

The U.S. DOE Methane Hydrate R&D Program

Publications and Presentations Resulting from DOE-
Supported Methane Hydrate R&D
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Section I: Publications Related to Methane Hydrate Fellowship Program

Papers Authored and Presentations Given by NETL Methane Hydrate Fellows

Papers Authored

- Brothers, L. L., Kelley, J. T., Belknap, D. F., Koons, P. O., Barnhardt, W. A., (2011). "Pockmarks: Self-scouring seep features?" *Proc. of the 7th International Conference on Gas Hydrates (ICGH 2011). Edinburgh, Scotland, United Kingdom, July, 17-21, (2011).* Paper 326.
- Brothers, L., Hart, P. E., and Ruppel, C. R., (2012). "Minimum distribution of subsea ice-bearing permafrost on the U. S. Beaufort Sea continental shelf." *Geophysical Research Letters*, vol. 39, L15501, doi:10.1029/2012GL052222.
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- Cook, A. and Goldberg, D., (2009). "Two Kinds of Gas Hydrate Reservoirs: Pore-filling Sand vs. Fractured Clay," *Eos Trans. AGU* 90(52), Fall Meet. Suppl. Abstract OS31A-1174.
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- Solomon, E. A., Spivack, A. J., Kastner, M., Torres, M., Borole, D. V., Robertson, G., Das, H. C., (2008). Hydrogeochemical and Structural Controls on Heterogeneous Gas Hydrate Distribution in the K-G Basin Offshore SE India. Proceedings of the 6th International Conference on Gas Hydrates (ICGH 2008), Vancouver, B. C., July 6-10, (2008).
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- Wagner, K. S., McEntee, M. H., Brothers, L. L., German, C. R., Kaiser, C. L., Yoerger, D. R., and Van Dover, C. L., (2013). Cold-seep habitat mapping, High-resolution spatial characterization of the Blake Ridge Diapir seep field. *Deep Sea Research II: Topical Studies in Oceanography*, v. 92, pp. 183-188, August, (2013).
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Presentations

- Brothers, L. L., Hart, P. E., Ruppel, C., (2011). Subsea permafrost mapped across the US Beaufort Sea using multichannel seismic data, AGU Fall Meeting 2011
- Brothers, L. L., Van Dover, C. L., German, C. R., Kaiser, C. L., Yoerger, D. R., Ruppel, C. D., Lobecker, E., Skarke, A. R., Wagner, K. S., (2012). Evidence for extensive methane venting on the southeastern U. S. Atlantic margin., AGU Fall Meeting 2012
- Brothers, L. L., Hart, P. E., and Ruppel, C., (2013). Subsea permafrost on the US Beaufort Sea Margin, Permafrost & Gas Hydrates Workshop, Helsinki Finland, (2013).
- D'Emidio, M, M Ingrassia, CB Lutken, L Macelloni, A Simonetti, M Pizzi, LL Lapham, R Wilson, P Hsing, and C Fisher, (2012). Biogeophysical classification of seafloor seeps at a carbonate-hydrate mound, Northern Gulf of Mexico. Poster. The Gordon Research Conference on Natural Gas Hydrate Systems, Ventura, California. March 18th-23rd
- Pohlman, J. W., Kessler, J. K., Maue, C., Ruppel, C. D., Brothers, L. L., Yvon Lewis, S. A., Sparrow, K., Bergeron, E., Worley, C., (2012). Methane fluxes to the atmosphere in an area of possibly dissociating gas hydrate in the shallow Alaskan Beaufort Sea, *Eos Trans. AGU* 87(36), Ocean Sciences Meet. Supplement, Abstract OS35E 02
- Ruppel, C., Brothers, L. L., Hart, P. E., Worley, C., (2011). The distribution of subsea permafrost and shallow methane on the central U. S. Beaufort Inner Shelf from newly acquired geophysical data, AGU Fall Meeting
- Ruppel, C., Brothers, L., Hart, P., Pohlman, J., (2012). Warming driven dissociation of gas hydrates on the continental shelf and upper continental slope of the US Beaufort Sea, for Arctic Frontiers, Tromso, Jan 2012.
- Wilson, R. M., Lapham, L. L., and Chanton, J. P., (2012). Chemical and physical controls on hydrate stability probed with field and laboratory experiments. Presented at the American Geophysical Union Fall Meeting, Dec. 3-7, San Francisco, CA.

- Wilson, RM, LL Lapham, B Anderson, N Garapati, and J Chanton, (2012). Laboratory experiments probe hydrate dissolution rates. Poster. The Gordon Research Conference on Natural Gas Hydrate Systems, Ventura, California. March 18th-23rd
- Wilson, RM, LL Lapham, CS Martens, JP Chanton, H Mendlovitz, K Sleeper, and M Riedel, (2012). Time-series methane monitoring in gassy sediments and the benthic boundary layer. Ocean Sciences Meeting, Salt Lake City, Utah. February 20th-24th
- Wilson, R. M., Lapham, L. L., and Chanton, J. P., (2013). Integrating seismic data and geochemical profiles to identify methane provenance, cycling, and migration pathways. Presented at American Chemical Society National Meeting, Apr. 8-12, New Orleans, LA.

