UNIVERSITY of HOUSTON | EARTH AND ATMOSPHERIC SCIENCES
312 Science and Research Bldg 1, Houston, Texas 77204; MC 5007

DEPARTMENT NEWSLETTER

FALL 2011

Message from the Department Chair

John Casey
Department of Earth and Atmospheric Sciences

The Department of Earth & Atmospheric Sciences (formerly the Department of Geosciences) at the University of Houston is pleased to present the 2011-2012 Newsletter that we hope will be informative for you. Our mission in the department is to advance understanding of the earth, oceans, atmosphere, and solar system. We are now the largest geosciences program in the U.S., with 734 total majors, 305 of which are graduate students, and 429 who are undergraduate students. We have achieved remarkable enrollment growth in majors over the last several years in all of our degree programs, culminating in the Fall of 2011 with an extraordinary 37% increase compared to the Fall of 2010 enrollment. In the last 10 years, our faculty numbers have also expanded from just 14 total tenure-line faculty in 1999, to a department with 29 tenure-line faculty, 18 research faculty, and 16 postdoctoral research scientists (totaling 63 Ph.D. scientists). We have expanded our research and academic programs into several new areas with faculty leadership that includes all major areas of geology, geophysics, geodesy, and atmospheric sciences. Our coverage of these disciplines ranges from the environment to energy and natural resource exploration, from the solid earth to its fluid envelopes, and from the subsurface to planetary and space sciences.

The University of Houston continues to be ranked as one of the two most diverse Tier 1 research universities by the U.S. News and World Report. As a department, its enrollment mirrors this overall institutional diversity. While percentages of underrepresented groups in geosciences programs do not exceed 5-7% nationally, the current demographics in the Department of Earth and Atmospheric Sciences at UH shows that underrepresented Black and Hispanic majors are approximately 29% of our total majors, Black and Hispanic undergraduates receiving B.S. degrees in geology or geophysics exceeded 33% of our graduates in 2011. This indicates that underrepresented groups have been highly successful in achieving undergraduate degrees in geosciences at UH. Our STEM programs at UH are also working to

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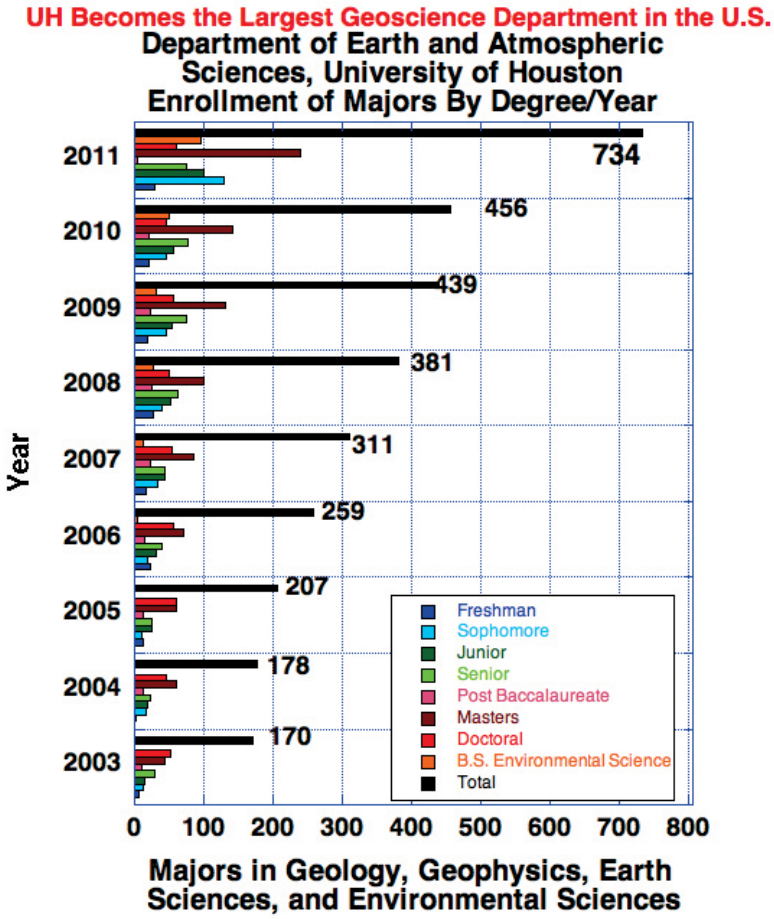
achieve greater access and participation of underrepresented groups in our graduate degree programs and in professional careers in the geosciences. An example of this success is one of our undergraduates, Yuribia Munoz, who just entered the Ph.D. program in geology at UH. She received both a highly-competitive and prestigious NSF Fellowship and a Merage Foundation American Dream Fellowship Award that will support her throughout her Ph.D. work.

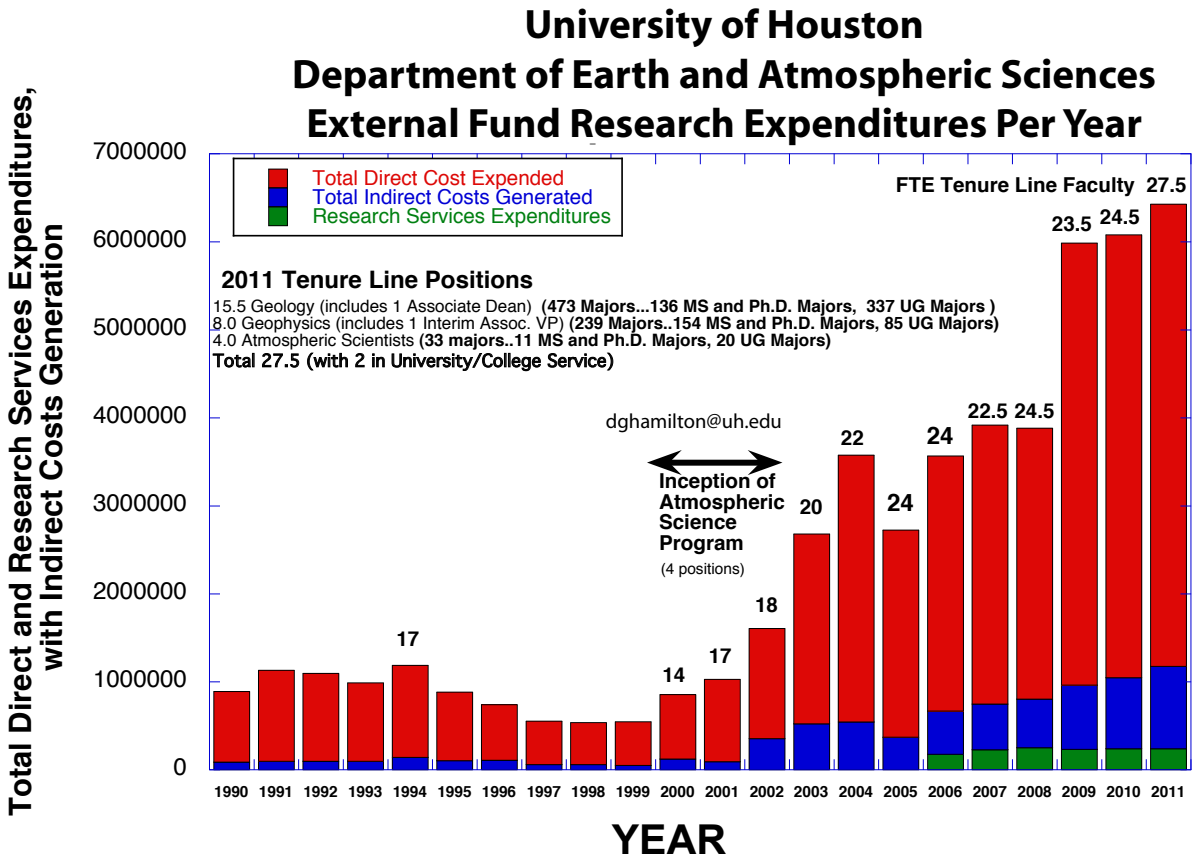
It is an especially exciting time to enter the geosciences field because of the high demand for our graduates, the rapid changes in our field, and the development of many new and important technologies that are making a dramatic impact on our department, academia, government, industry, and society. With job growth in geosciences-related occupations expected to be greater than 23% through 2018, a higher percentage than all other professions, coupled with replacements needed due to impending retirements, the field has significant opportunities for employment for the next generation of geoscientists. Our goal is to produce excellent graduates with the necessary background and skills to help meet this high demand and growth for geoscientists in the State of Texas and throughout the U.S.

Our last newsletter was in the fall of 2009. The period since, during the 2009-2011 academic years, was also equally exciting for the University of Houston as a whole and the Department of Earth and Atmospheric Sciences, in particular. In January 2011, the University of Houston joined the ranks of the top research universities in the nation with the announcement by the Carnegie Foundation for the Advancement of Teaching that placed UH in its top category of research universities. The designation makes the University of Houston one of only three public Carnegie-designated Tier 1 Research Universities in Texas, along with The University of Texas and Texas A&M. That's right – 3 public universities in Texas, but only one in Houston that has earned this affirmation of research excellence from a respected, national organization. We would not have been able to achieve this significant milestone without the support of the Houston community, our alumni, and the long record of excellence that led to this recognition. We are Houston's university, and we are grateful for your trust in our ability to exceed expectations and perform at the highest level of national excellence. Certainly in the Earth and Atmospheric Sciences Department, we have been making significant strides and have contributed to UH's push to the Tier 1 status (*see graph*), now finally achieved.



The Department of Earth and Atmospheric Sciences has rapidly moved in the last 10 years, from a department with an annual research expenditure of less than $1 million dollars per year, to achieving new records in external grants and contract funding that has enabled us to reach over $6 million dollars in research expenditures per year each year for the last 3 years. This now amounts to 6% of the total external research funds garnered by the University of Houston's 41 academic departments each year. This attests to the progress of the EAS Department and faculty and the current importance of our programs in research funding efforts at UH and their contribution to the University's Tier 1 effort.

We are also very pleased to announce that in 2009-2010 the Texas Board of Higher Education approved new M.S. and Ph.D. degree programs in Atmospheric Sciences and a new B.S. program in Environmental Sciences, with two specializations in environmental geology and environmental atmospheric science. The atmospheric programs initiated are focused on air pollution science and



understanding climate change. They join existing B.S, M.S., and Ph.D. programs in geology and geophysics. We have also developed Professional Petroleum Geology and Geophysics M.S. programs, which are non-thesis option M.S. degrees, accommodating working professionals in Houston. The programs have more flexible hours and are taught on weekends at an accelerated pace.

This past year, the department's Ph.D. programs were also recognized by the National Research Council (NRC). Six Ph.D. programs in geosciences in the State of Texas, out of the 11 Ph.D. granting departments, met the ranking criteria of the NRC as top research programs in the U.S. In the case of the Department of Earth and Atmospheric Sciences at the University of Houston, we were very pleased that both of our existing Ph.D. programs in geology and geophysics were ranked among these top tier programs. We are the only department in the State of Texas, and one of only several departments in the country, to have both geology and geophysics Ph.D. programs ranked by the NRC. More than 54 Ph.D. students have now received Ph.D. degrees in the last 5 years in both programs, and these programs are growing. Also of note in the NRC Report was that our incoming graduate students have the highest average GRE score in math of any other state university geoscience program in the region, including those in Texas, Louisiana, New Mexico, Oklahoma, and Arkansas. These rankings contributed to the Tier I recognition by Carnegie. It is important to understand that the metrics for the NRC study were garnered from data that was more than 5 years old, thus our more recent significant advances have not yet been measured in their periodic studies.

Our overall graduate programs at both the M.S. and Ph.D. levels were also ranked by U.S. News and World Report at 63 in the U.S., the highest ranking of any department in the College of Natural Sciences and Mathematics at UH (others ranking 68 to 160 in the U.S.). Our nationwide rankings have been improving over the last several years in U.S. News and World Report, although it is biased by the negative indicator of our part-time graduate programs that we, however, believe are important and serve the local energy industry well. Additionally, the web site of Campus Explorer has recognized our advancements. The site is utilized by high school seniors and guidance counselors seeking information of academic major programs. It recently ranked both the University of Houston's geology and geophysics programs within the top 10 most popular programs in the U.S. In geology, we are ranked #4 out of 513 colleges and universities that were evaluated. In geophysics, we had the distinction of being ranked #1 out of 40 U.S. colleges and universities that were evaluated. These rankings measure the

current level of interest in our programs at the University of Houston. Our College of Natural Sciences and Mathematics also recently ranked 92 in the sciences within the top 500 World Universities (http://www.arwu.org), whereas the institutional rank lags somewhat at 267 overall in the world.

