Earth, Ocean & Atmospheric Science

Inaugural Issue

Message from the Chair

There is much to report in my first message as Chair of Earth, Ocean & Atmospheric Science (EOAS). I am pleased to report that the EOAS department is up and fully functioning. In this first issue of our newsletter we are highlighting some of the research and teaching activities. This newsletter is designed to keep you informed and will be produced each semester. Our newsletter will describe faculty, student, and alumni activities and accomplishments. We look forward to hearing your comments and suggestions.

We recently received some very good news. The decision regarding the binding arbitration between Florida State University and Florida Faculty United has been released. In short, the arbitrator determined that termination of

April 22nd, Earth Day, marked the official beginning of the Department of Earth, Ocean & Atmospheric Science

Eventful Beginnings

That week in April marked change for the entire Gulf region, not just for us here at FSU. The day before the merger, the Deepwater Horizon explosion started spilling oil into the Gulf. Broad expertise in areas critical to responding to the oil spill made EOAS a leading player in the formation of the Oil Spill Academic Task Force. EOAS has the expertise to address immediate societal concerns and also broader needs in the geosciences. The National Science Foundation (NSF) will spend more than ten percent of its annual budget on environmental research and education and EOAS has the expertise to address three NSF priorities for the geosciences: reducing human vulnerability to intense and catastrophic events, understanding and forecasting the behavior of Earth systems, and training the next generation of geoscientists.

Commitment

EOAS, with its strong commitment to training the next generation of geoscientists, will continue to offer it's nationally recognized undergraduate degree in Meteorology and internationally recognized MS and Ph.D. degrees in Geology, Meterology, and Oceanography. We are very excited about two new interdisciplinary undergraduate Environmental Science degrees made possible by the formation of EOAS. The degrees will give students a strong background in physical science and at the same time permit sufficient flexibility to allow students to emphasize any of the three underpinning disciplines: geology, meteorology, or oceanography. We offer both a science-oriented Environmental Science BS degree and a BA in Environmental Science and Policy. EOAS also participates in the FSU-Teach program, where students may earn a teaching certificate while earning their science degree. Graduate students have the option of an

Chair's Message (con't.)

two full professors in Oceanography and four associate professors in Geology violated the terms of the collective bargaining agreement. We are pleased that these valued faculty will be with us as we form EOAS. It has been busy in the past year creating EOAS. The staff have worked above and beyond the call of duty attending to their normal duties while creating a staff structure for EOAS, and transitioning all of the records from three departments to EOAS. I can't say enough good things about the staff. The faculty have been working overload as well creating by-laws, a strategic plan, new environmental science BA and BS degrees, and have been very active in responding to the BP oil disaster. Some of th research on the BP disaster is highlighted in this issue. Of course, they maintained a high degree of production in their normal research and teaching assignments. We had a very good year in attracting research dollars, bringing in approximately $4 million in the past calendar year. The strategic plan may be viewed on the website (www.eoas.fsu.edu). The plan broadly outlines our goals and tasks for creating a cohesive department, our goals for graduate and undergraduate education, research initiatives for programs and interdisciplinary work, and some initiatives for promoting EOAS.

The plan contains a number of tasks for the chair, among them: increasing development activities and forming an advisory board. I look forward to creating an advisory board from our alumni and friends that will help the department with tasks such as creating professional MS degrees and increasing contact with our alumni. Development and fundraising will be a key to the success of the department. I reviewed development accounts for the department and was surprised to learn that we have very few scholarships to recruit the best students at both undergraduate and graduate program levels. In October, we held the annual Weathercasting Day, described in an article in this issue, and one of our alumni asked what he could do to help the new department. My answer was scholarships - in any amount. While our undergraduates have "Bright Futures" and graduate students are supported by teaching and research assistantships, the students still need support for a variety of expenses such as travel to professional meetings, field trips, and books. Be assured that your donations to the geology, meteorology, and oceanography programs will only be used to support the intended program. Your future gifts may be directed to a program or to EOAS. The department is in need of unrestricted funds that might be used for the tasks enumerated in the strategic plan, such as promoting the new department, visiting professional meetings to recruit students, contacting alumni, and hosting alumni events. Please consider donating to the new department and its programs. Visit the FSU or EOAS websites for information on giving. I look forward to meeting with many of you in the near future.

Go Noles! Go EOAS!

