the ENERGY lab

Fire in the Ice

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NETL

CONTENTS

CONTACT

Ray Boswell
Technology Manager—Natural Gas Technologies, Strategic Center for Natural Gas and Oil

412-386-7614
ray.boswell@netl.doe.gov

U.S. DEPARTMENT OF ENERGY

GMGS2 Expedition Investigates Rich and Complex Gas Hydrate Environment in the South China Sea

*ZHANG Guangxue (GMGS), YANG Shengxiong (GMGS), Zhang Ming (GMGS), LIANG Jinqiang (GMGS), LU Jingan (GMGS), Melanie Holland (Geotek), Peter Schultheiss (Geotek), and the GMGS2 ScienceTeam**

China's second major gas hydrate expedition, GMGS2, took place from the Fugro M/V *REM Etive* between June and September 2013, in the eastern part of the Pearl River Mouth basin, in the South China Sea (Figure 1). The investigated area lies northeast of the Shenhu site, where the first Chinese gas hydrate expedition (GMGS1) was completed in 2007. The GMGS2 expedition was contracted by the Chinese Geological Survey's Guangzhou Marine Geological Survey (GMGS) and conducted by Fugro, Schlumberger, and Geotek.

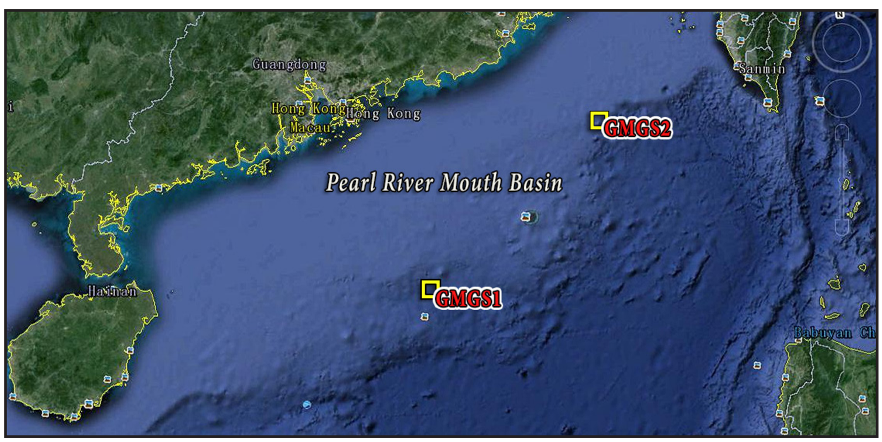

Figure 1. Map of Pearl River Mouth Basin, South China Sea, showing locations of GMGS1 and GMGS2 expeditions.

The primary objective of the expedition was to accurately quantify gas hydrate in sediment cores and to determine the nature and distribution of gas hydrate within the sedimentary sequence in the basin. To achieve these goals, GMGS2 employed an initial Logging While Drilling (Schlumberger LWD) phase (Leg 1), followed by a coring and sampling phase (Legs 2 and 3), which included some wireline logging.

* The GMGS2 Science Team includes researchers from the Marine Mineral Resources, Ministry of Land and Resources, China, and the Oil & Gas Geology Research Center of the Chinese Geological Survey

National Energy Technology Laboratory

1450 Queen Avenue SW
Albany, OR 97321
541-967-5892

420 L. Street, Suite 305
Anchorage, AK 99501
907-271-3618

3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507-0880
304-285-4764

626 Cochrans Mill Road
P.O. Box 10940
Pittsburgh, PA 15236-0940
412-386-4687

13131 Dairy Ashford, Suite 225
Sugar Land, TX 77478
281-494-2516

Visit the NETL website at:
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Interested in contributing an article to *Fire in the Ice*?

This newsletter now reaches more than 1400 scientists and other individuals interested in hydrates in sixteen countries. If you would like to submit an article about the progress of your methane hydrates research project, please contact Karl Lang at 724-554-3680 or karl.lang@contr.netl.doe.gov

Sixteen possible drilling sites were identified prior to the expedition, at sites with water depths ranging from 667 m to 1747 m. During the course of the expedition, 13 of the 16 possible sites were investigated (Figure 2). Sites GMGS2-02, -03, -04, -05, -08, -08s, -09, -11, -15 and -16 were first investigated on GMGS2 Leg 1 using LWD techniques, whereas sites GMGS2-01, -07 and -12 were first investigated on GMGS2 Leg 3

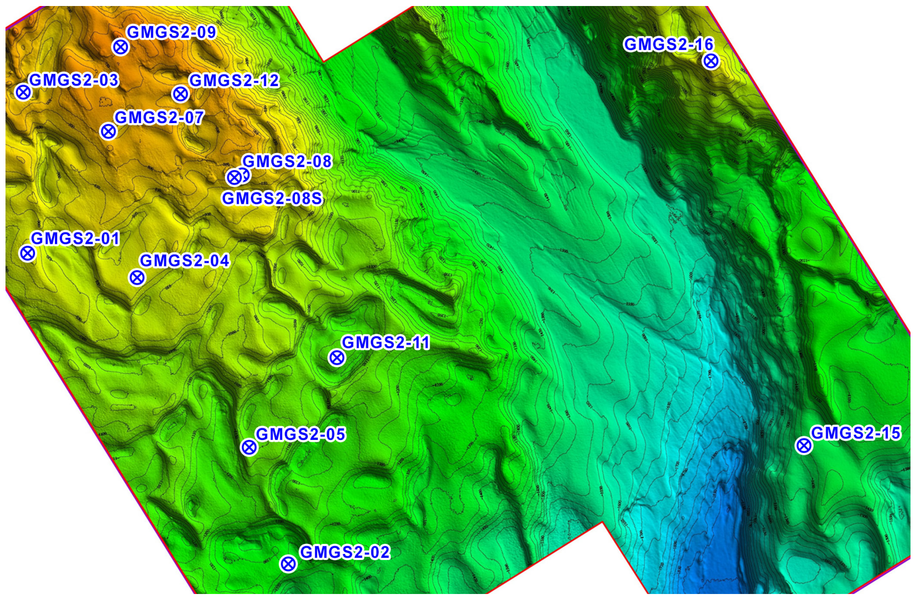

Figure 2. Map showing locations of GMGS2 drilling sites.

using wireline logging. Figures 3 and 4 illustrate the main LWD curves for sites GMGS2-08 and -05.

Of the 13 sites investigated during the GMGS2 expedition, five were selected for further analysis by coring. Sites GMGS2-05, -08, -09 and -16 were cored during GMGS2 Leg 2, while sites GMGS2-07 and -16 were sampled during GMGS2 Leg 3. Fugro coring tools used for GMGS2 included rotary and non-rotary tools for sampling different lithologies, as well as pressure coring tools designed to recover gas hydrate samples at *in situ* pressures. A team of GMGS and Geotek scientists and technicians performed a comprehensive suite of analyses of all core material recovered on board the vessel.

