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Oceanic Engineering Society Newsletter

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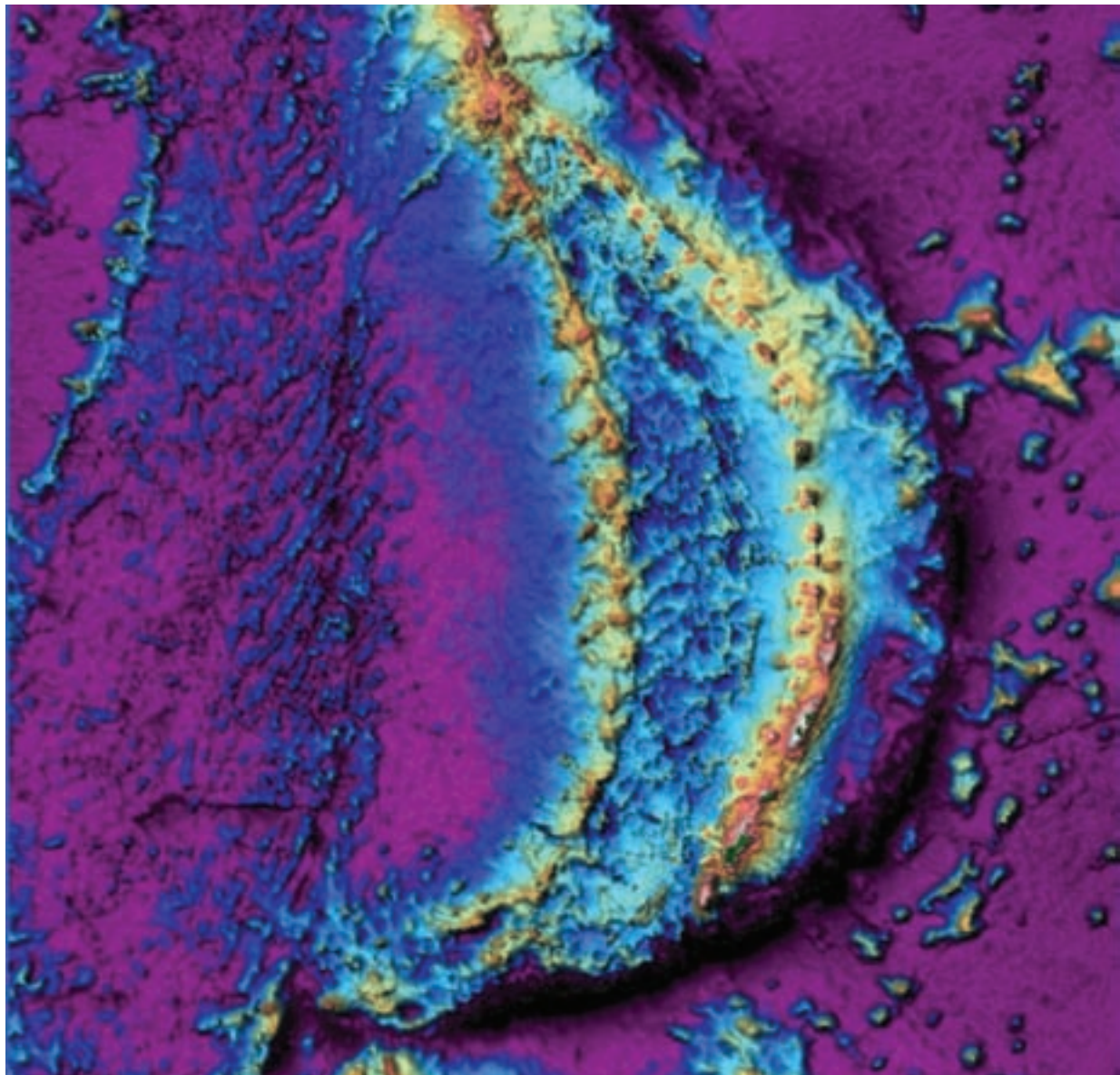
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Satellite derived bathymetry of the Mariana Arc region. EM300 MultiBeam bathymetry is overlaid on the satellite data. Pacific Ring of Fire 2004 Expedition. Image courtesy NOAA Office of Ocean Exploration; Dr. Bob Embley, NOAA PMEL, Chief Scientist

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j.gant@ieeee.org

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eNewsletter Editor

MARINNA MARTINNI
USGS
m_martini@comcast.net

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colmiller@comcast.net

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j.s.collins@ieeee.org

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elcreed@ieeee.org

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President's Corner

I would like to welcome our new ADCOM members who have been elected to serve a three year term starting January 1, 2010: James V. Candy, William M. Carey, James S. Collins, Barbara E. Fletcher, Marina Martini, and Robert L. Wernli. We had nine members running for six positions which shows a lot of interest from our membership in serving on the ADCOM. We want to thank the other three candidates and encourage them to continue to volunteer since I am sure we can find many ways for them to be active in the Society. We would like to thank Elizabeth L. Creed, Victor Klemas and John R. Potter for their service as their terms on the ADCOM end.

OCEANS '09 MTS/IEEE Biloxi will be held in October and should be a very excellent conference. The registration is very strong with many interesting papers and a large number of exhibitors. Hope you are able to attend and enjoy all the activities. OCEANS '10 IEEE/OES SYDNEY will be held May 24–28 with registration opening shortly. Our membership is expressing much interest in going to Sydney and I would recommend you make your travel arrangements early to get the best prices. We expect a very large crowd in Sydney.

In 2010 we will also have our South America Symposium April 12–14 in Buenos Aires; our Offshore Technology Conference May 3–7 in Houston; our Baltic Symposium June 15–17 in Riga, Latvia; and Passive 08 June 21–25 in Brest, France. The Fall OCEANS Conference will be September 20–24 in Seattle. We will probably have some additional Workshops in the latter half of the year. Please let us know if you would like to participate or help with any of the planned Conferences in 2010.



The IEEE Society Review is being conducted in November of this year for OES. This Review is done every five years for the Societies and is similar to a Command Inspection requiring much effort on the part of our volunteers. In preparing for the Review we have noticed several things that we would like to improve, in particular participation of students and IEEE GOLD Members in the Society. We will be taking additional measures in 2010 to promote participation of these groups and to better publicize the activities of the Society. We have a \$20,000 Student Scholarship Fund that is not being fully utilized each year. We request students please go to our web site and take advantage of this scholarship program.

In spite of the difficult economic times we are very pleased that our membership continues to increase and we remain in good financial condition which enables us to conduct our Conferences and to increase our activities. We now have several of our volunteers enrolled in the IEEE's Public Visibility Initiative who will be providing information to the media on areas of their expertise. Our Vice President for Professional Activities is working to revitalize and organize new OES Chapters. We will be updating our Distinguished Lecturers program and arranging for them to participate in Chapter activities. The OCEANIC ENGINEERING JOURNAL continues to be the pride of the Society due to the work of the Journal Editor Christian de Moustier and is known for the quality of its papers. We are delighted with our rejuvenated Newsletter under the guidance of the editor James Gant.

**Jerry Carroll,
OES President**

OES Newsletter Editorial



I recently came across a poster proclaiming the following

Viking Laws

- **Be Brave and Aggressive**
 - Be Direct
 - Grab All Opportunities
 - Use Varying Methods of Attack
 - Be Versatile and Agile
- **Attack One Target at a Time**
- **Don't Plan Everything in Detail**
- **Use Top Quality Weapons**
- **Be Prepared**
 - Keep Weapons in Good Condition
 - Keep in Shape
 - Find Good Battle Comrades
 - Agree on Important Points
 - Choose One Chief
- **Be a Good Merchant**
 - Find Out What the Market Needs
 - Don't Promise What You Can't Keep
 - Don't Demand Overpayment
 - Arrange Things So That You Can Return
- **Keep the Camp in Order**
 - Keep Things Tidy and Organized
 - Arrange Enjoyable Activities Which Strengthen the Group
 - Make Sure Everybody Does Useful Work
 - Consult all Members of the Group for Advice

I have no idea whether there is a shred of historical accuracy to these laws but even if they were just made up for tourists, I like them. I think they summarize many good points that we all should reflect on whether we call ourselves Vikings, oceanographers, engineers, biologists, government servants, or any other type of professional within the OES.

The first group of laws tells us to be brave and aggressive. There are opportunities all around us even in tough economic times. The key of course is to recognize those opportunities and have the vision, energy, and courage to develop them into something profitable. In the last issue I asked for your ideas for what opportunities you saw around you and I received one response that you will find in this issue. The invitation is always open for you to share with the rest of the community your vision of undeveloped ideas, improvements, or technologies.

The only law in this list that makes me hesitate before embracing it is the one that says to not plan everything in detail. I am by nature a detailed planner and I believe in the virtue of thinking things through before plunging ahead. I think, however, that what this law should say is to not plan in too much detail; i.e., allow room in your plan for failures, unexpected developments, etc. There is a quote sometimes attributed to Napoleon and sometimes to General Eisenhower that says "No battle plan survives first contact with the enemy." The point here is to be ready for the unexpected and be light on your feet, quick to maneuver when you encounter dynamic, real world conditions. A good risk plan prepares you for this and makes you versatile and agile. Another view of this is to say that the



Image from Elidpath, John Clarke. History of the World, Cincinnati: The Jones Brothers Publishing Company, 1919

value of planning is not in the plan itself but rather in the thinking process that is involved with creating the plan.

The virtues summarized in the "Be Prepared" category are numerous. As ocean engineering professionals, our weapons are sensors and instruments, computers, tools, ships, and sensor platforms. Using top quality equipment and keeping it in good condition makes perfect sense. Keeping in shape intellectually is just as important. The Oceans conferences are an excellent way to do that; not only because we can learn from others, but by preparing and presenting papers to our peers we exercise and sharpen our skills. We also find good battle comrades by networking with other OES professionals.

In a general sense, we are all merchants; we all provide some kind of goods or service and we all have clients in one form or another. The Viking laws pertaining to merchants seem to jump off the page as being both obvious and fundamentally important. Our markets are dynamic and we have to stay focused on what our clients will find most valuable. Developing cool technology that nobody wants is a hobby that few can afford. We also have to resist the temptation to oversell or misrepresent our capabilities. The last point in that grouping about arranging things so you can return reminds me of how we should deal with each other directly, honestly and fairly. We tend to be each other's clients, vendors, collaborators, etc. because we do business with each other. We are sometimes partners, sometimes competitors, sometimes masters, and sometimes servants. It is wise to apply the golden rule and treat our business associates as we would want to be treated ourselves so that we can return someday. We want to make a bed that we can sleep in.

