

College of Earth, Ocean, and Atmospheric Sciences

ACADEMIC REPORT FOR 2012-2013

2012-13 CEOAS Programmatic Achievements

1. Key Initiatives and Noteworthy Outcomes

a. Student engagement and success

- *Addressing increasing graduate student body.* The college currently offers four graduate degrees: Ocean, Earth, and Atmospheric Sciences, Geography, Geology and Marine Resource Management. Over 200 graduate students participate in our programs, and the CEOAS Student Services office is developing a uniform and consistent process for delivering quality service to our faculty, staff and students.
- *Graduate Student Productivity:* This is measured annually using a progress reporting process performed by students and their advisors. Information collected to measure productivity includes scholarship details, presenting material at conferences and contributing to research papers. The results indicate that students are actively involved in presenting and publishing their research. Efforts to increase student participation through increasing travel awards and communication training to improve presentation skills are working. At present, 88% of graduate students participated in a professional conference with 54% invited to make a formal presentation.
- *Heceta Head Coastal Conference:* CEOAS provided registration support for 20 graduate students to participate in bringing current ocean science and policy to Oregonians.
- *Student Assessment:* Results indicates further efforts are needed to preparing graduate students in writing and communicating their science as well as preparing early for their career. CEOAS's Director of Student Development works with each student individually in preparing for their career, including skill development, coaching, and alumni networking.
- *Improved graduate recruitment:* CEOAS Student Services pays special attention to the recruitment process and working with faculty to understand best practices and to ensure incoming students know whom they are working with, what they are working on and how that relates to the cost of their education.
- *Development of new and successful undergraduate programs:* Undergraduate programs are successful; about 500 students enroll in the Earth Sciences and in the Environmental Sciences majors. Enrollment in the still-new Earth Sciences major is strong, with enrollment slightly outpacing decline in majors owing to graduation of students in terminated degree tracks. A new Ocean Sciences option in Earth Sciences

has been developed and will be formally approved next year. The undergraduate GIS Certificate has become the largest certificate program on campus.

- *Building an undergraduate cohort:* A new Fall orientation hike for undergraduate majors has been implemented and was successful in fostering a sense of community for the Environmental Science students, who owing to the interdisciplinary nature of the degree have lacked an academic home. The OSU GeoClub, hosted by CEOAS, has recruited across the college and is the nucleus of an active and engaged undergraduate community. The club trip to Costa Rica was strongly supported by the college and alumni.
- *Visibility through undergraduate ambassadors:* CEOAS has initiated an undergraduate ambassador program modeled on that of the College of Science. Our 4 ambassadors have participated in a range of recruiting and outreach events.
- *Supporting undergraduates:* CEOAS has established 10 new scholarships for undergraduate students and has been actively and successfully recruiting among alumni to create undergraduate scholarships.
- *Undergraduate research and experiential learning:* CEOAS has a new internship and research coordinator to connect students to professional experience. The college offers modest undergraduate research awards. In collaboration with the Hatfield Marine Science Center, CEOAS has received nearly a million dollars in funds to continue the Research Experience for Undergraduates (REU) program for 5 more years.
- *Survey of student satisfaction:* Our first survey of graduating undergraduate students showed that most students graduated within 2-3 years of beginning the programs (over half of majors transferring into our programs after starting at OSU or a partner community college). They were very satisfied with their experiential learning opportunities and over $\frac{3}{4}$ of the graduates were confident in their preparation for a career.

b. Research and its impact

Some selected CEOAS research contributions.

- **Over 2000 research publications are now in Scholars Archive.** College faculty have been supportive of our open access policy for research publications, which will soon be mandated for most federally-supported research. In the last year, over 100,000 downloads were initiated for CEOAS faculty publications.
- **The sounds of science: Melting of iceberg creates surprising ocean din.** A new study has found that the mere drifting of an iceberg from near Antarctica to warmer ocean waters produces startling levels of noise. <http://bit.ly/13QXnpF>

