2009-2010 Programmatic achievements

1. Key Initiatives and Noteworthy Outcomes

   • **Student engagement and success**
     
     The COAS graduate programs have been restructured to reflect an increased emphasis on a “systems” approach to Earth science research and education. In this new view, ocean, atmospheric, and earth science knowledge and training are all needed for interdisciplinary understanding of planetary processes and policy options. Our category I proposal that merged three graduate majors (Atmospheric Science, Oceanography, Geophysics) into one (Ocean, Earth and Atmospheric Sciences) was approved by the Faculty Senate in May 2010. Companion category II proposals created interdisciplinary breadth courses (The Solid Earth, The Fluid Earth, The Biogeochemical Earth) required of all graduate students in COAS. The new courses and single major will provide context and intellectual identity (as Earth systems scientists) for incoming student cohorts.

     • COAS and Geosciences faculty began discussions to create and deliver a new undergraduate Earth Science major, with options in Geology, Geography and Earth Systems. The first two are traditional fields of study, while the third will emphasize interdisciplinary approaches to planetary processes and systems, with policy and management implications and a senior year synthesis experience (thesis or internship).

     • We initiated two new programs of research experiences for undergraduates (REU), both funded by the National Science Foundation for 3-4 years. A summer-only program, “Oregon Marine Science, from Upper Estuaries to the Deep Sea” brings 20 students from all around the nation to COAS and HMSC for 10 weeks of faculty-mentored field and laboratory-based research. A full-year program, “Increasing Diversity in Earth Sciences”, recruits 10-15 second-year science students from OSU, PSU and 5 community colleges in Portland and the Willamette Valley into a faculty-mentored research experience through a summer GIS workshop and field trips, followed by student-initiated projects in research, education and outreach in the Earth sciences.

     • One hallmark of the COAS research enterprise is the level of productivity and scholarly achievement of our graduate students. This is measured annually using a progress reporting process performed by students and their advisors. Information collected to measure productivity includes scholarship support, presentations at conferences and publications. Efforts to increase student participation through travel awards and seminar development of presentation skills are working.

     • Through the recruiting process, COAS Student Services ensures that incoming students know whom they are working with, what they are working on and how that relates to the cost of their education. As a result, the vast majority of
our students maintain funding throughout their studies through either research grants or targeted applied projects with agencies in the Pacific Northwest.

- **Research and its impact**
  - Some selected COAS research discoveries
    - COAS/OSU selected to archive Earth science data from a US Navy hyperspectral imager on board the International Space Station. These data will provide an unprecedented look into terrestrial and coastal ocean systems.
    - COAS/OSU faculty created the first-ever three-dimensional map of the electrical conductivity of the Earth’s mantle. Their results suggest that there may be more water than expected, especially in subduction zones.
    - COAS/OSU faculty are leading an international study of the Patagonian shelf and its connections with ocean circulation, productivity, and sustainable fisheries.
    - COAS and other OSU researchers continued their pioneering study of the low oxygen waters off Oregon and Washington and its possible links to climate change. The National Science Foundation created a special web section highlighting OSU science.
    - Two OSU faculty members, including the director of OCCRI, were selected to be lead authors on the fifth assessment by the International Panel on Climate Change (IPCC).
    - COAS/OSU faculty organized a national workshop on predator/prey interactions and their role in developing ecosystem-based approaches to ocean management.
    - Large-scale, “tropical instability waves” are shown to play a critical role in the cooling of equatorial waters in the Pacific Ocean. COAS/OSU faculty developed new instrumentation and discovered this previously unknown process. Moreover, IPCC models do not effectively capture the coupled ocean/atmosphere processes and their impact on the heat budget in this region of the world.
    - COAS/OSU faculty oversaw the publication of a special issue of *Oceanography* dedicated to undersea mountains and volcanoes.
    - State-of-the-art measurements of helium isotopes have shown that the volcanic domains of the Northwest have distinct sources for the various provinces.
    - A new model showed that seasonal changes in absolute humidity are linked to influenza outbreaks. Drier conditions increase the survival of the virus, thereby increasing its transmission.
    - Increasing ocean acidity, a direct result of rising carbon dioxide levels in the atmosphere, is damaging shellfish larvae in Northwest oyster farms.

