

SOEST Dean's Remarks at Chancellor's Welcome Reception 9/19/06

My wife, Barbara, and I came to Honolulu in January 1982. I had a faculty appointment split between the Department of Geology and Geophysics and the Hawaii Institute of Geophysics. Barbara, who is an artist, allowed for the possibility of a maximum five year stay, before we would return closer to her New York roots. Well, one opportunity led to another and now, nearly 25 years later, we are still here. Along the way, I went to sea a lot, we/she raised our 20-year old daughter, Stacy, and we accumulated a lot of frequent flyer miles. One of the pivotal opportunities that led to our stay was the creation in 1988 by the Board of Regents, on the recommendation of then President Al Simone, of the School of Ocean and Earth Science and Technology

SOEST has since grown to about 870 employees, including 240 Ph.D's, 450 staff, and 180 graduate assistants. The School is an international leader in such diverse fields as Alternate Energy, Tropical Meteorology, Coral Reef Ecosystems, Hyperspectral Remote Sensing, Volcanology, Seafloor Processes, Cosmochemistry, Marine Microbiology, Coastal Oceanography and Climate Modeling – and that is just the top ten!

Last year SOEST had a total budget of \$97M, three quarters of which was from extramural sources. The Schools extramural funding has tripled since its founding and accounts for 30% of the overhead generated at UH Manoa. SOEST offers a world-class undergraduate and graduate experience, enabled by state-of-the-art instrumentation and facilities, coupled with mentoring by leading researchers and educators. Four of those, Milton Garces, Andy Harris, Scott Rowland and Chip Fletcher, were honored today at the UH Convocation with Excellence in Teaching, Research and Service awards.

The School's success can be attributed to strong leadership, great faculty, excellent facilities, and dedicated support staff, as well as to Hawaii's strategic location and long standing cultural and economic connections to the sea.

The School's heritage includes a long line of Institute and Department leaders and my immediate predecessors: Dean Barry Raleigh and Interim Dean Klaus Keil. Barry and Klaus, although I served as your Acting Associate Dean for Research for the past dozen years, it is only now as I take on the Dean's job myself that I realize the full extent of your accomplishments. Mahalo.

One of the highlights of my first 80 days as Dean was participating in the opening, on August 1st, of the new National Science Foundation Science & Technology Center in Microbiology Oceanography, Research and Education. C-MORE will be directed by our newest National Academy of Sciences Member, David Karl, and is expected to be a decadal, \$50M program. Fully one third of the funding will go to education and outreach activities, in partnership with Manoa's College of Education and the Hawaii Department of Education. The Center is also being supported by generous funding from The Agouron Institute and the Gordon and Betty Moore Foundation.

During the Dean interview process, some commented that it is an unenviable task to follow in the footsteps of a Dean as successful as Barry Raleigh. Others expressed the opinion that, surely SOEST is big enough and questioned why we would want to grow further. I willingly accepted those challenges because I believe that there is an absolute need to take the School to the next level and, fortunately, that need is matched by opportunity.

The need comes from the fact that the fundamental global research, technology development and education that SOEST does to advance understanding of the Ocean Planet on which we live, is required if humankind is to prosper in the face of what Al Gore calls “An Inconvenient Truth”. Humans have become the most invasive species on the planet and we are forcing a unique global experiment. By burning fossil fuels and tropical forests, and by making cement, humans have added to the atmosphere more than one quarter of its carbon dioxide since the beginning of the industrial revolution. The increase in greenhouse gases such as CO₂ to levels unprecedented in the last 800,000 years of Earth’s history, is causing global warming and rising sea level. As the climate warms and precipitation patterns change, we are experiencing more frequent higher-intensity tropical cyclones. And, in less than 15 years, there will be a summertime ice-free NW passage through the Arctic. Fish stocks have been severely depleted and the increasing acidification of seawater is decreasing the ability of corals and marine plankton to grow their hard parts. Coupled with this, the current Federal Administration is forcing NASA away from its mission to planet Earth, thereby limiting our abilities to better monitor the global changes that we are forcing.

It is in this context that SOEST’s faculty have formulated strategic plans to address priority issues that have enormous societal relevance and immediate opportunities for implementation. The five priority areas are ocean observing, space flight, alternative energy, living marine resources, and natural hazards. Partnerships are key to their implementation. Our first priority is to establish the Pacific Integrated Ocean Observing System (PACIOOS), which will include Hawaii and the US-Flag and US-Affiliated Pacific Islands. This partnership of federal and state agencies with academic, business and private entities, will implement a set of regional ocean observing systems to assess and predict the effects of weather, climate and human activities on the state of the coastal ocean, on its ecosystems and living resources, and on the island economies. I co-chair with Eileen Shea from the East-West Center the pilot program funded by NOAA to establish PACIOOS. Additional positions to support this endeavor are part of SOEST’s biennial budget request. The vision is to provide an operational oceanographic service to the State to ensure a safe, productive and clean coastal ocean. Catalyst projects will define and forecast sea-state (that is, currents, waves, storm surge, flooding and beach erosion), enhance stewardship of living marine resources (the fisheries, coral reefs, and marine mammals), and develop a system of automated real-time monitoring of coastal water quality (both its chemistry and microbiology).