- **Ocean acidification killing oysters by inhibiting shell formation.** Water high in carbon dioxide altering shell formation rates, energy usage and the growth and survival of the young oysters. <http://bit.ly/12KZoB5>
- **Researchers document acceleration of ocean denitrification during deglaciation.** As ice sheets melted during the deglaciation of the last ice age and global oceans warmed, oceanic oxygen levels decreased and “denitrification” accelerated by 30 to 120 percent, creating oxygen-poor marine regions and throwing the oceanic nitrogen cycle off balance. <http://bit.ly/18qjuVz>
- **New study traces origin of cirrus clouds primarily to mineral dust and metals.** Cirrus clouds cover as much as one-third of the Earth and play an important role in global climate. <http://bit.ly/13Kdlxv>
- **Rethinking Yellowstone.** The hotspot theory gets a makeover from the emerging science of magnetotellurics. <http://bit.ly/15LqXsf>
- **Reconstruction of temperature history shows significance of recent warming.** Using data from 73 sites around the world, scientists have been able to reconstruct Earth’s temperature history back to the end of the last Ice Age, revealing that the planet today is warmer than it has been during 70 to 80 percent of the time over the last 11,300 years. <http://bit.ly/13QSRy4>
- **Climate change impact on stream flow differs according to location.** Climate change will have the greatest impact on summer stream flows in large, snow-fed rivers that originate in the high Cascades and other mountain ranges. <http://bit.ly/13mRcqi>
- **National Science Foundation selects OSU to lead project rejuvenating U.S. research fleet.** OSU initially will receive nearly \$3 million to coordinate the design phase of the project – and if funds are appropriated for all three vessels, the total grant is projected to reach \$290 million over 10 years. <http://bit.ly/12XWMMz>
- **Scientists underestimated potential for Tohoku quake.** Earthquake scientists are going back to the proverbial drawing board and admitting that existing predictive models looking at maximum earthquake size are no longer valid. <http://bit.ly/17nURUY>
- **Study finds prey density more important to predators than biomass.** The findings are particularly important because almost all fisheries management is based on biomass – tons of fish – and not how those fish may be distributed in the sea. <http://bit.ly/15Low9d>
- **New study finds major differences in motions of volcanic ‘hotspots.’** A new study by Anthony Koppers that analyzes the Louisville hotspot in the southern Pacific Ocean found very little drift of its mantle plume, suggesting it is moving independently of its Hawaiian counterpart, and not as part of a large-scale mantle wind. <http://bit.ly/1dHjGgc>

- **Study: High stream temperatures, low flow creating extreme conditions.** The study, with coauthor Mohammad Safeeq, notes that conditions in many Northwest streams could negatively affect fish and other organisms. <http://bit.ly/1bs9MCg>
- **Breathing underwater.** The fish Lorenzo Ciannelli collects are analyzed in multiple ways to help him build new understanding about the effects of hypoxia, the reduction of dissolved oxygen in aquatic environments that often occurs as a result of pollution. <http://bit.ly/18mTQNP>
- **Contributing to the Mars Mission.** Martin Fisk is examining NASA images for signs that Mars may be habitable to life. Jeff Barnes and Dan Tyler contributed expertise in the Martian atmosphere for planning the landing. Shan de Silva's work in Argentina's Puna region provides geologists with Martian analog. <http://bit.ly/120d6Bt>
- **OSU to lead project exploring ocean's response to increasing acidification.** A West Coast network of researchers has received a grant of nearly \$1.1 million from the National Science Foundation to analyze the ecological and biological response to ocean acidification in the California Current System. <http://bit.ly/151KdTn>
- **13-year Cascadia study complete—and earthquake risk looms large.** A comprehensive analysis of the Cascadia Subduction Zone off the Pacific Northwest coast, with lead author Chris Goldfinger, confirms that the region has had numerous earthquakes over the past 10,000 years and concludes that there is a 40 percent chance of a major earthquake in the Coos Bay, Ore., region during the next 50 years that could approach the intensity of the Tohoku quake that devastated Japan in March of 2011. <http://bit.ly/14ine8N> <http://bit.ly/16LDCuk>

c. ***Outreach and engagement***

- *CEOAS Advisory Board:* The college has extended the former Geosciences Advisory Board to include members who graduated from the Environmental Sciences and Marine Resource Management programs. We expect to add alumni representatives from the Ocean/Earth/Atmosphere program this year. The Board meets twice per year in Corvallis and provides insight and advice on our education programs and employment opportunities for our students (both undergraduate and graduate). Several Board members are also active contributors to our scholarship programs.
- *Oregon Salmon Bowl:* CEOAS hosted the 15th annual event held on the OSU campus. Sixteen teams from Northwest high schools competed to represent the region in the National Ocean Sciences Bowl in Washington, D.C. Neah-Kah-Nie from Rockaway Beach, Oregon, placed fourth at the two-day final national competition. About 100 volunteers, including faculty, staff and students helped host the OSU event.