Eventful Beginnings (con't.)

interdisciplinary PhD degree in Geophysical Fluid Dynamics, offered through the Geophysical Fluid Dynamics Institute. Creating a new department is a serious task, even from the strong foundation provided by the three departments. Check our progress as we articulate the future of the geosciences at Florida State University.

Deepwater Horizon

Hydrocarbon gas was released along with the oil, for a total of 750,000 tons of hydrocarbons discharged in less than three months.

Deepwater Horizon Update

The following article is a combination of Dr. Ian MacDonald's testimony for the Energy and Environment House Subcommittee (August 19, 2010) and a report to the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling (September 27, 2010).

The final cement seal on BP's blown out well at 1,500m water depth, 75 km southeast of Grand Isle, Louisiana was confirmed by the Unified Command on September 19, 2010, 150 days after the deadly explosion on the Transocean sister vessel Deepwater Horizon. Prior to the final plug, oil discharged for 84 days after the rig sank on April 22nd, until a steel cap was installed and successfully closed on July 15th. In the aftermath, we can see how understanding consistently lagged behind events by considering the sequence of estimates made by the authorities of the Unified Command and a few others about the singular, all-important, and very consequential variable in the ongoing emergency: the rate of discharge, from which one can estimate the total pollution load discharged into the deep-water Gulf of Mexico.

Of this, the NOAA report cites data from the Unified Command Response Effort indicating that 6% was burned and an additional 4% was skimmed. Thus, only 10% of the oil in the ocean was actually removed from the ocean. The response effort has dispersant application records suggesting that chemical dispersion broke down an additional 10% of the oil, thereby allowing it to become diluted in the ocean. These data account for only 20% of the discharged oil. Fully 90% of the discharge was not removed from the marine environment by human agency; a fraction; perhaps 10%, will have evaporated into the air. The balance remains in the marine and coastal ecosystem even if it has changed form and become less visible.

Methane, Ethane, Propane, & Other Gases

The Macondo Field product contained a high proportion of hydrocarbon gas, i.e. methane, ethane, propane, butane, pentane, etc. Indeed the enormous pressure of this gas in the reservoir and certainly its explosive properties contributed greatly to the tragedy of the Deepwater Horizon. However, all the reports of the pollutant load discharged from the well have been issued in barrels -- a unit of liquid volume -- and have ignored the gas. In fact, if calculated in equivalent units of weight (mass) or energy (barrel of oil equivalents), the magnitude of the oil plus the gas is equal to 1.5 X the oil alone. In other words, if 4.1 million barrels of oil were discharged, the total discharge in barrel of oil equivalents (oil plus gas) was actually over 6 million barrels.

The Unified Command has made no mention of this gas, but it should not be ignored. Because the discharge occurred at 5,000 ft. depth, all the material rising toward the surface or drifting in subsurface plumes is in the ocean for hours, days, or months and can have a significant chemical and biological effect. The hydrocarbon gas is highly soluble in the deep, cold waters of the Gulf. Fish exposed to

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Faculty & Alumni

Faculty Honors

***William Burnett*:** J. of Environmental Radioactivity editorial board; Environmental Forensics editorial board.

***Ming Cai*:** J. Atmospheric Sciences associate editor

***Jeff Chanton*:** J. of Geophysical Research associate editor for biogeosciences

***Allan Clarke*:** Fellow American Meteorological Society; Fellow Royal Meteorological Society; J. Marine Research editorial board for a special issue

***William Dewar*:** Ocean Modeling associate editor; Theoretical and Computational Fluid Mechanics editorial board

***Joseph Donoghue*:** J. of Coastal Research editorial board

***Robert Ellingson*:** Fellow American Meteorological Society

***Henry Fuelberg*:** 2011 Teaching Excellence Award American Meteorological Society

Robert Hart: Monthly Weather Review associate editor

***Bill Hu*:** Fellow Geological Society of America; J. Stochastic Environmental Research and Risk editorial board

***Munir Humayan*:** Clarke Medal

***Joel Kostka*:** Chair (2009-present) for Division N, Microbial Ecology, American Society of Microbiology; Fellow, 2009-2012, Hanse Institute for Advanced Study, Delmenhorst, Germany; Marine Biology Research associate editor; Applied and Environmental Microbiology editorial board member; Frontiers in Aquatic Microbiology associate editor; Applied and Environmental Microbiology editor

