting, Atlanta, Georgia, March 18, 2008.

Hydrologic and geochemical considerations for large volume geologic storage of carbon dioxide: presented to the Hydrogeology Brown Bag Seminar, Austin, Texas, February 22, 2008.

Public perception of CCS in Texas: presented to Texas Carbon Capture and Storage Association, Austin, Texas, February 14, 2008.

Sediment compaction rates and subsidence in deltaic plains—numerical constraints and stratigraphic influences: presented at the Louisiana Geological Survey Subsidence Symposium, Austin, Texas, January 2008.

Subsidence rates from fluid withdrawal and potential impact in southern Louisiana: presented at the Louisiana Geological Survey Subsidence Symposium, Austin, Texas, January 2008.

Pressure as a limiting factor influencing long-term sequestration capacity: presented at the Gulf Coast Carbon Center Annual Sponsor Meeting, Austin, Texas, January 2008.

The influence of seal thickness and rate of pressure buildup on CO₂ migration and sequestration: presented to the American Geophysical Union, Austin, Texas, December 10, 2007.

Pressure evolution and capillary seal performance during CO₂ injections: presented to the Austin Geological Society, Austin, Texas, November 5, 2007.

Gulf Coast stacked storage field test: presented at Sixth Annual Conference on Carbon Capture & Sequestration: Expediting deployment of industrial scale systems: Can it be done? How? Concerns to be addressed, Pittsburgh, Pennsylvania, May 9, 2007.

Gulf Coast Stacked Storage Field Test: presented at the NETL 6th Annual Carbon Capture & Sequestration Conference, Austin, Texas, May 9, 2007.

Update on demonstration projects of the Gulf Coast Carbon Center: presented to the Society of Petroleum Engineers—CO₂ Conference, Austin, Texas, December 4, 2006.

Overview of Gulf Coast Carbon Center: presented to the Interstate Oil & Gas Compact Commission, Austin, Texas, October 2006.

Sediment compaction in deltaic plains - numerically modeled compaction rates, stratigraphic influences, and potential consequences for lateral and vertical facies successions: presented to the JSG Soft Rock Seminar, Austin, Texas, October 2006.

Southern Louisiana's subsidence problem: geologic contributions and post-Katrina geophysical research opportunities: presented to the UT Institute for Geophysics, Austin, Texas, October 2006.

Stacked Storage Field Project: presented to the Department of Energy Annual Review of Regional Sequestration Partnerships, Pittsburgh, Pennsylvania, October 2006.

Projects and External Funding

- **PI or co-PI on 20 projects** with Meckel portion totaling **\$26.4 million** since 2006 (16 years). 6 awards are active (\$5.8M) , 14 are prior (\$20.5M). Total award amounts (including institutions other than UT) for those 20 projects has been **\$92.1 million**. Meckel accounts for 29% of all funds awarded. Funding application success rate is 88% (received funds/total funds applied for).
- External funding has been dominated by **Federal** sources (US DOE: NETL, BES; DOI: BOEMRE) with additional **State** (GLO), and **private** sector funds. Federal applications undergo NSF-style external peer and panel review. Industry grant applications are reviewed by experts within the sponsoring companies.
- Meckel is a key researcher in the **Gulf Coast Carbon Center (GCCC)**, a consortium of hydrocarbon and power companies interested in geological storage of CO₂ with a membership of 5-10 companies and an annual budget of **\$250-500k**. The annual fee is leveraged by mostly federal contracts awarded competitively to the GCCC PI and senior researchers. The GCCC is led by Dr. Hovorka (senior research scientist at BEG) and Meckel, as a Research Associate and Research Scientist, has played a significant role in advancing the research and goals of the GCCC, hiring new staff, and supervising post-doc and graduate student research.
- Meckel initiated and developed a research focus on **offshore CCS** potential in the United States, a topic that received minor prior attention. This topic has attracted almost **\$22 million**

dollars of total research funding under Meckel's leadership. This effort initially focused on the Texas portion of the Gulf of Mexico, expanded to the entire Gulf and Atlantic margin, with significant collaborations in the North Sea and Japan. GCCC initiated an international workshop series on offshore CCS, which will next be hosted by Norway in 2018.

