

College of Earth, Ocean, and Atmospheric Sciences

ACADEMIC REPORT FOR 2014-2015

2014-15 CEOAS Achievements and Outcomes

1. Provide a transformative educational experience for all learners

- *New courses and options:* An ocean sciences option in the Earth Sciences B.S. was established as part of the Earth Sciences undergraduate degree. Our first student graduated in June 2015. A growing number of undergraduate courses to support this option are being developed, including at-sea experience. A climate sciences option and course changes to support the new option have been submitted to the University curriculum approval system. The Environmental Sciences degree has seen a substantial revision with reduction of 23 tracks to 13.
- *Experiential learning opportunities:* Undergraduate students are required to participate in substantive experiential learning. All Environmental Sciences students complete an internship. All Earth Sciences students complete an introductory practical experience whether on land or at sea. Substantive new donations support several hands-on, practical courses. Funded through a private donation, CEOAS established a Student Research Vessel Experience Fund to encourage and allow students to have field experiences on research vessels and boats. The college funds an experiential learning coordinator who also participates in activities to enhance diversity. The GeoClub, with substantial college and alumni support, engages students in international field trips. In spring 2015 the club completed a trip to India with 4 faculty and 25 students.
- *Addressing professional development:* The semi-annual visit by the CEOAS Board of Advisors, a group of alumni, includes opportunities to provide guidance and information to all CEOAS students on career paths and skills that employers seek in new graduates. The college also invites relevant alumni to speak to smaller groups within specific disciplines. For example, Mike Parker, OSU Geology Alum presented his experience in supervising, coaching and mentoring early-career professionals. The college also hosted the Oregon Board of Geology Examiners annual meeting, where that professional board provided an open forum to our students. These various events are well attended by students.
- *Engaging Diversity:* The college faculty and staff are committed to diversity as a strength and source of enrichment. The college has newly hired a diversity coordinator and funds a graduate student to enhance diversity particularly among students (see below). CEOAS participates in LSAMP and in the Minorities Striving and Pursuing Higher Degrees of Success in Earth System Science program at the American Geophysical Union annual conference. Significant effort was also placed to support the Graduate School's annual Recruitment Day event for McNair Scholars, TRIO Participants, and others.
- *Student / Faculty Assessment:* CEOAS conducts a review of faculty and graduate students related to student degree progress each spring (CEOAS graduate

- progress reports). This process has attracted the broader attention of OSU and the College presented their program at the annual Center of Teaching and Learning Symposium and the Spring Quarter Graduate Program Directors & Coordinators Meeting. This process ensures basic expectations are being met and understood and to provide the college with relevant student and faculty data.
- *Heceta Head Coastal Conference*: CEOAS provided registration support for 20 graduate students to participate in bringing current ocean science and policy to Oregonians.
 - *Summer NSF-REU Program*: In collaboration with the Hatfield Marine Science Center, CEOAS continues to attract and mentor outstanding undergraduate students through the NSF-sponsored Research for Undergraduates Program that provides full time (10 weeks) funding for ten students to participate in earth science research under the mentorship of CEOAS faculty and graduate students.
 - *CEOAS leadership in designing new Marine Studies Initiative educational opportunities*: Nineteen CEOAS faculty, staff and students participated in planning the MSI which will include new marine-related courses, degree options, certificates and an undergraduate marine studies degree.

2. Demonstrating leadership in research, scholarship, and creativity while enhancing pre-eminence in the three signature areas of distinction