- **Open Access policy.** After several presentations to faculty members, discussion within the discipline groups, and reports to and discussions in the Dean’s Advisory Council, the COAS faculty adopted an Open Access Policy, modeled on the policy of the OSU Library faculty.

  “The College of Oceanic and Atmospheric Sciences (COAS) supports open access to our scholarship and knowledge. Consequently, we encourage faculty to grant to the college permission to make their scholarly work publicly available. We encourage them to do so by granting to the college a nonexclusive, irrevocable, worldwide license to exercise any and all rights under copyright relating to their scholarly work in any medium.

  “We encourage faculty to include in that permission all scholarly works authored or co-authored in your capacity as a faculty member of the College of Oceanic and Atmospheric Sciences, beginning with works created after March 31, 2010. Works include, but are not limited to, the following:

  - Articles
  - Internal reports of interest to a broader audience
  - Presentations if substantial
  - Book chapters
  - Conference papers and proceedings if more than an abstract
“When a publisher is involved who will not agree to the terms of this policy as stated in the Science Commons Access-Reuse Addendum, the faculty member should pay reasonable Open Access fees set by the publisher.

“Faculty who agree to assign copyrights or pay reasonable fees under this policy should deposit an electronic copy of the final published version of the work, in an appropriate format (such as PDF), at no charge to ScholarsArchive@OSU as soon as practical. Alternatively, faculty members may provide an electronic copy of the final published version to the COAS Publishing Department, who will make the work available to the public in ScholarsArchive@OSU.”

- **ScholarsArchive.** Having articles available on ScholarsArchive makes them more findable (both within indexes of scholarly literature such as Google Scholar and in other searches), accessible, and provides a permanent URL. Articles archived as Open Access have greater readership, are cited more frequently, and have greater impact.
  - 76 faculty members now have collections started within the COAS Research Publications collection in the OSU institutional archive.
  - Over 700 scholarly articles are archived and more are continuing to be added.
  - During the past year, these articles were viewed 30,996 times and there were 11,249 copies of articles downloaded.

- **Outreach and engagement**
  - **COAS Fiftieth Anniversary Celebration & Reunion.** Our 50th year began in July 2009. We selected da Vinci Days weekend to mark the event and coordinated with the festival for maximum visibility and impact with the public as well as for an entertainment draw for alumni and families and other invitees, to encourage travel to Corvallis.

  Outreach included:
  - Science Symposium at La Sells Stewart Center; a morning of short talks as well as displays of gliders, historical photos, science posters, and refreshments. Open to the public and da Vinci Days attendees as well as 50th anniversary invitees. Attendance ~225. Six faculty speaking. Another ~40 faculty members or staff exhibiting/attending.
  - Public Open House, during da Vinci Days and a stop on the tour bus, outside in the Burt courtyard, as well as on the first and second floors of Burt II, III, and IV. Attendance ~440 in three hours; the vast majority went to multiple exhibits in several locations. ~42 faculty/staff student volunteers staffed the 24 exhibits; another ~8 volunteers gave directions, answered questions, etc.
  - Luncheon with keynote speakers Mark Abbott and John Byrne, on past and future of COAS, for alumni and other invited guests such as elected officials. Attendance ~330, with ~50 faculty/staff.

- **Deep Sea Hydrothermal Vents Commemoration and Reunion, November 3, 2009.** COAS hosted a reunion of OSU’s discoverers of deep-sea hydrothermal vents. The incredible discovery of warm springs and exotic life on the ocean floor was made in 1977 near the Galapagos Islands by a team of scientists led by OSU oceanographer, Jack Corliss. He returned to campus to talk about the landmark event; the event and related exhibits were open to the public and invited guests.
• **Free choice learning.** We are partnering with Evergreen Aviation in informal education at the new wave park at their site in McMinnville, OR.

• **High school engagement.** COAS hosted the 12th annual Oregon Salmon Bowl event held on the OSU campus. This year, a record 22 teams from Oregon and one from Washington competed to represent our region in the National Ocean Sciences Bowl in Washington, D.C. About 100 volunteers, including faculty, staff and students in the OSU College of Oceanic and Atmospheric Sciences, helped host the event.

