ORE since 1966
OCEAN AND RESOURCES ENGINEERING
IN THE SCHOOL OF OCEAN AND EARTH SCIENCE AND TECHNOLOGY AT THE UNIVERSITY OF HAWAI'I AT MĀNOA

HANA O KE KAI "Work of the Ocean"

NEWSLETTER OF THE OCEAN AND RESOURCES ENGINEERING DEPARTMENT, Fall 2015, Volume 19, Issue 1

Chair's Message

Bruce M. Howe, Chair

The ABET accreditation review went very well, in fact perfectly! Thanks to everyone for your efforts in this regard (see detail by J. Wiltshire).

Prof. Cengiz Ertekin retired after serving in the department for thirty years. He will be living in New Jersey, continuing as editor-in-chief of *Journal of Ocean Engineering and Marine Energy*.

A variety of factors is leading us to broaden our program and make it more flexible: adding options for oceanographic engineering and interdisciplinary ocean engineering, reducing the core by one course and adding another required one to the option. There will be more about this in the next issue.

The ROV *Lu'uka'i* had partial success in servicing the ALOHA Cabled Observatory: a crucial instrument package was plugged in (with pressure, fluormeter, and CTD); two other tasks remain to be done in the next August 2016 cruise. Dan Greeson, John Wiltshire, Blue Eisen and I with others have been involved in this effort.

Best wishes to our new graduates Ghizlane Abrouch and Matthew Wesley; Ghizlane was hired at Healy Tibbetts in Honolulu and Matthew is working for the USACE in Los Angeles.

All the best wishes for the new year! Hau'olimakahikihou!

Inside this issue:

Editor's Corner

Jonathan Koons, TA

Once again, I would like to thank everyone at ORE that contributed to the newsletter this fall and throughout my time as TA here at ORE (it wasn't supposed to take this long!). I have nothing but fond memories of my experiences here. Best wishes and Happy New Year to all.

Student and Faculty News

- **Professor R. Cengiz Ertekin** retired this September after a successful career as a professor and researcher. ORE wishes him good luck in his future endeavors**.**
- **Professor Emeritus Hans Krock** is leading an effort to develop a large Ocean Thermal Energy Conversion project off of Barbers Point. For more information: http://www.bizjournals.com/pacific/news/2015/11/20/major-ocean-energy-project-planned-off-hawaii.html
- **ORE** passed its accreditation review with a perfect score
- **Matthew Wesley** defended his Plan A Thesis presentation "Bottom-Discontinuous Riemann Solver for Modeling of Wave Overtopping" on August 10, 2015.
- **Ghizlane Abrouch** defended her Plan B presentation "Application of an Intergral Buoyant Jet Model to Describe the Effluent Discharge from an OTEC Pilot Plant" on August 10, 2015
- **Jonathan Koons** defended his Plan B presentation "Mooring Procedures and the Use of High Modulus Synthetic Fiber Mooring Lines in the United States Navy" on December 10, 2015
- **ORE** welcomes new students Daniel Curley and Paul Manglona

Some Recent ORE Publications

Bai, Y. and **Cheung, K.F.** (2015). Dispersion and kinematics of multi-layer non-hydrostatic models. *Ocean Modelling*, 92, 11-27

Bai, Y., **Yamazaki, Y.**, and **Cheung, K.F.** (2015). Interconnection of multi-scale standing waves across the Pacific from the 2011 Tohoku tsunami. *Ocean Modelling*, 92, 183-197.

Nihous, G.C., "Notes on hydrostatic pressure," *Journal of Ocean Engineering and Marine Energy*, DOI: 10.1007/s40722-015-0035-1, 5 p., 2015.

Alford, M. A., T. McGinnis, and **Howe, B. M.,** An inductive charging and real-time communications system for profiling moorings, *J. Atmos. Oceanic Technology*, DOI:10.1175/JTECH-D-15-0103.1, 2015.

Van Uffelen, L.J., Howe, B. M.,, E.M. Nosal, G.S. Carter, P.F. Worcester, and M.A. Dzieciuch, Localization and subsurface position error estimation of gliders using broadband acoustic signals at long range, *IEEE J. Ocean. Eng.*, doi: 10.1109/JOE.2015.2479016, 2015.