The University has recently selected two scientific areas of research important to the region in which it will focus. These will be the pillars of university research in the sciences. These include BioMedical and Energy-related sciences. The Earth and Atmospheric Sciences Department will play a key and very important role in advancing the second initiative, and we look to new resources and faculty positions in the upcoming years to bolster UH's energy and environmental sciences position. As a department, our goal is to achieve top 25 NRC national rankings within the next 5 - 10 years. The effort by necessity will have to be across the board with participation of the university, the department, industry, Federal and State Funding Agencies, foundations, corporations, and especially our alumni and friends through a range of efforts. Our alumni in geosciences will be critical as many now hold managerial to CEO positions inside geoscience-related corporations and are well-recognized leaders in energy. Houston deserves not only a Tier I State Public University that is vital to it's economic viability, but a top 25 Geoscience Department in a city focused on geosciences. More than fifty percent of the base of the economy in Houston is energy-related. This means that it is geoscience-related, and our goals are important for Houston's future economic success, and providing a skilled workforce is necessary in energy and the environment. We ask that you join us in achieving these goals. Our goal in the next 5 years is to achieve international preeminence in geology, geophysics, atmospheric, and specialized areas including structure and tectonics, remote sensing and geodetics, sedimentology, geochemistry, applied geophysics, whole earth geophysics, planetary sciences, mineral resources development, environmental geosciences, air and water quality monitoring and research, and climate change, as well as in other broad areas of the earth and atmospheric sciences. In this effort, we will:

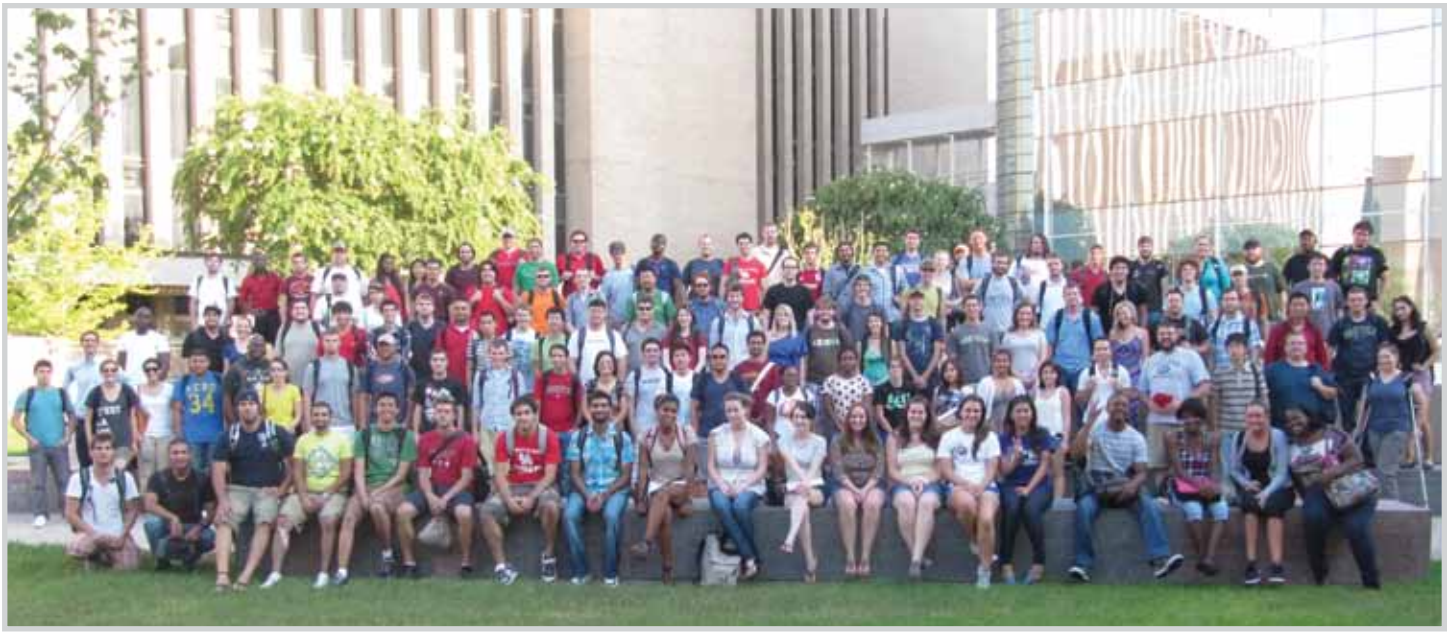
- Develop and pursue bold opportunities and research initiatives in the geosciences.
- Promote teaching and research excellence in the geosciences.
- Create the fabric of a great department by engaging the alumni and the next generation of passionate, productive, and highly knowledgeable student scholars.
- Promote research and experiential learning opportunities in undergraduate and graduate education, including focused efforts at our field camp near Red Lodge Montana.
- Develop unique strengths in core and develop areas of geoscience that will reach national and international prominence.
- Develop "state of the art" multi-user analytical, experimental, and field facilities to support several core areas of strength, and push at the current envelopes of knowledge in the earth sciences in those areas.
- Develop synergies from the combined resources of geology, geophysics, and atmospheric sciences in the department that bridge to other sciences and engineering fields.
- Maintain national and international prominence and expertise in all marine, land-based, airborne, and satellite field data acquisition systems in our science.
- Use our international and national contacts within other geosciences departments to broaden our research capabilities, collaborations, international educational programs, and student recruitment efforts.
- Improve NRC rankings of Ph.D. programs now ranked in geology and geophysics and grow the new Atmospheric Ph.D. program to achieve NRC ranking by the next survey.
- Increase our competitiveness for top faculty and student talent.
- Engage our alumni as stakeholders in our efforts to achieve our goals.

One of our goals has been to add outstanding faculty, instructors, and researchers to help achieve our overall goals in promoting excellence. To that end, in the last two years we have hired four new key faculty. Dr. Alan Brandon joined us in 2009 from NASA as an associate professor of geochemistry and has been funded by NASA and NSF to create a new Thermal Ionization Mass Spectrometry Lab at UH, with capabilities to measure a variety of precise radiogenic isotope ratios critical for isotope tracer studies and geochronologic studies on earth and planetary rocks and minerals. Dr. Brandon studies planetary material, including meteorites and lunar rocks, and is a leader in Os and Nd isotope measurements. In 2010, Dr. Robert Talbot joined the department as Director of The Institute for MultiDimensional Air Quality Studies. Dr. Talbot comes from the University of New Hampshire where he headed an Environmental Institute for the last 20 years. He is an atmospheric chemist specializing in mercury measurements who has the distinction of being in the top 0.5% in Geoscience Citations in the world. Dr. Guoquan Wang joined us in 2011 as an assistant professor in remote sensing. He is a Early Career NSF 5-year award winner and will be instrumental in our efforts with the Civil Engineering Department in supporting a new UH National Science Foundation Facility called the National Center of Airborne Laser Mapping (NCALM). Lastly, also in 2011, Dr. Paul Mann, formerly from UT Institute of Geophysics, moved to the department as a professor of tectonics and petroleum geology. He has also moved his Caribbean Basins, Tectonics, and Hydrocarbons Industrial Consortium, which is supported by 16 corporate sponsors. Dr. Mann is a well-known and respected Caribbean and South American regional tectonics and basins expert. These additions continue to build a strong geosciences faculty in

the department and will significantly help in our goal to be ranked in the top 25 Geoscience Programs in the U.S.

As with any expanding program with large enrollment gains, there are new space demands and financial strains on our academic programs, as well as new demands placed on faculty time and effort. The university continues to expand our faculty and facility infrastructure to help meet the demand, but these additions always lag behind the rate of enrollment and research growth and are, in turn, expensive. To accommodate these strains, we will require support from alumni, corporations, and friends directly to the department for support of our academic programs, field trips, field camps, and modern technologically advanced teaching and research computing and other equipment that becomes more critical for students and their success. We hope that you, our alumni and friends, can contribute in any way possible and can continue your generous support of the department through annual contributions, taking advantage of employee matches through our annual giving card enclosed. The university also has mechanisms of giving that can accommodate larger and more lasting departmental gifts to existing endowments or new endowments in the donor's name for scholarships, professorships, chairs, general discretionary, or new construction "bricks and mortar" support. We hope that you can continue to support the program in any way that you are able and, in effect, support the next generation of geoscientists and your future fellow alumni, our students.

Picture above: Spring 2010 Field Methods (Instructor: Dr. John Casey) at El Capitan in West Texas. Below: Fall 2011 Minerology (Instructor: Dr. Jonathan Snow. Enrollment total: 116)



Department's Report Card

- **Ranked at #63 by U.S. News and World Report for top graduate programs in the U.S.**
- **Ranked #1 in Geophysics and #4 in Geology by Campus Explorer in the top ten most popular programs in the U.S. (out of 513 colleges and universities)**
- **Currently is the largest geosciences program in the U.S. (734 total majors, including 305 graduates and 429 undergraduates)**

In the News

Dr. **Rasmus Andreasen** joined the department in the Spring of 2011 as a research assistant professor. He came from a post-doctorate position at the Imperial College London (after graduating from Dartmouth with a Ph.D. in Earth Sciences). He will take part in managing the department's new Multiple-Collector Inductively-Coupled Plasma Mass Spectrometer Laboratory.

Dr. **Janok Bhattacharya** continues to teach sequence stratigraphy and sedimentology in the department. This past April, Janok served as chair for technical sessions at the AAPG Conference which was held in Houston, TX (April 11 - 13, 2011). On a more personal note, last March, Janok finished the BP MS 150 bike ride; then he closed out 2010 by finishing the New York City Marathon.

Dr. **Alan Brandon** just completed setting up the Thermal Ionization Mass Spectrometer Facility and is about to finish setting up the Platinum Group Element Clean Lab. Funding for his laboratories came from the National Science Foundation (NSF) with matching funds from the University of Houston. Al was the recipient of the Director's Commendation Award from NASA's Johnson Space Center in 2009.

Dr. **Kevin Burke** was (briefly) a media sensation when his article, which touched the subject of finding diamonds, was published in *Nature,* a weekly scientific research journal. Dr. Burke and his team (Trond Torsvik of University of Oslo, Bernhard Steinberger of Helmholtz Centre Potsdam, Lew Ashwal, and Sue Webb of University of the Witwatersrand) presented their research results that could help improve the odds of finding diamonds by focusing future searches in particular areas.

Dr. **Regina Capuano** is the academic advisor for Environmental Science, a new Bachelor of Science degree offered by the Department of Earth & Atmospheric Sciences. It was formerly an interdisciplinary degree offered by the College of Natural Sciences and Mathematics. Within this discipline, students will have the options to major in: Environmental Science - Environmental Geology or Environmental Science - Atmospheric Science.

Dr. **John Casey** continues with his duties as department chair. He was appointed Distinguished Guest Professor at the University of Science and Technology of China in Hefei for the term of 2009 - 2012. He was invited to visit the University of Phillipines, the China University of Geosciences in Beijing, and the Hanoi University of Mining and Geology. He signed a Memoranda of Understanding with all three universities with plans for further developments and cooperations in teaching and research. After 28 continuous years of taking students to Saltillo, Mexico for Spring field trips, Dr. Casey was forced to change location due to the unstable condition at the US - Mexico border. For now he is settling for the new destination in the Indio Mountain of El Paso, Texas (staying at The University of Texas El Paso's research facility). He hopes to come back to Saltillo one day.

Dr. **Henry Chafetz** was invited to be a member of the curriculum committee for a new university created by PetroVietnam. The company aims to open an institute that is specialized in petroleum geosciences. He was invited to Hanoi to visit PetroVietnam and their university in the Fall of 2010. This past March, he was invited by TOTAL to a conference in Pau, France, where he gave a talk on travertines. Travertine is coming into focus since the largest oil find is in travertine (off the coast of Brazil.)

Dr. **Evgeny Chesnokov** received tenure from the University of Houston this past Spring.

Dr. **Peter Copeland** penned his first book, "Communicating Rocks: Writing, Speaking, and Thinking about Geology" which is published by Pearson (a division of Prentice Hall). The book includes guidance concerning the rules and styles of writing and speaking technically and scientifically in Earth Sciences. It illustrates the importance of effective communication in geologic investigations. It includes guidance on how to write an effective research proposal or paper, and how to deliver a scientific presentation. The book's first edition was out on the market July 24, 2011.

Dr. **John Dewey** was elected a Fellow of the Australian Academy of Sciences. He is currently a member of the U.S. National Academy of Sciences and a Fellow of the Royal Society of London. He will soon receive (another) honorary Doctor of

Science degree from the Universite de Rennes.

Dr. **Bill Dupre** received the UH Provost Faculty Advising Award in the spring of 2010. Anyone who knows Dr. Dupre would agree that the award is an honor that is a long-time coming. Besides his advising duties, Dr. Dupre continues with his teaching duties in both the regular program (undergraduate and graduate levels) and the professional master's program. He will be teaching again in the UH-YBRA field camp this summer. On a more personal note, Dr. Dupre is the proud first-time grandfather to little Zoe who was born last year.

Dr. **Stuart Hall** recently accepted the position of Associate Vice President for Graduate and Professional Studies. He will remain a faculty member of the Department of Earth and Atmospheric Sciences, and in place of his teaching duties, he will be spending much of his time working on the university's administrative issues.

Dr. **Thomas Lapen** was promoted to Associate Professor of Geology and is now a tenured faculty member in the department.

Dr. **Chris Liner** was selected to be the 2012 SEG Distinguished Instructor Short Course (DISC) presenter. The SEG DISC is an 8 hour, one-day short course on the topic of current and wide-spread interest. Sponsored by the SEG, it is presented at over 25 locations each year around the world. Established in 1998, the DISC has attracted over 25,000 participants in its 14-year history. Selection as the DISC instructor is viewed as a major honor and recognition of excellence by the SEG. The instructor is a prominent geophysicist whose work and presentation appeal to a wide audience ranging from students to professionals. The DISC is recorded each year and developed into a multimedia presentation called the DigitalDISC, which features the video of the instructor, transcript of the lecture, and presentation slides. This DigitalDISC is distributed as a service to student sections and is available for purchase from the SEG Book Mart. The 2012 DISC, presented by Christopher Liner, is on the topic of Seismic Dispersion. Toward the end of 2012, it will be available in ebook form or print edition.

The department welcomes Dr. **Paul Mann** who has accepted the position of Professor of Geology at UH and who will be starting in the summer of 2011. Dr. Mann comes from The University of Texas at Austin where he was Senior Research Scientist at the Institute for Geophysics. His main fields of interest include basin analysis, regional tectonics, structure, petroleum geology, and natural hazards. He has conducted research in the Caribbean and southwest Pacific. Dr. Mann is planning to move his research group, Caribbean, Basins, Tectonics and Hydrocarbons, to the University of Houston where he will move to "Phase III" of the group's project with the continuing support of his corporate sponsors.

Dr. **Michael Murphy** is the recipient of the 2010-2011 University of Houston Teaching Excellence Award: Provost Core. His dedication to teaching has earned him this honor, one of the highest bestowed by the University of Houston. The award carries a cash prize of $8,000.

Dr. **Jonathan Snow** completed a research expedition in October on the R/V Yokosuka with the Japanese research agency JAMSTEC. He was part of a joint US-Japan expedition to study the ocean floor in the Western Pacific between Guam and the Philippines, an area known as Godzilla Megamullion.