Section II: Publications Related to the Program's Major Field Projects

With private companies, state and local governments, universities, and research institutions

Alaska North Slope Gas Hydrate Reservoir Characterization (DE-FC26-01NT41332)

BP Exploration Alaska, Inc.

Peer-Reviewed Publications

- Anderson, B., Hancock, S., Wilson, S., Enger, C., Collett, T., Boswell, R., Hunter, R., (2010). "Formation pressure testing at the Mount Elbert Gas Hydrate Stratigraphic Test Well, Alaska North Slope: Operational summary, history matching, and interpretations," *Marine and Petroleum Geology, Vol. 28, Iss. 2, Thematic Set on Scientific results of the Mount Elbert Gas Hydrate Stratigraphic Test Well, Alaska North Slope*, pp. 478-492, ISSN 0264-8172, doi: 10.1016/j.marpetgeo.2010.02.012.
- Anderson, B. J., Kurhiara, M., Wilson, S. J., Pooladi-Darvish, M., White, M., Moridis, G., Gaddipati, M., Masuda, Y., Collett, T. S., Hunter, R. B., Narita, H., Rose, K., Boswell, R., (2010). "Regional long-term production modeling from a single well test, Mount Elbert Gas Hydrate Stratigraphic Test Well, Alaska North Slope," *Marine and Petroleum Geology, Vol. 28, Iss. 2, Thematic Set on Scientific results of the Mount Elbert Gas Hydrate Stratigraphic Test Well, Alaska North Slope*, pp. 493-501, ISSN 0264-8172, doi: 10.1016/j.marpetgeo.2010.01.015.
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- Boswell, R., Rose, K., Collett, T. S., Lee, M. W., Winters, W. F., Lewis, K., and Agena, W. F., (2010). "Geologic controls on gas hydrate occurrence in the Mount Elbert prospect, Alaska North Slope," *Marine and Petroleum Geology, Vol. 28, Iss. 2, Thematic Set on Scientific results of the Mount Elbert Gas Hydrate Stratigraphic Test Well, Alaska North Slope*, pp. 589-607, ISSN 0264-8172, doi: 10.1016/j.marpetgeo.2009.12.004.
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Planning of a Marine Methane Hydrate Pressure Coring Program for the Walker Ridge and Green Canyon Areas of the Gulf of Mexico (DE-FE0010175)

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Section III: Publications Related to the Program's Efforts with Universities and Other Research Institutions

Gas Hydrate Characterization in the Gulf of Mexico (DE-NT0005668) and Mapping Permafrost and Gas Hydrate using Marine CSEM Methods (DE-FE0010144)

Scripps Institution of Oceanography, University of California – San Diego

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- Kannberg, P. K. and Constable, S., (2016). "Surveying hydrates in the California Borderlands using electromagnetic methods," presented at the Natural Gas Hydrate Systems Gordon Research Conference, Galveston, TX.
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Assessing the Efficacy of the Aerobic Methanotropic Biofilter in Methane Hydrate Environments (DE-NT0005667)

University of California – Santa Barbara

Peer-Reviewed Publications

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University of Delaware

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Remote Sensing and Sea-Truth Measurements of Methane Flux to the Atmosphere (HYFLUX project) (DE-NT0005638)

Texas A&M University - Corpus Christi

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Texas A&M University – Corpus Christi

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Structural and Stratigraphic Controls on Methane Hydrate Occurrence and Distribution: Gulf of Mexico, Walker Ridge 313 and Green Canyon 955 (DE-FE0009904)

Oklahoma State University

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A New Approach to Understanding the Occurrence and Volume of Natural Gas Hydrate in the Northern Gulf of Mexico Using Petroleum Industry Well Logs (DE-FE0009949)

Ohio State University

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Gas Hydrate Dynamics on the Alaskan Beaufort Continental Slope: Modeling and Field Characterization (DE-FE0010180)

Southern Methodist University, Oregon State University, U. S. Geological Survey

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Oregon State University

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- Torres, M., (2016). "Assessing the response of methane hydrates to environmental change at the Svalbard continental margin," *DOE Award No.: DE-FE0013531, Quarterly Progress Report (Jan-March, 2016)*, April 2016.
- Torres, M., (2016). "Assessing the response of methane hydrates to environmental change at the Svalbard continental margin," *DOE Award No.: DE-FE0013531, Quarterly Progress Report (Oct-Dec, 2015)*, January 2016.
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- Torres, M., (2013). "Application of Crunch-Flow Routines to Constrain Present and Past Carbon Fluxes at Gas-Hydrate Bearing Sites," *DOE Award No.: DE-FE0010496, Quarterly Progress Report (October-December, 2012)*, February 2013.
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Verification of Capillary Pressure Functions and Relative Permeability Equations for Gas Production (DE-FE0009927)

Wayne State University

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Mahabadi, N., Zheng, X., and Jang, J. (2016). "The effect of hydrate saturation on water retention curves in hydrate-bearing sediments," *Geophysical Research Letters*, 43, doi: 10.1002/2016GL068656.