- With funding from **DOE-Basic Energy Sciences** for an Energy Frontier Research Center (EFRC) named **Center for Frontiers of Subsurface Energy Security** (CFSES; led by CPGE), Meckel served as one research theme lead and directed the developed a laboratory facility (**\$30k**) at PRC for the engineering of 2.5D heterogeneous sandpacks and visualization of 2-phase buoyant flow. Meckel supervised a PhD and Postdoc on this project for years. This facility complements pioneering research in numerical simulation of buoyant flow in high-resolution heterogeneous clastic models.
- With initial funding from DOE-NETL, as a Research Scientist Meckel led the development of **high-resolution 3D (HR3D) marine seismic imaging**, acquiring equipment (**\$2.1M**) and establishing a Marine Seismic Imaging Cost Center (**MaSIC**) at the Bureau of Economic Geology. Meckel is the PI and scientific director of MaSIC. This center represents the only U.S. academic research institution with this capability. Meckel has personally deployed the HR3D technology in CCS research funded by DOE in the Gulf of Mexico (2012, 2013, 2014) and Japan (2017). External grants utilizing this technology within the funded research total **\$11.8M**.

External grants and contracts

Meckel is PI or Co-PI on these awards (Sorted by end date)						
Project Title	External Agency	Dates		Funding		MECKEL
		Begin	End	Total Amount	Status	Amount
CURRENT AWARDS						
20 Coastal Bend Carbon Management Project	DOE - NETL	Awarded, in negotiation		\$ 9,000,000		\$ 73,747
19 Coastal Bend Offshore Carbon Storage	DOE - NETL	Awarded, in negotiation		\$ 7,357,327		\$ 1,087,304
18 Offshore Gulf of Mexico Partnership for Carbon Storage-- Resources and Technology Development	DOE - NETL	2/1/2018	1/31/2024	\$ 10,000,000	Awarded	\$ 3,300,000
17 Exxon Mobil Energy Scholars Program	Exxon Mobil	4/1/2017	5/31/2023	\$ 131,771	Awarded	\$ 131,771
Validation of MVA Tools for Offshore CCS: Novel Ultra-High-Resolution 3D Marine Seismic Technology Integrated with Coring and Geochemistry	DOE - NETL	10/1/2016	9/30/2023	\$ 2,498,654	Awarded	\$ 1,249,327
16 GCCC - Industrial Associates Program	Varied Industry	Annual		\$ 300,000	Awarded	\$ 24,000
				CURRENT SUBTOTAL		\$ 5,866,149
PRIOR AWARDS						
14 USGS-Gulf Coast Carbon Center Collaboration on Carbon Sequestration Capacity Evaluation	USGS	10/1/2017	9/30/2020	\$ 150,000	Completed	\$ 49,500
13 Southeast Regional Carbon Sequestration Partnership, Phase 3	DOE - NETL	10/1/2007	7/30/2019	\$ 31,447,977	Completed	\$ 10,377,832
12 GCCC support for ACORN Project	Univ. Edinburgh	1/31/2018	8/30/2018	\$ 22,989	Completed	\$ 22,989
11 Center for Frontiers of Subsurface Energy (CFSES EFRC)	DOE - BES	8/1/2009	7/31/2018	\$ 10,918,413	Completed	\$ 727,894
10 CarbonSAFE Phase I: Pre-feasibility Study - Northwest Gulf of Mexico CO2 Storage Complex	DOE - NETL	2/1/2017	7/30/2018	\$ 1,094,583	Completed	\$ 547,292
9 Atlantic Offshore CO2 Storage Resource Assessment	Battelle	2/1/2016	3/31/2018	\$ 22,015	Completed	\$ 22,015
8 Offshore Storage Resource Assessment of the Northern Gulf of Mexico (TXLA)	DOE - NETL	9/1/2015	8/31/2018	\$ 3,285,885	Completed	\$ 1,642,943
7 BEG Support to DOE FE Climate Change Working Group (China)	DOE - HQ	4/1/2015	5/15/2016	\$ 37,933	Completed	\$ 37,933
6 Offshore Carbon Sequestration on Texas State Lands	Texas General Land Office	1/25/2010	9/30/2015	\$ 1,200,000	Completed	\$ 600,000
5 Minimum Dataset Requirements and Development of a Modeling Workflow for CO2 Migration	PTRC	5/4/2015	5/4/2015	\$ 183,233	Completed	\$ 54,970
4 Sequestration	DOE - NETL	12/8/2009	9/30/2014	\$ 9,263,897	Completed	\$ 4,631,949
3 Sub-seabed Geologic Carbon Dioxide Sequestration Best Management Practices	DOI - BOEMRE	10/1/2010	9/30/2013	\$ 496,367	Completed	\$ 248,184
2 Southeast Regional Carbon Sequestration Partnership, Phase 2	DOE - NETL	10/1/2005	9/30/2010	\$ 4,634,563	Completed	\$ 1,529,406
1 Lower Colorado River Authority, Fayette CCS Study	LCRA	7/1/2009	6/30/2010	\$ 63,659	Completed	\$ 63,659
				PRIOR SUBTOTAL		\$ 20,556,564
				TOTAL AWARDED:		\$ 26,422,713