***William Landing*:** Marine Chemistry associate editor

***Guosheng Liu*:** J. of Geophysical Research – Atmosphere associate editor

***Nancy Marcus*:** Fellow American Association for the Advancement of Science; Fellow Association for Women in Science

***Sharon Nicholson*:** Hugh Robert Hill Medal; Fellow American Meteorological Society

***Doron Nof*:** Recipient of Nansen Medal; Fellow American Meteorological Society; Fellow Royal Meteorological Society

***James O'Brien*:** Sverdrup Gold Medal in Air-Sea Interaction; Medal of Honor, Liege University, Belgium; Medal of Honor, Ocean University of Quindao, China; Medalist, Florida Academy of Sciences; Fellow World Innovation Foundation; Fellow American Assoc. Advancement of Science; Fellow American Geophysical Union; Fellow American Meteorological Society; Fellow Royal Meteorological Society

***Leroy Odom*:** Geoscience Frontiers editorial board

***Richard Pfeffer*:** Fellow American Meteorological Society

***Peter Ray*:** Fellow American Meteorological Society

***Paul Ruscher*:** Fellow American Meteorological Society

***Vincent Salters*:** Geochemistry, Geophysics and Geosystem editorial board

***Kevin Speer*:** J. Marine Research editorial board; J. Physical Oceanography Editor as of Jan 2011

***David Thistle*:** Fellow American Association for the Advancement of Science; Vie et Milieu editorial board (a French journal of environmental science)

***James Tull*:** Fellow Geological Society of America

***Yang Wang*:** Chinese Science Bulletin editorial board

***Sherwood Wise*:** Fellow American Association for the Advancement of Science

***Zhaohua Wu*:** Advances in Adaptive Data Analysis editor

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concentrated methane have exhibited mortality and neurological damage. The hydrocarbon gas was a major component of the total pollution load discharged from the BP well.

Comparison of Natural Oil Seeps & the BP Discharge

The existence of natural seeps in the Gulf of Mexico has been cited as a factor that has pre-conditioned the gulf ecosystem better to rebound from the pollution dose received due to the 84-day discharge of 4.1 million barrels of oil (550,000 tons) and 2.1 million barrels of oil equivalent of gas (185,000 tons) from the BP well. The natural seeps, it has been suggested, are a hydrocarbon-rich environment promoting the prevalence of oil-consuming bacteria, strains of which might then consume oil discharged from the BP well. Moreover, the wide-spread occurrence of natural seep provides an alternate, background source of hydrocarbons throughout the Gulf. Oil from these natural sources, goes this argument, might be mistaken for oil from the BP discharge.

An active natural seep discharges about 10 barrels of oil per day with variable magnitudes of gas. The BP discharge was as much as 62,000 barrels of oil and over 31,000 barrels of oil equivalent gas during the initial phases of the emergency, decreasing to an estimated 53,000 BOPD at the end.

Oil from natural seeps, like the oil that rose to the surface from the BP well, leaves traces that can be detected by satellite remote sensing. Natural seeps create floating layers (slicks) that are <1% the thickness of a human hair (< 1µm) and cover surface areas of 0.5 to 1 km2. The oil from BP's discharge created large slicks with similar thicknesses and included substantial areas around the well where the oil was at least 100 fold thicker. In all, the surface oil from the discharge covered an area over 20,000 km2 during much of the discharge episode. Pelagic life -- fishes, birds, turtles, and whales as well as plankton and planktonic larvae will have received a concentrated dose of hydrocarbons over many weeks. Widespread, deleterious impacts should be anticipated.

In summary, the BP oil discharge was at least 10,000 times more concentrated in space and time and about twelve times greater in magnitude than the total annual release from natural seeps of the Gulf of Mexico. Of the material dispersed in the surface layers, about one third evaporated and ten percent was removed by burning or skimming. An additional ten percent was chemically dispersed. The remaining fraction - over fifty percent of the total discharge - is a highly durable material that resists further dissipation. Much of it is now buried in marine and coastal sediments. There is scant evidence for bacterial degradation of this material prior to burial.

What Happens Now?