Geotek provided a range of geophysical and geochemical core processing and core analysis equipment in containerized mobile laboratories for both pressure cores and non-pressure cores. The equipment suite included the Pressure Core Analysis and Transfer System (PCATS) for analyzing pressure cores up to 3.5 m long and PCATS Triaxial equipment for performing geomechanical tests on samples recovered at full, *in situ* hydrostatic pressures. Whole core analysis equipment for non-pressure cores included fast automated thermal infrared core logging as well as standard geophysical core logs. An example of a whole core X-ray CT image is shown in Figure 5. Cores were split on board the ship, before additional imaging and XRF measurements were made for detailed

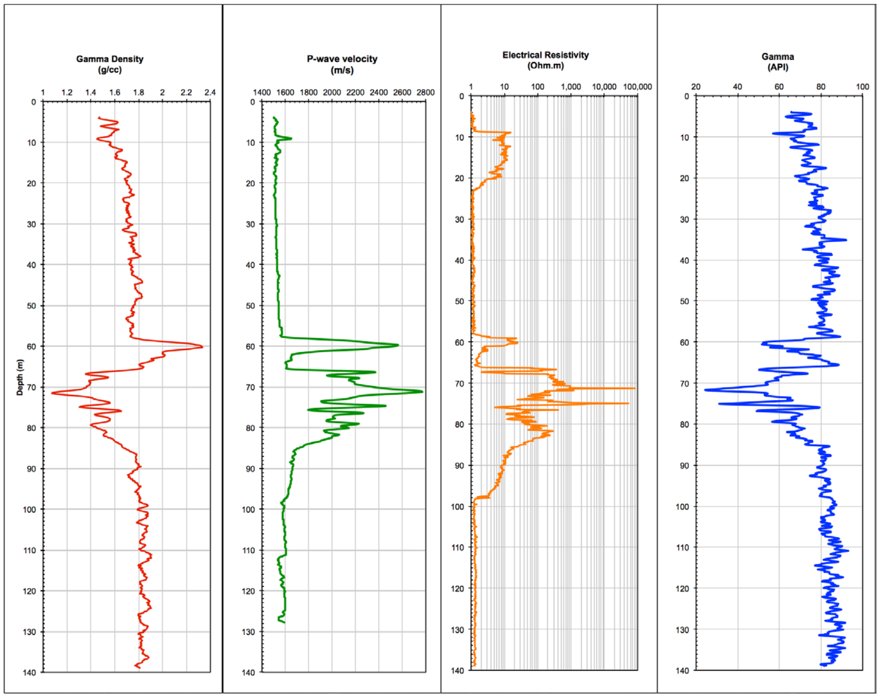

Figure 3. LWD data from site GMGS2-08, illustrating how a buried carbonate platform, and massive hydrate beneath it, are revealed in the different geophysical logs.

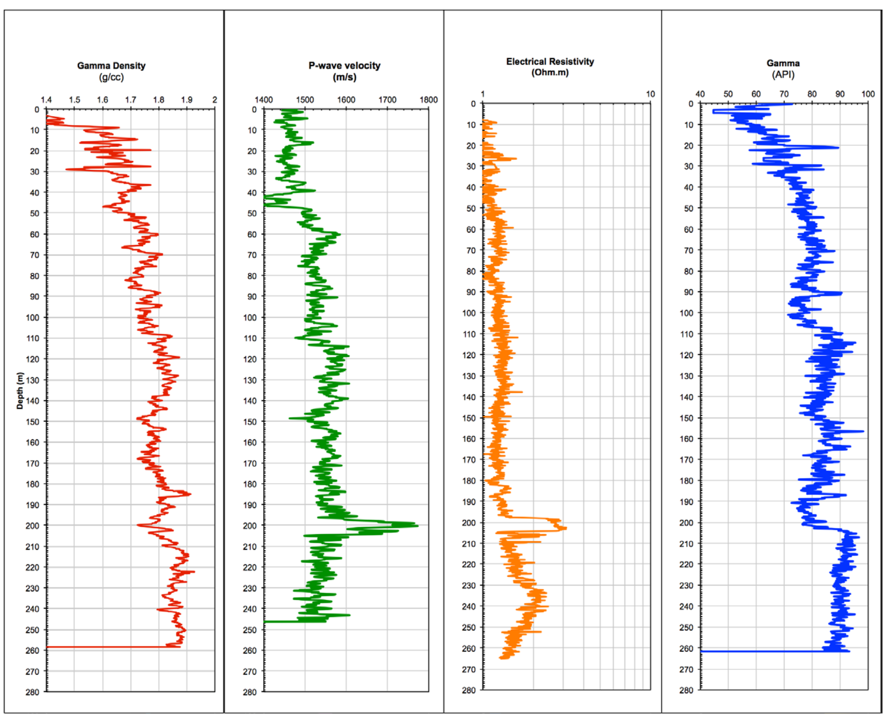

Figure 4. LWD data from site GMGS2-05, showing a small resistivity anomaly around 200 m below the seafloor. This corresponds to a 5 m-thick layer of fine-grained sediment that hosts disseminated gas hydrate in 30% of the pore volume. Note also the increase in P-wave velocity and the break in the natural gamma ray log in the same interval.

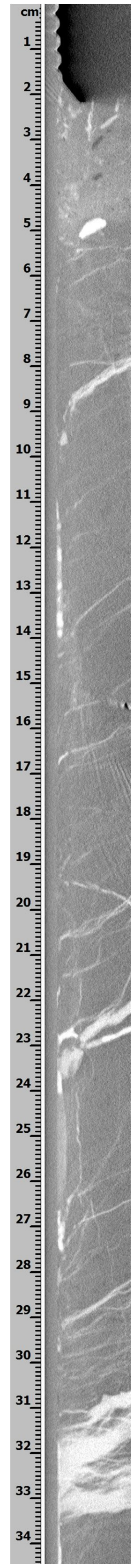

Figure 5. X-ray CT image through a shallow pressure core at site GMGS2-08, showing extensive gas hydrate veins.

sedimentological analysis. A geochemistry laboratory provided a full suite of pore water and gas analyses suitable for determining the nature and distribution of gas hydrate.

Using combined data from logging and core sampling, we were able to confirm that nine of the 13 sites investigated contain gas hydrate in one form or another. Gas hydrate-bearing sites include GMGS2-01, -04, -05, -07, -08, -09, -11, -12 and -16. Note that all five of the cored sites contain gas hydrate. Gas hydrate-bearing lithologies identified from the coring include the following morphologies: a) massive forms of visible gas hydrate (sites

Figure 6. Samples of massive gas hydrate, rapidly depressurized from a pressure core taken at site GMGS2-08.

GMGS2-07, -08, and -09; Figure 6); b) disseminated gas hydrate in deeply-buried fine-grained sediments (sites GMGS2-05, -09 and -16); c) dense, thin veins of gas hydrate in shallow, fine-grained sediments (sites GMGS2-08 and -16); and d) disseminated gas hydrate in coarse-grained sediments (site GMGS2-16). Photos in Figure 7 show the variety of gas hydrate morphologies found at GMGS2.