The last grouping of Viking laws provides good advice on how to keep the camp in your own organization, taking care of your employees and colleagues. This of course comes back to a belief that the organization exists because you can accomplish more as a group of fulfilled, motivated, self-actualized, contributors than you can as a group of unaffiliated individuals.

Do any of these laws resonate especially well with you? If so, write to me and tell me about it and how you think it applies to your situation or others that you have witnessed. What are the lessons we can learn from?

Jim Gant
j.gant@ieee.org

Adcom Election Results

The annual election for the OES Adcom was completed on 8 September for the class of 2010. The society would like to thank the candidates who had both the interest and the inclination to run for the positions. Since this was the Society's first electronic voting effort the N&A committee would like to receive comments from our members related to this approach to enhance the procedure for future elections. The comments should be sent to Jim Barbera at j.barbera@ieee.org.

There were nine candidates for the six positions and six were clearly chosen. The class will assume their positions

on 1 January 2010 for a three year term that can be renewed once consecutively. The results of the election are as follows:

- Jim Collins
- Jim Candy
- Bill Carey
- Barbara Fletcher
- Marinna Martini
- Bob Wernli

Thanks to all and welcome aboard to the class of 2010.

Guest Editorial Environmental Problems and Proposed Solutions

[Editor's Note: In the last issue I asked for opinions about opportunities that exist for advances in ocean related science and industry. The following article was received in response to that request. I encourage others to send in their ideas, rebuttals, etc. also. Send them to j.gant@ieee.org.]

I hope that readers will examine these proposed solutions to problems that confront us, help to make others aware of them, and contribute their own ideas.

Problem 1. Decreased precipitation on mountain tops worldwide. Air rises to flow over mountains, and encounters lower pressure at the higher altitudes. This allows it to expand and cool, so that moisture condenses on cloud condensation nuclei (CCN) called aerosols, which may be particles of dust, soot, bacteria, or clumps of gas molecules. The water or ice particles coalesce until they are heavy enough to fall to Earth. Much of the world's population depends for its fresh water supply on water and snow that falls on mountains and is distributed by streams and rivers. This precipitation is decreasing, resulting in drought, as for example, in the Rocky Mountains, Lake Victoria, Australian Alps, and Ethiopian Highlands. Growing evidence indicates that this is due to increased numbers of aerosol particles, so that the limited supply of moisture is distributed over more CCN, with resulting smaller water particles that fail to coalesce and precipitate.

Proposed solution: Rafts of floating solar-heated evaporator panels in coastal waters to increase the humidity of the air so that more water is distributed over a given number of CCN, making larger droplets that have a greater chance of coalescing. See www.sealevelcontrol.com for proposed raft construction and deployment. Evaporation is straightforward and predictable. Wind patterns, moisture transport and precipitation are variable and difficult to predict, so we may not receive precipitation where we need it. Placement of evaporator rafts will require great knowledge and care.

Problem 2. Global warming. Greenhouse gases (GHGs) are a cause of global warming. There is much talk about reducing

GHG emissions to the atmosphere. This will only reduce the rate at which GHGs are added to the atmosphere. Global warming will still increase.

Proposed solution: Rafts of floating reflector panels will reflect solar energy back to the sky or up to the clouds. Fresh and salt water are great absorbers of solar energy. Shading provided by the reflector panels will reduce the heating of the Earth. This is much safer than the seriously-considered proposal to shoot sulfurous aerosols into the stratosphere to create a sunshade of fine water or ice particles. Overturning circulation can carry these into the troposphere, where they will exacerbate the mountain-top drought problem.

Problem 3. Ocean deterioration due to dumping, pollution, over-fishing, killing unintended species, warming, and acidification due to dissolved carbon dioxide (CO₂). Nutrients (nitrates and phosphates) are needed in the sunlit surface layer so that phytoplankton can convert them into organic matter (more phytoplankton) to feed other creatures. Nutrients are stirred up from greater depths by winter storms when the sun does not heat the surface enough to keep the warm water on top and prevent mixing. The phytoplankton use up the nutrients during the Spring and cannot get more due to the stratification.

Demonstrated solution: Wave-powered pumps are described at www.atmocean.com with some enhancements described at www.sealevelcontrol.com. These can bring up nutrients through the thermocline (thermally-stratified layer) to restore productivity. Cooler deep water is brought to the surface along with higher concentrations of CO₂, which is vented to the atmosphere. The global-warming effect of this GHG is counteracted by the floating reflectors. Removal of some CO₂ from the ocean makes it more alkaline (less acidic) and enables the corals to form skeletons and phytoplankton to form shells.

Problem 4. Hurricane threat to the U.S. Gulf Coast. The Loop Current intrudes into the Gulf of Mexico (GoM) and collects a deep pool of warm water inside the loop. Hurricanes that

come through the GoM intensify if they pass through the warm pool, as did Katrina in 2005 and Ike in 2008.

Proposed solution: 64,000 floating turbines, each producing 250 kW of electric power, moored in the Yucatan Channel, Florida Straits, and Florida Current. This will eliminate the Loop Current intrusion entirely most of the time, so that the current goes directly from the Yucatan Channel to the Florida Straits. If there is no loop, there is no warm pool and no hurricane intensification. See www.sealevelcontrol.com for the hypothesis

that explains this. At other times, the Loop Current intrudes, but much less than it did during the extreme Katrina event.

I will be happy to answer questions.

Dr. Richard LaRosa
<http://www.sealevelcontrol.com>
317 Oak Street, South Hempstead,
NY 11550-7713
(516) 486-7827
rlarosa331@aol.com

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Elizabeth Creed, OES Membership Coordinator



IEEE is the world's largest technical society, bringing members access to the industry's most essential technical information, networking opportunities, career development tools, and many other exclusive benefits.

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The Oceanic Engineering Society (OES) focuses on all aspects of science, engineering, and technology that address research, development, and operations pertaining to all bodies of water. This includes the creation of new capabilities and technologies from concept design through prototypes, testing, and operational systems to sense, explore, understand, develop, use, and responsibly manage natural resources. Your OES membership brings you:

- IEEE Journal of Oceanic Engineering (print & electronic)
- Society Newsletter

To join IEEE, the best way is to apply on-line at www.ieee.org/join. Alternately, detach the paper application in this newsletter, fill it out and mail it to the address on the application form.

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*Half year rates apply to new members only.

If you have any questions about membership or the application process, please contact the membership coordinator, Elizabeth Creed at elcreed@ieee.org.

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IEEE defines the following membership grades: Student, Affiliate, Associate, Member, Senior Member, Fellow, and Life Member. The grade of Senior Member is the highest for which application may be made and requires experience reflecting professional maturity. For admission or transfer to the grade of Senior Member, a candidate must be an engineer, scientist, educator, technical executive, or originator in IEEE-designated fields for a total of 10 years and have demonstrated 5 years of significant performance. The benefits of senior membership include:

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- Ability to Refer Other Candidates: Senior Members can serve as a reference for other applicants for Senior Membership.
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We encourage all members of OES who meet the qualifications of senior membership to apply for it. OES will act as the nominator for those wishing to apply. Complete information and an application form can be found online at www.ieee.org/web/membership/senior-members. Members applying for elevation to senior member can contact Elizabeth Creed, elcreed@ieee.org, if they have any questions.

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(students and graduate students should apply online)

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- Physical Sciences
- Biological and Medical Sciences
- Mathematics
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- Other (please specify): _____

This academic institution or program is accredited in the country where the institution is located. Yes No Do not know

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- Physical Sciences
- Biological and Medical Sciences
- Mathematics
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Select the numbered option that best describes yourself. This information is used by IEEE magazines to verify their annual circulation. Please enter numbered selections in the boxes provided.

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12. Aircraft, missiles, space and ground support equipment
13. Oceanography and support equipment
14. Medical electronic equipment
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16. Independent and university research, test and design laboratories and consultants (not connected with a mfg. co.)
17. Government agencies and armed forces
18. Companies using and/or incorporating any electronic products in their manufacturing, processing, research or development activities
19. Telecommunications services, telephone (including) cellular
20. Broadcast services (TV, cable, radio)
21. Transportation services (airline, railroad, etc.)
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25. Distributor (reseller, wholesaler, retailer)
26. University, college/other educational institutions, libraries
27. Retired
28. Other _____

B. Principal job function _____

- | | |
|--|---|
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| 3. Project engineering management | 11. Software design/development management |
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| 5. Design engineering management - analog | 13. Science/physics/mathematics |
| 6. Design engineering management - digital | 14. Engineering (not elsewhere specified) |
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| | 17. Education/teaching |
| | 18. Retired |
| | 19. Other _____ |

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|--|-----------------------|
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| 7. Engineering Management | 16. Consultant |
| 8. Scientific Management | 17. Retired |
| 9. Member of Technical Staff | 18. Other _____ |

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Yes No If yes, provide, if known:

Membership Number	Grade	Year Expired

4 Please Sign Your Application

I hereby apply for IEEE membership and agree to be governed by the IEEE Constitution, Bylaws and Code of Ethics. I understand that IEEE will communicate with me regarding my individual membership and all related benefits. **Application must be signed.**

Signature _____ Date _____
Over Please

5 Add IEEE Society Memberships (Optional)

The 38 IEEE Societies support your technical and professional interests. Many society memberships include a personal subscription to the core journal, magazine or newsletter of that society. **For a complete list of everything included with your IEEE Society membership visit www.ieee.org/join.**

Please check the appropriate box.