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Mahabadi, N., Zheng, X., Dai, S., Seol, Y., Zapata, C. E., Yun, T.-S., and Jang, J. (2015). "Water retention curves in THF hydrate-bearing sediments – Experimental measurement and pore-scale simulation," *American Geophysical Union meeting*, San Francisco, CA, Dec. 14-18.

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Measurement and Interpretation of Seismic Velocities and Attenuations in Hydrate-Bearing Sediments (DE-FE0009963)

Colorado School of Mines, Geophysics Department

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Pohl, Mathias, Rydzy, Marisa, and Batzle, Mike, Colorado School of Mines, (2013). "Investigating the Influence of Clay Content on Ultrasonic Velocities in THF-bearing sediments" *The 2nd International Workshop on Rock Physics*, South Hampton, UK.

Rydzy, M, Batzle, M., Hester, K., Howard, J., and Stevens, J., (2013). "Effect of initial water saturation on the elastic properties of hydrate-bearing sediment," *The Unconventional Resources Technology Conference*, Denver, CO, Aug. 12-14.

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THCM Coupled Model for Hydrate-Bearing Sediments: Data Analysis and Design of New Field Experiments (Marine and Permafrost Settings) (DE-FE0013889)

Texas A&M University

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- McCartney, J., Sánchez, M., and Tomac, I., (2016). "Energy Geotechnics: Advances in Subsurface Energy Recovery, Storage, Exchange, and Waste Management." *Computers and Geotechnics*, v. 75, pp. 244–256, May 2016. doi:10.1016/j.compgeo.2016.01.002.
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- Sánchez, M. and Gai, X., (2016). "Geomechanical and numerical modeling of gas hydrate sediments," *1st International Conference on Energy Geotechnics (ICEGT 2016)*, Kiel, Germany, August 29-31.
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Controls on Methane Expulsion During Melting of Natural Gas Hydrate Systems (DE-FE0010406)

University of Texas at Austin

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Fate of Methane Emitted From Dissociating Marine Hydrates: Modeling, Laboratory, and Field Constraints (DE-FE0013999)

Massachusetts Institute of Technology

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- Brothers, D. S., Ruppel, C. D., Kluesner, J. W., Chaytor, J. D., ten Brink, U. S., and Hill, J. C., (2013). "Pervasive evidence for seabed fluid expulsion on the U. S. Atlantic continental margin," *American Geophysical Union Fall Meeting*, San Francisco, CA, Dec. 9-13.
- Kodis, M., Skarke, A., Ruppel, C., Weber, T., Lobecker, E., and Malik, M., (2013). "U. S. Atlantic margin methane plumes identified from water column backscatter data acquired by NOAA ship Okeanos Explorer," *American Geophysical Union Fall Meeting*, San Francisco, CA Dec. 9-13.
- Ruppel, Weber, Kessler, Pohlman, and Skarke. "Methane hydrate dissociation and gas seepage on global upper continental slopes driven by intermediate ocean warming," *EOS Trans. AGU, OS11C-01, AGU Fall Meeting*.
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- Xiaojing Fu, Cueto-Felgueroso, Luis, Ruben, Juanes (2015). "Viscous fingering with partially miscible uids," *EOS Trans. AGU H41D-1356, AGU Fall Meeting*.

Hydrate Evolution in Response to Ongoing Environmental Shifts (DE-FE0013565)

University of Oregon

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- Rempel, A., (2014). "Hydrate Evolution in Response to Ongoing Environmental Shifts," *Quarterly Research Performance Progress Report (Period Ending 9/30/2014)*. DOE Award No.: DE-FE0013565. October 2014.

Deepwater Methane Hydrate Characterization and Scientific Assessment (DE-FE0023919)