Massive gas hydrate at site GMGS2-09 was associated with a surface carbonate platform, which had been investigated during previous expeditions in the region. The massive gas hydrate features discovered at sites GMGS2-07 and -08 are thought to be features initially formed at the surface (as per site GMGS2-09), in association with carbonate platforms, and subsequently buried. The layers of disseminated gas hydrate lying just above the base of the methane hydrate stability zone in fine-grained sediment sequences are similar to those discovered at Shenhu during GMGS1 in 2007, with gas hydrate saturations of 25-55% of pore volume in formations that show only a 1-2 ohm-m anomaly in the LWD resistivity. However, the near-seafloor zones containing thin veins of hydrate (up to 33% of pore volume), found at two sites, have not been seen at other locations. At sites GMGS2-07 and GMGS2-16, free gas was observed coming directly from boreholes. Extensive coring and porewater analysis at site GMGS2-16 revealed evidence of a deep, coarse-grained aquifer around 200 m below the seafloor which may be supplying both free gas and fluids to the system.

After more than 3 months of expedition time it was concluded that the drilled region is a very active area of methane flux, and that gas hydrate is common in the first 200 meters below the seafloor. This area is of the richest and most complex marine gas hydrate environments studied to date.

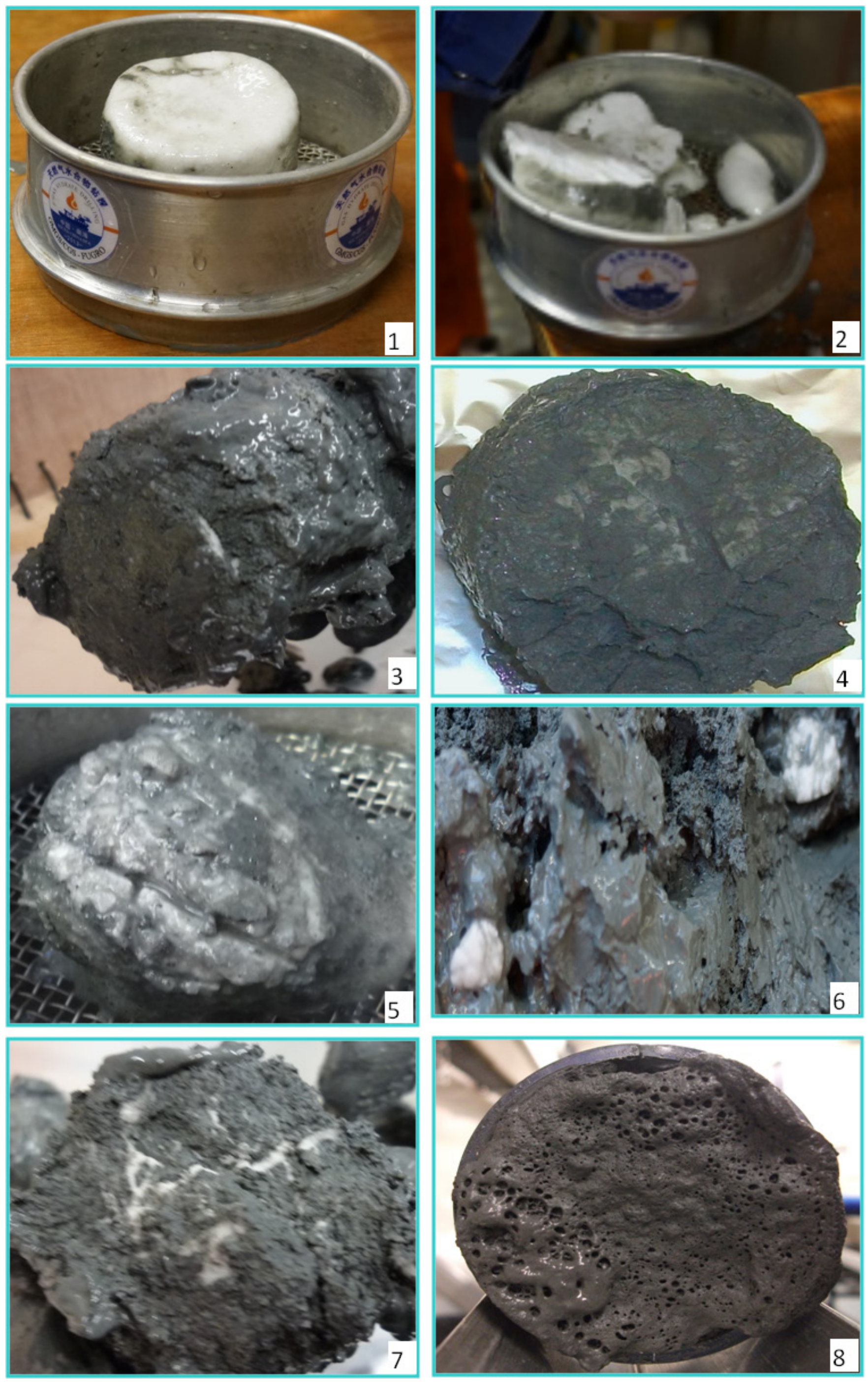

Figure 7. Morphologies of gas hydrate in samples retrieved from GMGS2 drilling sites, South China Sea. Photos 1 and 2: massive; photos 3 and 4: laminated; photos 5 and 6: nodular; photo 7: vein; photo 8: disseminated.

Response of a Gas-Producing Hydrate Deposit Following a Well Shut-In

George Moridis and Matt Reagan
Earth Sciences Division, Lawrence Berkeley National Laboratory

In this study, we examine the behavior of hydrate deposits following cessation of gas production from a hydrate reservoir. This is an important area of research, because it addresses concerns that production from hydrates could cause run-away dissociation after a well is shut in. We use numerical simulation to investigate the evolution of gas release from hydrate dissociation following cessation of reservoir fluid withdrawal.

The system we investigate is based on the well-characterized C-unit in the western Prudhoe Bay unit (PBU), on the North Slope, Alaska. For this exercise, we assume that the gas hydrate-bearing portion of the C-unit extends from a depth of z = 678.5 m (2226 ft) to z = 723.6 m (2374 ft) and is composed of two gas hydrate-bearing sandy units, designated C1 (upper) and C2 (lower), respectively. The shallower C1 unit is 17.1 m (56 ft) thick, the deeper C2 unit is 18.9 m (62 ft) thick, and the two are separated by a 9.2 m (30 ft) thick shale-rich layer. For simplicity, we assume impermeable shale top and bottom boundaries. In addition, we assign to the reservoir sands