Howe, B. M., F. K. Duennebier, R. Lukas, The ALOHA Cabled Observatory, in *Seafloor Observatories: A new vision of the Earth from the Abyss*, Eds. P. Favali, L. Beranzoli and A. De Santis, Springer-Praxis Publishing, pp. 439-463, DOI: I10.1007/978-3-642-11374-1, 2015.

Gemba K, **Nosal E-M** (*2016*). Source characterization using recordings made in a reverberant underwater channel. Applied Acoustics 105, 24-34.

Lee, C.H., **Huang, Z.H**., and Chiew,Y.M. (2015). A multi-dimensional model for granular flows and its application to collapse of granular columns. *Physics of Fluids*. 27, 113303; DOI: 10.1063/1.4935626

Yuan, Z.D.and **Huang, Z.H**. (2015). Morison coefficients for a circular cylinder oscillating with dual frequency in still water: an analysis using independent-flow form of Morison's equation. *Journal of Ocean Engineering and Marine Energy*. In press. DOI 10.1007/s40722- 015-0030-6.

Lee, C.H. , **Huang, Z.H**., and Chiew, Y.M. (2015). An extrapolation-based boundary treatment for using lattice Boltzmann methods to simulate fluid-particle interaction near a wall. *Engineering Applications of Computational Fluid Mechanics*. 9:1, 370-381, DOI: 10.1080/19942060.2015.1061554

Zhang,Y.M, Ariffin, M.Z., Xiao, Z.M., Zhang, W.G., and **Huang, Z.H**. (2015). Nonlinear elastic–plastic stress investigation for two interacting 3-D cracks in offshore pipelines". *Fatigue & Fracture of Engineering Materials & Structures*. DOI: 10.1111/ffe.12259

Zhang,Y.M. , Yi, D.K., Xiao, Z.M., and **Huang, Z.H**. (2015). Engineering critical assessment for offshore pipelines with 3-D elliptical embedded cracks. *Engineering Failure Analysis*. 51: 37–54. DOI:10.1016/j.engfailanal.2015.02.018.

Publications & Events

Upcoming Events

The Acoustical Society of America Meetings will be held in Salt Lake City Utah from May 23-27, 2016 and in Honolulu, Hawaii from Novermber 28-December 2, 2016 http://acousticalsociety.org/meetings/future_meetings

35th International Conference on Ocean, Offshore and Arctic Engineering (OMAE2016) in Busan, South Korea from June 19-24, 2016 http://asme.org/events/omae

OCEANS'16 MTS/IEEE Conference in Shanghai, China from April 10-13, 2016. http://oceans16mtsieeeshanghai.org/

The 2016 Ocean Sciences Meeting will be held in New Orleans, Louisiana from February 21-26. http://osm.agu.org/2016/

3rd International Conference on Coastal and Ocean Engineering will be held in Tokyo, Japan from April 8-9, 2016. http://iccoe.org

Students from ORE 601 assembling an openROV

Successful Accreditation Review

Dr. John Wiltshire

Every six years the department must undergo an accreditation review by the Accreditation Board for Engineering and Technology (ABET). This is a very rigorous process involving the submission of a detailed 250 page self-study report followed by a three day visit by a seven person review panel. The self study considers the curriculum, the faculty, facilities, supporting faculty in other departments, technicians, university services, grants, publications and the success of graduates to name a few of the areas of in depth evaluation. The report was submitted in July 2015. The panel visited in November 2015 and issued its findings. The findings were presented in oral and written form to the UH Chancellor and are subject to revision by a later full national ABET review caucus in July 2016 before they are finalized and published. The evaluation of ORE was very positive, in fact, ORE received a *highly unusual perfect score*! That is, the ABET evaluators found no deficiencies, no weaknesses and no concerns (their three categories of departmental shortcomings). No other program at UH received this high a score from ABET.

This extremely positive review is a testimony to the strong research and teaching performance of the department. ABET was also very pleased with the significant interaction between the department and its advisory committees. The support provided by the local engineering community in terms of the capstone design class and internships were critical to ABET's conclusions. The fact that local engineering companies such as 'Sea Engineering' repeatedly hire large numbers of the department's graduates along with our graduate's outstanding success in a wide range of ocean engineering positions across the US and around the world supports the conclusion that the program is providing a versatile and high quality education. This is what ABET is attempting to measure in as comprehensive a manner as possible. ABET was also pleased with the close links between the department and professional engineering societies such as SNAME and MTS.