University of Texas at Austin

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- Cook, A., Hillman, J., and Sawyer, D., (2015). "Gas Migration in the Terrebonne Basin Gas Hydrate System," *Abstract OS23D-05, American Geophysical Union Fall Meeting, San Francisco, CA, Dec. 14-18.*
- Cook, A. E., and Waite, (2016). "Archie's saturation exponent for natural gas hydrate in coarse-grained reservoir," *2016 Gordon Research Conference, Galveston, TX, Feb 28-March 4.*
- Cook, A.E., Hillman, J., Sawyer, D., Treiber, K., Yang, C., Frye, M., Shedd, W., and Palmes, (2016). "Prospecting for Natural Gas Hydrate in the Orca & Choctaw Basins in the Northern Gulf of Mexico," *2016 Fall Meeting, AGU, San Francisco, CA, 12-16 Dec.*
- Darnell, K., Flemings, P.B., and DiCarlo, D.A., (2016). Nitrogen-assisted Three-phase Equilibrium in Hydrate Systems Composed of Water, Methane, Carbon Dioxide, and Nitrogen, *Fall Meeting, AGU, San Francisco, Calif., 12-16 Dec.*
- Fortin, W., Goldberg, D. S., Holbrook, W. S., and Küçük, H. M., (2016). "Velocity analysis of gas hydrate systems using prestack waveform inversion," *Gordon Research Conference on Natural Gas Hydrate Systems, Galveston, TX, Feb 28-March 4.*
- Fortin, W., Goldberg, D.S., Küçük, H.M, 2016, Methane Hydrate Concentrations at GC955 and WR313 Drilling Sites in the Gulf of Mexico Determined from Seismic Prestack Waveform Inversion, *AGU, Fall Meeting, Session 13837: Experiments, Modeling and Field Studies on Gas Hydrate Formation, San Francisco, CA Dec 12-16, 2016.*
- Goldberg, D., Küçük, H. M., Haines, S., Guerin, G., (2016). "Reprocessing of high resolution multichannel seismic data in the Gulf of Mexico: implications for BSR character in the Walker Ridge and Green Canyon areas," *Gordon Research Conference on Natural Gas Hydrate Systems, Galveston, TX, Feb 28-March 4.*
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- Küçük, H. M., Goldberg, D.S, Haines, S., Dondurur, D., Guerin, G., and Çifçi, G., (2016). "Acoustic investigation of shallow gas and gas hydrates: comparison between the Black Sea and Gulf of Mexico," *Gordon Research Conference on Natural Gas Hydrate Systems, Galveston, TX, Feb 28-March 4.*
- Malinverno, A., (2015). "Monte Carlo inversion applied to reaction-transport modeling of methane hydrate in continental margin sediments, *Fall AGU Meeting, San Francisco, CA, Abstract OS23B-2003.*
- Malinverno, A., (2016). "Modeling gas hydrate formation from microbial methane in the Terrebonne basin, Walker Ridge, Gulf of Mexico," *Gordon Research Conference on Natural Gas Hydrate Systems, Galveston, TX, Feb 28-March 4.*
- Meazell, K., (2015). "Methane Hydrate-Bearing Sediments in the Terrebonne Basin, Northern Gulf of Mexico," *Abstract OS23B-2012, American Geophysical Union Fall Meeting, San Francisco, CA, Dec. 14-18.*
- Meazell, K., and Flemings, P. B., (2016). "New insights into hydrate-bearing clastic sediments in the Terrebonne basin, northern Gulf of Mexico," *Gordon Research Conference on Natural Gas Hydrate Systems, Galveston, TX, Feb 28-March 4.*

- Meazell, K., and Flemings, P. B., (2016). "The depositional evolution of the Terrebonne basin, northern Gulf of Mexico," *5th Annual Jackson School Research Symposium*.
- Phillips, S. C., Flemings, P. B., Meyer, D. W., You, K., Kneafsey, T. J., Germaine, J. T., Solomon, E. A., and Kastner, M., (2016). "Extraction of Pore Fluids at In Situ Pressures from Methane Hydrate Experimental Vessels," *Gordon Research Conference on Gas Hydrates*, Galveston, TX, Feb. 28-Mar. 4.
- Phillips, S. C., Borgfedlt, T., You, K., Meyer, D., and Flemings, P., (2016). "Dissociation of laboratory-synthesized methane hydrate by depressurization." *Gordon Research Conference on Gas Hydrates*, Galveston, TX, Feb. 28-March 4.
- Treiber, K, Sawyer, D., and Cook, A., (2016). "Dissociation of laboratory-synthesized methane hydrate by depressurization (Poster)" *2016 Gordon Research Conference*, Galveston, TX, Feb 28-March 4.
- Treiber, K, Sawyer, D., and Cook, A., (2016). "Geophysical interpretation of gas hydrates in Green Canyon Block 955, northern Gulf of Mexico, USA (Poster)" *2016 Gordon Research Conference*, Galveston, TX, Feb 28-March 4.
- Worman, S. and, Flemings, P. B., (2016). "Genesis of Methane Hydrate in Coarse-Grained Systems: Northern Gulf of Mexico Slope (GOM²) (poster)," *UT GeoFluids Consortia Meeting*, Austin, TX, March 2nd-March 4th.
- Yang, C., Cook, A., and Sawyer, D., (2016). "Geophysical interpretation of the gas hydrate reservoir system at the Perdido Site, northern Gulf of Mexico," *2016 Gordon Research Conference*, Galveston, TX, Feb 28-March 4.
- You, K. Y., DiCarlo, D., and Flemings, P. B., (2015). "Quantifying methane hydrate formation in gas-rich environments using the method of characteristics," *Abstract OS23B-2005*, *American Geophysical Union Fall Meeting*, San Francisco, CA, Dec. 14-18.
- You, K.Y., Flemings, P.B., and DiCarlo, D., (2016). "Quantifying methane hydrate formation in gas-rich environments using the method of characteristics," *2016 Gordon Research Conference*, Galveston, TX, Feb 28-March 4.