This total insult was not delivered to a vibrant and healthy ocean, rather to marine and coastal ecosystems already greatly stressed by serious existing problems. Do not overlook the hypoxic dead zone, the fishing closures for shrimp and fin fish due to declining stocks, and the accumulated effects of coastal development and runoff. The Gulf can and will rebound, but how much and how fast it does so will take years to determine. In many cases, we do not know how the impact will occur because the experiments have not been carried out. For many species, the impact could be occurring at every life stage. Consider reef fish that have complex life cycles. Eggs and larvae could be hit at the surface by oil; those that survive to reach coastal estuarine nursery habitats could be hit again because oil entered coastal marshes and seagrass beds; and the adults in their benthic existence could have oil components magnified through trophic webs as they eat species that have taken in oil in the diet. This could have indirect effects on their fecundity (number of eggs they produce) and on their general condition and ability to survive.

Crude Oil & Gulf Sands

Dr. Huettel and Dr. Kostka continue their research into the transport & biodegradation of Deepwater Horizon crude oil in Gulf beach sands.

The cross section of this trench at Pensacola Beach shows tar layers at approximately 50 cm depth

In October, we continued our research on the fate of Deepwater Horizon Oil that was buried in Gulf beaches. The project investigates transport and biodegradation of Deepwater Horizon crude oil in Gulf beach sands and oil effect on sediment biogeochmical characteristics and the structure of the microbial community. The main goals of the project are to assess 1) how much and how deep oil is transported into the beach, 2) how oil alters the beach filtration rate and thereby sediment oxygenation, 4) how oil contamination changes structure and function of the sand microbial community and 5) which factors regulate oil degradation by microbial communities in marine sands. Sets of beach sand cores are taken at time intervals along short transects at Pensacola Beach (oil) and St. George Island (no oil). The sediments are analyzed for oil content (amount, composition and distribution), sediment characteristics (permeability, porosity, grain size spectrum, oxygen penetration), and the microbial community (composition and activity). Heterotrophic microbial populations are enumerated using a combination of culture-based and cultivation-independent molecular methods. The culture-based approach provides a means of directly addressing the activity of natural hydrocarbon-degrading populations. The data produced by this project will help to make predictions regarding the impact and duration of the oil contamination in Gulf beach ecosystems and its influence on sediment biogeochemical processes and the metabolic activity of hydrocarbon-degrading microbial groups.

We found buried tar layers as deep as 60 cm in Gulf beach sands and sand layers with adsorbed oil as thick as 50 cm suggesting that oil components from the Deepwater Horizon spill will persist in Gulf beaches for a long time period. Thick sand layers stained with oil indicate that dispersed oil could penetrate through the pore space. The oil film covering the sand grains changed the cohesiveness and permeability of the sand, thereby changing its erodability and conductivity for oxygenated water. While the buried tar layers persist after 6 months, the oil film adsorbed to the sand grains shows effects of degradation and in some areas at our study site has disappeared. Oxygen consumption and

Crude Oil & Gulf Sands

carbon dioxide production rates of the oil-rich layers are comparable in magnitude to those measured in sand layers with buried algal material. These relatively high rates indicate that microbes rapidly decompose degradable components of the buried oil.

Analysis of the sand microbial community revealed a broad spectrum of aerobic and anaerobic bacteria, mostly from the class Gammaproteobacteria, that were able to degrade oil components. The abundance of these oil-degraders was proportional to the magnitude of the sediment oil contamination in the field. In the lab, isolates from the same microbial groups were shown to degrade a large fraction of fresh MC252 oil within a few weeks under aerobic conditions, whereas the oil persisted in cultures for months in the absence of oxygen. Thus, evidence from both cultivation-based and cultivation-independent molecular approaches pointed to known oil-degrading microorganisms that could be used as indicators of oil contamination in beach ecosystems. Our results indicated that in deeper sediment layers with lower oxygen availability, the oil degradation thus is slower than in the well-oxygenated surface layers.

Our in-situ experiment showed that tar washed out of the beach immediately released dissolved organic substances when exposed to oxygen-rich water. Buried oil thus may be a source of oil degradation products to nearshore waters.

Conclusions

The sandy beaches of the Northeastern Gulf of Mexico are of high ecological and economic value as they are biotope, foraging and breeding area of a large number species, and present a main tourist attraction. Understanding the transport and degradation of the buried oil components is prerequisite for predicting the oil degradation period and designing remediation procedures. This project produces data that help to understand the fate of the buried oil and its ecological consequences.