- Roughly 40 CEOAS-related news releases were generated over the 2014-15 fiscal year, leading to some 250 media pickups. Selected CEOAS research contributions:
 - [Science study: Sunlight, not microbes, key to CO₂ in Arctic](#): Arctic permafrost contains about half of all the organic carbon trapped in soil on the entire Earth. New research concludes that sunlight, not bacteria, is the key to turning organic carbon into CO₂, representing a major change in thinking about the Arctic carbon cycle.
 - [Pacific Northwest shows warming trend over past century-plus](#): The annual mean temperature in the Pacific Northwest has warmed by about 1.3 degrees Fahrenheit since the early 20th century – a gradual warming trend that has been accelerating over the past 3-4 decades and is attributed to human causes.
 - [Science study links greenhouse gases to African rainfall](#): An international research team linked the increase in rainfall in two regions of Africa thousands of years ago to an increase in greenhouse gas concentrations, solving a long-standing enigma known as the African Humid Period.
 - [PNAS study: Ocean biota responds to global warming](#): As the Earth warmed coming out of the last ice age, plant growth decreased while carbon export increased. This suggests that the ocean may be more efficient than previously thought at absorbing atmospheric carbon dioxide but raises new concerns about impacts on marine life.
 - [No laughing matter: Nitrous oxide rose at end of last ice age](#): By analyzing air extracted from ancient polar ice in Antarctica, scientists confirmed that

atmospheric levels of N₂O rose significantly as the Earth came out of the last ice age.

- [New study finds “saturation state” directly harmful to bivalve larvae](#): The earliest larval stages of Pacific oyster and Mediterranean mussel are directly sensitive to saturation state, or how corrosive the seawater is. Saturation state drops as CO₂ increases in the atmosphere, making it harder for early larvae to make their shells.
- [Scientists find deep-ocean evidence for Atlantic overturning decline](#): A new study has found evidence that a system of currents that brings warm water from the tropics to the North Atlantic region declined at the end of the last ice age. This affected regional climate and provides insight on future global warming.
- [OSU to outfit undersea gliders to “think like a fish”](#): Researchers received a \$1 million grant from the W.M. Keck Foundation to fund a pair of undersea gliders that will use acoustical sensors and predictive algorithms to respond to environmental cues and identify biological hot spots.
- [Researchers measure giant “internal waves” that help regulate climate](#): This is the first study that documents the complete life cycle of huge undersea waves that play a critical role in ocean mixing and regulating the climate.
- [New study: Iceberg influx into Atlantic during ice age raised tropical methane emissions](#): A new study shows how huge influxes of fresh water into the North Atlantic Ocean from icebergs calving off North America during the last ice age unexpectedly increased the production of methane in the tropical wetlands.
- [Researchers to complete final deployment of OOI instrumentation this week](#): The installment of a sophisticated research buoy and two undersea gliders completes a critical step in enabling real-time monitoring and assessment of the ocean — by scientists and citizens alike.
- [Scientists recruit public to help study “The Blob”](#): Parched conditions in California, Oregon and Washington may be connected to a phenomenon known as "The Blob," a huge mass of unusually warm water.
- *Recruit new faculty – strategic hiring*: The college’s Strategic Planning and Hiring Committee developed a multi-year hiring plan for tenure-track faculty based on projected research and educational opportunities and needs. We expect to hire 3-4 faculty at the assistant professor level each year for the next several years, given expected retirements.
- *Leadership of major national programs*: The college is the lead institution for the Endurance Array, a network of moorings and gliders off the coast of Oregon and Washington, as part of the NSF Ocean Observatories Initiative. We are leading the planning for the next-generation of research vessels under consideration by NSF.
- *Major awards for faculty and students*
 - Dr. Jon Kimerling was selected as the recipient of the Cartography and Geographic Society’s 2014 Distinguished Career Award. This award recognizes his considerable accomplishments in cartography and GIScience.