		BETWEEN 16 AUG 2008- 28 FEB 2009 PAY	BETWEEN 1 MAR 2009- 15 AUG 2009 PAY
IEEE Aerospace and Electronic Systems ⌘ <input checked="" type="checkbox"/>	AES010	25.00 <input type="checkbox"/>	12.50 <input type="checkbox"/>
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IEEE Dielectrics and Electrical Insulation ⌘ <input checked="" type="checkbox"/>	DEI032	20.00 <input type="checkbox"/>	10.00 <input type="checkbox"/>
IEEE Education ▪ ⌘ <input checked="" type="checkbox"/>	E025	20.00 <input type="checkbox"/>	10.00 <input type="checkbox"/>
IEEE Electromagnetic Compatibility ▪ <input checked="" type="checkbox"/>	EMC027	30.00 <input type="checkbox"/>	15.00 <input type="checkbox"/>
IEEE Electron Devices ▪ ⌘ <input checked="" type="checkbox"/>	ED015	12.00 <input type="checkbox"/>	6.00 <input type="checkbox"/>
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IEEE Geoscience and Remote Sensing ▪ <input checked="" type="checkbox"/>	GRS029	16.00 <input type="checkbox"/>	8.00 <input type="checkbox"/>
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IEEE Industry Applications ⌘ <input checked="" type="checkbox"/>	IA034	20.00 <input type="checkbox"/>	10.00 <input type="checkbox"/>
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IEEE Instrumentation and Measurement ⌘ <input checked="" type="checkbox"/>	IM009	25.00 <input type="checkbox"/>	12.50 <input type="checkbox"/>
IEEE Intelligent Transportation Systems ▪ ⌘ <input checked="" type="checkbox"/>	ITSS 038	35.00 <input type="checkbox"/>	17.50 <input type="checkbox"/>
IEEE Lasers and Electro-Optics ▪ ⌘ <input checked="" type="checkbox"/>	LE0036	25.00 <input type="checkbox"/>	12.50 <input type="checkbox"/>
IEEE Magnetics ▪ <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	MAG033	20.00 <input type="checkbox"/>	10.00 <input type="checkbox"/>
IEEE Microwave Theory and Techniques ⌘ <input checked="" type="checkbox"/>	MTT017	14.00 <input type="checkbox"/>	7.00 <input type="checkbox"/>
IEEE Nuclear and Plasma Sciences ▪ <input checked="" type="checkbox"/>	NPS005	30.00 <input type="checkbox"/>	15.00 <input type="checkbox"/>
IEEE Oceanic Engineering ▪ ⌘ <input checked="" type="checkbox"/>	OE022	19.00 <input type="checkbox"/>	10.00 <input type="checkbox"/>
IEEE Power Electronics ▪ <input checked="" type="checkbox"/>	PEL035	20.00 <input type="checkbox"/>	10.00 <input type="checkbox"/>
IEEE Power & Energy ⌘ <input checked="" type="checkbox"/>	PE031	35.00 <input type="checkbox"/>	17.50 <input type="checkbox"/>
IEEE Product Safety Engineering ▪	PSE043	35.00 <input type="checkbox"/>	17.50 <input type="checkbox"/>
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IEEE Reliability ▪ ⌘ <input checked="" type="checkbox"/>	RL007	30.00 <input type="checkbox"/>	15.00 <input type="checkbox"/>
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IEEE Social Implications of Technology ▪ ⌘ <input checked="" type="checkbox"/>	SIT030	26.00 <input type="checkbox"/>	13.00 <input type="checkbox"/>
IEEE Solid-State Circuits ⌘ <input checked="" type="checkbox"/>	SSC037	24.00 <input type="checkbox"/>	12.00 <input type="checkbox"/>
IEEE Systems, Man, & Cybernetics ▪ <input checked="" type="checkbox"/>	SMC028	12.00 <input type="checkbox"/>	6.00 <input type="checkbox"/>
IEEE Ultrasonics, Ferroelectrics, & Frequency Control ▪ ⌘ <input checked="" type="checkbox"/>	UFFC020	20.00 <input type="checkbox"/>	10.00 <input type="checkbox"/>
IEEE Vehicular Technology ⌘ <input checked="" type="checkbox"/>	VT006	18.00 <input type="checkbox"/>	9.00 <input type="checkbox"/>

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- ⌘ One or more Society publication(s) Online access to publication(s)
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United States	\$169.00 <input type="checkbox"/>	\$84.50 <input type="checkbox"/>
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Canada (includes HST)*	\$164.77 <input type="checkbox"/>	\$82.39 <input type="checkbox"/>
Africa, Europe, Middle East.....	\$142.00 <input type="checkbox"/>	\$71.00 <input type="checkbox"/>
Latin America	\$133.00 <input type="checkbox"/>	\$66.50 <input type="checkbox"/>
Asia, Pacific.....	\$134.00 <input type="checkbox"/>	\$67.00 <input type="checkbox"/>

*IEEE Canada Business No. 125634188

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Applicants who certify that their prior year income did not exceed US\$12,900 (or equivalent) or were not employed are granted 50% reduction in: full year dues, regional assessment and fees for one IEEE Society. If applicable, please check appropriate box and adjust payment accordingly. Student members are not eligible.
 I certify I earned less than US\$12,900 in 2007
 I certify that I was unemployed in 2007

7 More Recommended Options

Proceedings of the IEEE print \$33.00 or online \$33.00
 Proceedings of the IEEE (print/online combination)\$44.00
 IEEE Standards Association (IEEE-SA).....\$43.00
 IEEE Women in Engineering (WIE)\$25.00

8 Payment Amount

Please total the Membership dues, Society dues and other amounts from this page:

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AMOUNT PAID..... TOTAL \$ _____

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 EXPIRATION DATE (BILLING STATEMENT ADDRESS) USA ONLY

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9 Were You Referred to IEEE?

Yes No If yes, provide the following:

Member Recruiter Name _____

IEEE Recruiter's Member Number (Required) _____

 TRACKING CODE

 PROMO CODE

Welcome New Members

We would like to welcome the following new members to IEEE/OES:

New Members June 2009

Mohamed Abdelsalam	Egypt
Brian D. Abbott	USA
Joao Alves	Portugal
Joule M. Awadallah	Egypt
Bjoern Baschek	Germany
Zeenatul Basher	Malta
Hermann Bertram	Germany
Adrian Bodenmann	Japan
Tjasa Boh	Hong Kong
Giorgio Bruzzone	Italy
Stephan Bruschi	Germany
Mernout Burger	Norway
Laura Sanchez Cabezas	Spain
Sonia Castanedo	Spain
Hwa Chien	Taiwan
Enrique Coiras	Italy
Petar Covo	Croatia
John J. Cruz	USA
Christian Curt Daniel	Germany
Jonathan James Davies	UK
Laurent Delauney	France
Marcel Tous Faree	Spain
Laura Fenton	USA
Florence Ferrando	France
Fausto Ferreira	Portugal
Stylianos Flampouris	Germany
Janet J. Fredericks	USA
Yanzhe Fu	Germany
Grant Gerstner	USA
Vladimir V. Gozbatskiy	Russia
Sabine Graf	UK
Tiberio Grasso	Italy
Donald M. Hussong	USA
Rudolf Haraksim	France
Joerg Kalwa	Germany
Vijay Kumar Kanojia	India
David Katz	USA
Oleksiy Kebkal	Germany
Kevin A.P. Kirchman	Monaco
Jochen Klinker	USA
David Krout	USA
Carine Ilona Kubert	Germany
Caroline Lange	Germany
Xiaodong Liu	China
Shreenivas N. Londhe	India
Inigo J. Losada	Spain
Zhiyu Lui	China
Alex Sander Dias Machado	Germany
Fumitaka Maeda	Japan
Jean H. Marvaldi	France
Mohd Zubir Matjafri	Malaysia
Fernando J. Mendez	Spain
Hind Mestouri	France
Andrea Munafò	Italy
Levente Molnar	UK
Noel James Oates	USA
Unnikrishnan V.Painumgal	Japan

Sofia Santosq Patricio	Portugal
Gopu R. Potty	USA
Grant Pusey	Australia
Eberhard Sauter	Germany
Hossein Shahbazi	Iran
Saad M. Sharaf	Egypt
Midori Shimizu	Japan
Pedro Diaz Simal	Spain
Enrico Simetti	Italy
Oktay Sipahigil	Turkey
Vadim Sivkov	Russia
Panagiotis Sotiropoulos	Italy
Valentin Soulenq	France
Rene Swift	UK
Iyad Khalil Tumar	Bremen
Stuart Martin Taylor	Canada
Ahmet N. Unlu	Turkey
Thomas Rauschenbach	Germany
Sarab Tay	France
Elizabeth Valenti	USA
Sandor M. Veres	UK
Andres F. Villegas	Colombia
Xianbo Xiang	France
Lucy R. Wyatt	UK
Yusuke Yamane	Japan

New Members July 2009

Christopher John Anastasiou	USA
Enzo Alberto Candreva	Italy
Richard Lee Culver	USA
Linda Feeney-Entrican	USA
Jeannette Frances Lacasse	USA
Eric Reuel Meissner	USA
Neil L. Scott	New Zealand
Sanja Veleva	Macedonia
Harleigh Leigh Williams	USA

New Members August 2009

Fnu Lakitosh	USA
Caitlin Slezzycki	USA

New Members September 2009

Stephen Little	USA
Garrick McNey	USA
Luis Alberto Munoz	Mexico
Thomas Plowman	USA

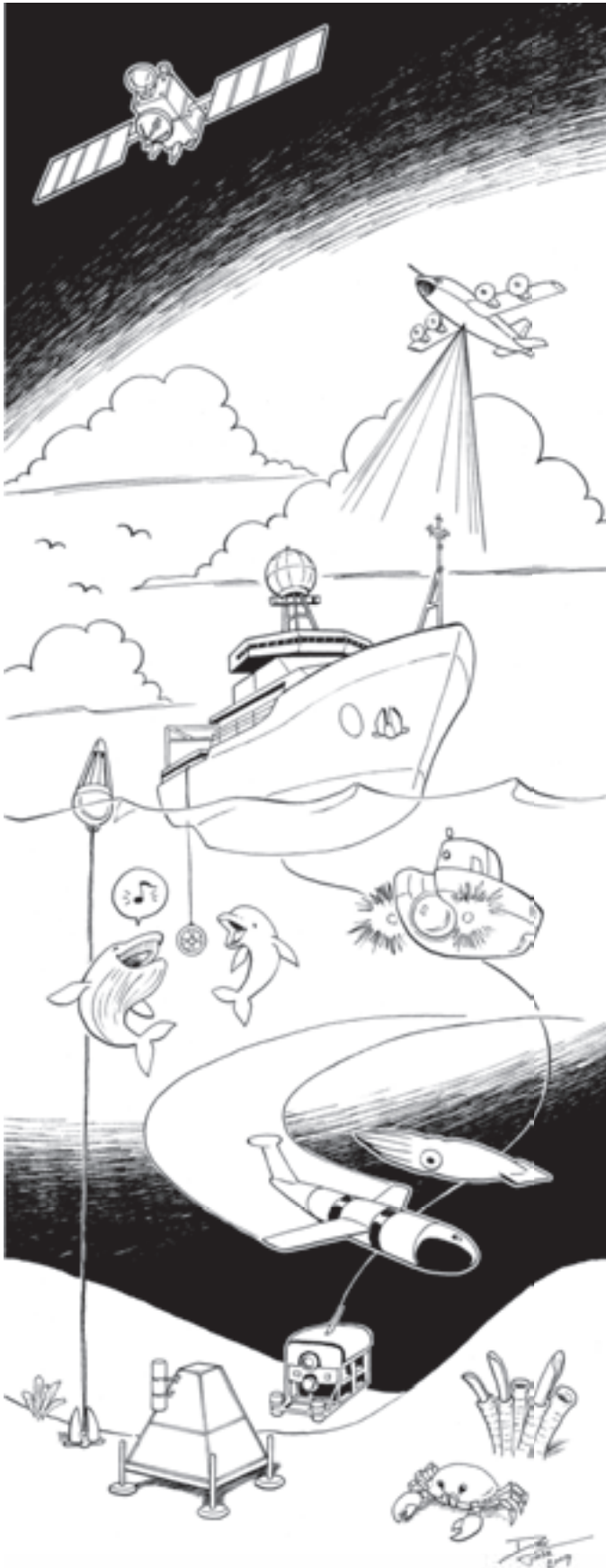
Reinstated Members

Marian Duta	Romania
Takeshi Nakatani	Japan
Jose Pinto	Portugal
Sergi Pons	Spain
Anuj Sehgal	Germany