Scholarship Opportunities

Several scholarships are available to EOAS students. Check with your major professor about these and other opportunities:

AMS scholarships & fellowships - www.ametsoc.org/amsstudentinfo/scholfeldocs/index.html

McKnight Doctoral Fellowships - www.fefonline.org/mdfapply/

SMART Scholarship (Science, Mathematics, & Research for Transformation) - smart.asee.org

Clare Boothe Luce Program (CBL) - www.hluce.org/cblprogram.aspx

ACC Research Fellowship - undergradresearch.fsu.edu/acc2011.html

Fellowships through the Graduate School - www.gradstudies.fsu.edu/Funding-Awards

NSF Graduate Research Fellowship Program (GRFP) - www.nsfgrfp.org

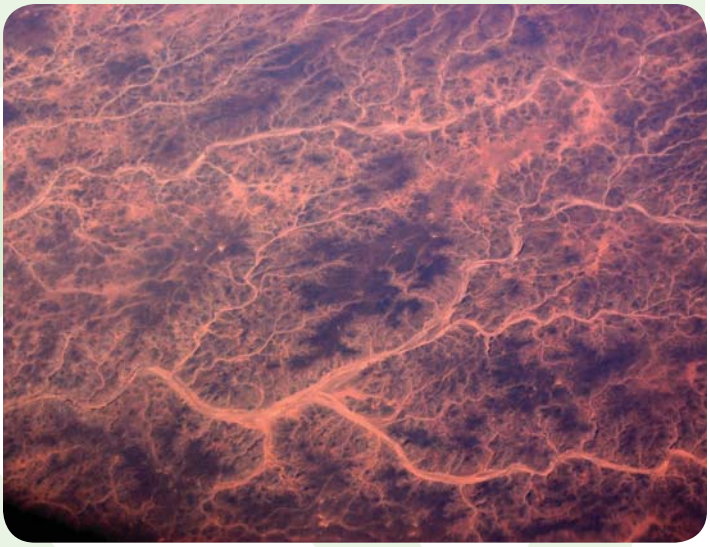
Alumni Spotlight

Robert W. (Bill) Maxwell, Jr.

The College of Arts & Sciences honored Bill Maxwell, Jr. as a Graduate of Distinction.

Bill Maxwell, Jr. is President and CEO of Suemaur Exploration & Production LLC, a private independent oil and gas company headquartered in Corpus Christi, Texas. He began his career as a petroleum geologist with Chevron in Lafayette, Louisiana in 1971. In 1973, he moved to Corpus Christi, Texas where he was employed as an Area Exploration Geologist with Texas Oil & Gas Corp. He joined Harkins & Company in 1975 and subsequently became Vice-President of Exploration in 1981, where he remained until the company was sold to Suemauar in 1990.

Bill attended Florida State University from 1964 to 1971, receiving a B.S. degree in Geology in 1969 and a MS degree in Geology in 1973. He is married to the former Mary Elizabeth Beck, who is also a graduate of Florida State University, having received a BS degree in English in 1968 and a MS degree in Special Education in 1971. Bill and Marybeth presently maintain residences in Corpus Christi, Texas and Angel Fire, New Mexico.



Scholarship Development

The Earth, Ocean & Atmospheric Science department is working to develop scholarships for our students. If you are interested in contributing to a scholarship, please call or email EOAS. 644-6205, ldudley@fsu.edu.

Weather-casting

Weathercasting students in EOAS continue to distinguish themselves. Last summer, **Lindsey Day** interned with the Fox network's national weather operations in New York City. At the end of her internship, she did a weathercast on national television that went so well that a viewer posted it on YouTube. To see it, go to YouTube.com and search on Lindsey Day weather. **Greg Bennett** and **Daniel Phillips**, both FSU undergraduates majoring in meteorology, regularly do weathercasts for WTXL in Tallahassee. Greg has been the weekend weathercaster at WTXL since his sophomore year.

FSU Weather - Live each Weeknight

Our entire student weathercasting team produces "FSU Weather" each weeknight, airing live at 6:30 - 7:00 pm Eastern time on Comcast cable channel 4 FSU. This is entirely a student production. Students assemble the information, create the graphics, present the material, and operate the equipment in our departmental TV studio. Even freshmen are involved, both on and off camera. Outside the Tallahassee viewing area, you can watch "FSU Weather" live over the internet at www.wfsu.org/flashwebcasts/4fsu.php and at livestream.com/FSUWeather, where recent shows are archived. We are the only department on campus to produce live television on a regular basis.