UNFUNDED						
7 CarbonSAFE Phase 2: Carbon Dioxide Storage Complex Feasibility In the Northwest Gulf of Mexico	DOE-NETL	3/1/2018	9/30/2019	\$ 6,125,828	unfunded	\$ -
6 Cost-benefit analysis of CCS Scenarios	Sloan Foundation	6/1/2017	6/1/2019	\$ 239,882	unfunded	\$ -
5 High-resolution 3D Seismic Imaging for Carbon Capture and Storage	DOE-NETL	10/1/2014	9/30/2017	\$ 950,949	unfunded	\$ -
4 High resolution 3D seismic detection of potential CO2 leakage pathways in offshore settings	DOE-NETL	9/1/2013	8/31/2016	\$ 1,433,550	unfunded	\$ -
3 Accelerating CCS Deployment	DOE-NETL	1/1/2015	6/30/2016	\$ 319,824	unfunded	\$ -
2 Integrated and Predictive Evaluation of Fault Performance for Carbon Dioxide Sequestration	DOE-NETL	1/1/2010	12/31/2012	\$ 1,725,723	unfunded	\$ -
1 Advanced strategies for integrating enhanced seismic imaging techniques with multi-scale buoyant flow simulation in fractured/faulted reservoirs and seals	DOE-NETL	1/1/2010	12/31/2012	\$ 2,093,112	unfunded	\$ -
				SUBTOTAL		\$ 12,888,868

I certify that the information provided in this summary form is accurate and reflects my actual research grant record.


Signature

Date 2/7/2023

Supervision: Postdoc, Graduate Student, and RSA

Supervisor of:

- 16 MS students (one in CPGE department); 7 as Research Scientist, 9 as primary JSG GSC member. One incoming fall 2023.
- 2 PhD Students (one in CPGE department); one incoming fall 2023.
- 4 postdoctoral researchers.
- 1 RSA-IV.