• **Community and diversity**
  - We have initiated the IDES program to recruit under-represented students into Earth science career paths. This program is a partnership of OSU (COAS/GEO units) with 5 Oregon community colleges and employers such as informal education centers (OMSI, Oregon Coast Aquarium), government agencies (NOAA, USGS, EPA, USFW, USFS), NGOs and private sector.
  - COAS is a partner in developing the Louis Stokes Alliance for Minority Participation program, in which OSU is one of 5 PNW cooperating institutions. This program started in late 2009 and is funded for 5 years by the National Science Foundation.

• **International level activities and accomplishments**
  - Our graduate programs continue to attract high quality international students, and currently comprise 10% of our graduate students. This is likely to increase with the implementation of a graduate certificate program in Fisheries Management. The Marine Resource Management program is collaborating with African institutions in partnership with the World Bank and other aid donors, to build capacity in fisheries management. The MRM director chairs the OSU International Council.
  - We continue to attract many international faculty to spend sabbatical visits at COAS as well as hire postdoctoral researchers and faculty from abroad. We have several international students here on traineeships in addition to our enrolled international students. Several COAS faculty serve on visiting committees for international institutions as well as conduct collaborative research projects.

2. **Brief assessment of unit’s efforts**

The College’s vision is as follows:

“OSU/COAS brings the best science and technology to the study of the Earth as a system. Our vision is to inform policy and decision making by governments, businesses, and citizens through effective partnerships that integrate the study of natural and human systems.”

Our reputation in the community is that OSU/COAS is the place to be for innovative, interdisciplinary research. The age structure of our faculty is much more balanced, and we have increased our external funding, despite an increasing level of competitiveness (e.g., NSF success rates have dropped from 35% to 26% over this time period.) Although we were not successful in our bid to the US Navy to be an operator of a new, oceans-class research vessel, the Navy noted in its review that:
“OSU is committed to the pursuit of world-class ocean science. The institution’s direction in multidisciplinary, system-oriented research is exciting and broad-based, to drive significant future discoveries in ocean and coastal sciences.”

We recruited our first cohort for the “institutional postdoctoral” program, providing 12 months support in the first year, 9 months in the second year, and 6 months in the third. A faculty mentor has been assigned at the beginning of each appointment, and the mentor will help the postdoctoral researcher develop collaborations for external funding to cover the remaining months of salary. At the end of the three-year appointment, the researcher could transfer into a faculty position with agreement of the faculty. This approach will allow promising researchers develop their research programs, acquire teaching experience, and build collaborations without the pressures of an assistant professorship. Moreover, it will also provide a focus for fundraising, allowing donors to have “named” positions. All of these new researchers focus on interdisciplinary questions, including one young scientist who studies the interactions between ancient native cultures and climate in North America.

The faculty group also developed procedures for “opportunity hires,” which have been used to bring established, fully-funded scientists to OSU/COAS. In the past, such hires have neither been strategic nor transparent to the entire faculty. A new process recommended by the faculty has been adopted that will overcome these limitations. We are presently evaluating one such “opportunity hire.”

The college developed a new set of “breadth” courses to replace the old “core” courses. These include fluid Earth, solid Earth, and biogeochemical Earth. All entering graduate students will take the entire sequence, which will give the student a solid basis for further studies in specific aspects of Earth system science. Incoming students will also participate in a one-week field program before the quarter begins so that they will see firsthand many of the Earth system processes that they will be studying later in the academic year. To reflect these changes, the college consolidated its degree programs into two: Ocean/Earth/Atmospheric Sciences (with areas of emphasis in oceanography, atmospheric sciences, and geophysics) and Marine Resource Management.

Our upgrades to the COAS research computing system are nearly complete. We now have 10 gbps Ethernet to every COAS building, nearly one petabyte of network-accessible storage, and dozens of specialized compute servers, including high performance compute systems. The college seminar room was upgraded to accommodate new types of input systems as well as higher resolution displays, which are now becoming standard. The college classroom was upgraded as well. We plan to complete these upgrades by the end of the calendar year.