Thirteenth Annual Weathercasting Workshop

Last fall on Parent's Day (October 16), we hosted our thirteenth annual Weathercasting Workshop, where regional weathercasting alumni and major market alumni Janice Huff (WNBC, New York), Stephanie Abrams (The Weather Channel), Karli Ritter (WDAF, Kansas City), Mark Walden (ABC24/CW30, Memphis), and George Winterling (WKRG, Jacksonville) critiqued and encouraged student weathercasters. This was the first year we invited two non-alumni, Casanova Nurse and Shawn Parker at WTXL, because of their strong support of our student interns and putting our students on the air.

Studio Equipment Upgrade

For spring 2011, we will implement a proposal funded through FSU's student technology fees to update the equipment in our studio so that we can transition from analog to digital television. Fewer than 10% of the proposals were funded, which speaks highly of the quality of our students' work.

For more information about weathercasting at FSU, contact Dr. Jon Ahlquist (ahlquist@fsu.edu).

Weathercasting professionals participating in the 13th Annual Weathercasting Workshop on Parents' Day, Oct. 16th.
Left to Right: ***Nancy Dignon, Lynn Dudley*** *(EOAS Chair),* ***Nate Harrington, Chris Smith, Janice Huff, Mark Walden, Jon Ahlquist*** *(EOAS Faculty),* ***Stephanie Abrams, Casanova Nurse, Yolanda Amadeo, Mike McCall. Not pictured: Karli Ritter and George Winterling.***

Alumni News & Notes

Alan Sealls (MS, Meteorology, 1987): Chair of the American Meteorological Society's Board of Broadcast Meteorology. Mr. Seals has won his second TV news regional Emmy for a 2009 story about Hurricane Ida entitled "Ida thought we were done."

In earlier years, Mr. Seals won his first news Emmy award, chaired the National Weather Association TV Seal Board, twice won "Best Weather Anchor" from the Alabama Associated Press Broadcasters Association , and won the American Meteorological Society's Science Reporting Award in 2009. Mr. Seals is the chief meteorologist at WKRG, Mobile, AL.

Chris Still (BS, Meteorology, 1996): South Carolina Broadcasters Association Award for Weathercaster of the Year. Mr. Still is the morning-noon meteorologist at WBTW, Myrtle Beach, SC.

Maria Molina (BS, Meteorology, 2008): Joined the Fox News Weather team in New York City in late fall 2010. Previously, Maria worked as a bilingual weathercaster for AccuWeather.

Permafrost & Climate Change

Florida State University oceanographer Jeff Chanton is part of an international team embarking on a new study of permafrost decomposition in arctic Sweden. What he and his fellow researchers discover there may be critical given the permafrost's key role in climate change, and vice versa.

It is all part of an ominous feedback loop, Chanton says.

A three-year, $2.8 million grant will fund a collaborative investigation between researchers from five universities on three continents.

The warming climate is causing the Swedish permafrost to thaw and decompose and, as it does, the greenhouse gases carbon dioxide and methane are released into the atmosphere, creating a feedback loop of further warming temperatures and accelerating permafrost's decomposition.

How much carbon is there?

"There are 1,672 gigatons of carbon stored in the permafrost as soil and peat organic matter," Chanton said. "To put that quantity in perspective, it is three times the amount of carbon found in our atmosphere, which contains 550 gigatons in the form of carbon dioxide. What will happen if all the permafrost thaws, releasing its gigantic store of carbon into the atmosphere? Will the respiration of that decomposing organic matter by bacteria produce not only carbon dioxide but also methane, a greenhouse gas 25 times more potent?

"We know that increasing carbon dioxide and methane in the atmosphere creates a positive feedback to global warming," he said. "Our new study will shed vital additional light on how the thawing affects the atmosphere, which affects warming, and how the thawing of the permafrost affects the organic carbon stored there."

Researchers from four countries, three continents

A three-year, $2.8 million grant from the U.S. Department of Energy will fund the collaborative investigation, to be undertaken by researchers from five universities on three continents. University of Arizona scientists are leading the team, which includes Florida State's Chanton and research colleagues at the universities of New Hampshire, Stockholm (Sweden), and Queensland (Australia).

Abisko permafrost collapse

Chanton will receive a $300,000 share of the DOE grant. He also has a part of a larger share of the award that will be used to purchase lasers and other field instruments for the entire team.