- *2013 OSU Day at the Capital*: CEOAS participated by sending student volunteers and faculty as well as hosted an outreach booth.
- *Da Vinci Days 2013*: CEOAS hosted a booth and faculty volunteer as presenters. CEOAS also hosted an Alumni Open House on Friday afternoon. The “model volcano explosion” (developed by students and staff) was used to start the Kinetic Sculpture Parade. Several CEOAS researchers were invited by festival organizers to give science presentations, which were recorded and made available online.
 - Jack Barth: “Ocean Exploration with Underwater Gliders”
 - Marty Fisk: “Curiosity on Mars: NASA’s search for habitable environments”
 - Andrew Thurber: “Life in the Polar Ocean”
- *OSU’s Inspiration Dissemination Radio Show*. CEOAS students continue to participate as another opportunity to develop communication skills.

d. Community and diversity

- *Outreach to community colleges*: In the US 50% of the college population is in the community college system. Between 60 and 75% of these students never transfer into a four-year institution. Doing outreach at community college is an opportunity to communicate our science to an under-served population and enhance student engagement in the post-secondary environment. Several CEOAS graduate students have participated in this program
- *CEOAS Day of Service*: Honoring Martin Luther King, Jr. Day included faculty, staff, and student participation in three volunteer efforts: Chintimini Wildlife Center clean-up and painting; Children’s Farm Home move into their newly renovated Old School; and City of Corvallis Parks and Recreation improving Martin Luther King Jr. Park.
- *SOLV Spring Oregon Beach Cleanup*: CEOAS volunteers headed to South Beach to take part in the clean up effort.
- *Promoting diversity for undergraduates*: The college promotes diversity through engagement of students in IDES (Increasing Diversity in Earth Sciences), a grant funded by the National Science Foundation. IDES brings community college students from underrepresented groups to campus and provides faculty mentors to work on specific research projects.
- *Building community*: The college is now hosting several social events (an end-of-the-year student awards BBQ, graduation reception, GeoDay, etc.) that bring together faculty, students, and staff.

2. Brief Assessment of unit’s efforts

The vision of CEOAS is:

The College of Earth, Ocean, and Atmospheric Sciences will provide, to Oregon and the world, leadership in observation and understanding of the past, present, and future Earth. The college will have nationally recognized undergraduate and graduate programs in Earth, ocean,

atmospheric and environmental sciences; excellence in Earth-, ocean-, and atmospheric-science research in support of society's natural scientists, educators, and resource managers; and leadership and outreach to the public and local, state, national and global stakeholders.

The new college is a leader at the national level in education and research on the components of the Earth system and their interactions. We continue to hire and mentor new faculty, and our institutional postdoctoral researcher program continues to be successful. We have developed new educational programs that focus on the Earth system and also provide research and internship opportunities at the undergraduate level. We are working with other units to integrate the wide range of environmental undergraduate and graduate degree programs.

We continue to make improvements in our physical infrastructure. We completed the Ocean Observing Center in south Corvallis. We operate R/V *Oceanus* on behalf of the National Science Foundation. NSF has stated their intent for the *Oceanus* to be in service through at least 2020, providing research and educational support. Working with OSU Legislative Affairs and the Research Office, we were successful in obtaining funding for ship support from the State of Oregon. We are upgrading labs and offices on the fifth floor of Weniger, and we are now preparing for substantial changes to our space in Strand Ag, beginning in 2014. Our tentative plan is that Strand will provide home to many of our educational activities and programs.

3. Faculty and student awards

Major national awards for faculty members include the following.

- *Oregon State University's Natural Resources Leadership Academy* won the Best Credit Program and the Best Overall Program awards at the Western Association of Summer Session Administrators conference in San Diego last week. The Steering Team members were Rebecca Badger, *Lynette de Silva*, Jessica DuPont, Chris LaBelle, Maurine Powell, Lisa Templeton, *Aaron Wolf* and Claire Cross.
- The Association of American Geographers Council has selected *Dawn Wright* to receive the Distinguished Teaching Honors of the Association of American Geographers for 2013.
- *Michael E. Campana* served as the Consulting Editor for the March 2013 "Water Is Life" issue of *Odyssey Magazine*, a science publication for children ages 10-16.
- *Aaron Wolf* is the recipient of the Monito del Giardino environmental award for 2013. This international award is conferred to those "who have distinguished themselves at an international level in safeguarding the natural balance of the planet." This award recognizes his work on behalf of a more democratic access to water sources. The value of his work has come to be recognized on the world stage, especially in areas where water is at the center of the geopolitical scene, such as in the Middle East. Previous recipients include Jane Goodall.
- *Jack Barth* was selected as the 2013 Fellow of The Oceanography Society. Barth is recognized for his "contributions and sustained leadership in all aspects of continental shelf oceanography, and for his commitment to community service."

- *Marta Torres* and *Andrew Meigs* were named 2013 Fellows of the Geological Society of America. The award recognizes Torres' seminal contribution to the study of convergent and transform margins, utilizing geochemistry as a tool for discerning fluid flow, authigenic mineral formation, gas hydrate processes, and global geochemical fluxes. Meigs was recognized for his "generous contribution of thoughtfulness and time to sustain a university and professional organization and his research on the interplay of rock uplift, erosion, and climate change, started well before this research was identified as a transformative science."
- *Marta Torres* was made a Fellow of the Hanse-Wissenschaftskolleg in Germany, which promotes interdisciplinary collaboration among scientists.