Mechanisms for Methane Transport and Hydrate Accumulation in Coarse-Grained Reservoirs (DE-FE0013919)

University of Texas at Austin

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- Daigle, H., Cook, A., and Malinverno, A., (2015). "Permeability and porosity of hydrate-bearing sediments in the northern Gulf of Mexico," *Marine and Petroleum Geology*, vol. 68 part A, pp. 561-564, doi:10.1016/j.marpetgeo.2015.10.004.
- Hillman, J. I. T., Cook, A. E., Sawyer, D., Küçük, H. M., and Goldberg, D. S., (2016). "The character and amplitude of bottom-simulating reflectors in marine seismic data," *Earth & Plan Sci Lett.*, submitted.
- Nole, M., Daigle, H., Cook, A., and Malinverno, A., (2016). "Short-range, overpressure-driven methane migration in coarse-grained gas hydrate reservoirs," *Geophysical Research Letters*, vol. 43, no. 18, pp. 9500-9508.

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- Daigle, H., (2016). "Mechanisms for Methane Transport and Hydrate Accumulation in Coarse-Grained Reservoirs," *Quarterly Research Performance Progress Report* (Period Ending 12/31/2015). DOE Award No.: DE-FE0013919. January 2016.
- Daigle, H., (2016). "Mechanisms for Methane Transport and Hydrate Accumulation in Coarse-Grained Reservoirs," *Quarterly Research Performance Progress Report* (Period Ending 3/31/2016). DOE Award No.: DE-FE0013919. April 2016.
- Daigle, H., (2016). "Mechanisms for Methane Transport and Hydrate Accumulation in Coarse-Grained Reservoirs," *Quarterly Research Performance Progress Report* (Period Ending 6/30/2016). DOE Award No.: DE-FE0013919. July 2016.
- Daigle, H., (2016). "Mechanisms for Methane Transport and Hydrate Accumulation in Coarse-Grained Reservoirs," *Quarterly Research Performance Progress Report* (Period Ending 9/30/2016). DOE Award No.: DE-FE0013919. October 2016.
- Daigle, H., (2017). "Mechanisms for Methane Transport and Hydrate Accumulation in Coarse-Grained Reservoirs," *Quarterly Research Performance Progress Report* (Period Ending 12/31/2016). DOE Award No.: DE-FE0013919. January 2017.

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- Andris, R., (2016). "The effect of restrictive diffusion on hydrate growth," *M.S. thesis*, University of Texas at Austin.
- Bihani, A., (2016). "Pore size distribution and methane equilibrium conditions at Walker Ridge Block 313, northern Gulf of Mexico," *M.S. thesis*, University of Texas at Austin.

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Presentations

- Andris, R., (2016). "The effect of restrictive diffusion on hydrate growth," *Gordon Research Conference on Natural Gas Hydrate Systems*, Galveston, TX, Feb 28-March 4.
- Bihani, A., Daigle, H., Cook, A., Glosser, D., Shushtarian, A., (2015). "Pore size distribution and methane equilibrium conditions at Walker Ridge Block 313, northern Gulf of Mexico," *Abstract OS23B-1999, American Geophysical Union Fall Meeting*, San Francisco, CA, December 14-18.
- Cook, A., Hillman, J., and Sawyer, D., (2015). "Gas migration in the Terrebonne Basin gas hydrate system, Gulf of Mexico," *Abstract OS23D-05, American Geophysical Union Fall Meeting*, San Francisco, CA, December 14-18.
- Daigle, H., and Rice, M. A., (2015). "Relative permeability of hydrate-bearing sediments from percolation theory and critical path analysis: theoretical and experimental results," *Abstract B12B-07, American Geophysical Union Fall Meeting*, San Francisco, CA, Dec 14-18.
- Fortin, W., Goldberg, D. S., Holbrook, W. S., and Küçük, H. M., (2016). "Velocity analysis of gas hydrate systems using prestack waveform inversion," *Gordon Research Conference on Natural Gas Hydrate Systems*, Galveston, TX, Feb 28-March 4.
- Goldberg, D., Küçük, H. M., Haines, S., Guerin, G., (2016). "Reprocessing of high resolution multichannel seismic data in the Gulf of Mexico: implications for BSR character in the Walker Ridge and Green Canyon areas," *Gordon Research Conference on Natural Gas Hydrate Systems*, Galveston, TX, Feb 28-March 4.
- Hillman, J., (2016). "Mapping and characterising bottom-simulating reflectors in 2D and 3D seismic data to investigate connections to lithology and frequency dependence," *Gordon Research Conference on Natural Gas Hydrate Systems*, Galveston, TX, Feb 28-March 4.
- Hillman, J., Cook, A.E., Daigle, H., Nole, M., and Malinverno, A., (2016). "Determining gas hydrate distribution in sands using integrated analysis of well log and seismic data in the Terrebonne Basin, Gulf of Mexico," presented at *Gas in Marine Sediments Conference*, Tromsø, Norway, 19-22 September 2016.
- Küçük, H. M., Goldberg, D., Haines, S., Dondurur, D., Guerin G., and Çifçi, G., (2016). "Acoustic investigation of shallow gas and gas hydrates: comparison between the Black Sea and Gulf of Mexico," *Gordon Research Conference on Natural Gas Hydrate Systems*, Galveston, TX, Feb 28-March 4.
- Malinverno, A., (2015). "Monte Carlo inversion applied to reaction-transport modeling of methane hydrate in continental margin sediments," *Abstract OS23B-2003, American Geophysical Union Fall Meeting*, San Francisco, CA, December 14-18 .
- Malinverno, A., (2016). "Modeling gas hydrate formation from microbial methane in the Terrebonne basin, Walker Ridge, Gulf of Mexico," *Gordon Research Conference on Natural Gas Hydrate Systems*, Galveston, TX, Feb 28-March 4.