Dr. **Robert Stewart** appeared on NBC's America's Got Talent Audition Episode when the show made its stop in Houston last April. Rob is a member of the Houston Choral Showcase.

Dr. **Don Van Nieuwenhuise** was one of the go-to experts over a six-month period in 2010 reporting on the BP blowout and oil release with over 100 television interviews, including multiple shows on BBC, CTV (Canada), ABC, CBS, NBC, PBS, Fox, CNN, MSNBC, the Weather Channel, CNBC, Bloomberg, and Houston's local stations KUHT, KHOU, KRTK, KRIV, and KIAH. He was also featured on numerous radio stations, including NPR, CBS Radio New York, and Fox Radio. He was quoted in over 100 news print articles world-wide, including the Washington Post, Wall Street Journal, New York Times, The Times (London), AP, the Times Picayune, the Miami Herald, and the Houston Chronicle.

Dr. **Guoquan Wang**, from the University of Puerto Rico, joined the department's faculty as Assistant Professor of Geophysics in Fall 2011. Most recently, he does research in GPS Geodesy and remote sensing and their applications in earth surface processes. Dr. Wang is the recipient of National Science Foundation's CAREER Award, one of the Foundation's most prestigious awards in support of junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education, and the integration of education and research within the context of the mission of their organizations.

In other news: After 18 years of serving as dean of the College of Natural Sciences and Mathematics, Dr. **John L. Bear** decided to step down in the spring of 2010. The college and our department have achieved tremendous accomplishments under his leadership, and he will be greatly missed by all. Dr. Bear will remain a professor in the Department of Chemistry. He will also be serving as special assistant/advisor to the provost on international academic cooperations. In November 2010, Dr. **Mark Smith** (from University of Arizona), was named NSM's new Dean.

Leading Atmospheric Scientist to Head UH's Air Quality and Climate Research

Rolando Garcia
College of Natural Sciences and Mathematics

One of the nation's most prominent atmospheric scientists is now spearheading the University of Houston's burgeoning research efforts in air quality and climate change.

In January, Robert Talbot, professor of atmospheric science, became the new director of UH's Institute for Multidimensional Air Quality Studies (IMAQS), which models, forecasts, and continuously monitors Houston's air quality.

For more than two decades at the University of New Hampshire, Talbot built an air pollution research group that was among the largest and most sophisticated of its kind, attracting more than $10 million annually in federal funding. More recently, he helped set up a groundbreaking air monitoring station in China that could yield the most advanced studies to date of air pollution in Chinese cities.

With Houston perenially ranked second among U.S. cities (behind Los Angeles) with the most polluted air, air quality studies in the region pose special challenges and opportunities, Talbot said, and it is crucial that UH establishes a strong presence in atmospheric science.

"Robert Talbot is not only one of the most respected atmospheric scientists in the field, he has a proven record of building strong research programs," said John Casey, chair of the Department of Earth and Atmospheric Sciences. "Professor Talbot has the expertise and experience to make UH a leader in air quality and climate change studies."

The effort has already come a long way since the department hired its first atmospheric scientist in 2000. Measurement instruments atop Moody Tower, an 18-story dormitory on the UH campus, coupled with four measurement stations throughout the country and data collected from an aircraft and balloon sampling are helping scientists develop a more accurate profile of the region's atmosphere.

These gauges measure fluctuating levels of more than 80 compounds that contribute to air pollution. These studies have provided the first reliable measurements of mercury in Houston's air and have also pinpointed the region's refineries and petrochemical plants as the source of much of the formaldehyde in the region's air. Formaldehyde serves as a catalyst in the production of ozone - a harmful pollutant when present in ground-level air.

IMAQS also generates daily ozone forecasts to aid Houston residents with breathing disabilities plan their outside activities. These forecasts run every evening on high performance computers, and the results are posted daily on the institute's website (www.imaqs.uh.edu)

In addition to air quality studies, the department now offers master's and doctorate degrees in atmospheric science. And, undergraduates majoring in environmental science - a bachelor's degree offered by the College of Natural Sciences and Mathematics - can choose an atmospheric science track.

Three years ago, the department changed its name from the Department of Geosciences to reflect this new, broader mission as it expands beyond its traditional strengths in geology and geophysics.

There are currently four atmospheric scientists on faculty, and Talbot hopes to add another two in the near future. His goal is to build the kind of large regional program he established in New Hampshire, where his studies of New England's air quality were among the most advanced and comprehensive ever undertaken. Integrating satellite data and air measurements collected at several stations, Talbot's team studied how New England was affected by air pollution generated in the Ohio River Valley that drifted northeast before moving out into the Atlantic.

This phenomenon made New England the "tailpipe of the U.S." Talbot said. Air pollution moves globally, Talbot added, with pollution from Asia likely affecting air quality on the West Coast, for example. However, with the rapid industrialization of China and the almost choking air pollution in its major cities, reliable air quality data is scarce, Talbot said.

So, in January he teamed up with scientists at Nanjing University to establish a state-of-the-art air monitoring station atop a 25-story dormitory on the Nanjing campus. Nanjing is a major industrial city of more than 7 million residents, and the air is filled with a thick, almost permanent haze of air pollution, Talbot said. On a typical day visibility is perhaps half a kilometer. Over the next two years the monitoring station in Nanjing will measure the presence of several pollutants in the city's air, including mercury and black carbon.

Caribbean Basins, Tectonics and Hydrocarbons (CBTH) Project Moves to University of Houston

Dr. Paul Mann joined the faculty of the UH Department of Earth and Atmospheric Sciences in June 2011 as a professor of geology - along with this move is the relocation of his world-renowned research consortium, Caribbean Basins, Tectonics and Hydrocarbons (CBTH) to the University of Houston.

Dr. Mann is the director of the CBTH project, a research consortium whose members and sponsors are primarily from the energy industry*. The project began under Mann's leadership while at The University of Texas at Austin in 2005. The goal of the project is to involve undergraduate, graduate, and postdoctoral researchers in a major, GIS-based compilation of hydrocarbon-related information from a vast, hydrocarbon-rich region extending from the Gulf of Mexico to Brazil. Over the past six years, this data set has become the most complete source of information on hydrocarbon basins in this region.

"Dr. Mann's arrival represents a significant step for UH's new energy initiatives," said Dr. John Casey, professor and chair of the Earth and Atmospheric Sciences Department.

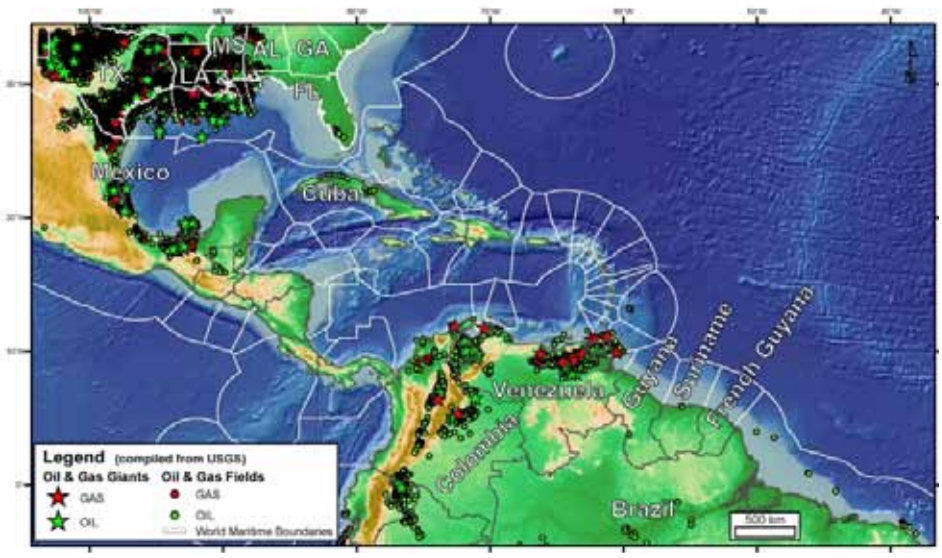
In addition to providing this information to the oil company sponsors of the project, subsurface seismic reflection and well data compiled by CBTH researchers also provided the basis for original research used for completing M.S. theses and Ph.D. dissertations. To date, funds from the CBTH project supported up to 21 persons in a single year and produced a total of three two-year postdoctoral studies, two Ph.D. dissertations, 14 master's theses, and employed 12 undergraduate students as research assistants. At the 2011 AAPG Conference in Houston, students working with the CBTH Project won first and third place in Best Student Poster Awards.

Upon entering Phase III of the project, CBTH's goal remains unchanged. The project will continue to expand its GIS database and make is data available to oil companies to sponsor and facilitate their hydrocarbon exploration efforts in the region. CBTH will also continue to work closely with the companies to generate support for undergraduate, graduate, and postdoctorals studies.

The new CBTH Project laboratory at UH is located in the Science and Research Building 1 (fourth floor). All inquiries regarding CBTH Project and sponsorship can be addressed to Dr. Paul Mann at *pmann@uh.edu.*

*CBTH's past and current sponsors include: BHP Billiton, British Gas, Chevron, Ecopetrol, ExxonMobil, Government of Curacao, Newfield, PDVSA, Petrobras, Repsol, Shell, Statoil, Noble Energy, Total, and Hess.

The above article is an extraction of the original article which appeared on the UH College of Natural Sciences and Mathematics website by Paul Mann and Kathy Major.



Political boundaries, offshore maritime boundaries, and hydrocarbon accumulations in GOM-Caribbean area. Source of international offshore boundaries is the Flanders Marine Institute (VLIZ) Maritime Boundaries Geodatabase. Source of offshore state boundaries in the GOM is approximated from MMS (Mineral Management Services).

Building Bridges

The Department of Earth and Atmospheric Sciences is expanding its global reach with proposals for new joint academic and research programs with several top universities in the world.

Officials from China University of Geosciences Beijing (CUGB) visited the University of Houston and the department of Earth and Atmospheric Sciences in January 2010 to meet with UH administration and to sign a Memorandum of Understanding with an agreement to further develop joint academic and research programs in geology, geophysics, and atmospheric sciences. CUGB is one of the leading Chinese universities that play a key role in China's oil and mining industry and claim some of the top key players in the Chinese government as its alumni. The delegation from CUGB, led by its vice president, Wang Cong, met with UH President Renu Khator, former NSM Dean John Bear, EAS Department Chair John Casey, and Jerald Strickland, UH Assistant Vice Chancellor for International Studies and Programs.

In 2009, former NSM Dean John Bear and EAS Department Chair John Casey visited the University of the Philippines Diliman in Quezon City where they signed a similar Memorandum of Understanding with the university. The department has also developed academic relationships with other international institutions, including the University of Capetown (South Africa), the Hanoi University of Mining and Geology (Vietnam), and PDVSA (Venezuela).

From left: Dr. John Bear, former NSM Dean; Dr. John Casey, EAS Department Chair; Dr. Renu Khator, UH President and UHS Chancellor; Wang Cong, CUGB Vice President; Jerald Strickland, UH Assistant Vice Chancellor for International Studies and Programs

Faculty

John Casey, *Professor and Chair*
Chris Liner, *Professor and Assoc. Chair*

Rasmus Andreasen, *Research Asst. Professor*
Janok Bhattacharya, *Professor*
Adry Bissada, *Research Professor*
Alan Brandon, *Associate Professor*
Kevin Burke, *Professor*
Regina Capuano, *Associate Professor*
John Castagna, *Professor*
Henry Chafetz, *Professor*
Evgeny Chesnokov, *Professor*
Peter Copeland, *Associate Professor*
John Dewey, *Distinguished Professor*
William Dupre, *Associate Professor*
Ian Evans, *Associate Professor*
Yongjun Gao, *Research Assistant Professor*
Gennady Goloshubin, *Research Professor*
Stuart Hall, *Professor*
De-hua Han, *Research Professor*
Fred Hilterman, *Distinguished Professor*
Xun Jiang, *Assistant Professor*
Shuhab Khan, *Associate Professor*
Thomas Lapen, *Associate Professor*
James Lawrence, *Research Assoc. Professor*
Barry Lefer, *Associate Professor*
Aibing Li, *Associate Professor*
Liming Li, *Research Assistant Professor*
Rosalie Maddocks, *Professor*
Paul Mann, *Professor*
Michael Murphy, *Associate Professor*
Bernhard Rappenglueck, *Assoc. Professor*
Arch Reid, *Professor*
Alexander Robinson, *Assistant Professor*
Max Shauck, *Research Professor*
Robert Sheriff, *Professor Emeritus*
Virginia Sisson, *Research Assoc. Professor*
Jonathan Snow, *Associate Professor*
Robert Stewart, *Professor*
John Stormer, *Research Professor*
Robert Talbot, *Professor*
Leon Thomsen, *Research Professor*
Don van Nieuwenhuise, *Res. Assoc. Prof.*
Jolante van Wijk, *Assistant Professor*
Guoquan Wang, *Assistant Professor*
Julia Smith Wellner, *Research Asst. Prof.*
Robert Wiley, *Research Associate Professor*

Tom Bjorklund, *Research Scientist*
Martin Cassidy, *Research Scientist*
Nikolay Dyaur, *Research Scientist*
Xiangshang Li, *Research Scientist*
June Zeng, *Research Scientist*

Road to Tier One - Current Research Projects and Funding

Fewer than 300 (out of 4,000) colleges and universities in the United States are classified by the Carnegie Foundation as "research universities." Recently, the Foundation cited 109 universities for Top Tier designation - these are the universities with "very high research activity." (The Carnegie Report, released in January 2011). The Carnegie classification is commonly regarded to be one of three indicators that reflect an institution's rank as a **Tier One** institution. University of Houston is now the third public university in Texas to be a top-tier research group, along with The University of Texas at Austin and Texas A&M University. UH receives further encouraging news from the State of Texas. In 2010, voters in Texas approved Proposition 4, a constitutional amendment enabling the creation of the National Research University Fund (NRUF) to financially support seven state institutions, including UH, as they meet benchmarks established by the Legislature and The Texas Higher Education Coordinating Boards. When UH is officially deemed qualified, it will be eligible to receive significant NRUF funds, helping to expand and enhance its Tier One efforts.