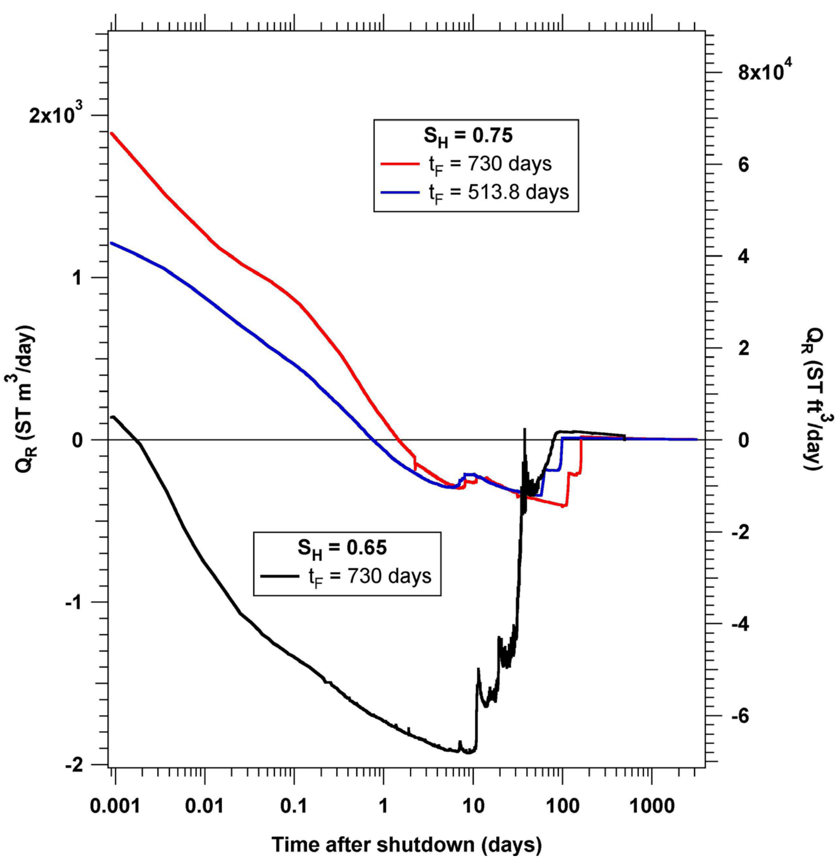

Figure 1. Response of the rate of gas release (Q_R) from the dissociation of hydrates in the C-Unit at the PBU L-106 site to the cessation of production (well shut-in) at a time t_F following depressurization-based production using a single vertical well (S_{H0} = 0.75 and 0.65).

high intrinsic permeability (k = 1-5 Darcys), high porosity (Ø = 0.4), high hydrate saturation (S_H = 0.75), a hydrostatic pressure P distribution varying between P_T = 7.3 and P_B = 7.7 MPa, and a temperature T ranging between T_T = 5 and T_B = 6.5 °C across the unit boundaries.

Figure 1 shows the evolution of the rate of CH_4 release, Q_R, from the hydrate dissociation in the entire deposit, after the well is shut in. Note that shut-in occurs at different times after the inception of production. Additionally, Figure 1 includes the Q_R evolution after the well shut-in in a hydrate deposit with lower initial saturation (0.65 vs. 0.75). The rates of CH_4 release, Q_R, decrease initially. Q_R is initially positive, indicating continuing dissociation because of persistent pressure gradients in the deposit after the well shut-in. Dissociation will gradually diminish and eventually go to zero, as the system reaches its new pressure equilibrium. Q_R then becomes negative, indicating hydrate formation near the well, where the pressure was at its lowest during production. At the same time, P increases to the new post-production level.

This example is a clear demonstration of the stability of the hydrate system and is fully consistent with expectations. Dissociation can only occur by imposing an external disturbance on the system, using depressurization or thermal stimulation. The system returns to a new stability equilibrium,

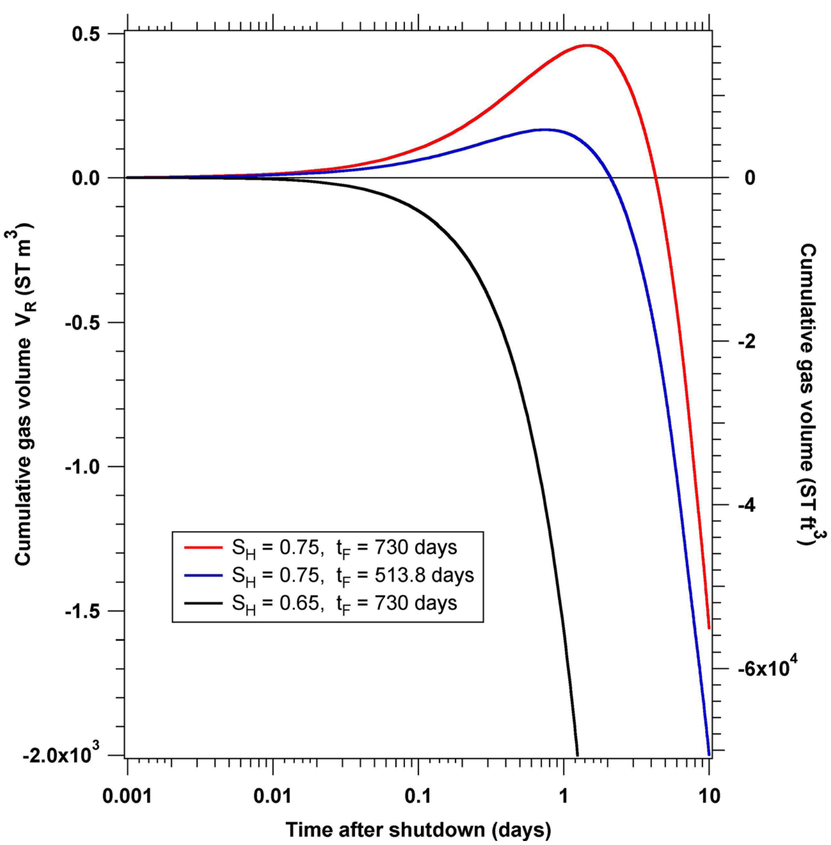

Figure 2. Early response of the cumulative volume (V_R) of gas released from the dissociation of hydrates in the C-Unit at the PBU L-106 site to the cessation of production (well shut-in) at a time t_F following depressurization-based production using a single vertical well (S_{H0} = 0.75 and 0.65).

once the external disturbance is removed. Figure 1 shows that hydrate reformation begins as early as a few minutes and no later than 2 days after the cessation of production. In other words, hydrate dissociation ends relatively quickly, and the system returns to its inherently stable condition soon after the cessation of production.

After a short time, Q_R drops rapidly to near-zero levels, indicating disappearance of free gas and cessation of hydrate reformation at t = 80 – 110 days past the well shut-in. Past that point, some low-level activity (indicated by $Q_R > 0$) continues for a long time, and denotes long-term hydrate dissolution and redistribution, as heat continues to flow into the deposit and pressure and geothermal equilibrium are re-established.

The cumulative volume of released CH_4 (V_R) after the well shut-in in Figure 2 closely follows the pattern identified in Figure 1. There may be an initial net increase in the volume of the gas released from hydrate dissociation, because of residual pressure gradients that persist within the deposit and allow continuing dissociation away from the well. These pressure differentials decline rapidly, leading to higher pressures in the vicinity of the well (where T is low), secondary hydrate formation, and rapidly declining V_R. This results in negative V_R values that are observed after a short time (<10 days) following the well shut-in. This indicates net hydrate formation and is evidence that the system has returned to stability.

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In-place Gas Hydrate Resources in the Ulleung Basin, East Sea of Korea

Ryu, B.-J., Yoo, D.G., Kang, N.-K., Yi, B.Y., Kim, G.Y., Bahk, J.J., Lee, J.Y.
Korea Institute of Geoscience and Mineral Resources

In 2005, the Korean government, with the support of the Korean Ministry of Knowledge Economy (currently the Ministry of Trade, Industry, and Energy), launched a 10-year Korean National Gas Hydrate Program to secure new energy resources for the future. As part of this national program, significant amounts of geophysical and geological data, including 2D and 3D seismic data, gas hydrate samples, and sediment samples, were collected from the Ulleung Basin, East Sea of Korea (Fig. 1). The program has now been extended to 2016, with a production test in the Ulleung Basin planned in 2015.