Promoted to Senior Member

Timothy Duda	USA
David Fratantoni	USA
James Irish	USA
William Kirkwood	USA

Oceanic Engineering Scholarships Available



Multiple undergraduate and graduate scholarships of \$2,000 are available each year from OES. Students must be enrolled full-time in an accredited college or university in a field of study that will lead to a career in ocean engineering or a related ocean science field.

Undergraduate Eligibility

Must submit a scholarship application outlining his/her field of study and plans for a career in ocean engineering or a related ocean science field.

- Must have completed at least the second year of study.
- Must submit an academic transcript.
- Application must be accompanied by written recommendations from two faculty members.
- Must have been a student or regular member of the IEEE Oceanic Engineering Society at least six months prior to the beginning of the requested scholarship year.

Graduate Eligibility

- Must submit a scholarship application outlining his/her field of study and plans for a career in ocean engineering or a related ocean science field.
- Must be currently enrolled, or have been accepted, in a graduate program of ocean engineering or a related ocean science field.
- Must have demonstrated excellence in academics and the ability to perform independent research, through professional and/or academic recognition programs.
- Application must be accompanied by a written recommendation by an academic advisor.
- Must have been a student or regular member of the IEEE Oceanic Engineering Society at least six months prior to the beginning of the requested scholarship year.

Application Deadlines

- There are two award cycles each year. Completed applications must be postmarked by 1-April for scholarship awards in September of that year, or 1-September for an award in the following January. References and recommendations must accompany the application.
- Official transcripts, mailed by the academic institutions, must be received by 15-April for September awards and by 15-September for January awards.
- Scholarships will be awarded during the spring and fall meetings of the OES Executive or Administrative Committee. Recipients of the awards will be invited to attend the following OCEANS conference to be recognized at the OES Awards Luncheon.

To find out more details or to get a scholarship application form, go online to www.ieeeoes.org and select the Student Scholarship Program link on the left hand side of the page.

Who's Who in OES

Editor's Note: This article is another installment in a continuing series that recognizes those who have distinguished themselves in the ocean engineering profession.



P.R. Saseendran Pillai was born on 28th October 1953. He received his Ph.D. in the field of Underwater Communication: Development of Programmable Arrays in 1982 from the University of Cochin. He started his career as Scientific Officer in the Department of Electrical Communication Engineering, Indian Institute of Science, Bangalore in 1982. In 1983, he joined the Department of Electronics, Cochin University of Science And Technology (CUSAT) as faculty and has been elevated to the post of Professor in Electronics in 1994. He was the Professor and Head of the Department of Electronics during 1998–2001.

Professor Pillai was instrumental in organizing and conducting the biennial Symposium on Ocean Electronics (SYMPOL) in the Department of Electronics of the Cochin University of Science And Technology. This symposium is intended to provide a forum for the researchers to interact with one another and present their innovative ideas and research findings in the area of Ocean Electronics. The tenth SYMPOL is being organized as an International Conference addressing the Global Oceans, Systems and Technologies during 18–20 November, 2009 in The Hotel International, Cochin. The first Symposium of this series (SYMPOL-91) was organized during 18–20 December, 1991, to mark the occasion of the formal opening of the Center for Ocean Electronics established in the Department of Electronics of the Cochin University of Science And Technology as a joint venture of the Ministry of Human Resource Development (Government of India) and the University Grants Commission (UGC), New Delhi. A Technical Panel of SYMPOL-91 suggested that the Symposium on Ocean Electronics should be organized periodically, at least once in two years. In line with this recommendation, SYMPOL is being organized as a biennial event. The Technical Panel of SYMPOL-2005 organized during 15–16 December, 2005 suggested that SYMPOL should be organized as an international venture and its international visibility should be enhanced by giving wider publicity and

hence SYMPOL-2007 was organized as an international conference. The enthusiasm, cooperation and support extended by the IEEE-OES, particularly by Dr. James S. Collins led to the culmination of the technical cosponsoring of the SYMPOL-2009 by IEEE-OES. The international visibility of SYMPOL and its successful conduct would not have been possible without the whole hearted cooperation and support rendered by his colleague Dr. Supriya M.H., the Coordinator of SYMPOL-2009 as well as his Faculty Colleagues and Research Scholars.

Professor Pillai has conducted theoretical and experimental studies in Underwater Communication, Sonar Signal Processing, Ocean Acoustics, Communication and Networking. He has more than 86 research publications in these areas and was responsible for editing all the SYMPOL Proceedings. He has successfully completed many Technology Development and Application Oriented R & D Projects funded by various Government of India Departments and Agencies. Some of the major projects include Development of an Array Gain Control System, Investigations on Low Frequency Piezopolymer Sensor Elements and Arrays for Underwater Applications, Software Development for Echo Simulation and Processing, Transducer Systems for Ocean Engineering Applications, Computer Aided Design of Transducers, Development of Acoustic Techniques for Fish and DSL Biomass Estimations, Development of Algorithms for Spread Spectrum Underwater Communication Systems, Implementation of multiple CDMA Communication Systems, Implementation of an Intelligent Identifier for Noise Sources in the Ocean, Tuna Resources of the Indian EEZ: An Assessment of Growth and Migratory Patterns, etc. He is presently in the process of implementing two Mission Mode Projects, one on Development of Autonomous Buoy Systems for Radio Acoustic Positioning and Tracking and the other on Development of Miniaturised Archival Tags. He has participated in many cruises and field trials, as a part of implementation of various research projects.

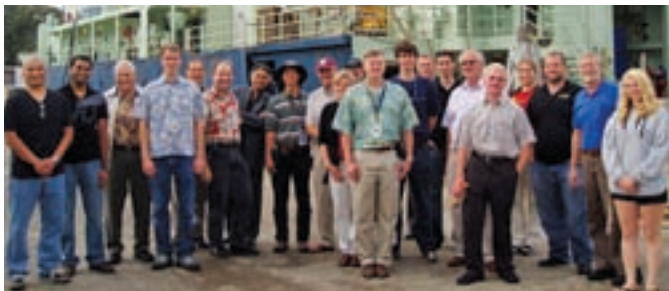
He has secured the Sir C.V Raman Award for the Best Paper published in the Journal of the Acoustical Society of India in the year 2002. He is a member of IEEE, Oceanic Engineering Society, Acoustical Society of America and the Life Member of the Acoustical Society of India. He is also the Vice-Chairman of the new OES India Chapter under the India Council, opened in September, 2008.

Chapter Report: Tour of Scripps Oceanographic Institute and R/V *Atlantis*

Kevin J. Delaney

On October 2, the San Diego chapter toured the Scripps Institution of Oceanography's Nimitz Marine Facility hosted by Scripps Marine Superintendent Captain Zoltan Kelety. The highlight of the event was a tour of the R/V *Atlantis*, visiting from Woods Hole Oceanographic Institute, by the ship's master, Captain Adam Seamans.

Aboard *Atlantis*, Capt. Seamans briefed OES members on the ship's sophisticated control and navigation system, which uses GPS data to drive three steerable thrusters that can position the ship over a desired bottom location or along a desired track. Members also saw the handling system for the research submersible *Alvin*. At the Scripps marine facility



San Diego OES members join Scripps Marine Superintendent Capt. Zoltan Kelety and WHOI Capt. Adam Seamans after touring the R/V *Atlantis*.



Capt. Adam Seamans, master of R/V *Atlantis*, briefs San Diego OES members on the submersible Alvin's handling system.

ashore, engineers described the oceanographic community's systems for at-sea broadband connectivity. Finally, other

Scripps engineers demonstrated custom equipment for ocean sampling at precise depths.

Chapters Meeting Report

Jim Collins, IEEE OES Chapters Coordinator



The following twenty OES Chapters are presently operational:

- | | |
|-----------|---------------------------|
| Region 1 | Boston |
| Region 2 | Washington, DC |
| Region 4 | Chicago |
| Region 5 | Houston |
| Region 6 | San Diego |
| | Seattle |
| | Hawaii |
| Region 7 | Atlantic Canada (Halifax) |
| | Quebec |
| | Ottawa |
| | Toronto |
| | Victoria |
| Region 8 | France |
| | Spain |
| | UK & RI |
| Region 10 | India |
| | Japan |
| | New South Wales |
| | Singapore |
| | Taiwan |

To remain operational and qualify for their annual rebate these chapters must complete an online L31 meeting report for two technical meetings annually. The online report blank is found at www.ieee.org/L31. Technical meetings in 2009 reported at this time are:

- | | | |
|--|------------|---|
| Atlantic Canada (Halifax) | 2009.03.13 | Dr. Graham Daborn |
| | | Where should we go with Fundy Tidal Power? |
| | 2009.06.11 | Dr. M.A. Rahman |
| | | Advances in IPM Technology for Hybrid Electric Vehicles |
| Ottawa (Joint Chapter with SP and GRS Societies) | 2009.03.17 | Vickram Krisnamurthy |
| | | Adaptive Filtering Games for Designing Reconfigurable Sensor Networks |

- | | | |
|---|------------|---|
| Singapore | 2009.06.12 | Affan Syed |
| | | Understanding and Exploiting the Acoustic Propagation Delay in Underwater Sensor Networks |
| | 2009.06.16 | Dr. Stephen Simpson |
| | | The Importance of Reef Noise for Coral Reef Fishes: Lessons |
| United Kingdom and Republic of Ireland (Joint Chapter with GRS Society) | 2009.01.07 | Dr. Li Zhang |
| | | Relating Crop Patterns to Soil Moisture Variation by Remote Sensing |
| | 2009.03.24 | Dr. Yong Xue |
| | | Grid Computing and High Performance GeoComputation |
| | 2009.06.25 | Forrest Hoffman |
| | | Data Mining of Climate-Related Data |
| | 2009.09.28 | Dr. Bob Yu |
| | | The U.S. GOES-R Algorithm Working Group Team: Activities and Accomplishments |
| Victoria | 2009.04.01 | Emmett Gamroth |
| | | Design, Implementation, and Testing of an Underwater Global Positioning System |

Chapters are encouraged to file these reports with in a week so that the information can be passed on to OES members in a timely way. In any case to qualify for a 20% bonus reports must be filed by February 20th.