Last Name	First	Period of Supervision		Position Description	Now Employed By
		Start	End		
Ni	Hailun	2020	2022	Postdoc	BEG RA - GCCC
Feng	Ye	2018	2020	Postdoc	BP - Geophysics
Trevisan	Luca	2015	2017	Postdoc, BEG	Karlsruhe Inst. Tech.
Carr	David	2010	2015	RSA IV, BEG	BEG
Zahid	Khandahar	2010	2012	Post-doc, BEG	Chevron

Student Name	Semesters Enrolled		Supervision		Now Employed By
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Ph.D. (3)					
Last	First	Entered	Exited	Research	GSC
Dunlap	Dallas	Fall 2016			X BEG
Krishnamurthy ^{*,PE}	Prasanna	Fall 2013	Spring 2020	X	ExxonMobil

MS (16)					
Last	First	Entered	Exited	Research	GSC
Avitt	Sean	Fall 2023			X
Hull	Harry	Fall 2019	Spring 2021		X EOG Resources
Garcia	Omar	Fall 2017	Spring 2019		X Kroll
Franey	John	Fall 2019	Fall 2022		X Antea Group USA
Ruiz	Izaak	Fall 2017	Spring 2019		X Repsol
Beckham [#]	Emily	Fall 2016	Spring 2018		X ExxonMobil
Sabbagh [#]	Reinaldo	Fall 2015	Spring 2017		X Equinor, BEG
Osmond [#]	Johnathon	Fall 2013	Spring 2016		X PhD program: Univ. Oslo
Mulcahy [#]	Francis	Fall 2013	Spring 2015		X Statoil, Geologist
Ditkof [*]	Julie	Fall 2011	Spring 2013	X	ExxonMobil, Geophysicist
Wallace [*]	Kerstan	Fall 2011 ^{**}	Spring 2013	X	Encana, Geologist
Ganesh ^{PE}	Priya	Fall 2010	Spring 2012	X	Battelle, Reservoir Engineer
Miller	Erin	Spring 2009	Spring 2012	X	Huckberry
Nicholson [#]	Andrew	Fall 2010	Spring 2012	X	Anadarko, Sr. Geologist
Urquhart	Alexander	Fall 2008	Fall 2010	X	American Academy of Arts and Sciences
Kalyanaraman	Nishanth	Fall 2007	Spring 2008	X	Occidental Petroleum, Sr. Geoscientist

* Denotes a student with a first author peer-reviewed publication.

Denotes student co-author on peer-reviewed publication.

** Supervision of Kerstan began as URA during undergrad enrollment in JSG in Fall 2009.

^{PE} Denotes UT CPGE student

Student Theses Supervised (15)

Krishnamurthy, P.G., 2020, Geologic heterogeneity controls on CO₂ migration and trapping,