Elevating the University of Houston to Tier One status will reap economic and educational benefits for Houston and the region for generations to come. Through greater financial support from the state, UH will be able to enhance the quality of student education, attract and retain more high-quality faculty, use state appropriations as leverage for greater federal research support, increase technology transfer to private sector, attract new companies and industries to the Houston area, and produce spin-off companies.

UH faculty has been reportedly awarded more than $119 million in research expenditures - a major contributing factor to UH's Tier One status. Within the past two years and by the end of fiscal year 2011, the faculty of Earth and Atmospheric Sciences have contributed the following fundings to UH's quest to Tier One.

Janok Bhattacharya
Project: Quantitative Sedimentology Research Consortium
Sponsor: Various private agencies
Total award: $455,000

Adry Bissada
Project: Petroleum Systems and Geochemistry Program
Sponsor: Knowledge Reservoir
Total award: $93,578

Alan Brandon
Project: Testing Models for Continental Growth and Melt-Rock Interaction from ^{186}Os-^{187}Os-Hf-Nd-Sr Isotopes in Southwest USA Mantle Xenoliths
Sponsor: National Science Foundation
Total award: $338,147

Project: Acquisition of a Thermal Ionization Mass Spectrometer (Thomas Lapen, co-PI)
Sponsor: NSF and NASA
Total award: $360,685

Project: Impact Processes in the Origin and Evolution of the Moon: New Sample-driven Perspective (Jonathan Snow, co-PIs)
Sponsor: Lunar and Planetary Institute
Total award: $50,000

Project: Isotopic Studies of Achondrites and the Moon
Sponsor: NASA Cosmochemistry
Total award: $213,000

Project: Isotopic Investigations of Planetary and Solar System Materials
Sponsor: NASA Cosmochemistry
Total award: $743,496 (requested)

John Casey
Project: Acquisition of a Multiple-Collector Inductively-Coupled Plasma Mass Spectrometer (Thomas Lapen - PI, John Casey, Jonathan Snow, Michael Murphy - co-PIs)
Sponsor: NSF and UH
Total award: $569,658

John Castagna
Project: Seismic Inversion Case Studies
Sponsor: G&W
Total award: $117,000

Project: Spectral Inversion Case Studies (approved, pending contract)
Sponsor: MS, Inc.
Total award: $473,000

Project: Evaluation of Ray Tracing Algorithms (approved, pending contract)
Sponsor: Repsol
Total award: $180,000

Project: Pre-stack Noise Attenuation (approved, pending contract)
Sponsor: Dataseismic
Total award: $36,000

Evgeny Chesnokov
Project: 3D Fracture Determination for Barnet Shale Area and Pore Pressure Prediction
Sponsor: various private agencies
Total award: $895,020

Project: Microseismic Fracture Monitoring
Sponsor: Southwestern Energy Company
Total award: $20,000

Gennady Goloshubin
Project: Development of Algorithm, Software and Methodical Support for Frequency-dependent Processing and Interpretation
Sponsor: West Siberian Research Institute of Geology and Geophysics
Total award: $287,560

De-Hua Han
Project: Fluid & Rock Properties and Seismic Hydrocarbon Indicators
Sponsor: Various private agencies
Total award: $286,738

Project: Fluid & Rock Property Controls on Production & Seismic Monitoring Alaska Heavy Oils
Sponsor: Colorado School of Mines
Total award: $75,799

Xun Jiang
Project: Investigate Physical Processes in Global Climate Models Using Atmospheric Infrared Sounder
Sponsor: NASA and Caltech
Total award: $184,992

Project: Improving the Characterization of Pollution Transported into Texas (Barry Lefer, co-PI)
Sponsor: Texas Commission on Environmental Quality
Total award: $150,000

Project: Comparison between Atmospheric Chemistry Model and Observations for the Second Texas Air Quality Study Period
Sponsor: NASA - Stennis Space Center
Total award: $92,939

Project: Global Change and Air Pollution - Phase 2 Implications
Sponsor: Harvard University, EPA
Total award: $30,000

Project: Enhancing the Speed and Quality of CO2 Retrievals from the OCO-2 Mission
Sponsor: NASA
Total award: $450,000

Shuhab Khan
Project: Image Spectroscopy and Hyperspectral Remote Sensing
Sponsor: Jindal Petroleum
Total award: $100,000

Project: Integration of Geological, Geochemical, and Remote Sensing Data for Finding Source Rocks for Gold in the Northern Areas of Pakistan
Sponsor: The National Academies
Total award: $200,000

Project: Integrated Remote Sensing and Shallow Geophysical Investigations on the Pelusiac River
Sponsor: National Science Foundation
Total award: $57,256

Project: Neotectonic Studies of the Northwestern Himalayas
Sponsor: National Science Foundation
Total award: $50,000

Thomas Lapen
Project: Coupled Lu-Hf and Sm-Nd Isotopic Studies of Martian Meteorites: Constraints on Crystallization Ages and Source Compositions (Rasmus Andreasen, co-PI)
Sponsor: NASA
Total award: $222,452

Project: Testing Models for Continental Growth and Melt-rock Interaction from 186Os-187Os-Hf-Nd-Sr Isotopes in the Southwest USA Mantle Xenoliths (Al Brandon, PI)
Sponsor: National Science Foundation
Total award: $338,147

Project: Impact Processes in the Origin and Evolution of the Moon: New Sample-driven Perspectives
Sponsor: Lunar and Planetary Institute
Total award: $158,983

Project: Acquisition of a Thermal Ionization Mass Spectrometer (Al Brandon, PI)
Sponsor: NSF and NASA
Total award: $360,685

Project: Test of Hf Isotope Heterogeneity in the Early Solar System
Sponsor: NASA
Total award: $426,000

Project: U-Pb Age and Hf Isotope Composition of Detrital Zircons, Ouachita Orogenic Belt, Marathon Uplift, Texas
Sponsor: State of Texas Advanced Research Program
Total award: $125,000

Project: Acquisition of a Multiple-Collector Inductively-Coupled Plasma Mass spectrometer (John Casey, Jon Snow, Mike Murphy, co-PIs)
Sponsor: National Science Foundation
Total award: $265,650

Barry Lefer
Project: University of Houston Study of Houston Atmospheric Radical Precursors (SHARP) Data Analysis (Bernhard Rappenglueck, PI)
Sponsor: TCEQ
Total award: $290,534

Project: SHARP Data Analysis: Radical Budget and Ozone Production
Sponsor: UT at Austin
Total award: $199,368

Project: Quantification of Industrial Emissions of VOC, NO_2 and SO_2 by SOF and Mobile DOAS (Bernhard Rappenglueck, PI)
Sponsor: UT at Austin
Total award: $258,198

Project: Dallas Measurements of Ozone Production
Sponsor: UT at Austin
Total award: $195,054

Project: Surface Measurements and One-dimensional Modeling Related to Ozone
Sponsor: UT at Austin
Total award: $98,134

Project: Operations of the Radar Wind Profile at the UHCC
Sponsor: Bureau of Ocean Energy Management, Regulation, and Enforcement
Total award: $35,835

Project: HGB O_3-Sonde Launches and Vertical Ozone Profiles in Eastern Texas (Bernhard Rappenglueck, Garry Morris, co-PIs)
Sponsor: TCEQ
Total award: $185,000

Project: Ozone and Carbon Monoxide Monitor Operations, University of Houston sites (Bernhard Rappenglueck, co-PIs)
Sponsor: TCEQ
Total award: $125,000

Project: Collaborative Research: PROPHET 2009 - Community Atmosphere-Biosphere Interactions Experiment
Sponsor: National Science Foundation
Total award: $116,550

Project: Comparison between an Atmospheric Chemistry Model and Observations for the Second Texas Air Quality Study Period
Sponsor: NASA
Total award: $92,939

Aibing Li
Project: The Growth of the Tibetan Plateau - A Seismic Investigation of the Qilian Shan
Sponsor: National Science Foundation
Total award: $120,527

Project: Integrating Seismic Constraint on Continental Upper Mantle
Sponsor: National Science Foundation
Total award: $450,712

Project: Geodynamic Solutions for Seismic Observations of Iceland Hotspot-ridge Interaction
Sponsor: National Science Foundation
Total award: $152,000

Project: Constraining 3D Shear-wave Velocity and Anisotropy Structure Beneath the Tien Shan from Shear-wave Splitting and Surface Wave Tomography
Sponsor: National Science Foundation
Total award: 121,364

Liming Li
Project: The Equatorial Region of Saturn: A Multi-instrument Study
Sponsor: NASA
Total award: $330,858

Project: Energy Balance of Saturn
Sponsor: NASA
Total award: $449,741

Project: Recycling Rate of Atmospheric Moisture Based on the AIRS Observations
Sponsor: NASA
Total award: $34,986

Project: Time Variation of Jupiter's Energy Balance
Sponsor: NASA
Total award: $459,669

Project: Fellowship for Early Career Researchers
Sponsor: NASA
Total award: $100,000

Christopher Liner
Project: Lab Modeling of Marine Guided Waves
Sponsor: Geokinetics
Total award: $148,974

Project: 3D Seismic Training for CO_2 Sequestration
Sponsor: US Department of Energy
Total award: $298,830

Paul Mann
Project: Caribbean Basins, Tectonics and Hydrocarbons
Sponsors: various industry sponsors
Total award: $720,000

Bernhard Rappenglueck
Project: Ozone and Carbon Monoxide Monitor Operation, University of Houston sites (Barry Lefer, PI)
Sponsor: TCEQ
Total award: $210,000

Project: HGB O_3 Sonde Launches 2010-08 and Vertical Ozone Profiles in Eastern Texas 2010-10 (Barry Lefer, PI)
Sponsor: TCEQ
Total award: $185,000

Project: VOC Canister Analysis Program in Support to ENVIRON Int. Corp., Novato, California
Sponsor: ENVIRON Int. Corp.
Total award: $15,359

Project: University of Houston Moody Tower 2010 Ozone Formation Research Monitoring (Barry Lefer, co-PI)
Sponsor: TCEQ
Total award: $309,466

Project: University of Houston Study of Houston Atmospheric Radical Precursors (SHARP) Data Analysis (Barry Lefer, co-PI)
Sponsor: TCEQ
Total award: $290,534

Project: Meteorology Modeling with WRF for Houston Air Quality (Liming Li, co-PI)
Sponsor: Texas Air Research Center
Total award: $11,400

Project: Study of Potential Biogenic Surface Sources for Important Atmospheric Radical Precursors HCHO and HONO
Sponsor: Environmental Institute of Houston
Total award: $14,950

Project: WDEQ UGWOS 2011 HONO and HCHO Measurements
Sponsor: Meteorological Solutions Inc.
Total award: $47,000

Project: Quantification of Industrial Emissions of VOCs, NO_2 and SO_2 by SOF and mobiel DOAS
Sponsor: UT at Austin and UH
Total award: $484,661

Project: Airborne Measurements to Investigate Ozone Production and Transport in the Dallas-Fort Worth (DFW) Area During the 2011 Ozone Season (Max Shauck, PI)
Sponsor: UT at Austin
Total award: $279,642

Alex Robinson
Project: Continuation and Termination the Karakorum and Karakax faults in Western Tibet: Implication for the Role of Regional Strike-slip Faults in Orogenic Belts
Sponsor: National Science Foundation
Total award: $173,357

Virginia Sisson
Project: Electron Microprobe Upgrade (Jonathan Snow, co-PI)
Sponsor: National Science Foundation
Total award: $159,861

Project: Integrating Experiential Learning into Introductory Geoscience Classes (with Julia Wellner)
Sponsor: University of Houston
Total award: $20,000

Jonathan Snow
Project: Impact Processes in the Origin and Evolution of the Moon: New Sample-driven Perspective (Al Brandon, PI)
Sponsor: Lunar and Planetary Institute
Total award: $50,000

Project: Godzilla: Death of a Backarc
Sponsor: National Science Foundation
Total award: $375,297

Project: Costa Rica Peridotite
Sponsor: National Science Foundation
Total award: $111,701

Project: Electron Microprobe Upgrade (Jonathan Snow, co-PI)
Sponsor: National Science Foundation
Total award: $159,861

Project: Granulites
Sponsor: NASA
Total award: $190,000

Project: SGER Godzilla
Sponsor: National Science Foundation
Total award: $914,708

Project: Acquisition of a Multiple-collector Inductively-Coupled Plasma Mass Spectrometer (Tom Lapen, PI, John Casey, Mike Murphy, co-PIs)
Sponsor: National Science Foundation
Total award: $265,650

Project: Lena Trough
Sponsor: National Science Foundation
Total award: $230,000

Robert Stewart
Project: Allied Geophysical Laboratories (AGL) Consortium: Full-wave Seismic Exploration for Reservoir
Sponsor: Various private agencies
Total award: $90,000

Project: Anisotropic Physical Modeling
Sponsor: Conoco-Phillips
Total award: $725,000

Project: Lake Kivu Stability
Sponsor: VanOil
Total award: $20,000

Project: CO_2 and Seismic
Sponsor: Shell Oil
Total award: $35,000

Project: Scholte 4C Wave
Sponsor: Geokinetics
Total award: $125,000

Robert Talbot
Project: Reno Atmospheric Mercury Intercomparison Experiment
Sponsor: National Science Foundation
Total award: $178,154

Project: Measurement and Analysis of Atmospheric Mercury Observations Aboard the DC-8 During ARCTAS
Sponsor: NASA
Total award: $478,530

Project: Mercury Cycling in the Marine Environment
Sponsor: National Science Foundation
Total award: $530,268

Project: UNH Air Quality and Climate Program
Sponsor: NOAA
Total award: $779,500

Jolante van Wijk
Project: Geodynamic Modeling of Edge-Driven Convection
Sponsor: National Science Foundation
Total award: $176,001

Julia Wellner
Project: The Sedimentary Record of Tidewater Glacier Response to Holocene Climate Variability in the Antarctic Peninsula
Sponsor: National Science Foundation
Total award: $242,278

Project: Abrupt Environmental Change in the Larsen Ice Shelf System, a Multidisciplinary Approach - Marine and Quaternary Geosciences
Sponsor: National Science Foundation
Total award: $269,024

Project: Integrating Experiential Learning into Introductory Geoscience Classes (with Virginia Sisson)
Sponsor: University of Houston
Total award: $20,000

Rock of Ages: Clues about Mars Evolution Revealed

Lisa Merkl
University Communications

Through the study of a popular martian meteorite's age, a University of Houston professor and his team have made significant discoveries about the timeline of volcanic activity on Mars.