Moving forward, ABET applauded the department's plans to expand the three option areas to include oceanographic engineering and interdisciplinary engineering. ABET also liked the idea of including more choice of courses in each of the option areas as this would allow specialization beyond the core classes. The department is also strengthening its advising through a new form and procedure which advisors and students will jointly complete each semester to insure ABET requirements are fully met and documented and that each student has as productive and efficient a course of study as possible. In summary, the ABET evaluation procedure was a positive experience for the department, documenting our excellence and getting a strong endorsement for a clear path forward.

Inside ORE

SOEST Open House

Every two years, the School of Ocean and Earth Science and Technology has an open house to showcase to the public some or the research conducted at the University of Hawaii with educational "hands on" displays. It was estimated that over 4,000 students from elementary, middle and high school attended on Friday, October 23. On Saturday, it was open to the general public.

ORE was represented by Yaprak, Florian, Andreia, Conghao and Professor Huang. They ran demonstrations of the wave tank, constructed by Dr. Pawlak, while entertaining the guests and informing them of wave processes.

Conghao and Florian on Saturday

Yaprak and the wave tank

Yaprak and Florian entertaining the children on Friday

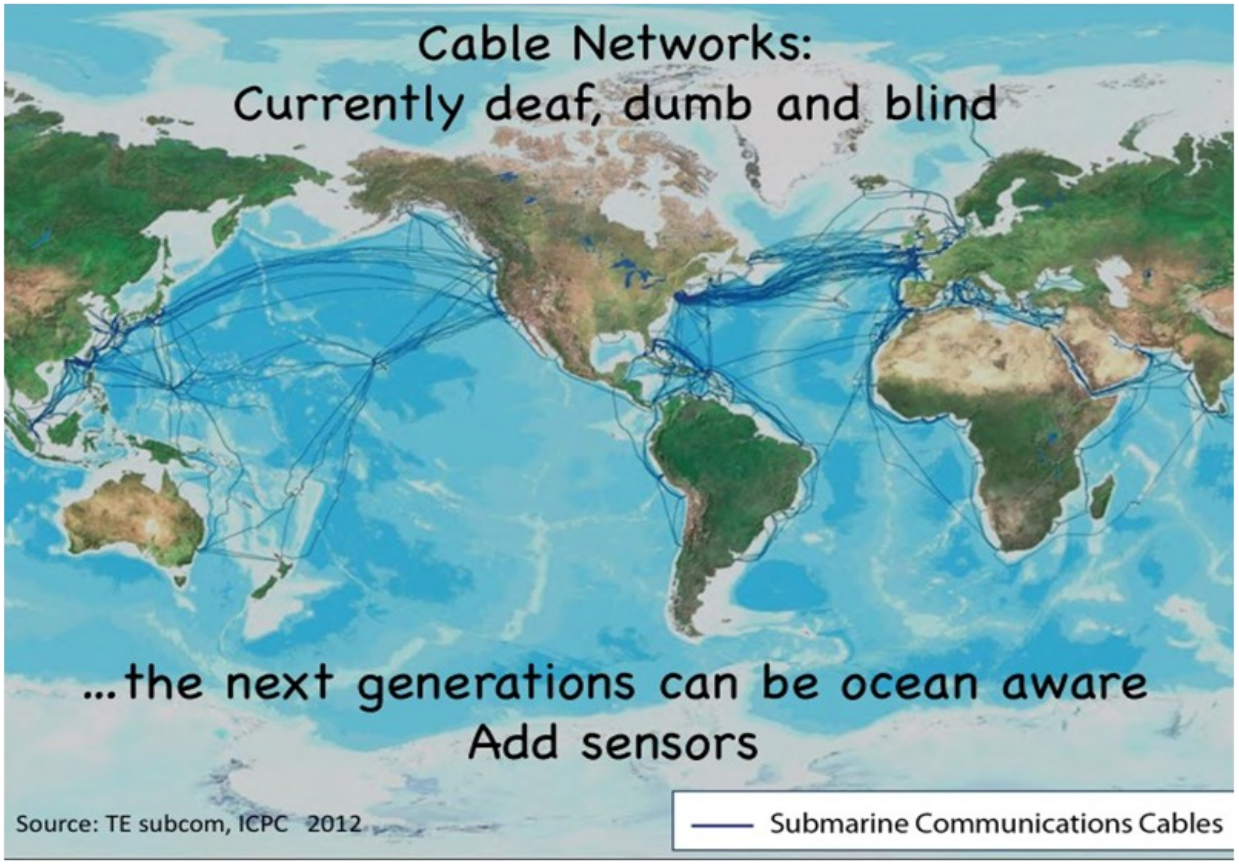
SMART Cables

Dr. Bruce Howe

Planning is underway to integrate ocean sensors into Scientific Monitoring And Reliable Telecommunications (SMART) subsea cable systems to provide basin and, ultimately, global array coverage within the next decades. We envision that SMART cables will provide the following: contribute to the understanding of ocean dynamics and climate; improve knowledge of earthquakes and forecasting of tsunamis; and complement and enhance existing satellite and *in situ* observing systems. SMART cables will be a first order addition to the ocean observing system, with unique contributions, strengthening and complementing satellite and other *in situ* systems. Cables spanning the ocean basins with repeaters every ~65 km will host sensors/mini-observatories, providing power and real-time communications. The current global infrastructure of commercial submarine telecommunications cable systems consists of 1.5 Gm of cable with ~23,000 repeaters; the overall system is refreshed and expanded on a time scale less than 10 years whereas individual systems have lifetimes in excess of 25 years.

In two recent NASA-funded workshops, the scientific utility of the initial measurement suite (bottom temperature, pressure, and acceleration) is explored. A comprehensive report and other material is available at http://www.soest.hawaii.edu/NASA_SMART_Cables.

These new SMART cable systems will be a highly reliable, long-lived component of the ocean observing system. They will complement satellite, float, and other *in situ* platforms and measurements. Several UN agencies including the International Telecommunications Union, World Meteorological Organization, and UNESCO International Ocean Commission have formed a Joint Task Force to move this concept to fruition (ITU/WMO/IOC JTF; http://www.itu.int/en/ITU-T/climatechange/task-force-sc)