- Hull, H.L., 2021, Characterizing Reservoir Quality for Geologic Storage of CO₂—A Case Study from the Lower Miocene Shore Zone at Matagorda Bay, Texas, 215 p.
- Franey, J., 2021, Characterization of the High Island 24L Field for Modeling and Estimating CO₂ Storage Capacity in the Offshore Texas State Waters, Gulf of Mexico, 134 p.
- Garcia, O.R., 2019, Geologic characterization and modeling for quantifying CO₂ storage capacity of the High Island 10-L Field in Texas state waters, offshore Gulf of Mexico, 144 p.
- Ruiz, I., 2019, Characterization of the High Island 24L Field for Modeling and Estimating CO₂ Storage Capacity in the Offshore Texas State Waters, Gulf of Mexico, 134 p.
- Beckham, E.C., 2018, CO₂ Storage in Deltaic Environments of Deposition: Integration of 3- Dimensional Modeling, Outcrop Analysis, and Subsurface Application, 220 p.
- Sabbagh, R.S., 2017, Pre-injection reservoir characterization for CO₂ storage in the inner continental shelf of the Texas Gulf of Mexico, MS Thesis, The University of Texas at Austin, 90 p.
- Osmond, J.L., 2016, Fault seal and containment failure analysis of a Lower Miocene structure in the San Luis Pass area, offshore Galveston Island, Texas Inner Shelf, MS Thesis, The University of Texas at Austin, 220 p.
- Mulcahy, F.J., 2015, Use of High Resolution 3D Seismic Data to Evaluate Quaternary Valley Evolution History during Transgression, Offshore San Luis Pass, Gulf of Mexico, MS Thesis, The University of Texas at Austin, 122 p.
- Ditkof, J.N., 2013, Time-lapse seismic monitoring for enhanced oil recovery and carbon capture and storage field site at the Cranfield field, Mississippi, MS Thesis, The University of Texas at Austin, 124 p.
- Wallace, K.J., 2013, Use of 3-Dimensional Dynamic Modeling of CO₂ Injection for Comparison to Regional Static Capacity Assessments of Miocene Sandstone Reservoirs in the Texas State Waters, Gulf of Mexico, MS Thesis, The University of Texas at Austin, 152 p.
- Miller, 2012, A question of capacity – Assessing CO₂ sequestration potential in Texas offshore lands, MS Thesis, The University of Texas at Austin, 133 p.
- Ganesh, P.R., 2012, Geologic factors affecting buoyant plume migration patterns in small-scale heterogeneous media: Characterizing capillary channels of sequestered CO₂, MS Thesis, The University of Texas at Austin, 141 p.
- Nicholson, A.J., 2012, Empirical analysis of fault seal capacity for CO₂ sequestration, Lower Miocene, Texas Gulf Coast, MS Thesis, The University of Texas at Austin, 100 p.
- Urquhart, A.S.M., 2011, Structural controls on CO₂ leakage and diagenesis in a natural long-term carbon sequestration analogue: Little Grand Wash fault, Utah, MS Thesis, The University of Texas at Austin, 459 p.
- Kalyanaraman, N., 2008, Evaluating the influence of seal characteristics and rate of pressure buildup on modeled seal performance and carbon sequestration economics, MA Thesis, The University of Texas at Austin, 119 p.

PROFESSIONAL & PUBLIC SERVICE

EDITORIAL BOARD

Petroleum Geoscience, September 2017 to present.

COMMITTEES

University Committees

Promotion Advisory Committee, BEG – 2019-2023.

Jackson School of Geosciences Appointments Committee, 2018-2021.

Candidate Search Committee for Associate Dean of Research, Jackson School of Geosciences, September 30, 2014-December 28, 2015

Jackson School of Geosciences Postdoctoral Fellow Committee, 2014-2016.

Walter Geology Library Committee, 2014-2020.

Publications Council, Bureau of Economic Geology, 2007 - 2010.

Climate System Science Theme Hire Committee, Jackson School of Geosciences, 2007

Lab Space Committee, Bureau of Economic Geology, 2007

External Committees Participation

U.S. House of Representatives, Committee of Natural Resources, testimony for hearing on “The opportunities and risks of Offshore Carbon storage in the Gulf of Mexico”, April 28, 2022, <https://www.youtube.com/watch?v=c087wEhr2fE>

Society of Petroleum Engineers, Storage Resources Management System (SRMS), 2016-present.

National Petroleum Council, Meeting the Dual Challenge: A Roadmap to at-scale deployment of carbon capture, use and storage, 2019.

International Standard Organization, T265 working group on CO₂ Capture, Transport, and Storage, 2014-2016.

Chair, AAPG-DEG Carbon Sequestration Committee, 2009 – 2014.

Member, AAPG Research Committee, American Association of Petroleum Geologists, 2008-2012.

Expert, Texas Senate Committee on Natural Resources, Senator Kip Averett, Chair, Technical developments in carbon capture and storage in Texas, 2007.

ARTICLE PEER REVIEWER (Journals)

Nature Geoscience, Basin Research, International Journal of Greenhouse Gas Control, Geology, Geophysical Research Letters, Journal of Petroleum Science and Engineering, Geophysics, Earth and Planetary Science Letters, Environmental Earth Sciences.

PROFESSIONAL MEETING LEADERSHIP

Advisory Panel, Fifth international Workshop on Offshore Geologic CO₂ Storage, New Orleans, TX, 2022.

Co-Convener & Field Trip Leader, Second International Workshop on Offshore Geologic CO₂ Storage, Beaumont, TX, 2017.