Thomas Lapen, associate professor of geology at UH, describes his team's findings in a paper titled "A Younger Age for ALH84001 and its Geochemical Link to Shergottite Sources in Mars," appearing April 16 in Science, the world's leading journal of original scientific research, global news, and commentary.

ALH84001 is a thoroughly studied, well-known martian meteorite. This stone is unique among Mars rocks available for study on Earth, since its formation age is more than 2.5 billion years older than any other recognized martian meteorite, giving scientists the only sample of material formed early in Mars' history. Data from this rock may help geologists better understand, through analogy, the processes of early Earth evolution.

Lapen and his colleagues' data showed that the true age of this meteorite is 4.091 billion years old, about 400 million years younger than earlier age estimates. They concluded that this stone formed during an important time when Mars was wet and had a magnetic field, conditions that are favorable for the development of simple life. This finding precludes ALH84001 from being a remnant of primordial martian crust, as well as confirming that volcanic activity was ongoing in Mars over much of its history.

"This research helps us better refine the history of Mars," Lapen said. "This has huge ramifications for our understanding of volcanic processes active in Mars and for the nature of deeper portions of the planet that are sources of magmas that produced the largest volcanoes in the solar system. This data is also used to refine models of initial planetary formation and early evolution."

With the crystallization age and formation of this rock being debated since its discovery in 1984, Lapen and his team seized an opportunity to better refine the early history of Mars. With samples provided by the NASA Antarctic meteorite curator and the meteorite working group, the researchers used a relatively new method that has never been applied to the stone - lutetium-hafnium isotope analysis.

"We studied variations in isotopic compositions of minerals to determine the age and sources of magmas that produced these rocks," Lapen said. "We uncovered evidence that the volcanic systems in Mars were likely active more than four billion years ago. This connection allows the possibility that regions with the largest volcanoes in the solar system perhaps host some of the longest-lived volcanic systems in the solar system."

In addition to Lapen, the team includes Alan Brandon, an associate professor in UH's department of Earth and Atmospheric Sciences, and their two postdoctoral researchers, Minako Righter and John Shafer. Other collaborators were Brian Beard from the University of Wisconsin-Madison and NASA Astrobiology Institute, Vinciane Debaille from the University of Bruxelles, and Anne Peslier, a research scientist at Jacobs Technology working at NASA.

The project was supported by NASA Cosmochemistry grants to Lapen and Brandon, a NASA Astrobiology grant to Beard, and a grant from UH's Institute for Space Systems Operations to Lapen. The Belgian fund for Scientific Research provides current financial support to Debaille. The research took about 15 months.

Lapen's Research Group

A new climate-controlled and HEPA-filtered mass spectrometry lab has been completed and now houses a multi-collector inductively-coupled plasma mass spectrometer (MC-ICP-MS), as well as an excimer laser ablation system and a thermal ionization mass spectrometer. Instrumentation was funded by the National Science Foundation, NASA, and the State of Texas.

Members of Lapen's research group include: Dr. Minako Righter (lab manager) and Dr. Rasmus Andreasen (manager of the MC-ICP-MS). Lapen's graduate students working in the lab include: Barry Shaulis (Ph.D. candidate - studying the U-Pb ages and Hf isotope compositions of detrital zircons from the Ouachita Mountains, TX and OK), Sam Simmons (M.S. candidate - studying the early evolution of the moon by analyzing the Sm-Nd and Lu-Hf isotope compositions of its earliest crust), Jesse Dietderich (M.S. candidate - studying the U-Pb and Pb-Pb ages as well as initial Hf isotope compositions of eucrite meteorites), Daniel Buechmann (M.S. candidate - studying the sediment provenance of the mid-Cretaceous Dunvegan sandstone in western Canada), and Therica Grosshans (M.S. candidate - studying isotopic compositions of martian meteorites).

UH Geologist Looks for Gold in Mountains of Pakistan

Rolando Garcia
College of Natural Sciences and Mathematics

Beneath a remote, mountainous patch of northern Pakistan could sit large deposits of gold, and one University of Houston geologist is using cutting-edge remote sensing technology and analysis to find it.

Shuhab Khan, associate professor of geology, is part of a $370,000 National Academies of Science project to aid in the exploration of an area along the Indus River long believed to contain substantial amounts of gold.

Some in the region eke out a meager living panning for gold - earning less than $100 a year - but no serious exploration or mining has been attempted. The project - announced last November - also includes geologists at the University of Peshawar and is intended to foster U.S. - Pakistan relations through scientific cooperation and economic development.

Khan is tagged with identifying and mapping specific target zones where gold deposits could lie by collecting and analyzing satellite and GIS data to look for rock alteration zones that could signify the presence of gold. Then rock samples will be collected to determine if they contain trace amounts of gold.

Gold deposits typically sit in the shallow subsurface and if found could easily be extracted by mining. It may not be another California gold rush, but Khan believes there are economically significant amounts of gold in the isolated Pakistani highlands where the Hindu Kush and Himalaya mountains converge. The project includes training Pakistani scientists in remote sensing image processing and trace element geochemistry.

The area's gold panners will also be trained in safer, more efficient methods of panning for the glittering nuggets. They currently use primitive tools to sift through the Indus River sands, extracting coarse gold while throwing fine, tiny gold particles back into the river. They also use mercury in the panning process which is causing pollution in the river and groundwater, a problem the project hopes to alleviate.

Finding Diamonds

Department of Earth & Atmospheric Sciences

In their latest research publication in Nature, Dr. **Kevin Burke** and his fellow researchers describe a way that could help improve the odds of finding diamonds by focusing future prospecting in particular areas.

Dr. Burke's team found that kimberlites owe their origin to occasional pulses of hot mantle rock, called mantle plumes, that have risen through the entire thickness of the Earth's mantle from deep down next to the core of the planet. This core lies at a depth of about 2,000 miles. The idea that there might be mantle plumes rising from the core/mantle boundary is not new, but it is only within the past few years that evidence of plumes coming all the way from this boundary to the Earth's surface has been clearly demonstrated by Burke's group.

"Our approach is new, because it combines observations of the Earth's deep interior from seismology with evidence of how tectonic plates have moved about on the Earth's surface during the past 500 million years," Burke said in an interview with Science Daily. "I have been interested in mantle plumes from the core/mantle boundary since they were first hypothesized in 1971. About 10 years ago, I realized there might be a link between the seismically defined structure at the core/mantle boundary and volcanic rocks at the Earth's surface that had been suggested to be linked to mantle plumes. I immediately realized how the existence of that link could be tested, and it was then that I came in contact with Trond Torsvik in Norway, who proved to be uniquely qualified to carry out the required test."

Dr. Burke's team consists of Trond Torsvik of University of Oslo, Bernhard Steinberger of the Helmholtz Centre Potsdam in Germany, and Lew Ashwal and Sue Webb of the University of Witwatersrand in South Africa.

Their work has helped confirm the seismologists' result regarding the present structure of the Earth's mantle, but it also describes the structure as it was in the past, revealing the history of deep mantle structure over the geologically long period of 500 million years. That, Burke said, is new. Ultimately aiming for a better integrated understanding of how the solid Earth's crust and mantle works, the group hopes to obtain further results soon. They hope to better establish how plate motions at the Earth's surface have evolved over the last 500 million years and how to work out just how those movements have related to both the stable and moving parts of the Earth's mantle during the same interval.

Permeability

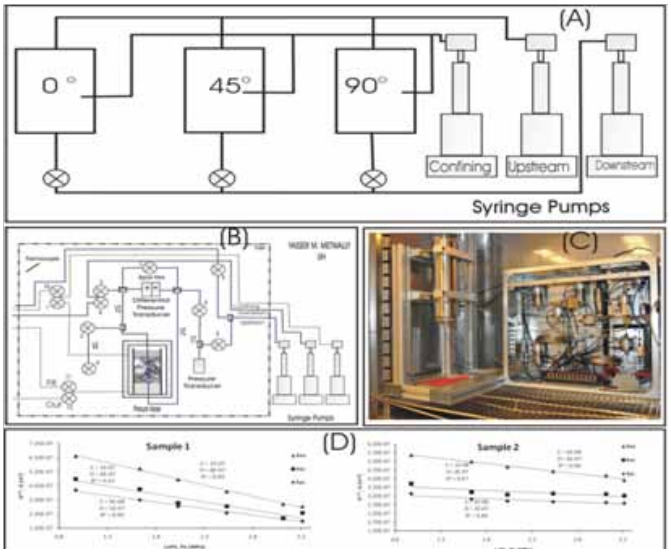
Dr. Evgeny Chesnokov, Professor
Department of Earth and Atmospheric Sciences

Many geo-engineering projects such as mining, tunneling, reservoir productivity, hydraulic-fracturing, and nuclear waste disposal are affected by mechanical and hydraulic properties. Recently, unconventional reservoirs such as gas shales, coal bed methane, and tight-gas sand have become significant producers of domestic natural gas and offer tremendous potential for future gas reserves and production. Recent success in tight-gas shales has renewed interest in understanding gas flow in these reservoirs and how to measure permeability in these tight rocks. For example, increasing the value of a permeability is a goal of hydropumping and, as a consequence, is a generation of microseismic events in a medium. In this case, any approach to estimate the changes of this parameter due to hydropumping is absolutely justified.
In our case, we will make some attempts to measure k_{ij} in laboratory conditions and estimate a coefficient of permeability from the locations of microseismic events. One goal of these investigations is to find the link between two scales: laboratory and field.

Laboratory Measurements
The experimental laboratory allows permeability tensor k_{ij} to be measured and was built at the Institute of Theoretical and Applied Geophysics (Metwally, Chesnokov, 2010). This lab has the capability to measure k_{ij} of tight rock, such as gas and shale, using a custom built apparatus that allows the simultaneous measurements of permeability and effect porosity under the same conditions of confining pressure, pore pressure, and temperature. This apparatus is composed of three hydrostatic pressure vessels that can be pressurized up to 68.95 MPa. Each cell is connected to a common servo-controlled confining pressure system and common downstream pore pressure system. The upstream pore pressures are independently controlled. For optimum temperature control, the pressure vessel and all valves and controllers are placed in an oven that maintains temperature at ± 0.1° C.

In our case, taking into account that we can determine the changes of the microfrack locations with time, we can build the time-space map of the permeability. Moreover, knowing the character of the permeability tensor k_{ij} behavior from the laboratory measurements, we can compare these values with the values obtained from the field data and then predict the direction of max and min value of permeability in a space.

Special mathematical technique and software is developed to find the link between two different scales of permeability estimations: laboratory and field. Thus, the time-space map, showing the changes of permeability is ready to be plotted and analyzed



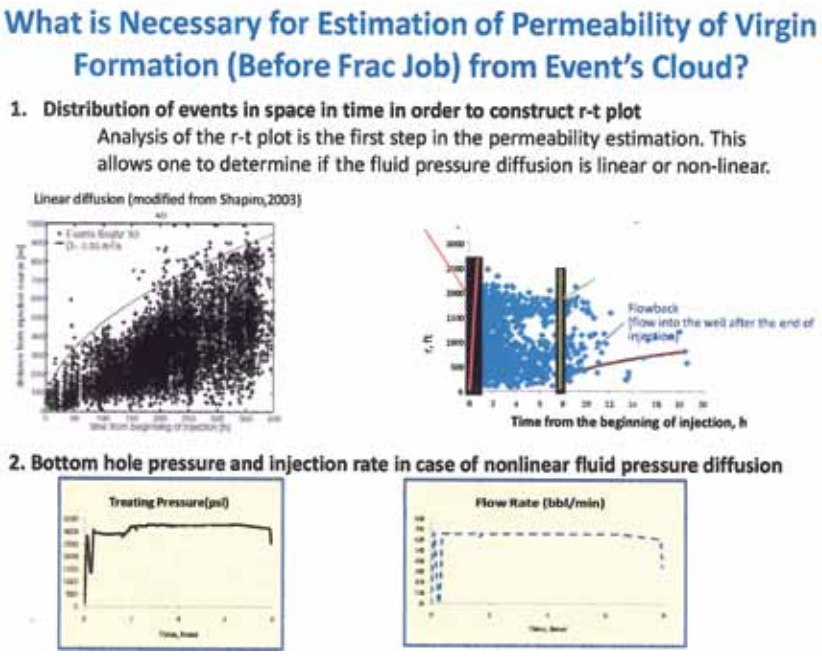


Figure 1 (*above*) (A) Schematic diagram for the whole system, (B) a detailed schematic diagram for one pressure cell, (C) a photograph for one pressure cell inside an oven, and (D) directional dependence of cubic k versus ln(Pe) relationship for two different gas-shales. The fact that slope $k_{xx} > k_{xz} > k_{zz}$ indicates the presence of bedding parallel cracks-like pore.

Second possibility is the estimation of permeability based on locations of microseismic events (Bayuk, et. al., 2009). Scheme of the methodology of the determination of this parameter is briefly shown on **figure 2** (*at left*).

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1. Irina O. Bayuk*, Mike Ammerman, and Evgeny Chesnokov, 2009. Estimation of Shale's Permeability from Microseismicity. SEG, Houston, p.1581-1585

Nitrous Acid (HONO) and its Role in Ambient Air Quality

Bernhard Rappenglueck, Associate Professor
Department of Earth & Atmospheric Sciences

Photochemical processes leading to the formation of secondary species like ozone (O_3) frequently occur in areas where enhanced values of volatile organic compounds (VOC) and nitrogen oxides (NOx) are found. In addition to the chemical environment, meteorological conditions (e.g. intense solar radiation, boundary layer variations, local, and regional flows), influence the formation and distribution of ozone (O_3).