The OES is encouraging members to consider new chapters where they do not yet exist. Additionally, some Chapters are relatively inactive since, in most cases, the Chairs have moved on to other responsibilities or new positions not technically related to the OES field of interest. If this is the case in your area and you would consider helping, for more information and assistance please contact me, Jim Collins, OES Chapters Coordinator at j.s.collins@ieee.org or +1-250-595-6928.



OCEANS'10 IEEE Sydney

Conference and Exhibition
24-27 May 2010 Sydney, Australia

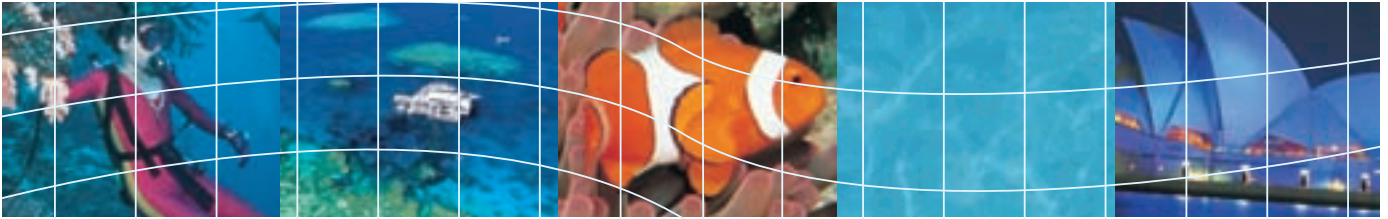
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- Advances in Underwater Imaging and Mapping
- Advances in Understanding of the Southern Ocean
- Advances in Exploration and Recovery for the Offshore Oil & Gas Industry
- Advances in Understanding of the Impact of Climate Change on the Oceans
- Advances in Understanding of Marine Environments in the Western Pacific

General OCEANS Topics

- Underwater acoustics and acoustical oceanography
- Sonar signal / image processing and communication
- Ocean observing platforms, systems, and instrumentation
- Remote sensing
- Ocean data visualisation, modelling, and information management
- Marine environment, oceanography, and meteorology
- Optics, imaging, vision, and EM systems
- Marine law, policy, management, and education
- Offshore structures and technology
- Ocean vehicles and floating structures

Critical Dates

Abstract submission opens	15 November 2009
Abstract submission closes	15 January 2010
Notification to authors	21 February 2010
Final paper submission	21 March 2010

For further information about conference topics, abstract submission, exhibition and registration, please visit our website

www.oceans10ieeesydney.org

or contact

OCEANS '10 Conference Secretariat
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OCEANS Conference Operational Policy Manual: A Constant improvement

René Garello, VP Conference Operations



The OCEANS Conference Operational Policy (OCOP) Manual was initiated by René Garello and a first version, developed within the Joint OCEANS Administrative Board (JOAB) with OES and MTS members. The approved version is dated 2008, but was started in 2006. The subtitle of the document is “How to propose, host and conduct an OCEANS conference”, which is self explanatory. We felt the need to update and upgrade the OCOP Manual and we gathered some of the JOAB members for a working meeting in Palmer House, Falmouth, MA from July, 22 to July, 24 2009. The members were: Rene Garello, John Flory, Jim Barbera, Bob Wernli, Stan Chamberlain, Todd Morrison, Sandy Williams (and Ken Foote visiting).

So far the Manual is made of nine chapters related to the preparation of the conference, to the Webtools and the abstract to CD/DVD mechanism, and to the main positions in a Local Organizing Committee (LOC): technical program, exhibit, finances, local arrangement, promotion, etc.

We have specifically developed and detailed the main mechanism and time schedules concerning the abstract proposals, the reviewing operations, the paper upload and the final acceptance. Indeed once the paper is accepted and written, the authors have to comply with several requirements which are not always easy to enforce. First, the paper must be IEEE PDF compliant. This is quite easy to accomplish using the IEEE PDFExpress Website; a compliant pdf file and a certificate are returned to the author. Then, the paper must be uploaded to the OCEANS conference website. In order to be able to do so, the authors have three steps to fulfill: electronically sign a copyright form, prove that the paper is PDF compliant (the certificate) and pay a paper fee (one fee can cover up to three papers).

Several improvements on the technical program were discussed during the meeting:

- 1) Request for a PDF only abstract (now called “paper proposal”) submission. Two pages with a short introductory abstract, text with equations and figures (if necessary) and references will be expected.
- 2) Inclusion of comments to rejected abstract authors for improvement.
- 3) An anti-plagiarism (CrossCheck) algorithm will be run on every paper.
- 4) Student Poster handling is simplified and more straightforward. All Student poster “abstracts” will be reviewed with the “regular” ones. Only the ones accepted will be considered for the competition. The ones not accepted for the competition (due to space reasons) will be offered the possibility to participate as regular papers (if all the above listed conditions are met). No benefit will result from the delegate being a student.

Then, we spent quite a bit of time on the Exhibit section. The Exhibit is a very large component of an OCEANS conference and it should be recognized as so. Setting the prices for



JOAB meeting in July 2009. (L to R) John Flory, Sandy Williams, Todd Morrison, Bob Wernli, Rene Garello, Jim Barbera (photo by Stan Chamberlain)

exhibits, attracting local exhibitors, soliciting past exhibitors to return, stroking the exhibitors, follow up with the exhibitors afterwards is partly the LOC and partly the contracted PCO (Professional Conference Organizer) task and the description of these functions will be included in the OCOP Manual as a JOAB guidance option. The benefits of an OCEANS conference for exhibitors are stressed: the attendees are not buyers but are influencers, and the technical program introduces the technologies of the future, and opportunities to influence sales can be found outside the booths such as at the luncheons and social functions where clients can be met while they eat.

Some existing ways of handling the exhibitors were reinforced and added in the Manual as mandatory:

- A complimentary full registration comes with a booth (one registration) and permits attendance at the luncheons and Gala etc.
- An exhibitor badge allows entrance to Technical Sessions.
- Exhibitors can invite guests to obtain an Exhibits Only registration at no charge.

Indeed, exhibitors like to show their display to certain clients during the conference. To support this need there is an Exhibit Only registration that is free. The new registration on-line tool for exhibitors, includes one full conference registration (Exhibitor Full Registration) and some number of booth only registration (Exhibitor Booth Only). The Exhibitor Reception is open to Booth Only also.

An exhibit schedule chart has been added to the Manual in order to synchronize the conference flyer information in a timely manner including events such as: Call for exhibitors put up on the website, call for exhibitors distributed to the past exhibitors list, exhibit floor plan available at previous OCEANS conferences at the OCEANS booth, etc.

Finally we went through the guidance for the financial aspects of the conference and the increased interweaving with our Webtools. The description of the Webtools is now complete in the Manual and a HD video is available for further training. This meeting was very fruitful and we will continue our effort towards an increased quality of the document. The Manual will be available on-line on the OES Website (www.ieeeoes.org) as soon as possible.

2009 OES Awards Presented

Each year OES presents two awards at the fall OCEANS conference. The awards include a certificate, a plaque, a watch, and placement of the person's name on the historical list of past recipients on the OES web site. This year the following awards were presented at the OCEANS 2009 conference in Biloxi, Mississippi.



The Distinguished Technical Achievement award was presented to **Mr. Robert T. Bannon**. This award is given to honor an outstanding technical contribution to oceanic engineering in either the fundamental or applied areas. The recipient need not be a member of OES or IEEE. The award recognizes either a single major invention or scientific contribution or a distinguished series of contributions over a long period of time.

As a Director at AT&T and Bell Labs, Mr. Bannon was instrumental in the development of special underwater protection, maintenance and repair techniques for trans-oceanic communications companies. He was responsible for designing special application remotely operated and autonomous underwater vehicles and towed arrays for government and commercial applications. Mr. Bannon was the Chair of the International Systems Maintenance and SCARAB Committees. He was the lead scientist for Digital Signal Processing for sensor data real time detection and identification.

Mr. Bannon is the founder of Bannon International Consulting, a recognized technical leader in the underwater communications and unmanned subsea robotics industries. He has over 40 years of design engineering, operations and program management experience in global fiber optics communications, underwater systems, advanced sensor technologies, SONAR, and development and integration of commercial autonomous underwater vehicles for communications, oil and gas industries, and military operations.

Mr. Bannon was technical lead for the US-Russian Homeland Security Congress 2005 in Moscow, addressing the Russian Duma on behalf of the United States. He is a leading expert on Maritime Security and Critical Infrastructure Protection.

Mr. Bannon holds a BSEE, MS, and multiple MBA's from Pennsylvania State University, Wharton School – University of Pennsylvania, and George Washington University. He also holds a certificate from the London Power Engineering School. Mr. Bannon is a Fellow of the IEEE.

The five most recent awardees are:

2004	John P. Craven
2005	Douglas C. Webb
2006	Fred Noel Spiess
2007	Donald E. Barri k
2008	Thomas B. Sanford



The OES Distinguished Service Award for 2009 was presented to **Dr. Christian de Moustier**. This award is given to honor an individual IEEE member for outstanding contributions towards furthering the objectives of OES. Candidates for the award are nominated by the OES Awards Committee and must be approved by a majority of the elected membership of the Administrative Committee.

Christian de Moustier is completing his second 3-year term as Editor-in-Chief of the IEEE Journal of Oceanic Engineering. During that time he served two terms (2007-2008) on the Products and Services Committee of the IEEE TAB Publication Services and Products Board, and he contributed to rewriting the OES Constitution and Bylaws. He had served as Associate Editor for the Journal beginning in 1990 for topics related to seafloor acoustic remote sensing, bathymetry mapping and surveying, and sonar image and signal processing.