Invited Expert, Mission Innovation, Defining Priority Research Directions for CCS, Houston, September 24-28, 2017.

Co-Convener, First International Workshop on Offshore Geologic CO₂ Storage, Austin, TX, 2016.

Co-Chair, GHGT-13, Lausanne, Switzerland, Geomechanics for CCS Technical Session, 2016.

Invited Panelist, GHGT-13, Lausanne, Switzerland, Transferring 20 years of learning at the Sleipner Offshore CCS site, 2016.

Field Trip Leader, GHGT-12, Austin Texas, 2014.

Session Chair, Society of Petroleum Engineers, International Conference on CO₂ Capture, Storage, & Utilization, New Orleans, LA, November 2010.

Organizer & Session Chair, AAPG Geoscience Technology Workshop, Golden, CO, August, 2010.

Trip Leader, International Energy Agency – Greenhouse Gas R&D Programme, 6th Monitoring Network Meeting Field Trip: Cranfield Sequestration Project, Mississippi, USA, May 2010.

Trip Leader, AAPG Pre-meeting Field trip: CO₂-EOR & Sequestration project near Natchez, MS, March, 2010.

Co-Convener, Hedberg (AAPG/SPE/SEG) Research Conference: Geological Carbon Sequestration: Prediction & Verification, 2009.

Organizer, Carbon Capture & Storage Technical Workshop, Houston, Texas, December 8, 2008.

PUBLIC OUTREACH

17th Annual Earth Science Week Career Day, Austin, TX, Oct. 7, 2016, *High-resolution Marine Seismic Imaging of the Subsurface*.

The Girls School, Austin, TX, Oct. 2010: *Rocks, Minerals, & the Geology of Austin*.

Ace Academy, Austin, TX, Dec. 2009: *Science Fair Judge*.

UT-Explore, Austin, TX, Mar. 2009: *Demonstrations related to Carbon Capture & Storage*.

Bureau of Economic Geology, Austin, TX, Jan. 2009: Podcast: *Carbon Capture and Sequestration*.

Kealing Middle School, Austin, TX, May 2009: *Plate Tectonics*.

Texas Regional Collaborative Workshop, Austin, TX, Jun. 2008: *CO₂ Demonstrations for the Classroom*.

Columbia University, Sch. Int. Public Affairs, Austin, TX, Mar. 2007: *Role of CCS in Energy Policy*.

Austin Geological Society, Austin, TX, Monthly Meeting, Nov. 5, 2007: *An overview of carbon capture and geologic storage in the Gulf Coast*.

Killeen High School visit, Austin, TX, Jun., 2007: BEG visit for Science Camp.

AWARDS

Outstanding Educator Award, 2018, Jackson School of Geosciences

Outstanding Research Award (GCCC), 2017, Jackson School of Geosciences, UT-Austin.

Funding Rainmaker, 2017, 2018, 2019, 2022, Bureau of Economic Geology, UT-Austin.

First Author Publication Award, 2008, 2011, 2014, 2016, 2017, 2019, 2021 Bureau of Economic Geology, UT-Austin.

Bernold M. Hanson Excellence of Presentation Award, 2013 AAPG Annual Convention and Exhibition for

"Determining seal effectiveness and potential buoyant fluid migration pathways using shallow high-resolution 3D seismic imaging: Application for CO₂ storage assessment on the inner Texas shelf"

Second Place, Gordon I. Atwater Best Poster Award, for the 2014 annual convention of the Gulf Coast Association of Geological Societies and Gulf Coast Section of SEPM, Lafayette, LA., 2014

Best Presentation by Ph.D. Candidate, Department of Geological Sciences, The University of Texas at Austin, 2003

Gale White Fellowship, Institute for Geophysics, The University of Texas at Austin, 2001 - 2002

Banks Scholarship, Department of Geological Sciences, The University of Texas at Austin, 2002