- Malinverno, A., Cook, A., and Daigle, H., (2016). "Modeling the formation of methane hydrate-bearing intervals in fine-grained sediments," presented at *Gas in Marine Sediments Conference*, Tromsø, Norway, 19-22 September 2016.
- Malinverno, A., Cook, A., and Daigle, H., (2016). "Modeling the formation of hydrate-filled veins in fine-grained sediments from in situ microbial methane," presented at *American Geophysical Union Fall Meeting*, San Francisco, CA, December 12-16.
- Nole, M., Daigle, H., Mohanty, K., Hillman, J., and Cook, A., (2015). "Assessing methane migration mechanisms at Walker Ridge, Gulf of Mexico, via 3D methane hydrate reservoir modeling," *Abstract OS23D-07, American Geophysical Union Fall Meeting*, San Francisco, CA, December 14-18 .
- Nole, M., (2016). "Implications of pore-scale heterogeneities on biogenic methane hydrate distributions in marine sediments," *Gordon Research Conference on Natural Gas Hydrate Systems*, Galveston, TX, Feb 28-March 4.
- Nole, M., Daigle, H., Cook, A., and Malinverno, A., (2016). "The impact of flow focusing on gas hydrate accumulations in overpressured marine sediments," presented at *Gas in Marine Sediments Conference*, Tromsø, Norway, 19-22 September 2016.
- Nole, M., Daigle, H., Cook, A., Malinverno, A., and Hillman, J.I.T., (2016). "Linking pore-scale and basin-scale effects on diffusive methane transport in hydrate bearing environments through multi-scale reservoir simulations," presented at *American Geophysical Union Fall Meeting*, San Francisco, CA, December 12-16.
- Wei, L., (2016). "A 1D mass balance model for the formation of gas hydrate in marine sequences," *Gordon Research Conference on Natural Gas Hydrate Systems*, Galveston, TX, Feb 28-March 4.

Characterizing the Response of the Cascadia Margin gas Hydrate Reservoir to Bottom Water Warming Along the Upper Continental Slope (DE-FE0013998)

University of Washington

Peer-Reviewed Publications

- Johnson, H. P., Miller, U. K., Salmi, M. S., and Solomon, E. A., (2015). "Analysis of bubble plume distributions to evaluate methane hydrate decomposition on the upper continental slope," *Geophys. Geochem. Geosyst.*, v. 16, pp. 3825-3839, doi:10.1002/2015GC005955.
- Philip, B. T., Denny, A. R., Solomon, E. A., Kelley, D. S., (2016). "Time-series measurements of bubble plume variability and water column methane distributions above Southern Hydrate Ridge, Oregon," *Geochem. Geophys. Geosyst.*, 17, pp. 1182-1196.

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- Solomon, E., (2016). "Characterizing the Response of the Cascadia Margin Gas Hydrate Reservoir to Bottom Water Warming Along the Upper Continental Slope," *Quarterly Research Performance Progress Report* (Period Ending 12/31/2015). DOE Award No.: DE-FE0013998. February 2016.
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- Solomon, E., (2017). "Characterizing the Response of the Cascadia Margin Gas Hydrate Reservoir to Bottom Water Warming Along the Upper Continental Slope," *Quarterly Research Performance Progress Report* (Period Ending 12/31/2016). DOE Award No.: DE-FE0013998. February 2017.

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- Embley, R.W., Merle, S.G., Raineault, N., Baumberger, T., Seabrook, S.A., Johnson, H.P., Trehu, A.M., Lupton, J.E., Thurber, A.R., Hammond, S.R., Solomon, E.A., and Salmi, M., (2016). "Numerous bubble plumes mapped and new seeps characterized on the Cascadia margin," Abstract OS41A-1939, American Geophysical Union Fall Meeting, San Francisco, CA, December 12-16.