Figure 1 describes in principle the fast reaction cycles involved in the formation of secondary species as well as the removal mechanisms from those cycles for nitrogen and carbon containing species. The hydroxyl radical (OH) is the most important oxidant in the atmosphere and controls the atmospheric lifetimes of most trace gases. OH is produced in photolysis processes of ozone (O_3), formaldehyde (HCHO), and nitrous acid (HONO). OH initiates oxidation reactions with NOx, CO, anthropogenic, and biogenic VOCs. These reactions form peroxy radicals (RO_2) which in turn will cause the conversion of NO to NO_2 and subsequently the formation of O_3. Within the degradation of VOC also carbonyls will be formed which either may be photolyzed (e.g. HCHO) or oxidized by OH and finally contribute to the formation of peroxycarboxylic nitric anhydrides (PANs). Loss mechanisms for OH involve reactions between peroxy radicals leading to hydrogen peroxide (H_2O_2) and organic peroxides, e.g., methyl hydroperoxide (MHP) and hydroxylmethyl hydroperoxide (HMHP), and reactions with NO_2 leading to nitric acid (HNO_3) and PAN.

Nitrous acid, HONO, has long been known as a precursor of OH radicals, however there are still significant uncertainties associated with the formation of HONO, and this has posed challenges to air quality modeling. Apart from gas-phase formation of HONO, it has been shown that HONO is formed through conversion of NO_2 on surfaces with adsorbed water in the dark. HONO can also be emitted from various combustion processes, and emissions from traffic can significantly contribute to observed HONO levels. There are also a number of photo-enhanced heterogeneous reactions currently being discussed as likely daytime HONO sources, among them the photolysis of surface adsorbed nitrate or nitric acid, which is believed to be the main source of HONO in polar regions, and light-induced NO_2 reduction on surface adsorbed humic acid films, as found on soil and other surfaces.

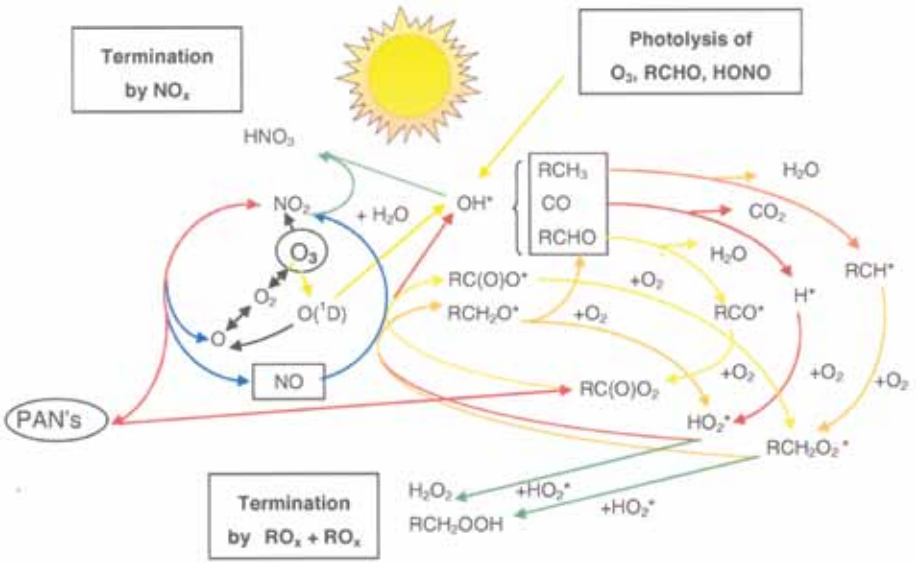


Figure 1 - Daytime photochemical processes

Current research in Rappenglueck's group addresses measurements of HONO in various environments (urban, rural, remote) in intercomparison of HONO measurement techniques and lastly in refining the HONO module in the Community Multiscale Air Quality (CMAQ) Model v4.7.

Urban air quality

In a collaboration with the Universidad de Chile and the Bergische Universität Wuppertal, Germany, we performed a measurement campaign in downtown Santiago de Chile in late November 2009 looking into vertical gradients along a high rising building. Two identical LOPAP (Long Path Absorption Photometry) instruments, together with instrumentation for O_3, NO, and NO_2, were deployed at 6 m and 53 m altitude, and photolysis frequencies were deployed.

Results show that direct emissions can only partly explain high HONO levels in this city. The observed daytime maximum of the HONO/NOx ratio indicates the existence of a strong daytime source of HONO at both altitudes. Thus, it is concluded that HONO is an important OH radical source in Santiago, not only close to the ground surface, but also at higher altitudes (Villena et al., 2010).

Traffic emissions

Funded by the Houston Advanced Research Center (HARC) and the Texas Commission on Environmental Quality (TCEQ), the group set up a trailer in the immediate vicinity of one of the most frequented highway junctions in Houston, Texas and carried out measurements of a wide range of traffic emission related trace gases from July-December 2009, among them HONO. Major interest was to determine HONO emissions in traffic exhaust in order to obtain the most updated and representative input data for air quality modeling (Czader et al., 2010). Surprisingly, only scarce traffic emission data is available for HONO. Most studies have been performed more than a decade ago, and the majority of measurements were obtained in tunnel studies with a significant surface to volume ratio that may have been impacted by heterogeneous NO_2 to HONO conversion on the tunnel walls. Our study revealed a relatively high HONO/NOx ratio, which may indicate a higher fraction of diesel vehicles, such as heavy duty trucks (Rappenglueck et al., 2010a and 2010b). Currently, we try to confirm this observation at a different site in the Houston area and also compare the results to the most current

Figure 2 - HONO measurements at high-rise building in Santiago de Chile at 53 m (lower picture). UH student, Giovanna Croxatto (now at University of Copenhagen) checking the LOPAP system (picture above)

traffic emission model MOVES2010 (Motor Vehicle Emission Simulator) (Rappenglueck et al., 2011). Due to the unusual length of this campaign, almost all group members participated (Sergio Alvarez, Julia Golovko, Luis Ackermann, Richard Fuller, Leonardo Pedemonte).

Rural and remote areas

Rural areas may provide important information about surface sources for HONO. Supported by the Environmental Institute of Houston, my group performed HONO flux measurements at the coastal prairie of the UH Coastal Center in the summer of 2010 using a microtower system equipped with a stepmotor to sample at different levels over the soil. It has been found that during stable atmospheric conditions HONO mixing ratios are closely related to soil NO emissions, most likely due to bacterial denitrification processes in the soil.

During the months of January-March 2010, a field campaign was carried out in the Upper Green River Basin in Wyoming, supported by Meteorological Solutions Inc. with overall funding provided by the Wyoming Department of Environmental Quality. Over the last winter seasons, surprisingly high ozone events have been observed. Our results of the winter season 2010 showed enhanced HONO levels associated with NOx emissions in conjunction with stronger UV radiation due to the higher albedo while snow cover was present. Similar observations have been found previously in polar regions. However, radiation in polar regions are limited, thus also limiting photochemical ozone production. The Upper Green River Basin is the first documented midlatitude location with enhanced photochemical formation of ozone during wintertime. Currently, the group is finalizing this year's winter campaign in Wyoming which started in early January.

HONO intercomparison

The accurate measurement of HONO is critical for the evaluation of the impact of HONO in ambient air quality. During May 2010 my group participated in the FIONA (Formal Intercomparisons of Observations of Nitrous Acid) experiment in the EUPHORE smog chamber in Valencia, Spain. This experiment was funded by the European Union. With 19 participating groups, it was the most comprehensive HONO intercomparison so far. First results will be present at an upcoming conference (Ródenas et al., 2010).

HONO modeling

The final goal of HONO research is to refine air quality modeling so that air quality forecasting, particularly for ozone, can be improved. Drs. Beata Czader and Xiangshang Li, both members of my group, apply and improve chemistry transport models such as CMAQ v4.7 coupled with MM5 or WRF. In order to take advantage of HONO chemistry

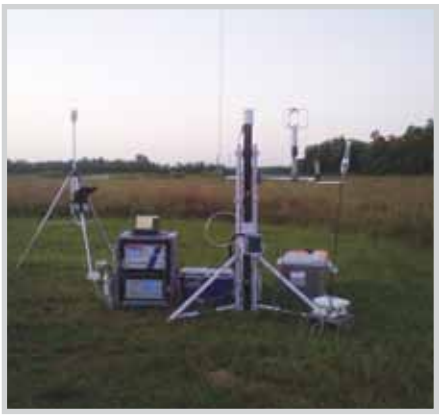


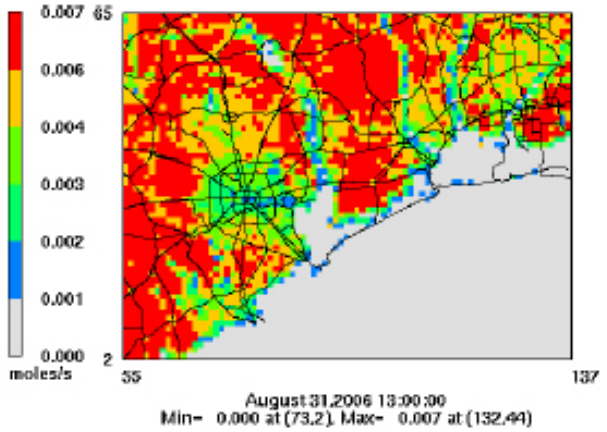
Figure 3 - HONO traffic emission measurements Houston, TX, at Interstate 59 and Loop 610 (in the Houston-Galleria area)

Figure 4 - HONO flux measurement at the UH Coastal Center (above) and during wintertime at Pinedale in the Upper Green River Basin, WY (right)

in CMAQ v4.7, it is necessary to estimate complex parameters for urban surfaces, surface of particles and leaves as well as the overall vegetation fraction. Also, latest findings on HONO traffic emissions and parameterization for the impact of humic acids on HONO formation need to be included. Latest comparison of model data vs observed altitude dependent HONO distribution for Houston show some very good improvement (Czader and Rappenglueck, 2010). Figure 6 shows examples for HONO emissions which are typical for urban (e.g. traffic) and rural (e.g. soil) conditions (Czader et al., 2010).

Figure 5 - FIONA intercomparison in the EUPHORE smog chamber in Valencia, Spain
Left picture above: UH student Giovanna Croxatto together with Dr. Rappenglueck during the experiment in the lab beneath the chamber

Right picture above: chamber open exposed to natural solar irradiation



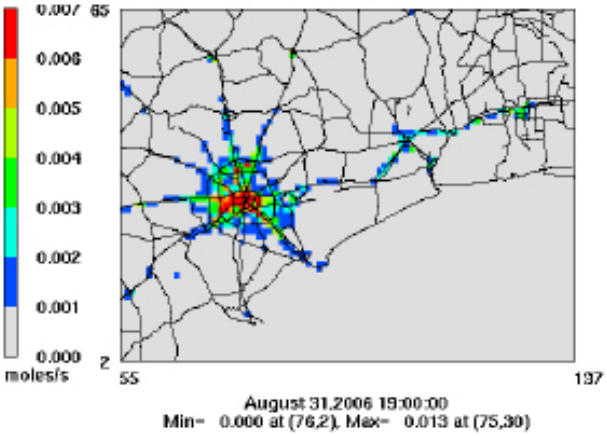


Figure 6 (at left) - Spatial distribution of HONO emissions from traffic (above) and from humic acid (below) in the Houston area

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In the Spotlight: Yuribia Munoz

Department of Earth and Atmospheric Sciences

When Yuribia Munoz started her academic career at the University of Houston as a business major, going to Antarctica on a research expedition was definitely not on her "to-do" list. But, as she soon discovered, life can be full of surprising adventures, and it is her incredible ability to adapt that propels her head and shoulders above others.

Born and raised in a small town in Veracruz, Mexico, Yuribia moved to the United States with her mother and sister in 2000 when she was 16 years old. She attended Pearland High School in Pearland, Texas where she was placed in English as a Second Language courses with non-Spanish speaking teachers. "The only person who spoke Spanish at my school was the Spanish teacher," said Yuribia, "so I had to learn English - quick!" Yuribia graduated from Pearland High School in 2002 and began taking courses at Alvin Community College (ACC). After obtaining her Associate degree from ACC, she moved back to Mexico briefly. In 2006, Yuribia began attending courses at the University of Houston with the intention of majoring in Business and Spanish. She had a change in plan, however, after she attended an introductory geology course with Dr. Michael Murphy. "He was a great professor, and he got me hooked on geology. I started liking it and decided to change my major," said Yuribia. (Dr. Murphy, whom Yuribia credited for igniting her interest in geology, received the UH Provost's Teaching Excellence Award in 2011.)

With a newfound interest in geology, Yuribia made the big decision to change her major. She chose earth science instead of geology, mainly because as a major, earth science would help her retain the maximum number of credits she had accumulated as a Business major. "My interest," she said "is more in geology."

And the faculty of the Department of Earth and Atmospheric Sciences seemed to agree with Yuribia on the big switch. In 2009, while attending Dr. William Dupre's environmental science course, Yuribia performed so well that Dr. Dupre highly recommended her for the British American Foundation of Texas (BAFTX) scholarship. Winning this scholarship was the beginning of the great many things that would happen to Yuribia in the next couple of years.

In the summer of 2009, Yuribia began working for Dr. Julia Wellner in her laboratory. Dr. Wellner was so impressed with Yuribia's abilities that in November 2009, she nominated Yuribia for a spot on the research cruise to Antarctica where Yuribia spent two months conducting research. At this time, Yuribia was still classified as a sophomore/junior in the Earth Science major.