The second project is a joint venture with the College of Engineering to form the Hawaii Space Flight Lab. It promises, within 4 years, to have the University of Hawaii join only a handful of other NATIONS capable of launching satellites into space. With Federally appropriated funds and the collaboration of industrial partners such as BAE Spectral Solutions/SurreySat, government labs such as Sandia and JPL, together with the Pacific Missile Range Facility on Kauai, we plan to launch micro-satellites into low Earth orbits for a fraction of the cost currently

charged by NASA. Even so, the instrument development and first two launches will cost \$40M. Using a rail-launch facility at PMRF and spin-stabilized solid-fuel rockets, the Hawaii Space Flight Lab will break the current log-jam of getting small satellites weighing 30-300 kg into Earth orbits at 300-1100 km distance. Not only will this be an amazing high-tech workforce and economic engine for Kauai and Hawaii, but it will provide unparalleled opportunities for faculty- and student-built microsatellite systems to get into space. One such system developed at SOEST and, before the Columbia shuttle disaster, slated for deployment on the Space Station, is a Hyperspectral Imager of the Coastal Ocean. It can be used, for example, to monitor the global distribution and health of shallow coral reefs.

The third area of priority research, engineering development and training is in developing alternative energy sources. The cost of energy in Hawaii makes this a natural place for the accelerated development of globally exportable technologies to reduce our dependence on imported oil. Several of these partnerships are already in place. One is the Hawaii Fuel Cell Test Facility, operated by HNEI together with Hawaiian Electric. This is part of the Hawaii Energy and Environmental Technology initiative, funded by ONR, that also includes the assessment of methane hydrates as a potential future energy source. Another is the biomass gasification and flash carbonization projects that have several industrial partners. A third is the fabrication of thin-film semi-conductors for solar hydrogen production and solar photovoltaic systems. A faculty partnership has submitted a \$17M proposal to Shell Oil to build a demonstration facility that generates biodiesel by feeding CO₂ to marine algae. Reducing UH's energy bill is also a priority issue for the Manoa campus, as my fellow Dean's know who have just received their annual budget allocations. To that end there will be an Energy Summit here on October 24th led by Steve Meder from Architecture and Gordon Grau from Sea Grant, who have formed another partnership: The Center for Smart Building and Community Design.

The fourth SOEST priority relates to marine ecosystems. Understanding the biology, ecology and biogeochemistry of marine microorganisms, which are the base of the multi-cellular food chain, is the focus of the C-MORE Science and Technology Center, previously mentioned. Novel methods in molecular biology, combined with satellite- and sea-based remote sensing technologies, will link microbial process studies at spatial scales ranging from genes to entire Pacific Ocean. At the Hawaii Institute of Marine Biology we have multiple programs related to the health and vitality of tropical coral reefs – from gene flow, to community structure, to dispersal patterns. In partnership with NOAA, HIMB is the “brain trust” for improving stewardship of the NW Hawaiian Islands National Monument, as well as for understanding the foraging patterns of top predators such as tuna and sharks. HIMB researchers also study the sensory and perceptual processes of marine mammals. Human-induced ocean noise has become an increasingly contentious issue; witness the initial hold-up of parts of the Navy's Rim-Pac exercises. Our scientists are seeking to inform that debate with hard-to-obtain data on the echolocation capabilities of whales and dolphins. Although there is a well-established graduate field of study in Marine Biology, some may be surprised to learn that UH does not offer it as a graduate degree. Working with the College of Natural Sciences and the Faculty Senate, I hope that we can soon rectify that.

The fifth focus area concerns natural hazards: earthquakes, tsunami, volcanic eruptions, hurricanes, storm surge and flooding. Our faculty are working with the State, City and County to prepare better tsunami inundation maps and to implement Oahu Beach Hazard ratings predicted from offshore wave buoy data. We are working on all aspects of volcanic eruption processes.

Partnering with the Japanese Marine Science and Technology Agency, faculty and researchers in the Department of Meteorology and the IPRC are improving our understanding of the Asian monsoon (which affects the lives of half the world's population), and of tropical cyclones and thunderstorms. This past week we celebrated the 50th anniversary of Meteorology at UH. Despite outstanding advances in the last decades to forecast weather 5 days in advance and to predict hurricane tracks, we still face fundamental limitations on our ability to forecast hurricane intensity and risk. Roger Lukas in Oceanography together with Greg Holland from the National Center for Atmospheric Research are proposing a national 5-year \$50M initiative to improve hurricane intensity forecasts and impact projections. This will involve many Federal and State agencies together with Industrial Partners such as the Oil Companies whose offshore rigs in the Gulf of Mexico would become instrumented platforms.

These are some of the key areas in which we are taking up the challenge to fulfill the four-fold vision of the School, which is to:

- Advance understanding of the Ocean, Earth & Planets
- Provide world-class education
- Promote sustainable use of the environment
- Foster a high-tech economy

My goal as Dean is to continue building an innovative faculty, supported by excellent facilities and motivated staff, that will fulfill our potential and result in our shared success.

Mahalo to the administration, faculty and staff for the trust put in me to lead this wonderful enterprise that is the School of Ocean and Earth Science and Technology.