- Graw, M. F., Solomon, E. A., Treude, T., Pohlman, J., Colwell, F. S., (2015). "Towards biogeochemical modeling of anaerobic oxidation of methane: Characterization of microbial communities in methane-bearing North American continental margin sediments," **Abstract OS33A-1993, American Geophysical Union Fall Meeting, San Francisco, CA, December 14-18.**
- Johnson, H. P., Miller, U. K., Salmi M. S., Solomon, E. A., (2015). "Analysis of bubble plume distributions to evaluate methane hydrate decomposition on the Cascadia margin," *Abstract OS23B-1990, American Geophysical Union Fall Meeting, San Francisco, CA, December 14-18.*
- Salmi, M. S., Harris, R. N., Johnson, H. P., Solomon, E. A., (2015). "High resolution thermal model of the Washington margin of the Cascadia subduction zone," *Abstract T21D-2870, Presented at American Geophysical Union Fall Meeting, San Francisco, CA, December 14-18 .*
- Solomon, E.A., Kowalski, L., and Whorley, T.L., (2017). "Chronic downward flow of seawater in bacterial mats at Hydrate Ridge—Mechanisms and biogeochemical significance." *Ninth International Conference on Gas Hydrates, Denver, CO.*
- Whorley, T. L., Solomon, E. A., Torres, M. E., Johnson, H. P., Berg, R. D., Philip, B. T., (2015). "Evaluating active methane hydrate dissociation along the Washington margin in response to bottom water warming," *Abstract OS23B-2015, American Geophysical Union Fall Meeting, San Francisco, CA, December 14-18.*
- Whorley, T. L., Solomon, E. A., Torres, M. E., Johnson, H. P., Berg, R. D., Philip, B. T., (2016). "Evaluating water and methane sources at the upslope limit of methane hydrate stability along the Washington margin." *Gordon Research Conference on Natural Gas Hydrate Systems, Galveston, TX, Feb 28-March 4.*
- Whorley, T.L., Solomon, E.A., Philip, B.T., Torres, M.E., and Johnson, H.P., (2017). "Investigating the response of methane hydrates to modern bottom water warming along the upper continental slope of the Cascadia margin," *Ninth International Conference on Gas Hydrates, Denver, CO.*

***Borehole Tool for the Comprehensive Characterization of Hydrate-Bearing Sediments
(DE-FE0013961)***

Georgia Institute of Technology

Government Reports

- Santamarina, J. C., (2014). "Borehole Tool for the Comprehensive Characterization of Hydrate-Bearing Sediments," *Quarterly Research Performance Progress Report* (Period Ending 12/31/2013). DOE Award No.: DE-FE0013961. January 2014.
- Santamarina, J. C., (2014). "Borehole Tool for the Comprehensive Characterization of Hydrate-Bearing Sediments," *Quarterly Research Performance Progress Report* (Period Ending 3/31/2014). DOE Award No.: DE-FE0013961. April 2014.
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- Santamarina, J. C., (2015). "Borehole Tool for the Comprehensive Characterization of Hydrate-Bearing Sediments," *Quarterly Research Performance Progress Report* (Period Ending 12/31/2014). DOE Award No.: DE-FE0013961. January 2015.
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- Santamarina, J. C., (2016). "Borehole Tool for the Comprehensive Characterization of Hydrate-Bearing Sediments," *Quarterly Research Performance Progress Report* (Period Ending 12/31/2015). DOE Award No.: DE-FE0013961. February 2016.
- Santamarina, J. C., (2016). "Borehole Tool for the Comprehensive Characterization of Hydrate-Bearing Sediments," *Quarterly Research Performance Progress Report* (Period Ending 3/31/2016). DOE Award No.: DE-FE0013961. April 2016.
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- Santamarina, J. C., (2016). "Borehole Tool for the Comprehensive Characterization of Hydrate-Bearing Sediments," *Quarterly Research Performance Progress Report* (Period Ending 9/30/2016). DOE Award No.: DE-FE0013961. October 2016.

Impact of Clays on the Compressibility and Permeability of Sands During Methane Extraction from Gas Hydrate (DE-FE0028966)

Louisiana State University

Government Reports

Jung, J., (2016). "Impact of Clays on the Compressibility and Permeability of Sands During Methane Extraction from Gas Hydrate," *Quarterly Research Performance Progress Report* (Period Ending 12/31/2016). DOE Award No.: DE-FE0028966. December 2016.

Jung, J., (2017). "Impact of Clays on the Compressibility and Permeability of Sands During Methane Extraction from Gas Hydrate," *Quarterly Research Performance Progress Report* (Period Ending 03/31/2017). DOE Award No.: DE-FE0028966. March 2017.

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Jang, J., Waite, W.F., Jung, J., (2017). "Pore-fluid sensitivity of clays and its impacts on gas production from hydrate-bearing sediments. Ninth International Conference on Gas Hydrates, June 25-30, 2017, Denver, Colorado.

A Multi-scale Experimental Investigation of Flow Properties in Coarse-grained Hydrate Reservoirs during Production

University of Texas at Austin

Government Reports

Flemings, P.B., (2016). "A Multi-scale Experimental Investigation of Flow Properties in Coarse-grained Hydrate Reservoirs during Production," *Quarterly Research Performance Progress Report* (Period Ending 12/31/2016). DOE Award No.: DE-FE0028967. January 2017.

Section IV: Publications Resulting from Work with the Dept. of Energy's National Labs

Additional publications produced by the National Labs in association with the Program's major field projects are included within Section II.