- Aaron Wolf was one of 6 recipients of the Heinz Award this year.
- Emily Shroyer was named as a recipient of a 2015 Young Investigator Award by the Office of Naval Research. ONR's Young Investigator Program seeks to identify and support academic scientists and engineers who show exceptional promise for doing creative research.
- Nilo Bill, PhD candidate in Geology was the recipient of the John T. Dillon GSA Alaska Research Award, a Harry and Joy Jameson AAPG grant and a Summer School in Paleoclimatology Full Scholarship
- Kim Ogren, a PhD Geography student, won the Outstanding Student Oral Presentation Award at the recent American Water Resources Association (AWRA) Annual Conference.
- Bojan Šavrič, a graduate student in Geography, received the 2015 Cartography and Geographic Information Society's PhD Scholarship Award. Bojan's research focuses on map projections and the automated selection of map projections.
- Charles Preppernau won the 2015 National Geographic Award in Mapping competition for his Mount Hood hazard map.
- Environmental Sciences undergraduate students Lacey Gunther and Sierra Payne received the NOAA Hollings Scholarship.
- Erin Peck and Maggie Buktenica were selected to receive an Achievement Rewards for College Scientists (ARCS) awarded to top PhD students.
- Elizabeth King, PhD candidate in Ocean, Earth, and Atmospheric Sciences received a NSF SAVI Grant for Soil Science and Climate Change as well as a summer internship grant with both total over \$10,000.
- Jon Yang, PhD candidate in Ocean, Earth, and Atmospheric Sciences, received a 2014 East Asia and Pacific Summer Institute Fellowship.
- Jennesa Duncombe, MS student in Ocean, Earth, and Atmospheric Sciences received a National Science Foundation Fellowship
- Andrea Havron, Marine Resource Management graduate student, received The University of Auckland Doctoral Scholarship
- MRM students Eva Lipiec, Laura Ferguson, and Melissa Errand were selected for the NOAA Knauss Fellowship in Washington D.C.

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3. **Strengthen impact and reach throughout Oregon and beyond**

- *Oregon Salmon Bowl*: CEOAS hosted the 18th annual Salmon Bowl, a regional ocean science competition that brings over 150 high school students, teachers, coaches, and volunteers to the OSU campus. This year's winning team also earned first place at the National Ocean Sciences Bowl.
- *Marine Science Day at Hatfield*: CEOAS students and staff showcased current and historical research and programs in celebration of Hatfield's 50th anniversary.
- *OSU Day @ the Capitol*: Students and staff represented the Marine Studies Initiative and promoted CEOAS's statewide impact to legislators in Salem.
- *CEOAS Faculty serve on the West Coast Ocean Acidification and Hypoxia Panel*: Jack Barth, Burke Hales and George Waldbusser were appointed by the

Governor's office to help summarize knowledge for action on these threats to marine ecosystems along the west coast.

- All researchers engaged in outreach activities. A few examples include:
 - Phil Mote: Several climate presentations or panel discussions through the Oregon Global Warming Commission, Tribal Climate Change Adaptation, the American Association of State Climatologists Meeting, and other events/orgs.
 - Roy Haggerty: Staff in his research group conducted stream ecology and hydrology lessons at the Audubon Society in Corvallis.
 - Bill Smyth: Invited lecturer on the thermohaline circulation at Crescent Valley High School in Corvallis.
 - Martin Fisk: Lecturer on NASA's Mars Science Laboratory, Curiosity, for the Academy of Life Long Learning; organized the speaker for Hydrothermal Vent Day.
 - Todd Jarvis: Speaker at the Benton County Historical Society on the history, geography and science of water witching.
 - Ed Brook: Ongoing collaborator with Cheldelin Middle School in Corvallis to teach students about polar science.
 - George Waldbusser, Jack Barth and Burke Hales delivered a public lecture on "Climate Change and the Health of Our Ocean," at an educational forum in Roseburg sponsored by the Douglas County Global Warming Coalition
 - Adam Schultz: Various presentations on geothermal systems, volcanoes and subducting plates at OSU Science Pubs. His graduate student also presented at OMSI.
 - Frederick Colwell: Conducted seven different ship-to-shore video events with remote participants as part of an IODP Expedition to the South China Sea.
 - Peter Ruggiero: Presentation to the Tillamook County Board of Commissioners and the North Coast League of Cities on mitigating coastal hazards and coastal climate change.
 - Andrew Thurber: Participant in a Twitter conversation for the Consortium of Ocean Leadership's World Oceans Day.
- *Alumni relations*: CEOAS published its annual alumni magazine, Elements, which was mailed to 5400 supporters and friends. The publication included a mix of research stories and profiles that demonstrated our contribution to key coastal and earth science issues, as well as our commitment to training future scientists and practitioners. An inaugural alumni e-newsletter was sent to 3,000 people. These communications have established regular and vital touch points with our graduates. In addition, the college exhibited a glider and engaged with alumni at the annual State of the University address in Portland.