The study will periodically find Chanton north of the Arctic Circle, where he kicked off his research in August near Abisco, Sweden, amid the mosquitoes and black flies typical of the arctic summer there. While this is his first foray into Sweden's remote arctic realms, Chanton is no stranger to permafrost research. His previous studies focused on Alaska and Siberia.

Chanton is a faculty member in Florida State University's Department of Earth, Ocean and Atmospheric Science (EOAS), where he holds the dual titles of Winchester Professor of Oceanography and Distinguished Research Professor.

Article by Libby Fairhurst, FSU.com

Student Symposium

On November 12, 2010, the Thalassic Society and the Department of Earth, Ocean and Atmospheric Science hosted the fifth Annual Student Symposium. This all-day event, including both oral and poster presentations, provides our students an academic conference-like setting for information sharing regarding their investigations under the direction of faculty advisors.

Increasing awareness among the general public made many of these student research topics of heightened interest; projects such as carbon and nitrogen cycling, biomass energy, and the health of the Gulf of Mexico are just a few examples.

Research Presented

- Carbon Flux to the atmosphere from peatlands covering about 3% of the Earth's land surface, especially in Siberia, where escalating permafrost melt is releasing vast stores of carbon to the atmosphere, reinforcing the greenhouse effect
- Growing microalgae native to the area in City of Tallahassee wastewater to produce biomass energy could provide two problem solutions: energy production not competing with food crops and elimination of additional fertilizer need, since the wastewater already contains excess nutrient in need of remediation.
- Participating in a cruise aboard the research vessel *Joides Resolution,* one of our students utilized new drilling advances to gather seafloor cores from both continental shelf and slope sites off New Zealand. The overall objective is to analyze the relationship between global sea-level change and the sequence stratigraphic record. This work will help fill a paleoclimate information gap, since most Cenozoic nannofossil data from continental margins languish unpublished in petroleum company archives.
- Analysis of sediments deposited in Florida Big Bend coastal lakes during hurricane landfalls before hurricane records were kept will extend the short historic record we now have, and may determine whether our current historic record is non-representative.
- The Gulf of Mexico has suffered many destructive hurricanes. Cold fronts remove heat from surface waters, yet their climatology and importance to the upper ocean heat budget have been under-investigated. What does this mean for the next summer's hurricane potential and intensification over Gulf Waters? This study will focus on winters with strong and frequent cold fronts over the Gulf and their effects on upper ocean heat content.
- The role of the Gulf of Mexico current complex in delivering larval fish to their nursery grounds in the coastal seagrass beds, as well as the dispersal of pollutants.
- Oxygen contribution to the water column by microphytobenthos on the Gulf of Mexico continental shelf is under investigation. Microbial photosynthesizers living on the bottom and in the upper sediments contribute significant amounts of oxygen to the water column. How might a healthy oscillation of water column oxygen be affected by increasing turbidity as coastal pollution escalates?
- Methane is in use as a biomarker in space exploration. It can be formed by both biogenic and abiotic processes. NASA has reported methane on Mars. Rocks high in salt content have also been detected, seas and rivers were once present, and liquid water has been reported. A lot of objectives on Mars bear physical and mineralogical similarities to hypersaline pond sites we are investigating. Methane abounds at our sites in microbial mats, in the sediment beneath them, and trapped inside evaporite minerals. Researchers are continuing investigation of the pathways of its production.

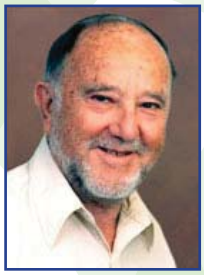
Thank you to the Thalassic Society and all the event supporters, especially Dr. Lynn Dudley, for your generous advice and support despite a very busy schedule. Thanks also go to event sponsors such as the Congress of Graduate Studies, the FSU Foundation, the Thalassic Society, the Center for Ocean Atmosphere Prediction Studies, all the student volunteers for setup, the student presenters, and the Thalassic Society officers, Erin Easton, Austin Todd, Amanda Tazaz, Ashley Stroman, and Jennifer Coor.

REMEMBRANCES

EOAS is saddened by the loss of four outstanding individuals. While we mourn their loss, we are thankful for the opportunity to have been part of their lives.