Brookhaven National Laboratory

Peer-Reviewed Publications

- Eaton, M., K. Jones, and Mahajan, D., (in review). "Methane hydrate formation/decomposition in depleted Sediments," *Proceedings of the Geological Society*, London, England.
- Eaton, M., Mahajan, D., and Flood, R., (2007). "A novel high-pressure apparatus to study hydrate-sediment interactions," in D. Mahajan, Taylor, C., and G. Ali Mansoori, eds. *Journal of Petroleum Science and Engineering – Natural Gas Hydrate/Clathrate (Elsevier)*, Volume 56, Issues 1-3, pp. 101-107.
- Jones, K., Kerkar, P., Mahajan, D., Lindquist, W., and Feng, H., (in review). "Microstructure of Natural Hydrate Host Sediments," *Nuclear Instruments and Methods in Physics Research: Section B*.
- Jones, K., Feng, H., Tomov, S., Winters, W., Prodanović M., and Mahajan, D., (2007). "Characterization of methane hydrate host sediments using synchrotron-computed microtomography (CMT)," D. Mahajan, Taylor, C., and G. Ali Mansoori eds. *Journal of Petroleum Science and Engineering – Natural Gas Hydrate/Clathrate (Elsevier)*, Volume 56, Issues 1-3, pp. 136-145.
- Jones, K., Feng, H., Lanzirooti, A., and Mahajan, D., (2005). "Synchrotron X-ray Microprobe and Computed Microtomography for Characterization of Nanocatalysts," *Nuclear Instruments and Methods in Physics Research: Section B*, Volume 241, pp. 331-334.
- Mahajan, D., Servio, P., Jones, K., Feng, H., and Winters, W., (2004). "Methane Hydrate Studies, Delineating Properties of Host Sediments to Establish Reproducible Decomposition Kinetics," in Taylor, C., and J. Kwan, eds., *Recent Advances in the Study of Gas Hydrates*, NY, American Institute of Chemical Engineers and Kluwer Academic/Plenum Publishers, p. 239-250.
- Servio, P., Eaton, M., Mahajan, D., and Winters, W., (2005). "Fundamental Challenges to Methane Recovery from Gas Hydrates," *Topics in Catalysis*, Volume 32, n. 3-4, pp. 101-104.
- Zheng, L., Zhang, H., Zhang, M., Kerkar, P., and Mahajan, D., (in review). "Modeling methane hydrate formation in marine sediments," in Collett, T., A. Johnson, C. Knapp and Boswell, R., eds., *Natural Gas Hydrates: Energy Resource and Associated Geologic Hazards*, The American Association of Petroleum Geologists Hedberg Special Publication.

Other Publications

Mahajan, D., Kotzle, T., Klooster, W., Brammer, L., McMullan, R., and Goland, A., (2000). "Crystal Growth, Structure Characterization, and Schemes for Economical Transport: An Integrated Approach to the Study of Natural Gas Hydrates," *Annals of the New York Academy of Sciences, Volume 912*, pp. 940-949.

Presentations

- Eaton, M. and Mahajan, D., (2006). "Methane Hydrate Kinetics in Depleted Host Sediments using the FISH unit," *International Workshop on Science & Technology Issues in Methane Hydrates R&D, Engineering Conference International, Kauai, HI* March 5-9.
- Eaton, M., Mahajan, D., Flood, R., Koga, T., and Rafailovich, M., (2005). "Hydrate-Sediment Interactions in a Novel High-Pressure Apparatus," *Symposium on Gas Hydrates and Clathrates, 229th American Chemical Society National Meeting, San Diego, CA*, March 13-17.
- Jones, K., Feng, H., Tomov, S., Winters, W., Eaton, M., and Mahajan, D., (2005). "Morphology of methane hydrate host sediments," *Symposium on Gas Hydrates and Clathrates, 229th American Chemical Society National Meeting, San Diego, CA*, March 13-17.
- Kerkar, P., Jones, K., Feng, H., and Mahajan, D., (2006). "Spectroscopic Characterization of Host Sediments," *International Workshop on Science & Technology Issues in Methane Hydrates R&D, Engineering Conference International, Kauai, HI*, March 5-9.
- Mahajan, D., (2006). "Mimicking natural systems in the FISH unit: Methane hydrate formation/decomposition in depleted Sediments," *New Insights on Natural and Synthetic Systems, Sediment-Hosted Gas Hydrates, The Geological Society, London, UK*, January 25-26.
- Mahajan, D., (2004). "Technical Challenges to Mining Methane Hydrates: The next Energy Frontier," *Marine Sciences and Atmospheric Sciences Colloquium Series, New York, NY*, February 6.
- Mahajan, D., Jones, K., Feng, H., and Winters, W., (2003). "Methane Hydrate Studies: Delineating Properties of Sediments Using Synchrotron Computed Microtomography (CMT)," *Symposium on Gas Hydrates, American Institute of Chemical Engineering Spring National Meeting, New Orleans, LA*, March 30-April 3.
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Section V: Publications Resulting from Interagency Agreements

Additional publications by agencies are included under major field projects where appropriate.

Department of Defense, Office of Naval Research, Naval Research Lab

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National Energy Technology Laboratory

626 Cochrans Mill Road
P.O. Box 10940
Pittsburgh, PA 15236-0940

3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507-0880

13131 Dairy Ashford Road, Suite 225
Sugar Land, TX 77478

1450 Queen Avenue SW
Albany, OR 97321-2198

Arctic Energy Office
420 L Street, Suite 305
Anchorage, AK 99501

Visit the NETL website at:
www.netl.doe.gov

Customer Service Line:
1-800-553-7681