Under Dr. de Moustier's leadership, the Journal's Editorial Board has streamlined editorial and publication process:

- Moved to an all-electronic web-based manuscript management system, thereby reducing the manual copy editing workload and associated publication delays;
- Offered authors various options for displaying figures in color;
- Provided clear composition and formatting guidelines for manuscript preparation;
- Instituted rapid posting of articles on IEEE Xplore.

Dr. de Moustier holds the Diplôme d'Ingénieur (1979) Ecole Supérieure d'Ingénieurs de Marseille, France and a M.S. and Ph.D. from UCSD. He began his professional career at Scripps Institution of Oceanography. He is now Principal Scientist for Heat, Light, and Sound Research, Inc. He is a Fellow of the Acoustical Society of America.

The five most recent awardees are:

2004	William M. Carey
2005	Claude P. Brancart
2006	Rene Garello
2007	Stephen M. Holt
2008	Archie Todd Morrison III

The IEEE Oceanic Engineering Society: From National to Global, 1968 – 2009

Stanley G. Chamberlain, IEEE/OES Past President '83-85
Engineering Fellow, Retired
Raytheon Company, Tewksbury, MA, 01876 USA



Abstract-- The IEEE Oceanic Engineering Society (OES) has completed forty-one years of active engagement: the initial eight years in the form of the Oceanography Coordinating Committee (OCC), followed by seven years as the Council of Oceanic Engineering (COE), then the past twenty-six years in the form of an IEEE society. This paper briefly reviews the growth of the society from national to global in terms of the organizational structure, the flagship OCEANS Conference venues, chapters, technology committees, symposia and workshops, student activities and recognition of outstanding contributors.

Keywords-- history, oceanic engineering, IEEE society

I. INTRODUCTION

It was in April of 1968, 41 years ago that the roots of the IEEE Oceanic Engineering Society were firmly planted. The intent was to establish a forum in the area of oceanic engineering that would be of service to society, the engineering profession, the oceanic engineering community and the professional interests of IEEE members working in oceanic engineering. Where we started and how far we have come over those 41 years is briefly summarized here. Some of the more significant aspects of the society, including its Organizational Evolution, the flagship OCEANS conferences, Chapters & Technology Committees, our emphases on students and our recognition of outstanding contributors, are touched on here. In all of these, like many IEEE societies, the Oceanic Engineering Society has grown from an initial United States Society into a global entity. A more complete history of the Society is contained in two papers that were published in the Society's Journal of Oceanic Engineering; the first, published in the April, 1985 issue, covers the first 20 years of the Society [1], and the second, appearing in the January 2008 issue, discusses the Society's second 20 year period [2].

II. ORGANIZATIONAL EVOLUTION

The initial objectives were to represent the IEEE in the multiple-society sponsored Offshore Technology Conference (OTC), held annually in Houston, Texas, and to sponsor a separate conference devoted to the broad aspects of applying electro-technology in the oceans – namely the OCEANS conference. To do this, a “committee” was formed within the IEEE, whose members were various IEEE societies. It was called the Oceanography Coordinating Committee. Initial

members of the Committee were the Geosciences & Remote Sensing Society, the Aerospace & Electronic Systems Society and the Communications Society. To communicate the activities of the Committee, a Newsletter was initiated. In the IEEE organizational structure, a “Committee” could sponsor conferences and publish a Newsletter. However, an IEEE Committee is not allowed to publish a Journal containing archival papers. To do this, the Committee must transition into a so-called “Council”. And thus the Council of Oceanic Engineering (COE) was formed in 1976 and the Journal of Oceanic Engineering began to be published. By this time the number of society members had grown to 17, and eventually to 22¹. The OES is what has sometimes been called an “applications” society, where many of the specialty technologies of the various IEEE societies get applied in the oceanic environment. A couple of years after the establishment of the Council, Technology Committees began to be formed to sponsor specialty workshops and encourage presentation of papers in their specialty areas at the OCEANS conferences.

As the OCEANS conferences moved to different locations, there was a need for people in the various locations to help organize the conferences. However, the members of IEEE Councils are IEEE societies, not individual persons. To have individual members, the Council would have to transition into a “society”. This took place in 1983, and shortly after this, Chapters were formed in locations where there was a sufficient number of society members, initially in San Diego, Seattle and Halifax, Nova Scotia.

IV. OES PRESIDENTS

We have had eight presidents of the OES over the first 25 years as a Society, as shown in Fig. 1. I was privileged to serve as the first president. Fig. 2 shows our ninth and current president, Jerry Carroll, who began serving in 2009. It is

¹Acoustics, Speech and Signal Processing Society, Aerospace and Electronic Systems Society, Antennas and Propagation Society, Circuits and Systems Society, Communications Society, Components, Hybrids & Manufacturing Technology Society, Computer Society, Control Systems Society, Electrical Insulation Society, Electron Devices Society, Engineering in Medicine and Biology Society, Engineering Management Society, Geoscience and Remote Sensing Society, Industrial Electronics Society, Information Theory Group, Instrumentation and Measurement Society, Microwave Theory and Techniques Society, Nuclear and Plasma Sciences Society, Power Engineering Society, Reliability Society, Sonics and Ultrasonics Group, and Vehicular Technology Society.

interesting that of the 9 presidents we have had to date, there are 7 who are still active in the Society.



Figure 1. OES Presidents from 1983-2008



Figure 2. Jerry Carroll, Ninth OES President - 2009

VI. OCEANS CONFERENCE VENUES: 1970 – 1975

In the initial period as the Oceanography Coordinating Committee, we held 6 OCEANS Conferences. As shown in Fig. 3, these were all in North America, with five in the United States and one in Canada. They were held at the four corners of the United States, where there are concentrations of universities and companies specializing in marine technology and oceanic engineering.



Figure 3. OCEANS Conference Venues: 1970-75

VIII. OCEANS CONFERENCE VENUES: 1976 – 1981

From 1976 to 1981, the OCEANS conferences alternated between the West and East Coasts of the United States, with 2 conferences in Washington DC, as shown in Fig. 4.



Figure 4. OCEANS Conference Venues: 1976-81

X. OCEANS CONFERENCE VENUES: 1982 – 1990

From 1982 to 1990, the Conferences continued to alternate between the West and East Coasts of the United States, but with Washington DC becoming prominent (See Fig. 5). This was because of the influence of the Marine Technology Society, who was by now our co-sponsors of the OCEANS Conferences, and whose members had a predominance of United States government customers concentrated in Washington DC. This trend was about to change, as we will see next.



Figure 5. OCEANS Conference Venues: 1982-90

XI. OCEANS CONFERENCE VENUES: 1991 – 2003

During the next 13 years, the conference never returned to Washington DC and it was held in many new locations, including 2 in Europe and one in Hawaii (See Fig. 6). The West-East alternation continued, with even-numbered years on the East Coast and odd-numbered years on the West Coast, with Halifax, Nova Scotia, Canada apparently being considered on the West coast.



Figure 6. OCEANS Conference Venues: 1991–2003

XII. OCEANS CONFERENCE VENUES: 2004 – 2010

Starting in 2004 we really became global in nature, with the 2004 conference in Kobe, Japan, and later conferences being held twice a year, with one in North America every year and those in even-numbered years in Asia-Pacific and those in odd-numbered years in Europe (See Fig. 7). You'll notice future conferences scheduled for Seattle, Washington and Sydney, Australia in 2010. Not shown, conferences in 2011 will be in Waikoloa, Hawaii and Santander, Spain.



Figure 7. OCEANS Conference Venues: 2004-10

XIII. RECENT OCEANS CONFERENCE LOGOS

We've had an interesting set of Logos and Themes for the various OCEANS conferences – which reflect some of the interesting places we've held the conference. Here in Fig. 8 are some of the ones from recent conferences. The Kelpie logo was for OCEANS'07-Aberdeen, Scotland and the Sea-Eagle for OCEANS'07-Vancouver, Canada.



Figure 8. Logos from Recent OCEANS Conferences

XIV. IMPORTANT GOVERNMENT PARTICIPANTS

Fig. 9 shows a picture from the banquet at OCEANS'76, held in Washington DC, during the 1976 Bicentennial year of the United States. It shows six US senators being interviewed by Bob Frosch, then Assistant Secretary of the Navy. The group included 4 Democrats and 2 Republicans, each with interest in the oceans. The event was televised; you might be able to make out the TV camera on the right side of the Figure.



Figure 9. Banquet at OCEANS'76

XV. RIBBON CUTTING CEREMONY

Some of the conferences have a more formal aspect to them. In Fig. 10 we have the Ribbon Cutting Ceremony at OCEANS'08-Quebec in Canada. Besides society and conference leaders, the group included leaders of the major oceanographic agencies in Canada and the US.



Figure 10. Ribbon Cutting Ceremony at OCEANS'08-Quebec, Canada

XVI. INTERESTING SOCIAL EVENTS

We always have interesting social events at the conferences. In Fig. 11 we see a very lovely night scene of Kobe Harbor (Japan), taken on the evening that we took the Harbor Cruise at the conference in 2004 held in conjunction with the Japanese bi-annual Techno-Ocean Conference.



Figure 11. Kobe, Japan Harbor

Another of our interesting social events is shown in Fig. 12, which shows some members of the OES Administrative Committee, taken at OCEANS'07-Aberdeen, Scotland. You'll notice that the women are wearing slacks and the men are wearing skirts – or rather kilts.



Figure 12. OES AdCom Members at OCEANS'07-Aberdeen), Scotland

XVII. OCEANIC ENGINEERING SOCIETY CHAPTERS: 1980S

As the locations of the OCEANS conferences moved around the globe, there were chapters of the OES formed in various sites. In the 1980's, six chapters were formed in the USA and two in nearby Canada, as identified in Fig. 13.



Figure 13. OES Chapters in the 1980s

XVIII. OCEANIC ENGINEERING SOCIETY CHAPTERS: 1990S

In the 1990's, two more chapters were formed in Canada, but four were formed outside continental North America, in Japan, France, Norway and Hawaii (see Fig. 14).



Figure 14. OES Chapters in the 1990s

XIX. OCEANIC ENGINEERING SOCIETY CHAPTERS: 2000s

In the 2000's, there were two more added in Asia-Pacific, two in Europe, one in Canada and three in the United States. Not shown in Fig. 15 is a recently formed chapter in India. So that today, we have a total of 18 Chapters of OES around the globe.