When the Antarctic Peninsula broke up in 2002, it provided an opportunity for the study of physical and biological environment of the former ice shelf. Yuribia and other privileged few were on a research cruiseship headed to Antarctica for this project. The research cruise was funded by the National Science Foundation by a proposal by Dr. Julia Wellner (in a collaborative project) entitled "Abrupt Environmental Change in the Larsen Ice Shelf System, a Multidisciplinary Approach - Marine and Quaternary Geoscience."

Upon coming back to Houston, Yuribia worked hard to catch up. A plan for graduate school was also hatching. Yuribia graduated in the spring of 2011 with a Bachelor of Arts degree in Earth Science. She was accepted into the department's graduate program and now is working on her Master's thesis under the advisement of Dr. Julia Wellner. Her area of research is focused on sedimentation and how it is related to the fauna of the Antarctic. She plans to stay with UH for a Ph.D. degree and, later on, pursue a career in research.

Great news began to flood in as Yuribia started her graduate career. In May, the National Science Foundation announced that Yuribia was one of the only five students from UH to have won the prestigious National Science Foundation Graduate Research Fellowship - which recognizes outstanding students pursuing research-based Master's and doctoral degrees in NSF-supported sciences. The fellowship will provide Yuribia with substantial financial support throughout her graduate years. She is also the proud recipient of the aptly-named "American Dream Fellowship" from the Merage Foundation. She was one of only 10 in the country to have received this scholarship from the Foundation.

This past May, the faculty of the department put their stamp of approval on Yuribia's fine accomplishments by unanimously voting her to be "Houston Geological Society Outstanding Student of 2011." Yuribia has come a long way from Veracruz, Mexico, and she plans to go further still. Planning, of course, as she learned, is a relative word. After all, she never did plan to go to Antarctica.

Image Below: Yuribia Munoz (sitting, second from right) in the ice field.

Platinum Group Elements Laboratory

The Department of Earth and Atmospheric Sciences is home to a new state-of-the-art clean lab for analysis of platinum group elements (PGEs) and osmium isotopes. Within the Platinum Group Element Lab, Dr. Alan Brandon and his group have the capability to extract and purify PGEs from a variety of rocks, ranging from organic-rich shales to meteorites, in order to examine terrestrials and cosmochemical problems. The Os isotopic compositions of these materials are measured on a new thermal ionization mass spectrometer (TIMS). Dr. Brandon's new facility is the centerpiece of a world-class research program working to better understand the behavior of noble metals in terrestrial and extraterrestrial environments. The research is being performed by undergraduate and graduate students, as well as post-doctoral scholars. Current funding for the new facility and individual research projects was obtained from the State of Texas, the National Science Foundation, and the National Aeronautics and Space Agency. Efforts to partner with energy companies in the Houston area for the research problems examined that use measurements of PGEs in shales, are underway.

Multiple-Collector Inductively Coupled Plasma Mass Spectrometry Laboratory

The department has recently acquired a new Nu Instruments Nu Plasma II Multiple-Collector Inductively Coupled Plasma Mass Spectrometer (MC-ICP-MS), equipped with 16 Faraday detectors and 5 ion counting multipliers, that is used to facilitate NASA, NSF, State of Texas, and industry-funded research. This instrumentation was acquired with NSF (PI: Thomas Lapen; Co-PIs: John Casey, Jonathan Snow, and Michael Murphy), NASA (PI: Thomas Lapen), and UH funding. A Photon Machines Analyte.193 excimer laser ablation system (PI: Thomas Lapen) can be coupled with the mass spectrometry for the in situ analysis of solid materials. This equipment can accurately and precisely measure the isotopic compositions of elements across most of the periodic table from Li to the transuranic elements.

AGL's Minivib

Our UH geophysical capability grew considerably with the recent delivery of a vibroseis source truck. The new Industrial Vehicles International T1500 "minivib" has allowed us to undertake a variety of seismic surveys for teaching as well as research. We employed the vibe at our 2011 Geophysics Field Camp in Montana (as shown at left in the Elk Basin oilfield) and were delighted to acquire some excellent multicomponent surface seismic and VSP data. This minivib, with a sweep range of 10Hz - 550 Hz and output force of 6,000 lbs, is particularly effective for near-surface (1000 m depth range) surveys. It is also road and field drivable which greatly expands its reach and efficiency. The vibe and accompanying 240-channel geometrics recording system is allowing us to better educate undergraduate and graduate students in seismic methods. We have a number of projects planned for the vibe, including imaging of salt dome flanks and urban faults and use of ultra-long sweeps.

Geophysics Field Education: Better Learning by Doing

Robert Stewart, Professor
Department of Earth and Atmospheric Sciences

A fascination with natural phenomena, a love of the outdoors, and an interest in using advanced technologies draw many to geophysics. In addition, the soul of an exploration geophysicist will likely harbor an energetic curiosity along with the spirit to search for something valuable. Inherent in this quest and the practice of geophysics is a field survey - with its adventure, camaraderie, and measurements. The survey is usually about imaging the subsurface to discover or define something buried. Geophysicists are thus called to make a contribution toward scientific understanding of the Earth and, via conscientious resource recovery, an improvement in prosperity. Central to this endeavor is making observations and acquiring data.

Rationale for field courses

Kastens et al. (2009) describe the geoscience "community of practice" as characterized by relying on spatial thinking, interpreting observations in terms of intertwined processes, and describing the "raw materials of nature" in symbolic terms (cascades of inscriptions). They note that field experiences provide a sense of scale, introduce concepts of Earth processes, assist in developing the ability to integrate fragmentary information, and give practice in gathering and evaluating the quality of data. More generally, Ray (2009) suggests that "the great worth of outdoor-education programs is their focus on the elements that have always united humankind - driving rain, hardwind, warm sun, forests deep and dark - and the awe and amazement that our Earth inspires" and "campers develop improved cooperation and conversation skills." As is well known, we typically divide applied geophysics into separate realms of acquisition, processing, and interpretation. Naturally, knowledge of each area can help with understandings in another. And actual measurements play a critical role in the formulation and testing of new ideas. So, the practice of our professional community, as well as the demands of the industry attached to it (Whitmeyer and Mogk, 2009), require field exposure and education. Thus, some participation in field acquisition is integral to geophysics.

In the past, some energy companies had their own field crews to undertake surveys, conduct tests, and train employees. But this "in-house" ability has diminished. Other organizations are trying to fill in some of this instructional gap, such as the Summer of Applied Geophysical Experience (SAGE) partnership (Jiracek et al., 2008) and the Canadian Association of Geophysical Contractors and its Seismic in Motion event (Fernando, 2007), along with several universities.

The technical objectives of the field experience includes giving students opportunities to learn to: frame and solve geologic problems via geophysical surveys; organize and undertake actual field surveys; operate geophysical instruments and other equipment; and evaluate/initially assess the quality of data.

YBRA field camp in Montana

The Red Lodge, Montana has a colorful history (visits from Calamity Jane, the Sundance Kid, and Buffalo Bill) as well as remarkable geology. It was the spectacular mountain topography and exposed rock that drew geologists from Princeton University in the 1930s to found geology field camps near Red Lodge (Kauffman, 2008). A permanent camp location, some 5 miles south of Red Lodge, was finally established on the pleasantly wooded slopes of Mount Maurice. Lodge, lecture, and cabin facilities were built in the following years, and ownership of the camp eventually rested with the nonprofit Yellowstone-Bighorn Research Association (YBRA).

Through the subsequent decades, several dozen Ph.D. theses have been produced from the area as well as many hundreds of geology "campers." In 2008, the University of Houston (UH) became the manager of the geology program at the YBRA camp.

Responding to the general absence of geophysics field courses and the compelling opportunity to undertake one at YBRA, we organized the inaugural UH Geophysics Field Camp in the summer of 2009. The 12-day program was convened with 18 undergraduate and graduate students, largely from UH (one Baylor University participant). A number of faculty (including Stuart Hall, Shuhab Khan, Chris Liner, and Rob Stewart from UH and University of Calgary Field School veteran, Joe Wong) led the educational and research efforts.

Geological targets and geophysical activities

We began the school with a geological overview of the Red Lodge area. The region has numerous scientifically and economically interesting targets. We selected several for active surveying sites. The area around the YBRA facility itself had been mapped geologically for many decades, but with little geophysical information. Its nearby subvertical beds and postulated tear faults gave many questions to resolve geophysically. At the base of the lodge road and toward Red Lodge are several glacial outflow deposits (benches). Local geoscientists asked us to estimate their thicknesses. The road up to a nearby ski resort showed a number of interesting intrusives as well as partially obscured culverts and drainage pipes. We were also invited to survey the Mother's Day

Quarry (to explore for sauropod dinosaur bones). Additionally, Encore Energy group, which operates the Elk Basin oil field (producing about 4500b/d), gave permission to undertake surveys over the field. The field's enhanced recovery operations are particularly challenged by deeper faults as its reservoirs undergo water flooding.

The geophysical methods that we employed included: positional line surveying using GPS technologies; multicomponent seismic refraction and reflection (using an accelerated weight drop source and planted geophones, plus 3-C land streamers); ground-penetrating radar (GPR); and gravity and magnetic surveys. We conducted well-log measurements (using gamma-ray, sonic, resistivity, and temperature tools) and vertical seismic profiles. Daily meetings and procedures put an emphasis on safety.

We divided the students into four groups of 4 - 5 each, because small groups are essential to give each student adequate attention and opportunity to use the instruments. A day was dedicated to each technique. Each task was performed by all students. Because many students will ultimately be employed in the energy industry (whose primary technique is seismic), we had several activities dedicated to this method.

Evaluation
Each day ended with a debriefing on its activities, experimental procedures, equipment used, data acquired (with their quality, meaning, and analysis). The subsequent dinner hour was always welcome. In the evening, the students would prepare a five-slide PowerPoint presentation on their photos, observations, and results which would be reviewed and graded that night, providing immediately assessment and response. A student's final grade was an average of each day's evaluation (the students themselves were also encouraged to review the course in detail). The course gave participants three university credits.

While the camp days and evenings were full, there was some scheduled time for a break. The midpoint of the camp was a free day for laundry, provisions, and reconnoitering additional sites. That evening we attended the locally famous pig races at the Bear Creek Saloon and Steakhouse. The pigs run around a short oval (in quest of food at the end). One of our group picked a winning pig and won $25!

Summary
A significant and exciting part of geophysics is its data acquisition (survey design, instrument, and measurements). As such, a complete education includes geophysical measurement and field surveying. Field camps play a role in allowing students to better understand the techniques of subsurface imaging. Our inaugural field camp at the YBRA facility near Red Lodge introduced students to a wide variety of geophysical measurements and data. All students and faculty had an edifying time and we'll look forward to the next year!

*The 2012 Geophysics Field Camp will run from July 29 to August 9.

Underwater Expedition

Dr. Jonathan Snow led (as co-chief scientist) a research expedition on R/V Yokosuka with the Japanese research agency JAMSTEC. He joined a joint US-Japan expedition to study the ocean floor in the Western Pacific between Guam and the Philippines, an area known as Godzilla Megamullion. Snow and postdoctoral researcher, Wendy Nelson, dove into the research of submersible Shinkai 6500 to depths up to 5700 meters (~19,000 ft). Also participating was Matthew Loocke, a UH undergraduate senior.

2009 Gala & Alumni Reunion

On October 24, 2009, the Department of Earth and Atmospheric Sciences held its very first Alumni Reunion and a fundraising event to benefit the students of UH-YBRA Field Camp programs at the Houston Museum of Natural Sciences. At the event, the department also awarded its first Distinguished Alumni Award to William (Bill) A. Berggren for his achievement and contributions to the science of geology and to the field of paleontology.

The event had successfully raised over $30,000 which was used to establish a permanent fund to assist with the operation of field camp, and provide field camp scholarships to deserving students. We thank those who have attended the event and who have generously given to this worthy cause.

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(01) Distinguished Alumni Award recipient William A. Berggren ('57)
(02) Left to right: Mike Murphy, Beth Murphy, Cindy Bhattacharya, Janok Bhattacharya, Ekaterina Casey ('95), Marie-Pierre Aubry
(03) Left to right: Andrea Quintanilla ('05), Angel Callejon ('06), David Rajmon ('03), Rachel Sissenwein ('05)
(04) Left to right: John Ceron, Hector Alfonso-Acero ('00), Angel Callejon ('06), Alejandro Sanchez
(05) Dr. and Mrs. Robert and Margaret Sheriff

(6)

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(06) Left to right: Jacques & Nancy Leveille, Cheri & Steve Checkles ('88), Lisa Buckner ('91). Back row (left to right): Tamra Beauboeuf, Dr. Stuart Hall, Grigoryi Perov ('09), Dr. Adry Bissada
(07) Steve Naruk and Dr. Henry Chafetz
(08) Left to right: Sherry & Richard Lane ('88), Dr. John Bear
(09) Left to right: Dr. Anne Peslier, Dr. Alan Brandon, Dr. Thomas Lapen
(10) Dr. Bill Dupre and Dr. Peter Copeland
(11) Marilyn & Billie Long ('74)
(12) Dr. Chris Liner & Dolores Proubasta


(13)


(14)


(15)


(16)


(17)

(13) Dr. Michael Murphy and Savci Gultekin ('88)
(14) Penelope Parr ('02) & David Meaux ('89)
(15) Raj Eti ('04)
(16) Left to right: Charles Puryear ('06), Joaquin Owens ('08), Don van Nieuwenhuise ('77), Tom Baltz ('09), Adrian Gittens ('08), Barry Shaulis ('10)
(17) Dr. Shuhab Khan, Eleanor Cozier-Abdulah ('94) and Ken Abdulah

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Department Activities

2010 Department Picnic

On Saturday, April 17, 2010, the department held its annual picnic at Hermann Park (Houston, Texas). We also helped celebrate Dr. Robert Sheriff's 88th birthday. The events drew close to 100 students, faculty, and staff members.
Picture: (front row, from left) Vanessa Lobo, Shannon Leblanc, Cecilia Ramirez, Arkadiusz Turolski, Dr. Robert Sheriff, Mrs. Margaret Sheriff, Miguel Silva, Dr. Hank Chafetz and Dr. Mike Murphy (and daughter)

2010 R.E. Sheriff Lecture

Each year at the Sheriff Lecture, UH graduate students present to the Houston scientific community the products of their works. Winners of the competition receive travel awards from the department which can be used toward their travels to scientific conferences. The winners of the 2010 Sheriff Lecture (held on November 15, 2010; Speaker: Dr. John Walsh, University of Dublin) are: Kimberly Mead (tier 1 winner), Soumya Roy (tier 2 winner) and Duan Li (tier 3 winner). Congratulations to all our winners! (With special thanks to **Swift Energy** for sponsoring student registrations at this event).
Picture: (from left) Justin van der Brink (Chair, HGS International Group), Duan Li, Soumya Roy, Kimberly Mead, Duane Pierce (UH alum) and Al Danforth (HGS International Group)

Research Day 2010

Keeping up with tradition, the department hosted its Annual Research Day on April 16, 2010 with competitions in oral presentations and posters throughout the day. The Scholarships and Awards Ceremony followed in the afternoon, and we ended the day at the Annual Alumni Get Together at the Mucky Duck. *Below picture: faculty and 2010 graduating class on the front steps of Science and Research Bldg. 1*

UH at the 2011 SEG

When the Society of Exploration Geophysicists International Exposition and 81st Annual Meeting came to San Antonio, Texas this year (September 18 - 23, 2011), the UH department of Earth and Atmospheric Sciences was represented (by way of Allied Geophysical Laboratory or AGL) by faculty, staff, and students at booth number 3755. Students presented a number of posters and talks. Information about AGL and the department were widely disseminated. Dr. Robert Stewart, AGL's director, declared the conference a great success!