A resource assessment of the gas hydrate reservoirs in the Ulleung Basin was conducted by facies analysis and probabilistic analysis using a Monte-Carlo based simulation. Data integrated into the simulation include logging-while-drilling data from 18 sites analyzed during two Ulleung Basin drilling expeditions. Five sites are from the first Ulleung Basin Gas Hydrate Drilling Expedition (UBGH1), which took place in 2007, and 13 are from the second Ulleung Basin Gas Hydrate Drilling Expedition (UBGH2), which took place in 2010.

The assessment was also based on wireline/vertical seismic profile data from three sites (one UBGH1 site and two UBGH2 sites), results of core analyses from 13 sites (three UBGH1 sites and ten UBGH2 sites), 6,690 km of 2D multichannel reflection seismic lines collected in 2005, and 700 km^2 of 3D seismic data acquired in 2006 and 2008 (Fig. 1; Ryu et al., 2013).

Five facies were classified based on seismic facies, lithofacies, log facies, and results of core analyses and gas hydrate saturation values (S_h). Each facies was characterized by various parameters (total volume, porosity, net to gross ratio, S_h, cage occupancy, and volume ratio). The ratios of net thickness of gas hydrate-bearing sand layers to the total thickness of gas hydrate-bearing intervals were determined following the approach of Fujii et al. (2008).

The targets of the production test in the Ulleung Basin are gas hydrate-bearing sand layers, which were identified from the UBGH2 sites and are regarded as recoverable resource with existing technologies (Boswell, 2009). The in-place gas hydrate resource volume within the sand reservoirs was additionally assessed. The total amount of mean in-place gas resource contained in the gas hydrates within the survey area was estimated to be 58.75 trillion cubic feet (tcf). The mean in-place gas hydrate resource volume within the sand reservoirs was estimated to be 31.16 tcf.

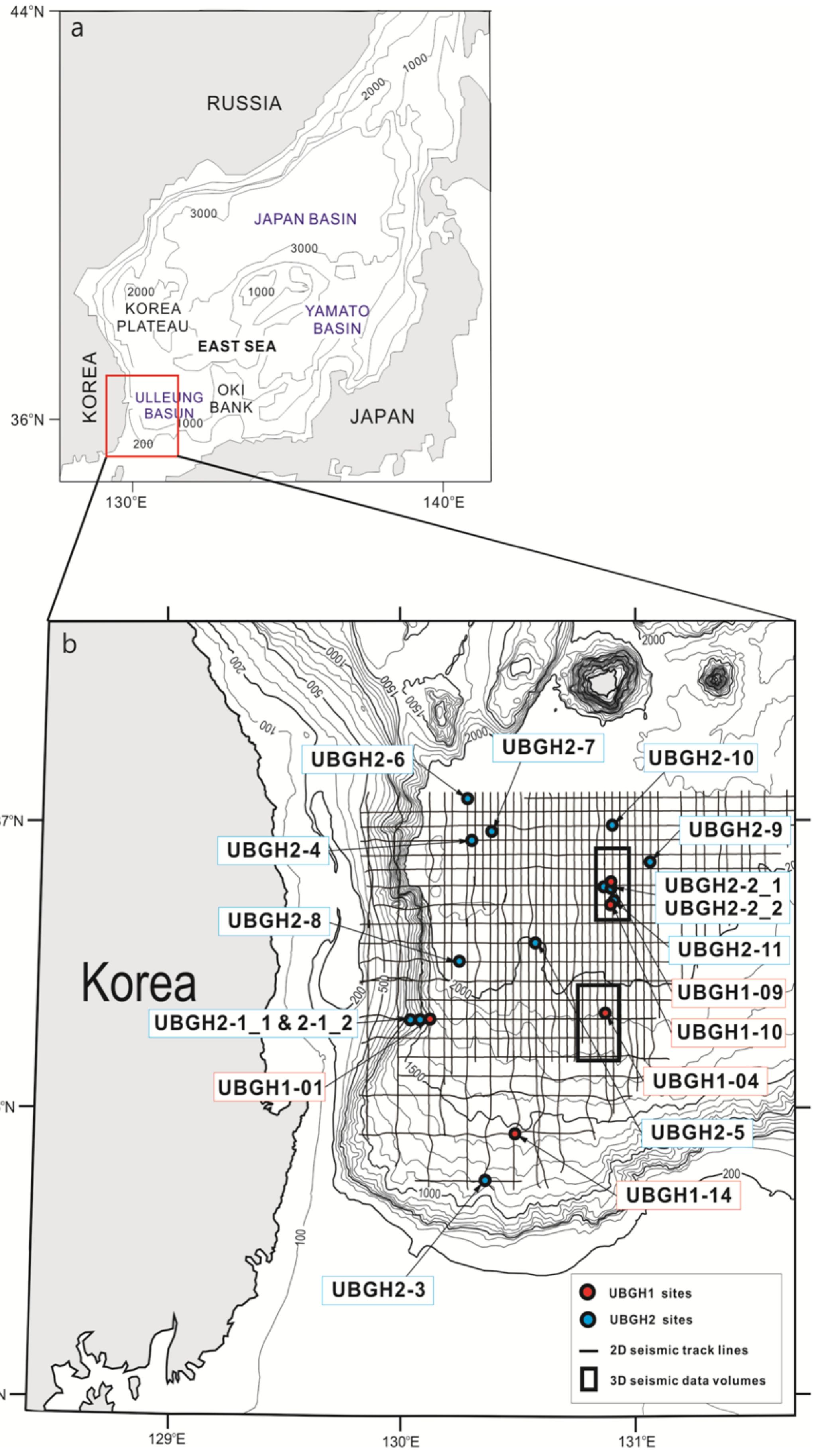

Figure 1. (a) Physiographic map of the East Sea and the surrounding region (bathymetry in meters). Box including the Ulleung Basin Gas Hydrate Drilling Expedition (UBGH) area is expanded in (b). (b) Detailed map of 2D seismic tracks (lines), 3D seismic data volumes (rectangles), and drill sites of UBGH1 (red dots) and UBGH2 (blue dots) (Ryu et al., 2013).

Marine Life at Bremer Canyon, Australia—Fueled by Hydrocarbons?

David Riggs, documentary filmmaker and marine researcher, riggsaustralia@gmail.com

Martin Hovland, University of Bergen, Norway, martin.hovland@ambio.no

Eight years of up-close observations in the Bremer Canyon area, off the coast of southwestern Australia, have left researchers impressed by the shear abundance of marine animals living here. In these waters, it is not uncommon to see pods of enormous orcas (Figure 1A), sperm whales, and pilot whales; schools of oversized pelagic sharks (Figure 1B); and an occasional giant squid. The presence of so many large marine predators begs the question: what are the special conditions that created this unique biological hotspot? Recent hydrocarbon exploration in the area has led us to hypothesize that hydrocarbon seeps, and possible methane hydrate deposits at the seafloor, may be responsible for fueling this marine wildlife bonanza.