Major national awards for students include the following.

- *Victoria Klein*, a University Honors College biology major working with *Dr. George Waldbusser* was awarded the DeLoach Work Scholarship to enhance her academic training and to spend more time working in the laboratory on her thesis project.
- 2012-13 WAGS/UMI Distinguished Master's Thesis Award - *Cody Beedlow, M.S. Geology*
- Best Student Talk Award, 2012 Eastern Pacific Ocean Conference (EPOC), *Piero Mazzini, Ph.D. Ocean, Earth, and Atmospheric Sciences*
- NSF Fellowship from the Center for Deep Biosphere Investigations (C-DEBI), PhD student, *Amy Smith, Ph.D. student in Ocean, Earth, and Atmospheric Sciences*
- *Elizabeth Brunner, M.S. student in Ocean, Earth, and Atmospheric Sciences* is working with *Dr. George Waldbusser* and has been selected to present her work in a special Spotlight Session at the upcoming World Aquaculture/American Fisheries Society/National Shellfisheries Association Triennial Meeting.
- *Susan Schnur, Ph.D. student in Ocean, Earth, and Atmospheric Sciences* was awarded a prestigious IODP Schlanger Fellowship from the Consortium for Ocean Leadership this year.
- *Denise Costello, M.S. in Geography* was invited to attend the "Monitoring Sustainable WASH Service Delivery Symposium" in Addis Ababa, Ethiopia to present her research, "Safe Water Access For Rural Communities in Northern Afghanistan."
- *Douglas Wood, M.S. in Geography* was awarded the AAG Wine Specialty Group best graduate paper of the year
- *Brooke Marston, MS graduate student in Geography*, won a \$10,000 Crisp Fellowship for graduate education, granted by Alpha of Colorado Chapter of Phi Beta Kappa, University of Colorado at Boulder
- *Michelle Fournet, M.S. in Marine Resources Management* won best Oral Presentation at the annual meeting for the Society of Marine Mammalogy's Northwest Student Chapter
- *Amelia O'Connor, M.S. in Marine Resource Management* won the best MS student poster award at the Alaska Marine Science Symposium

Major national awards for alumni include the following.

- *Tracy Vallier, Geosciences PhD* under Bill Taubeneck, has been cited in the U.S. House of Representatives for his lifelong commitment to the geology of Hells Canyon.
- *Jeremy Childress, CEOAS Marine Resource Management Alum*, has been awarded the Ocean News and Technology "Next Generation" Award which recognizes an individual ages 35 or younger who has already made valuable contributions through leadership positions within MTS.
- *CEOAS Marine Geology MS graduate Craig Joseph*, was selected by the National Energy Technology Laboratory's (NETL) Office of Research and Development as an ORISE featured participant for 2012. This distinction is given to those who display outstanding research skills or contribute to the overall effectiveness of the NETL mission to advance the national, economic, and energy security of the United States.

4. Leveraging resources and improve administrative efficiencies

- We leverage about \$7 in grants and contracts for every \$1 in direct State funding.
- The Forestry/Oceanic/Atmospheric Sciences Business Center (FOBC) continues to provide outstanding support for our research activities.
- Private fundraising continues to increase, especially in the area of planned giving. We have simplified the diverse giving opportunities for potential donors.
- We have reorganized the staffing for advising, student programs, and student services, including the development of an integrated administrative office suite.

2012-2013 Results and Outcomes

Performance on college-level metrics

- *Student Applications*: Enrollment rate continue to be healthy, although graduate support for the best continues to be a challenge as federal funding declines. We have created new scholarship opportunities at the undergraduate level.
- *Incoming graduate students*: 93% of incoming students are funded
- *Current students*: Approximately 14% are minority
- *Career Placement*: Exit interviews indicate graduates have employment opportunities prior to completing their degree with a majority gaining employment in their field within 3 months of graduation. The Student Services office continues to collect career placement data and will make further efforts to strengthen the ability of CEOAS alumni to provide assistance and mentoring to our current students. The new Board of Advisors will be incorporated into this effort.
- *Research Funding*: Our awards continue to increase, despite the recent declines in federal funding. 320 proposals were submitted and thus far over ¼ have been funded. Over 60% are still pending a decision. Given that the national average for NSF proposals (which accounts for the bulk of our awards) is about 20%, our faculty continue to be highly successful.
- *Diversify our funding*: With 8 invention disclosures (compared with a long-term average of 1 per year), we are growing our partnerships with the private sector.