Dr. Melvin Stern

(from the Florida State Times, April/May 2010 issue)



Melvin Stern, 81, the V.W. Ekman Professor of Oceanography (emeritus) at The Florida State University and a member of the National Academy of Sciences, died Feb. 2, 2010 in Philadelphia. Stern, a pioneer in his field, is credited with discovering and publishing ground-breaking theories on ocean currents. Stern taught at Florida State from 1987 to 2006. Prior to that time, he served on the faculty at the University of Rhode Island and was one of the founders of the Geophysical Fluid Dynamics program at the Woods Hole Oceanographic Institute. Stern received his doctorate in meteorology in 1956 from the Massachusetts Institute of Technology, while he was stationed there as a lieutenant in the Air Force. Throughout his career, Stern often directed the Summer Institute for Geophysical Fluid Dynamics at Woods Hole. Stern was a fellow of the American Academy of Arts and Sciences; a fellow of the American Geophysical Union; a Guggenheim fellow; and the first recipient of the American Meteorological Society's Henry Stommel Medal.

James "Jim" Winne

(By Diane J. Grubbs)

James Robert Winne, age 59, of Bruno, AR and formerly of Tallahassee and Neptune Beach, FL, died in an automobile accident in Hernando, MS July 25, 2010.

Jim retired after 25 years as the machinist for the Department of Oceanography on December 30, 2002. He was FSU's Employee of the Year in 1990. While Jim worked for the department, he gained respect for his machinist's skills, his cleverness, his cheerful attitude, and his ability to get the work done. His hobbies included photography, ham radio (KB4IVH), acrylic painting, repairing items, visiting flea markets and cooking.

He is survived by his wife Pat, stepson John L. Terrie, brother Leon Gall, niece Colleen Moore, father and mother-in-law Walter and Pat Zukowski and many friends.

George W. DeVore

(paraphrased from the Tallahassee Democrat, December 9, 2009)

George Warren DeVore was born in Laramie, Wyoming in spring, 1929. His enlistment in the Army Air Corps brought him his first

exposure to a world outside of the Rocky Mountain west. He served as a tail and ball-turret gunner in bombers out of New Guinea; participating in McArthur's island-hopping campaign into the Philippines and spending a year in occupied Japan. He returned home and took advantage of his GI benefits, completing his undergraduate studies at the University of Wyoming and his Doctoral work at the University of Chicago, where he earned his PhD in geology. While working on his dissertation, he met and married his wife, Jean Marie (Bowen) DeVore. They spent the first months of their honeymoon camping on the hard ground of the west while he conducted research for his dissertation. Dr. DeVore soon became a professor of geology at the University of Chicago; and after several years, moved to Tallahassee to teach at FSU. He served as Chairman of the Department of Geology, retiring in 1991. He conducted much-published research, saw the establishment of the Antarctic Core facility at FSU and guided students from freshmen to Doctoral candidates. There are many graduates who fondly recall his unique style of instruction and credit him with founding their successful careers.

Henry James Edmund "Harry" Cooper

(paraphrased from the Tallahassee Democrat, August 27, 2010)

Henry James Edmund Cooper, known as "Harry" to friends and family, died at his home in Tallahassee. Harry was born June 22, 1942, in Liverpool, England. He spent his childhood in England where he attended Secondary school at St. Mary's College in Crosby, earning his A-Levels in Science. At the age of 18, Harry emigrated to Riverside, CA, where he held jobs picking oranges and spray-painting sheet metal, spending his first paycheck on a guitar and a pair of Levi's. He left California after joining the US Air Force, briefly spending time in Texas and Illinois before being stationed at Tyndall Air Force Base in Panama City.

During this time, Harry attended classes at Gulf Coast Community College, where he met his future wife, Jane, when she purchased his English textbook. After his discharge from the Air Force, he used the GI bill to pursue a degree in International Affairs at FSU. After marrying, Harry returned to Florida State , earning his BS in Mathematics and his MS in Applied Mathematics. Harry moved to Charlottesville, VA, accepting a fellowship to the University of Virginia, and later earning his PhD in Environmental Sciences. Harry accepted a post-doctoral fellowship at the NASA/Goddard Space Flight Center, followed by a position with Simpson Weather Associates. In 1987 Harry returned to Tallahassee where he was a lecturer and researcher at FSU until his retirement in 2008. Over his career, Dr. Cooper was the author of many scientific publications, delivered many formal addresses and seminars at numerous scientific forums and had close collaborations and friendships with some of the finest minds in his chosen field.

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