A new undergraduate program in Earth science, which would have several areas of concentration, is being built within the existing Geosciences majors (Geology and Geography). The new Earth Science option would have several senior capstone requirements, such as a year-long senior seminar, and an experiential learning component – thesis for research-oriented students, internship for “work ready” students, and supervised off-campus group project. Initially, faculty from COAS and Geosciences
would be involved in development of new courses, delivery of the coursework, and program and career advising, but faculty from other ESS units could also participate as the program matures. A Category 1 proposal is being prepared for submission this fall.

Our development activities have been increasing, but with the economic slowdown, progress has been slower than expected. However, we do have a solid core of friends of the college, and we are gradually expanding our advisory board. Several new funds have been established to support college programs, and the college is now part of several estate plans.

During the past academic year, the college has been actively engaged in the development of the Earth system science concept. As part of the realignment process, it soon became clear that an integration of Geosciences (presently in the College of Science) with COAS could provide a unique opportunity for OSU to be a leader in both ESS research and academic programs. Faculty were engaged in a long series of discussions, and recently the concept of a new college was proposed. Although there are many issues to be studied and resolved, the opportunities are substantial, and we expect to spend the next year developing an implementation plan to achieve our vision.

3. Faculty and student awards

- **Dudley Chelton** Distinguished Professor, Physical Oceanography
  
  *2010 The Robert L. and Bettie P. Cody Award in Ocean Sciences.* “The Cody Award recognizes outstanding scientific achievement in oceanography, marine biology, and Earth science. It is presented by Scripps Institution of Oceanography to a scientist who has made significant contributions to his or her field of science specialty.”

- **Christoph Thomas**, Assistant Professor, Atmospheric Sciences
  
  *NSF Career Award.* “The CAREER award is the NSF's most prestigious award for new faculty members, designed to recognize and support the early career-development activities of those teacher-scholars who are most likely to become the academic leaders of the 21st century. Each award carries a substantial grant to support the faculty member's research projects that stimulate the discovery process in which the excitement of research is enhanced by inspired teaching and enthusiastic learning.”

- NASA Earth and Space Science Fellowship (Alex Jonko, Rachael Mueller)
- NSF Graduate Research Fellowship (Roxanne Hastings, Summer Praetorius, Sarah Strano)
- NSF East Asian and Pacific Summer Institute Fellowship (Julie Doumbia)
- US Department of Energy: Oak Ridge Institute for Science and Education Fellowship (Craig Joseph)
- Society of the Cincinnati – McCabe Scholarship (Neal McIntosh)
- Visiting Fellowship: Institute of Rock Magnetism (Mo Davies)
- Mexican Counsel of Sciences and Technology Scholarship (Gabriela Mayorga)
- Northwest Scientific Association Student Grant (Amanda Gladics)
- Cooperative Institute for Coastal and Estuarine Environmental Technology Award (Megan MacClellan)

**2009-2010 Results and Outcomes**
1. **Performance on college-level metrics**
   - The College continues to exceed its targets in the level of its research grants awarded and expenditures. COAS faculty brought in nearly $32M in external grants and contracts last year. The number of grants grew back to its historic levels (around 250). Seventeen awards were made with “stimulus” funding. With over $450,000 in grants per faculty member, it is unlikely that this can be increased substantially. However, the White House has begun to implement significant increases in the Nation’s science budgets, especially in the area of climate change.
   - Our minority enrollment rate has increased to 9.7% over the last three years, which is higher than many other Earth science programs and nearly three times as high as 7 years ago. We expect this value to increase, as our rate among entering students has been about 6% for the last four years.
   - We awarded 36 graduate degrees last year and student/faculty ratios are relatively low and constant, reflecting the research-intensive nature of our College.
   - Private giving has increased, and this growth has continued with the arrival of Doug Brusa as our development officer. We received nearly $1.2M in private giving last year. We continue to cultivate new donors and established a new advisory board focused on fundraising.

2. **Leveraging resources and improve administrative efficiencies**
   - We continue to leverage about $10 in grants and contracts for every $1 in State funding.
   - Our Publications office continues to provide support for electronic submission of grant proposals, and our administrative staff has been engaged in the development of the Forestry/Oceanic/Atmospheric Sciences Business Center (FOBC).
   - The upgrade to the seminar room was funded through a grant from ONR.
   - Private fundraising is increasing, and this will allow us to leverage state funding.