Bremer Canyon is located 30 miles off the southern coast of West Australia and about 6 miles seaward of the continental shelf edge (Figure 2). It is one of dozens of deep marine canyons that have been mapped in this region. However, whereas other submarine canyons this far from the mainland are nearly barren of marine life, Bremer Canyon is brimming with biological activity. Year after year, in summer research cruises dating back to 2006, we have consistently observed exceptionally high numbers of seabirds, sunfish, sharks, orcas, and tuna, as well as plentiful schools of smaller fish. What is it about this particular canyon that attracts such abundant and diverse marine life?

One possible explanation relates to the presence of hydrocarbons beneath the seafloor. In 2004, Geoscience Australia, the nation's geoscience information agency, published a report in which they identified possible hydrocarbon deposits in a number of offshore West Australia locations, including Bremer Canyon. More recently, in 2009, oil and gas exploration efforts in the region began in earnest, including systematic geological and geophysical data acquisition surveys. These surveys resulted in the

Figure 1. (A) Orcas, also known as killer whales, were photographed during February, 2012—the summer season at Bremer Canyon. (B) Large, pelagic sharks are also common predators at Bremer Canyon.

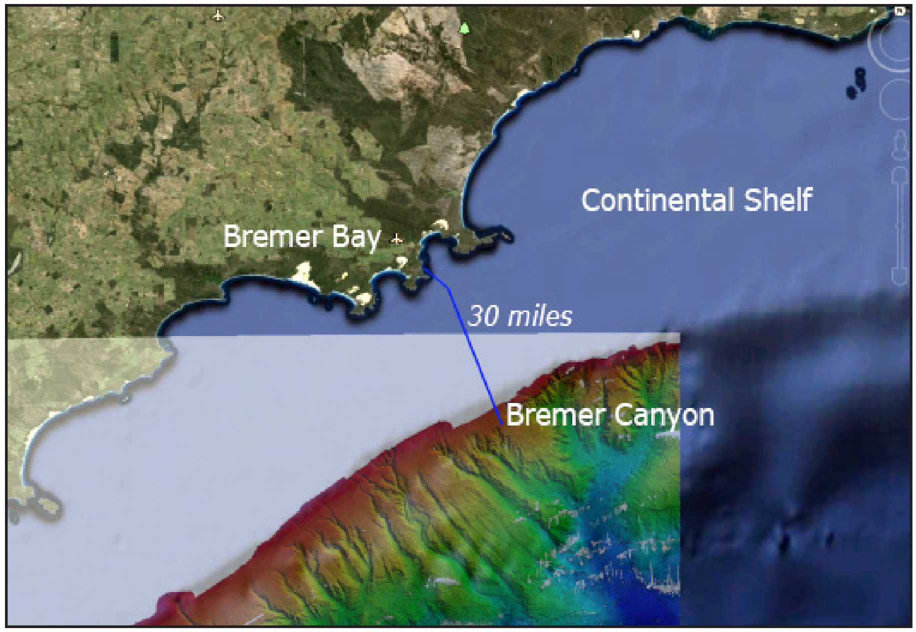

Figure 2. Map of Bremer Canyon showing subsea bathymetry.

identification of several oil and gas prospects in geological formations beneath Bremer Canyon. Could hydrocarbon accumulations in subsea strata be responsible for the productive marine life at Bremer Canyon?

Another piece of the puzzle is the occurrence of “dirty water” plumes, apparently phytoplankton blooms, observed in air photos and high resolution satellite images of the sea surface above the canyon. These blooms occur in areas where large sea animals are known to congregate—and in the same geographic region where hydrocarbon prospects are mapped beneath the seafloor. It now seems likely that hydrocarbons in deeply buried sedimentary deposits are somehow fertilizing the bottom of the food chain in Bremer Canyon.

We suggest that hydrocarbon fluids are migrating upward from these deeply buried formations, creating seeps and possible methane hydrate deposits right at the seafloor. Hydrocarbon seeps and hydrate outcrops at the seafloor would be capable of kickstarting the phytoplankton bloom in the water column, ultimately attracting the marine animals that gather and feed here. A schematic diagram of this hypothesis is shown in Figure 3.

In this scenario, hydrocarbons at the seafloor provide nutrients to the primary producers— namely bacteria and archaea, causing these organisms to grow in great numbers. This sets off a chain reaction, as the bacteria and archaea provide food for the secondary producers— microscopic animals including foraminifera and other bacteriavores. These secondary producers proliferate in great numbers, providing abundant food to the primary consumers (including shrimp, krill, and small fish), which in turn feed the secondary consumers (large fish, whales, birds, and seals), which in turn feed the large predators (orcas, sharks, and giant squid).

In conclusion, we suspect that hydrocarbon seepage and possible methane hydrate outcrops at the seafloor may explain the high biological productivity at Bremer Canyon. It is important to note that no deepwater or seafloor monitoring or sampling has been carried out at this location to date. The next step in our research is to go deep and to search for potential hydrocarbon features and indicators—such as bubble plumes, mud volcanoes, pingoes, and methane hydrates. At the time of this publication, author Riggs is at sea for a 25-day research expedition to Bremer Canyon, on a vessel equipped with high resolution sonar for detecting deep water features that may be related to hydrocarbons. In future work, we hope to utilize instrumented ROVs, for collection of water, gas, and rock samples from the bottom of the canyon.

For more information on the Bremer Canyon biological hotspot and on the current research cruise, please visit:

http://www.riggsaustralia.com/---!expedition-2013/cgof

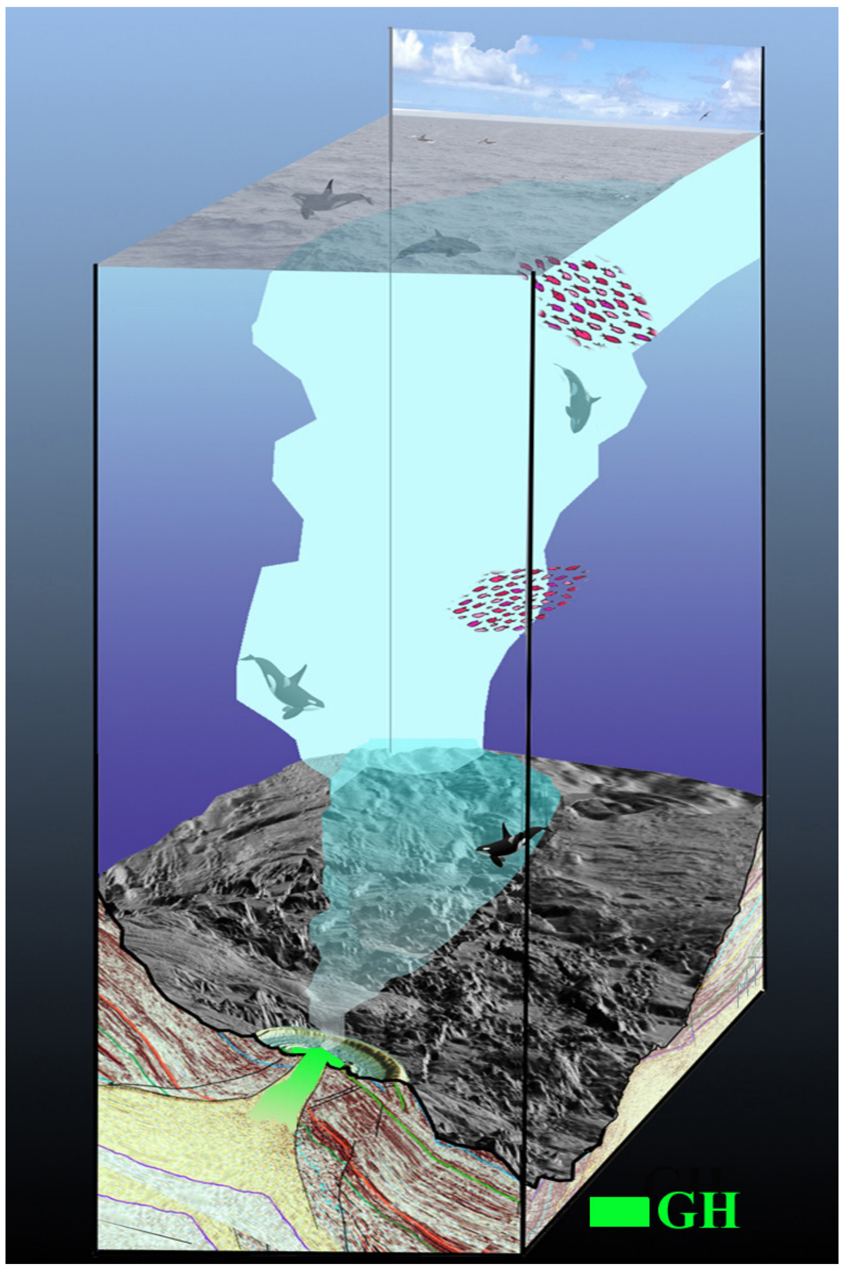

Figure 3. Schematic diagram illustrating possible linkage between a hydrocarbon vent at the seafloor, a phytoplankton bloom in the water column, and abundant sea animals observed in the water column and at the sea surface.

DOE/NETL Launches Seven New Methane Hydrate Projects

NETL's Methane Hydrate Program initiated seven new research projects this year. Four of the projects focus on improving our understanding of how naturally-occurring methane hydrate deposits respond to environmental conditions tied to climate change; two projects are aimed at developing numerical tools for specialized reservoir and production simulation modeling; and one project will develop a borehole sampling tool for collecting hydrate-bearing samples from beyond the drilled zone.

Methane Hydrate and Environmental Change

Researchers from Oregon State University will collaborate with EU-funded scientists from the University of Bremen (Germany) and the University of Tromsø (Norway) to study the stability of methane hydrate deposits on the Svalbard continental margin. The research team will collect water and sediment samples near suspected hydrate accumulations and analyze the biogeochemical response of this gas hydrate system to changing environmental conditions in the region.

Scientists from the Massachusetts Institute of Technology will work with researchers from the USGS and the University of New Hampshire to investigate the fate of methane in the water column above seafloor seeps that occur within and outside the gas hydrate stability zone. The goal of the project is to constrain the conditions under which methane could reach the water surface or the atmosphere once it is released from subsea sediments. In addition, the research team will examine the role that hydrate armoring of methane bubbles may play in methane transport from seafloor seeps.

Researchers from the University of Washington have begun a project to study the effects of contemporary warming of bottom water temperatures on gas hydrate stability along Washington's continental margin, at the upper edge of the gas hydrate stability zone. The goal is to quantify methane flux and oxidation rates from the subsea sediments, through the water column, and to the atmosphere and to evaluate potential sources of various methane emission streams.

Scientists from the University of Oregon are developing models of hydrate formation and dissociation in response to changes in environmental conditions. The goal of this project is to use these predictive models to evaluate the impact of sediment properties on hydrate system behavior. The results may lead to enhanced capabilities in forecasting hydrate-associated slope failure, gas escape features, and the release of methane into the water column and the atmosphere.

(New Projects, continued)

Reservoir and Production Modeling Tools

Researchers from the University of Texas at Austin, Ohio State University, and Columbia University- Lamont Doherty Earth Observatory will work together to extend 3D reservoir modeling to include sediment deposition, compaction, pressurization, and methane hydrate formation below the seafloor. The goal of the project is to improve our understanding of the primary controls on massive hydrate accumulations in deep, sub-seafloor environments—and the role of free gas and other factors in the formation and persistence of these deposits.

Researchers from Texas A&M Engineering Experiment Station and Georgia Institute of Technology will develop a fully coupled thermo-hydro-mechanical modeling code that can account for complex physical and chemical changes associated with production of methane from hydrate-bearing sediments. The code includes factors not fully incorporated in other simulators, including volume expansion, excess pore pressure, granular strains, percent fines, and multi-phase flow behavior. This new modeling tool is intended to optimize future hydrate production testing and to improve our understanding of how hydrate systems respond to induced or natural changes in their environment.

Specialized Methane Hydrate Sampling Tool

Research scientists and engineers from Georgia Tech Research Corporation will design, build, and test a borehole sampling tool that will allow direct measurement of hydrate-bearing sediment properties, by reaching beyond the zone disturbed by drilling. Accurate measurement of in-situ sediment properties will help assess and predict the response of hydrate-bearing sediments to environmental changes as well as production-induced changes.

Methane Hydrate Research Fellowship Awarded to Jennifer Frederick

Jennifer Frederick, a post-doctoral researcher at the Desert Research Institute in Reno, Nevada, is the latest recipient of the NETL-National Academy of Sciences (NAS) Methane Hydrate Research Fellowship. The fellowship is awarded to students and post doctoral researchers engaged in studies that are likely to advance our understanding of methane hydrates as an energy resource and in settings impacted by changing climates.

Jennifer will utilize the fellowship funding to investigate the present-day stability of permafrost and methane hydrate deposits in the Arctic. She says, "I feel very fortunate and grateful for being awarded this fellowship. As an NETL-NAS postdoctoral fellow, I have been given the opportunity to advance our understanding of Arctic permafrost-associated methane hydrate deposits under climate change."

Jennifer's fellowship research represents a logical outgrowth of doctoral studies she carried out at UC Berkeley with advisor Bruce Buffett. Those studies included developing a numerical model to simulate permafrost and hydrate stability in the near-shore portion of Arctic continental shelves, where elevated methane levels had been reported. She found that localized, unfrozen zones in otherwise continuous permafrost can create permeable pathways for upward migration of methane from deeper strata. This result is important, because earlier thermal modeling had suggested that near-shore submarine permafrost is continuous and stable and should act as an impermeable barrier to upward flow of fluid and gas. Jennifer's modeling results suggest that fluids and gas can in fact penetrate this barrier and escape to the sediment surface.

Now, with the support of the NETL-NAS Fellowship, Jennifer will track the evolution of temperature, salinity, and pressure in the Arctic continental shelf sediments under varying conditions. Preliminary results show that fluid and gas migration are closely tied to permeability variations in the overlying permafrost layer. Moreover, the present-day permafrost extent is sensitive to changes in salinity resulting from freshwater input from submarine groundwater discharge. Jennifer explains that the results of these studies will give us a better understanding of how Arctic hydrate deposits respond to climate change; and how they may contribute to the global methane budget and global warming.