A Map of Submarine Communication Cables

Inside ORE

ORE 601 Class Conducted Field Study at Kilo Nalu Site, REMUS AUV and ADCP Deployed

Conghao Xu

On Oct. 30, 2015, the class of ORE601 Ocean Engineering Lab went on a field trip on board the research boat *Kilo Kai*. The purpose of the field trip was to conduct a short period study of the hydrodynamics (current and wave) and bathymetry of the Kilo Nalu Site, right off Kaka'ako on the southern shoreline of Oahu. Participating students are expected to gain valuable field trip experience as well as hands on experience in conducting field observations using various instruments. The trip was led by Dr. Zhenhua Huang and Prof. Geno Pawlak.

Deploying the Acoustic Doppler Current Profiler

During the field trip, the students successfully conducted the deployment and retrieval of a Teledyne ADCP and a REMUS AUV, used to collect the hydrodynamic data and bathymetric data respectively. The ADCP was left on the sea bottom at the site for a few hours. Two REMUS deployments with different mission profiles were conducted. The data collected during the period was later analyzed by the students, and will be used as a reference for the Kilo Nalu Observatory project

Deploying the REMUS Autonomous Underwater Vehicle

Tsunami Observer Program

Linyan Li

The Hawaii Tsunami Observer Program is an organized team effort sponsored by the Hawaii Emergency Management Agency and is located at the Environmental and Water Resources Center here at the University of Hawaii at Manoa. The purpose of the program is to gather runup and inundation data after a tsunami event to develop and test the computer data in which emergency evacuation maps and response protocols are developed for the state of Hawaii.

This is a voluntary program in which the members are given training with surveying equipment including measuring tape, poles, GPS and compasses. During our training session, we went to a beach site to practice using these tools.

Yoshiki, Yefei and I are members of this program. We welcome any other ORE students to join us as we know how important it is to have measurement data as a reference for the future and to validate tsunami modeling work. More information about volunteering for the Hawaii Tsunami Observer Program can be found here: http://www.hawaiitsunamiobservers.com/volunteering/

Yefei, Linyan and Yoshiki at a training session held at the Hawaii Kai Public Library

Final Page

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Catching a sunset at Wailupe Beach Park during low tide

Hana O Ke Kai
Newsletter of the
Department of Ocean and Resources Engineering
School of Ocean and Earth Science and Technology
University if Hawaii at Manoa

2540 Dole Street, Holmes Hall 402
Honolulu, HI 96855-2303
USA

TEL: +1(808)956-7572
FAX: +1(808)956-3498
Email: adminore@hawaii.edu
URL: http://www.ore.hawaii.edu

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ENGINEERING THE OCEANS SINCE 1966!