4. Key initiatives that align with university commitments

- **Enhancing 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 colleges 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 doing trail maintenance.
- *SOLV Spring Oregon Beach Cleanup*: CEOAS volunteers headed to South Beach to take part in the clean up effort.
- *Promoting diversity*: The college is committed to promoting diversity at all levels. Increased diversity among faculty engaged in academic programs was achieved through the provost's hiring initiative through the lens of equity and inclusion. One of these, Dr. Miguel Goñi, has been appointed to a new position on engagement, recruitment, and retention of students from diverse backgrounds, in addition to his present duties in research and teaching. The college also supports a graduate student to assist his work, modeled on the successful IDES initiative (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, thus combining the diversity enhancement with the college commitment to experiential learning.
- *Building community*: The college hosts several social events (an end-of-the-year student awards BBQ, graduation reception, GeoDay, etc.) that bring together faculty, students, and staff. The college also host alumni receptions at professional meetings to foster the larger CEOAS community.
- **Stewardship of resources**
 - 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. Private giving exceeded over \$2M, significantly higher than any previous year.
 - We have worked with Facilities Services as part of the renovation of the Strand Agricultural Sciences Building to create new spaces for collaborative research and education.
 - The former Nypro building in the Sunset Research Park now holds much of our equipment for field research. We expect that it will also accommodate space for mock-ups of the labs and bridge for the planned research vessels for NSF.
- **Technology as a strategic asset**
 - The college's Research Computing System continues to support faculty and graduate students. Presently, the system provides about 500 processor cores for high-end computation and about a petabyte of shared storage. Similar

capabilities are available in faculty-acquired systems in support of their research grants. Supported by three staff members, RCS provides exceptionally- cost-effective high-end services.

- The college is completing an upgrade of its networking to state-of-the-art wireless to complement its gigabit wired networking. Over 3000 devices are presently attached to the college network.
- The integration of the former Geosciences network is nearly complete, extending the reach of the college's RCS. This includes two specialized teaching classrooms.
- The college regularly upgrades faculty research laboratories to accommodate new instrumentation and new requirements. A fiber optic link to the Ocean Observing Center in south Corvallis will be completed soon.

5. Performance on college-level metrics

- *Student Applications:* Enrollment rates continue to be healthy, although graduate support for the best continues to be a challenge as federal funding declines. We continue to expand scholarship opportunities at the undergraduate level.
- *Incoming graduate students:* 90% of incoming students are funded, 6% are minorities, 16% are international, and 61% percent are female.
- *Current graduate students:* 16% minority, 13% international, equal distribution between men and women.
- *All students:* 15% US minority, 5% international, 28% high-achieving Oregon high school graduates.
- *Retention rates:* The retention rate for first year graduate students is 86%, significantly higher than the university rate of 57%
- *Career Placement:* Exit interview indicate graduates have employment opportunities prior to completing degree with majority gaining employment in their field after 3 month of graduating. According to university data, 85% of undergraduates obtain employment in their field and garner salaries about 10K higher than the for average OSU Bachelors student. 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.
- *Research Funding:* Our awards continue to increase, despite the recent declines in federal funding. Funding requests totaled about \$98M, and the amount of funds grants was over \$39M. Given that the national average for success rates for NSF proposals (which accounts for the bulk of our awards) is about 20%, our faculty continue to be highly successful.
- *Diversify our funding:* One invention disclosure occurred this past year, but several more are in preparation. Funding from the US Geological Survey and some industry support has been increasing, but NSF continues to be the dominant source. Funding from private foundations remains strong, including from the David and Lucile Packard Foundation, the Keck Foundation, and the Simons Foundation.