Back row, from left: Nikolay Dyaur (and spouse), Penny Maher, Ady Geda, Robert Stewart, Daisy Huang, Anna Khadeeva, Johnny Seales, Jintan Li, Tim Brown.
Front row, from left: Anthony Torlucci, Emrah Pacal, Soumya Roy, Jose Sierra

2011 Annual Mucky Duck Alumni Get Together

Who will you see again at the Mucky Duck this year? Don't forget the department's annual Mucky Duck Day which usually happens on the last Friday of April. Visit *www.geosc.uh.edu* for announcement of the date.

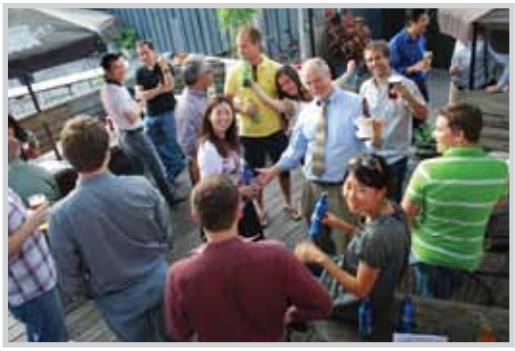
(1) From left: Leslie and Alan Wong, Lisa Buckner and Dr. Kevin Burke
(2) Dale Bird and Martin Cassidy battling at chess
(3) From left: Edip Baysal and Dr. Hilterman
(4) Dr. Hank Chafetz with Christie Gell (holding a wallet she had lost during her undergraduate years, and which was found just days before this year's Mucky Duck!).
(5) Dr. Liner (in blue shirt and tie) sharing a good cheers with his students
(6) From left: Dan Garza, Don Tomlinson, Kristian Joseph and Adrian Gittens


(1)

(2)


(3)


(4)


(5)


(6)

Student Scholarships and Awards

Whether making a direct donation, funding an endowment, or acting as a liaison for the department within their own companies, geosciences alumni made a big difference in the way we support our students and our academic programs. In 2010, financial supports from corporations and individuals enabled us to offer $75,747 in scholarships to deserving students. These are some of the students who benefited from your generosity, and, on their behalf, we thank you.

2010 - 2011 Scholarship Recipients

Soumya Roy
Susan Greene
Jeremy King
Joseph Jackson
Kelly Heyt
Eray Kocel
Jeremy Krimmel
Doyle Adams
Yingqian Xong
Barry Shaulis
Kellen Springer
Shams Ul-Hadi
Daniel Imrecke
Azizuddin Abdul Aziz
Xin Wan
Arkadiusz Turolski
Ammar Alali
John Epps
Chunbi Jiang
Tania Mukherjee
Ayato Kato
Donald Tomlinson
Dan Garza
Jarratt Kelso
Jingqian Wang
Joel Adebayo
Raymond Straka
Cindy Au
David Wearden
Therica Grosshans
Tommy Ringo
John Lebas, III
Ismail Ahmad Abir
Osama Al Nasery
Ashley Thackeray
Victor Attah
Amanda Hays
Kevin Foto
Megan Cook
Samuel Simmons
Daniel Buechmann
Jeremy Slaugenwhite
Elizabeth Busch
Janelly Saldana
Denet Pernia
Tommy Ringo
Raul Benavidez
Veronica Sanchez
Yuribia Munoz
Rui Zhang
Dan Coleff
Aziz Ozyavas
Gabriel Gil
Alex Barnard
Dip Nanda
Johnny Seales
Lillian Schaffer
Therica Grosshans
Khalid Aljoaib
Syed Omar Zaman
Ander Kerekgyarto

2011-2012 Scholarship Recipients

Anna Khadeeva
Eric Faul
Hasan Garadaghi
Yanet Cuddus
Gustavo Lopez
James Trammell
Dustin Villarreal
Alicia Staszyc
Yuribia Munoz
Shenelle Gomez
Andrew Welch
Lillian Schaffer
Kirirotha Um
Rino Manangkalangi
Sura Karralli
Mousaab Dalu
Tian Xu
Robert Torres
Kumar Sharma
Mohammed Abu Alreesh
James Stutz
Daniel Buechmann
Calvin Silver
John Lebas
Samuel Simmons
Shams Ul-Hadi
Denet Pernia
Daniel Imrecke
Oyebode Famubode
Jeremy Slaugenwhite
Mingyong Chen
Lun Li
Hua Yu
Soumya Roy
Luanxiao Zhao
Chunbi Jiang
Dong Liu
Tania Mukherjee
Tommy Ringo
Casey Snyder
Veronica Sanchez
Jinqian Wang
Xin Lan
Maryam Nasizadeh
Andrew Welch
Yuribia Munoz
Raymond Straka
Therica Grosshans
Ammar Alali
Soumya Roy
Deborah Bradley
Lorenzo Izarra
Tim Brown
Yangyang Li
Matt Loocke

Students accepting scholarships and awards on Research Day. From left: Denet Pernia, Therica Grosshans, Oyebode Famubode, Yuribia Munoz (with alumnus David Meaux)

Congratulations!

These are the graduates of 2010 and 2011. Many of our students have also decided to pursue an advanced degree in geology, geophysics, and atmospheric sciences. To those who are about to begin their graduate student careers - congratulations, and good luck!

2010 Graduates

David Fonseca, B.A., Earth Science
Jonathan Weiss, B.S., Environmental Science
Blake Austin, B.S. Geology
Daniel Buechmann, B.S., Geology
John Le Bas, B.S., Geology
Denet Pernia, B.S., Geology
Ismail Ahmad Abir, B.S., Geophysics
Nicholas Brooks, B.S., Geophysics
Marc Taylor, M.S., Atmospheric Science
Paul Davis, M.S., Geology
Barry Shaulis, M.S., Geology
Kellen Springer, M.S., Geology
Amelia Wright, M.S., Geology
Jiannina Bastidas, M.S., Geophysics
Heather King, M.S., Geophysics
Gabriel Gil, M.S., Geophysics
Kenny Lew, M.S., Geophysics
Shuqin Ma, M.S., Geophysics
Krista Mondelli, M.S., Geophysics
Maria Brito, M.S., Geophysics
Oluwaseyi Fatoke, Ph.D., Geology
Xuan Guo, Ph.D., Geology
Damayanti Mukherjee, Ph.D., Geology
Aziz Ozyavas, Ph.D., Geology
Ana Petrovic, Ph.D., Geology
Sergio Sarmiento, Ph.D., Geology
Yijie Zhu, Ph.D., Geology
Ayato Kato, Ph.D., Geophysics
Maria Rojas, Ph.D., Geophysics
Rui Zhang, Ph.D., Geophysics

2011 Graduates

Prentice Higley, B.A., Earth Science
Yuribia Munoz, B.A., Earth Science
Allan Brown, B.A., Environmental Sciences
Natalie Ferrari, B.A., Environmental Sciences
Abdulaziz Al-Noaim, B.S., Geology
Victor Attah, B.S., Geology
Duarte DeCarvalho, B.S., Geology
Therica Grosshans, B.S., Geology
Maiwenn Nguyen, B.S., Geology
Kyle Vidock, B.S., Geology
Ammar Alali, B.S., Geophysics
Ezzeden Alfataiergei, B.S., Geophysics
Kaitlin DeBoer, B.S., Geophysics
Rino Manangkalangi, B.S., Geophysics
Janelly Saldana, B.S., Geophysics
Brett Sellers, B.S., Geophysics
Doyle Adams, M.S., Geology
Sumiyyah Ahmed, M.S., Geology
Carmen Dragoi, M.S., Geology
Laurin Hardin, M.S., Geology
Michael LoParco, M.S., Geology
Joaquin Owens, M.S., Geology
Leigh Owens, M.S., Geology
Shawn Wright, M.S., Geology
Yekaterina Akhmetzhanova, M.S., Geophysics
Elmira Chabyshova, M.S., Geophysics
Wendy Church, M.S., Geophysics
Bryan Flynn, M.S., Geophysics
Jingqiu Huang, M.S., Geophysics
Craig Hyslop, M.S., Geophysics
Shannon LeBlanc, M.S., Geophysics
Lauren Rod, M.S., Geophysics
Veronica Sanchez, Ph.D., Geology
Yingqian Xiong, Ph.D., Geology
Ching-Wen Chen, Ph.D., Geophysics
Christine Haman, Ph.D., Atmospheric Science

Staying in Touch

More here than in any other academic discipline, geosciences students forged and strengthened their camaraderie within the classrooms and in the fields (especially in those month-long summer field camp programs). Lifelong friendships are created and nurtured among geoscientists - and it all started with that first field trip.

Please help us create a strong UH geosciences alumni community. Come back and visit us (on campus or on our website at *www.geosc.uh.edu*). To update your contact information, please call (713) 743-3402.

Thank you! The following corporations, alumni and friends have made generous donations to the Department of Earth & Atmospheric Sciences in the past two years. We thank you for your support which has contributed substantially to activities and to the quality of our teaching and research. We hope you will continue to support us in our mission to educate the next generation of geoscientists.

AAPG
Eleanor Cozier ('94) & Ken Abdulah
Richard Abrahams ('58)
Peggy ('09) & David Alderman
Anadarko Petroleum Corporation
Darrell Anderson ('10)
Mr. & Mrs. W. M. Anderson
Barbara Barnes ('83)
Randall Barta ('76)
Richard Beaubouef ('93)
Janok & Cyndy Bhattacharya
Bird Geophysical
Thomas Bjorklund ('02)
Debra Bones ('82)
BP America
Verna Ray ('78) and Dan Breaux ('74)
Larry Briggs ('74)
Ronald Brink ('87)
British American Foundation of Texas
Lisa Buckner ('91)
David Burge ('89)
Brian Cardner ('07)
John & Ekaterina Casey ('95)
Martin Cassidy ('05)
John Castagna
Chevron Corp.
Janet Combs
ConocoPhillips
Edward Crase ('89)
Bridget Day ('08)
Devon Energy
William & Elaine Dupre
Rajendra Eti ('04)
Ian and Joyce Evans
ExxonMobil
Christianne Gell ('99)
Mark Gordon
Sean Guidry ('01)
Hess Corporation
Fred Hilterman
Philip Inderwiesen ('87)
Mr. & Mrs. John Kelsey
Ronald Kleist
Sam & Ann Koster
Jayakrishnan Krishnan
Lisa Leighton ('86)
Mr. & Mrs. George Milton Liese ('71)
Jianlei Liu (('71)
Billie ('74) & Marilyn Long
Karen Love ('90)
Mr. & Mrs. Jeffrey Lund ('73)
Marathon
Duane Moredock ('63)
Steve Naruk
Newfield Exploration Company
Patrick Yuchung Ng
Carl Norman
Mr. & Mrs. William Owens ('74)
Petroleum Geo-Services (PGS)
Dianna Phu ('00)
Rebecca Pugh ('69)
Andrea Quintanilla ('05)
Joe Rayzor ('51)
Haitao Ren ('08)
David Richard ('72)
Gary Robinson ('92)
Gultekin Savci ('88)
Schlumberger Technology Corp.
Randall Schott ('67)
Shell Oil Company
Virginia Sisson and Will Maze
William Spencer ('56)
Statoil
Swift Energy
Leon Thomsen
Don van Nieuwenhuise
Richard & Claudia Verm ('83)
Douglas Weber ('88)
Julia and Robert Wellner
Susan Lock Williams ('86)
Russell Wilson ('00)
Alan Wong ('91)

Ways to Give

Donations to the department are being used in the most conservative ways in support of departmental operations and activities. Your donations help bring in weekly seminar speakers, acquire field equipments, support field trips, and create student scholarships. Recently, from funds raised at the 2009 gala, we have established an endowment which is designated for the support of our UH-YBRA Summer Field Camp programs.

The simplest way to give is to contribute to the Department's Annual Fund which the department chair will use at his discretion for the benefit of the department. However, you may also direct your donations to be used for a specific purpose. You may select to support one of the several existing endowments we have in the department, create your own scholarship endowment or include us in your estate planning.

Whatever way you contribute, the most efficient way to do so is to send your donations directly to the department (312 Science & Research Bldg 1, Houston, Texas 77204-5007) to the attention of the Department Chair, with a note directing us how to use it. Please call us at (713) 743-3402 with any question you might have or direct your question to Dr. John Casey at *jfcasey@uh.edu*.

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