Figure 15. OES Chapters in the 2000s

XX. OES TECHNOLOGY COMMITTEES: 1980s

A society of 1500 to 2000 members will naturally have a variety of specialized technology areas within it. To respond to this, Technology Committees were formed to encourage interactions between those with similar technology interests. In the 1980's we had an initial set of eight Technology Committees (see Fig. 16). These included such areas as Autonomous Underwater Vehicles, Oceanographic Instrumentation, Underwater Acoustics, and Air/Space Remote Ocean Sensing.



Figure 16. OES Technology Committees in the 1980s

XXI. OES TECHNOLOGY COMMITTEES – 2009

Today, we have a total of seventeen Technology Committees. As shown in Fig. 17, new Committees include Environmental Acoustics, Global Earth Observing System of Systems (GEOSS), Ocean Energy, Underwater Communications, Navigation & Positioning, Ocean Policy & Education, Submarine Cable Technologies, and Maritime Security & Critical Infrastructure. These Committees assist in soliciting and reviewing papers and chairing sessions at OCEANS conferences, and for some of them, in sponsoring specialty workshops and symposia.



Figure 17. OES Technology Committees in 2009

XXII. OTHER CONFERENCES & WORKSHOPS

Besides the Flagship OCEANS Conference, the OES sponsors a broad set of other conferences and workshops, as identified in Tble. 1. The Offshore Technology Conference is held annually, since 1969, the early days of the Oceanography Coordinating Committee. The OES is one of 11 societies that co-sponsor this conference. The Underwater Technology Conferences (in AsiaPacific) & Baltic Conferences (in Europe) are held every two years, as is the Autonomous Underwater Vehicles Symposia (which had its first non-North American workshop in France in 2007). The Chile-US Workshop was our first entry into South America. There is another Workshop scheduled for Argentina for later this year. The latter 4 workshops are sponsored by some of the Technology Committees of the society. There is a host of additional conferences, symposia and workshops, including a conference in India, in which the OES is a technical co-sponsor, without any financial responsibilities.

TABLE I. OTHER OES CONFERENCES AND WORKSHOPS

Other Conferences & Workshops
• Offshore Technology Conference <ul style="list-style-type: none"> o Annually since '69
• Underwater Technology Conference (Japan/Asia Pacific) <ul style="list-style-type: none"> o '98, '00, '02, '04, '07, '09
• US/EU Baltic Conference (Baltic Countries) <ul style="list-style-type: none"> o '04, '06, '08
• Chile-US Workshop on Ocean Observation Systems <ul style="list-style-type: none"> o '08
• Current Measurements Tech Conference <ul style="list-style-type: none"> o '78, '82, '86, '90, '95, '99, '03, '05, '08
• Autonomous Underwater Vehicles Symposium <ul style="list-style-type: none"> o '90, '92, '94, '96, '98, '00, '02, '04, '06, '08
• Submarine Cable Workshop <ul style="list-style-type: none"> o '03, '04, '06, '07, '09
• Homeland Security Technology Workshop <ul style="list-style-type: none"> o '03, '04, '05

XXIII. STUDENT POSTER PRESENTATIONS

To encourage students to enter the profession as Oceanic Engineers, the OES sponsors or co-sponsors several forums involving students. Students are provided financial support to attend and present poster papers of their oceanic engineering work at each OCEANS conference. Since 1989, 838 abstracts have been submitted and 428 posters have been presented. Students have come from 28 different countries. Fig. 18 shows the Student Poster students with OES Student Poster Coordinator Norm Miller at OCEANS'09-Bremen, Germany.



Figure 18. Student Poster Presenters at OCEANS'09-Bremen, Germany

XXIV. HUMAN POWERED SUBMARINE COMPETITIONS

Another student activity sponsored (actually co-sponsored) by the OES is the Human Powered Submarine event. As shown in Fig. 19, in 2007 there were 22 teams with an interesting variety of submarine designs. Most are single person powered, but some use two persons. Most vehicles have propellers, but some have other means, such as the one with wings that flap up and down. These events have been held every other year since 1989, with a total of 205 teams participating. The initial events were held on the coast of Florida, but more recently they have moved indoors to the US Navy Test Tank in Maryland, just outside Washington DC.



Figure 19. Human Powered Submarines at 2007 Competition

XXV. DISTINGUISHED ACHIEVEMENT RECOGNITIONS

Like most IEEE societies, the OES recognizes those who have made outstanding contributions. The OES has sponsored 26 IEEE members elected to the rank of IEEE Fellow. Many more OES members have been sponsored by other IEEE societies to Fellow status. We have also recognized additional

significant contributions with our annual Distinguished Technical Achievement and Distinguished Service Awards. In Fig. 20, Dr John Craven, a giant in oceanic engineering, receives the Distinguished Technical Achievement Award from then OES President Tom Wiener at the OCEANS Conference in 2004.



Figure 20. John Craven Receiving "OES Distinguished Technical Achievement Award in 2004

XXVI. BENEFITS OF OES MEMBERSHIP

In closing, it wouldn't be right unless I gave a bit of a commercial, in terms of the benefits of membership in the IEEE Oceanic Engineering Society. Regular receipt of the archival Journal of Oceanic Engineering and our Newsletter tops the list, along with the opportunity to meet and network with our (local, national and global) peers in the oceanic engineering and marine technology community. We obtain discounted registration rates at OCEANS and other society conferences, symposia and workshops. There is also opportunity to serve the engineering profession and grow professionally by helping to organize conferences and workshops and other activities of the society. Also important is the unlimited on-line access by OES members to papers from past OCEANS conference proceedings and the Journal of Oceanic Engineering. To become a member of the OES, one must also be an IEEE member. This brings with it all the benefits of IEEE membership, including access to other IEEE publications and conferences, use of IEEE Career development tools (including on-line tutorials and mentoring) and reduced cost insurance, financial and home office services.

XXVII. IEEE OCEANIC ENGINEERING SOCIETY- FROM NATIONAL TO GLOBAL: 1968 – 2009

The IEEE Oceanic Engineering Society – From National to Global. We've come a long way over the past 41 years. We have a long way yet to go. It will be interesting to see where the challenges of the future lead us.

REFERENCES

- [1] I. Coggeshall, "Oceanic Engineering: The Making of an IEEE Society", IEEE J. Ocean. Eng., vol. OE-10, No. 2, pp. 63-83, Apr. 1985.
- [2] S. G. Chamberlain, J. Czika, N. D. Miller & G. N. Williams, "The IEEE Oceanic Engineering Society at Forty: The Challenges of an Evolving Society", IEEE J. Ocean. Eng., vol. OE-33, No. 1, pp 1-54, January 2008]

Proceedings from GEOSS Workshop XXVII – Understanding the Integrated Ocean Observation System, Including Sub-surface Sensors

Congress Center Bremen, Bremen, Germany; Sunday May 10, 2009.

The GEO (Group on Earth Observations), a voluntary partnership of governments and international organizations, was established at the Third Earth Observation Summit in February 2005 to coordinate efforts to build a Global Earth Observation System of Systems, or GEOSS.

This one day workshop explored the status of existing ocean observation systems and data portals for the Global Earth Observation System of Systems – GEOSS. The discussion focused on the ability to build on existing ocean observation systems to develop a global, coordinated, sustainable information and data system for ocean monitoring to better understand the dynamics of the deep-ocean processes throughout the ocean water column.

The organizers of the workshop were:

Francoise Pearlman	(jsp@sprintmail.com),
Christoph Waldmann	(waldmann@marum.de)
Al Gasiewski	(al.gasiewski@colorado.edu)
Udo Gärtner	(ugaert@aol.com)
George Percivall	(gpercivall@opengeospatial.org)

Background

The Global Earth Observation System of Systems (GEOSS) covers all aspects of Earth observations and introduces a new capability for monitoring environmental processes. GEOSS is a complex “system of systems,” including sensors, communication systems, spatio-temporal data infrastructures and other components essential for observing the Earth and disseminating this information to users for a host of important societal benefits. In addition, GEOSS includes models and data fusion processes to create information from the observational data that is essential for decision making. The 2003 Earth Observations Summit established the objective “to monitor continuously the state of the Earth, to increase understanding of dynamic Earth processes, to enhance prediction of the Earth system, and to further implement our international environmental treaty obligations”. GEOSS goals are to achieve comprehensive, coordinated and sustained observations of the Earth system, in order to improve monitoring of the state of the Earth, increase understanding of Earth processes, and enhance prediction of the behavior of the Earth system.

The GEOSS 10-year Implementation Plan states that GEOSS provides the overall conceptual and organizational framework for integrated global Earth observations to meet user needs. GEOSS is a system of systems consisting of existing and future Earth observation systems and the tools to create information for decision makers. It provides the institutional mechanisms for ensuring the necessary level of coordination, for strengthening and supplementing existing Earth observation systems, and for reinforcing and supporting component systems in carrying out their mandates.

The emphasis of GEOSS is on societal benefits, initially in nine key areas. Sound management of the Earth system, in

both its natural and human aspects, requires information that is timely, of known quality, long-term, and global. Interpretation and use of Earth observations requires information on drivers and consequences of change, including geo-referenced socio-economic data and indicators. The nine areas addressed in the GEOSS Implementation Plan are:

- Disasters: Reducing loss of life and property from natural and human-induced disasters
- Health: Understanding environmental factors affecting human health and well-being
- Energy: Improving management of energy resources
- Climate: Understanding, assessing, predicting, mitigating, and adapting to climate variability and change
- Water: Improving water resource management through better understanding of the water cycle
- Weather: Improving weather information, forecasting and warning
- Ecosystems: Improving the management and protection of terrestrial, coastal and marine resources
- Agriculture: Supporting sustainable agriculture and combating desertification
- Biodiversity: Understanding, monitoring and conserving biodiversity

Although all of the above societal benefit areas (SBAs) are important for GEOSS, this workshop focused specifically on Ocean Observing Systems, which relate primarily to Climate, Ecosystems, Weather, Water, and (via transportation) Energy SBAs.

The GEO Work Plan

The GEO 2009–2011 work plan takes the GEOSS 10-year Implementation Plan through its midway point, and has an increasing focus on putting the components of GEOSS into place. This phase of the plan enables connections to be realized between diverse observing, processing, data assimilation, modeling and information-dissemination systems. The work plan also enhances the role of users and Communities of Practice within GEO.

Workshop Theme

The Workshop explored the status of existing ocean observation systems and data portals for the Global Earth Observation System of Systems. The discussions were focused on the ability to build on existing systems to develop a global coordinated information and data system for ocean monitoring. This would improve understanding of the dynamics of the deep-ocean processes throughout the ocean water column. The workshop addressed as well the strategic GEOSS scientific issues for the development of Ocean Observatories.