Best Presentation by a Fellowship Recipient, Institute for Geophysics, The University of Texas at Austin, 2002

Research Grant, Geological Society of America, distinguished for exceptional merit in conception and presentation, 2000

Departmental Award for Academic Scholarship, Department of Geological Sciences, The University of Texas at Austin, 1999

Scholarship, Academic Excellence and Field Research, Billings Geophysical Society, Billings, Montana, 1997

PROFESSIONAL SOCIETIES

American Association of Petroleum Geologists

Meckel Family grant for Field Studies

Society of Exploration Geophysicists

American Geophysical Union

Society for Petroleum Engineers

Geological Society of America

PROJECT MANAGEMENT

Meckel has 16 years of project management experience as PI or Co-PI on 20 externally-funded projects.

- **Offshore CCS Projects (9):** The majority of Meckel's research management includes projects he led dominantly as PI since 2009 in the Gulf of Mexico and Japan. He is also a formal advisor on an Atlantic CCS project led by Battelle. This research topic did not exist at BEG prior to Meckel's initiation, and he has been the primary driver and manager of this topic. Total funding for this

research topic has attracted almost \$26M since 2009, including both State and Federal funds. Of those awards, \$8.7M was allocated to Meckel. During the projects Meckel has been responsible for scientific direction and achievement, budgeting, and deliverables. As part of these projects, Meckel obtained a novel high-resolution 3D marine seismic acquisition system (P-cable, \$2.1M), and has deployed it personally 4 times since 2012 in the Gulf of Mexico and Japan, involving 5 graduate students in those deployments, data acquisition, and processing. In addition to supervising many subcontracts (including domestic and international vessel contracts), Meckel has supervised thesis research by 7 graduate research assistants as part of these projects. On this topic he was recently asked to contribute to a project (ACORN) in the North Sea directed by the University of Edinburgh, a relatively small effort (\$23k) he manages.

- **Southeast Regional Carbon Sequestration Partnership (SECARB)**: These two DOE-funded projects - Phase 2 (\$4.6M) and Phase 3 (\$31.4M) - both involved dozens of researchers both inside and outside BEG. This recognized flagship project of DOE involved numerous external subcontracts, including both laboratory and field components, in addition to well drilling (4) and instrumentation. Meckel was a primary field participant throughout, and contributed to budget management, science management, and deliverables. The project was recognized in 2010 by the Carbon Sequestration Leadership Forum (CSLF), comprised of 26 member nations, for outstanding contributions to CCS research. <https://www.csforum.org/csrf/Projects/SECARB>
- **Center for Frontiers of Subsurface Energy Security (CFSES)**: This 4-year multi-institutional (UT, Sandia National Laboratory) project is funded by Basic Energy Sciences at DOE as one of three U.S. Energy Frontier Research Centers on CCS, and is administered through the CPGE Department. Meckel is one of three research theme leads at UT, and manages research (\$725k) under the theme of buoyancy-driven multiphase flow. He supervised one postdoc and one PhD student during the project. The effort includes ongoing supervision and management of a laboratory facility developed (\$30k) at PRC for engineering sandpacks for visualizing and quantifying buoyant fluid saturations in heterogeneous clastic materials.
- **ExxonMobil Energy Scholars Program**: Meckel was sought as one research theme lead on this 4-year industry-funded project related to Carbon Capture and Storage. He supervises a current MS student in this effort, and manages a budget of approximately \$130k.
- **Gulf Coast Carbon Center**: Meckel is a primary contributor and assistant manager to center PI Dr. Susan Hovorka. Meckel contributes to attracting consortium member sponsorship on an annual basis, including recently USGS. Meckel advises and is directly involved in recruitment of GRA and RA participants in the center.
- **Petroleum Technology Research Center**: Meckel was one of 3 Co-PIs of this effort related to establishing minimum dataset requirements and development of modeling workflow for CO₂ migration. Meckel managed research of buoyant fluid migration in stratigraphy for the notable Weyburn Project in Canada.