Jennifer was born near Chicago and completed her undergraduate studies at the University of Illinois. She moved to California in 2008 to carry out graduate work at UC Berkeley—completing an M.S. in Mechanical Engineering in 2010 and a PhD in Earth and Planetary Sciences with a minor in Computational Science in 2013. She then took a post-doctoral position at the Desert Research Institute in Reno. She is an avid hiker and volunteers her time maintaining several natural hot spring pools located on public lands in Nevada and California. She is also a member of the Desert Dingo Racing Team, which participates in off-road desert racing of old generation stock VW Beetles.

Anderson to Receive Presidential Award

Dr. Brian Anderson, West Virginia University (WVU) chemical engineering professor and NETL-Regional University Alliance faculty fellow, has been selected to receive the highly prestigious Presidential Early Career Award for Scientists and Engineers. President Obama will present the awards in Washington, D.C. later this year.

Anderson was nominated by the DOE for his innovative research on energy systems including work on molecular and thermodynamic modeling of natural gas hydrates. The presidential awards are presented each year to science and engineering professionals who show exceptional promise for leading the nation to new frontiers of scientific knowledge during the 21st century.

Anderson's research is focused on sustainable energy and development, economic modeling of energy systems, geothermal energy, and molecular-scale modeling of energy systems including natural gas hydrates. His hydrate research is aimed at understanding the behavior of hydrates when subjected to natural and human-induced changes in reservoir conditions. The results will improve our understanding of methane hydrate as an energy resource and as a potential contributor to climate change.

Anderson is a native of Ripley, West Virginia. He completed his undergraduate work in chemical engineering at WVU in 2000 and went on to earn M.S. and Ph.D. degrees from Massachusetts Institute of Technology in 2004 and 2005. Anderson returned to WVU in 2006 to work as an associate professor and research scientist in the chemical engineering department, and he later joined the NETL Regional University Alliance.

ICGH-2014 Beijing

The 8th Annual International Conference on Gas Hydrates (ICGH) will take place July 28th through August 1st, 2014 in Beijing, China at the China National Convention Center. The conference is organized by the China Geological Survey and the Chinese Academy of Sciences.

The theme of this year's conference is "Opportunity and Challenge—Development and Utilization of Gas Hydrates." Technical topics in support of this theme will include: (1) fundamentals of methane hydrates; (2) natural hydrate systems; (3) energy related issues and technologies; (4) hydrates and the environment; and (5) flow assurance. The conference will include a welcome reception and keynote address on the evening of the 28th, followed by four days of oral and poster sessions. The ICGH is held every 3 years in a different country, and the last conference took place in Edinburgh, Scotland in 2011. Early registration for ICGH-2014 is available through April 30th, and regular registration will continue through June 30th.

For more information and to register, visit the ICGH-2014 web site at: http://www.icgh8.org/dct/page/1

Methane Hydrate Advisory Committee To Meet March 27-28th

The U.S. Federal Methane Hydrate Advisory Committee will meet March 27-28th at the Hotel Galvez in Galveston, Texas. The meeting will include presentations on gas hydrate resources; climate-sensitive hydrate occurrences and geohazards; updates on international gas hydrate activities; a review of FY 2013 research initiatives; an update on methane hydrate activities in Alaska; Program plans for FY 2014; a draft Interagency roadmap; and more.

The purpose of the Methane Hydrate Advisory Committee is to provide advice to the Secretary of Energy on potential applications of methane hydrate and to assist in developing recommendations and priorities for the U.S. DOE's Methane Hydrate R&D Program. The committee was created as part of the Methane Hydrate Research and Development Act of 2000 and reauthorized by the Energy Policy Act of 2005.

For more information on the upcoming meeting, please contact Lou Capitanio, Committee Manager, at: Louis.capitanio@hq.doe.gov or 202 586-5098.

MATT HORNBACH

Southern Methodist University

Matt is a geophysics professor at Southern Methodist University, where he specializes in marine geology and geophysics. His most recent research cruise to the Lesser Antilles examined links between pore pressure and slope failure. He lives in Dallas with his wife, Laura, and their two young children, Luke (in orange) and Willie (in blue).

Spotlight on Research

Matt Hornbach's affinity for marine science can be traced back to his early childhood. Born in New Bedford, Massachusetts, he spent a significant part of his youth on tiny Cuttyhunk Island, just off the Atlantic coast. Matt says his love for the ocean started there. "We spent countless hours exploring, flipping over rocks, digging for shellfish, and swimming in the North Atlantic," he recalls. Cuttyhunk is so small that the ocean can be heard from any location—it is literally omnipresent. Add to this maritime upbringing occasional stories of great marine explorers, like Captain Cook and Lieutenant Bligh, and it is no wonder that Hornbach developed an appetite for marine adventure and discovery.

Hornbach says his parents played a significant role in nurturing an early interest in science. They were both teachers, and his father had a classroom filled with books about the ocean, the moon, and the solar system. While his dad was preparing lessons, Matt would read these books over and over again. He found them fascinating, and they sparked a lifelong interest in science.

When Matt reached school age, his family moved to Texas, to the area north of Dallas. Sitting at a desk, in a classroom, was less engaging than exploring the intertidal zone at Cuttyhunk or the muddy creek bottom near his house in Texas. Matt recalls, "I often found myself daydreaming in class and itching to get outside. I was a lazy student, and my academic performance was underwhelming. I preferred to be outside playing sports, looking for fish and crawdads, or tinkering with electronics in the garage."

Hornbach finally became serious about academics when he was a sophomore in high school. His mother died that year, after a long battle with cancer, and this hit him hard. For the first time, he understood the value and impermanence of life, and he decided to live fully from that point on. He says, "that year, for the first time, I decided to make the most of the incredible opportunities my parents had given me." He began to pay attention in his high school science classes.

Hornbach went on to major in Physics at Hamilton College, in upstate New York, and then to pursue a graduate degree at the University of Wyoming, in their Physics and Astronomy department. He had his sights set on using their large infrared telescope for planetary geology studies. However, during his first year at Wyoming, the university was threatening to shut down the department, and all new graduate students were advised to consider leaving. Steve Holbrook, from the Geology and Geophysics department, approached Hornbach about switching departments and joining his research group to study methane hydrates on the Blake Ridge. Hornbach decided to give it a try, and it turned out to be a perfect fit for him. The research group was excellent, the field work included data collection from state-of-the-art research vessels, and Hornbach was thoroughly transformed into a marine geophysicist.

After completing graduate work at Wyoming and post-graduate work at UT-Austin, Hornbach returned to Dallas, as a professor at SMU. In his hydrate research, he is driven by two big questions: 1) what is the true global inventory of methane in hydrates? and 2) what is the role that methane hydrates play in the earth's carbon cycle and in continental margin evolution? His latest project is a team effort with scientists from Oregon State University and the USGS to investigate the upper continental slope in the Alaskan Beaufort Sea and determine if gas hydrates there are in equilibrium with present-day climate conditions. He hopes the results will improve our understanding of the energy potential and environmental risks associated with Arctic hydrates.