Workshop Overview

The workshop first addressed the integration of a sustainable Ocean Observing System within the broader context of GEOSS

building on the current know-how and ocean observing systems made available mostly by the Ocean Science Community. After bringing the audience up to date on the GEOSS architecture and standards and providing a GEOSS portal demonstration, the discussion focused on answering a series of questions associated with Ocean data collection, evaluation and decision support systems, including:

- What are the critical issues in ocean observing systems moving beyond the current state of the art?
- What is a desirable mix of ocean observing resources needed to resolve these issues?
 - Autonomous underwater and aerial vehicles (AUVs)
 - Buoys (surface, including profiling buoys)
 - Cables and fixed sensors
 - Instrumented aquatic animals
 - Satellites
 - Ships (either dedicated platforms or ships of opportunity – including submarines)
 - Tethered manned vehicles
- What are the desired features of ocean data sets and ocean information systems for interoperability?
 - How can observations and model output be generalized to be used in workflow compositions?
 - How can ocean data and information be made more readily available to users (similar to land and meteorological data sets)?
- How do we engender international collaboration in ocean observing on a sustained basis?
- How can GEO/GEOSS help in achieving the needs of the oceanographic community?
 - How can GEOSS facilitate monitoring the Arctic on a sustained basis
 - How can we encourage GEOSS data sharing principles?
 - How can international cooperation be implemented on the working level?

By answering these questions the workshop serves to enhance and improve the coordination of coastal/open-ocean observations and modeling initiatives in support of a global ocean observation system.

Sponsorship

The organizations and agencies listed below provided financial, organizational and/or logistical co-sponsorship of the GEOSS workshop:

- European Seafloor Observatory Network (ESONET)
- IEEE Committee on Earth Observations (ICEO)
- IEEE Ocean Engineering Society (OES)
- National Science Foundation (NSF)
- Open Geospatial Consortium (OGC)

Workshop Summary

The workshop was opened by Christoph Waldmann, who welcomed the audience and introduced Karl Trauernicht of the German Federal Ministry of Transport. Mr. Trauernicht welcomed attendees to Bremen and opened the workshop with comments on the importance of ocean observation. He described briefly a history of oceanography and the impact of oceanographic data on Germany and on global climate and sustainability. The oceans are receiving increasing attention from the

public, as exemplified by guidelines adopted by Germany to develop an integrated maritime policy. He stressed the need for close cooperation in ocean observations and discussed the importance of the GEO work plan in this regard. To this end, he cited a plan for a European marine observatory, to be discussed in November in Copenhagen. He also mentioned a new strategy for developing an international climate information network, to be discussed this year. Mr. Trauernicht closed by expressing his hopes for positive results from the workshop.

Karl Trauernicht's opening was followed by a brief discussion of workshop objectives and logistics by Al Gasiewski of the University of Colorado and ICEO. Prof. Gasiewski motivated the central themes and questions of the workshop, namely:

- What are the critical issues in ocean observing systems moving beyond the current state of the art?
- What is a desirable mix of ocean observing resources needed to resolve these issues?
 - Autonomous underwater and aerial vehicles (AUVs)
 - Buoys (surface, including profiling buoys)
 - Cables and fixed sensors
 - Instrumented aquatic animals
 - Satellites
 - Ships (either dedicated platforms or ships of opportunity – including submarines)
 - Tethered manned vehicles
- What are the desired features of ocean data sets and ocean information systems for interoperability?
 - How can observations and model output be generalized to be used in workflow compositions?
 - How can ocean data be made more readily available to users (similar to land and met data sets)?
- How do we engender international collaboration in ocean observing on a sustained basis?
- How can GEO/GEOSS help in achieving the needs of the oceanographic community?
 - How can GEOSS facilitate monitoring the Arctic on a sustained basis
 - How can we encourage GEOSS data sharing principles?
 - How can international cooperation be implemented on the working level?

He also discussed how the proceedings of the workshop will be used by the IEEE regarding the activities of GEO as defined by the GEO tasks. He proceeded to chair the morning session.

Invited Presentations

The first presentation was made by Udo Gärtner who is consultant for the German DLR on GEOSS data sharing principles. Dr. Gärtner presented the talk for Michael Tanner of the GEO Secretariat. He presented the guidelines adopted by GEO for data sharing, which included eight points. He emphasized the importance of oceanographic data consistency and the need for full, open, and timely exchange. The data sharing implementation is documented under GEO task DA-06-01, for which a specific series of milestones exists. As examples he indicated that several networks are already established to disseminate, access, use and reuse data, including GEONetcast, GEOBON, Global agricultural monitoring

(GAM), and others. In addition, the GEOSS Common Infrastructure (GCI) should soon start implementing policies and tools for data sharing. No single set of rules will apply to all types, sources, and uses of data. He noted that positive feedback on the value of GEOSS data to member countries is important in encouraging data sharing. He also reminded the attendees of the reality of GEOSS as a system of systems in that technical interoperability is a major challenge, along with coordination and harmonization of data and data cost. A task force is meeting during May of 2009 to further develop GEOSS data sharing principles.

The status of the GEO Science and Technology Committee (STC) was discussed by Gilles Ollier of the European Commission. He stated that the science community has an important role to play in GEO, and that a 2015 goal of GEO is to “ensure full interaction and engagement of relevant science and technology communities into GEOSS.” The co-chairs of the GEO STC are from COSPAR, Germany, Australia, South Africa, Italy, and the European Commission, and the U.S. has also offered a co-chair. Starting with the 2009–2011 work plan, there will be revolving scientific review of GEO developments on grounds of technological soundness and challenges. Two strategic science and technology tasks have been included in the 2009–2011 plan: 1) ST-09-01 for catalyzing R&D funding for GEOSS, and 2) ST-09-02 for promoting awareness and benefits of GEO in the science and technology communities. The STC has created a roadmap to assess requirements for continuity and long term monitoring. The roadmap is especially relevant for oceans. G. Ollier pointed out that many of the observatories currently available or planned for the ocean are systems sponsored by the Science Community. Gilles Ollier enumerated the major ocean observables from space, including sea surface topography, sea surface vector winds, sea surface temperature, sea ice cover, ocean color, gravity, and surface salinity. The Committee on Earth Observing Satellites (CEOS) plays an important role in this regard. Major breakthroughs in oceanography may come from longer integration times, better sensitivities, and higher resolutions. However, fundamentally the oceans are challenging environments, and observatories are needed to complement ship based observations. To this end, he promoted the importance of observation science in oceanography and the need for incentives and promotion of successes in developing observations systems within the scientific community.

A discussion of sensor web enablement (SWE) with regard to GEOSS was presented by Johannes Echterhoff of the International Geospatial Services Institute GmbH. He presented his talk for Mike Botts. He described SWE as the enabling technology for using many ubiquitous discoverable sensors connected to users over the internet. Key attributes of sensors within a sensor web were enumerated. To enable the sensor web, a suite of open standards, including xml encoding and web service interfaces to implement real time mining of sensors in a services oriented architecture was outlined. SWE naturally provides for interoperability between traditionally disparate communities. Its open standards are backed by the OGC. SWE is netcentric, sensor agnostic, semantically tied, traceable, and flexible from the implementation standpoint.

Clients have access to all sensor web components via the web. The evolution of SWE has produced significant refinements in specifications that led to the current approved standards. Johannes Echterhoff discussed SWE specifications, which define a sensor markup language, transducer markup language, core models and schema for observations, and a variety of web services, including sensor access, control and feedback. Several examples of the use of sensor web concepts were provided, including application to a tsunami early warning system. Conflicts in controlling certain types of user-driven sensors (e.g. configurable or steerable sensors such as radars) can be managed using prioritized tasking. A high level of interoperability has been achieved in SWE pilot projects. Documentation on how to design sensors for SWE is available on the OGC web site, and OGC meetings on SWE provide background on sensor design for SWE. SWE standards are considered in GEOSS task AR-09-02c.

A presentation on an OGC-organized ocean interoperability experiment (OIE) for ocean science was made by Eric Delory of DBscale. He described an ocean observing system architecture that was used to implement the first phase of this international experiment, called OOSTethys. A report on the experiment is available at the web site for the OGC SWE initiative (<http://www.oostethys.org>), and includes a list of best practices. The use of the IEEE 1451 network capable processor standard was described as being valuable to ensure sensor interoperability. Tasks for the second phase of the OIE include SWE harmonization, instrument control, automated metadata/software installation via PUCK protocol, and real-time feedback for standards development. An online web interface was demonstrated that provided real-time access to ocean data from a large number of world-wide stations operated by many GEO member country national organizations and agencies. The information available through the OIE is available in a standard .kml layer for viewing using Google Earth. Phase I of the OIE has been completed, and phase II is currently beginning. Overall, the experiment illustrated the strong potential for organizing ocean sensor data under an interoperability protocol.

Phil Weaver of the U.K. National Oceanography Centre, Southampton discussed the impact of observing systems on ocean services. He indicated how seasonality and longer-term periodic and episodic changes in the deep ocean environment (e.g., seabed at up to ~5000 m depth) impact ocean processes. Cascading of cold nutrient rich water into the western Mediterranean from surface weather changes can impact temperature and currents in canyons, and as a result greatly affect the production and harvesting of surface-dwelling fauna such as large Gamba shrimp. A large increase occurs after flushing events due to reseeded by cold nutrient rich water. Cold water cascading occurs in the Aegean, as well, and likely at many other locations around the globe. Removal of predators along with climate disturbances can also cause changes in the oceans ecosystems affecting biological production with major impact on goods and services. Such a periodic event caused by overfishing could have occurred, for example, off Oman. In another example of ocean observing Dr. Weaver described methane production at mud volcanoes on the ocean bottom. Questions exist as to whether these sources of methane reach the atmosphere and

how they vary with time. He described bottom water temperature changes off Svalbard linked to Arctic climate and sea ice state. Here methane hydrates are known to outcrop at the seabed and the changing bottom water temperatures could destabilize these hydrates releasing methane. Such releases may be linked to destabilization of the continental margin. A cabled seafloor observatory system on the western Svalbard shelf and slope is being developed to monitor gas release and hydrate stability. Ingestible acoustic transponders were described as being potentially useful for tracking aquatic animal habits and responses to production changes. Observatories are being installed off the Lofoten islands in Norway to monitor the migration of commercial fish larvae in this critically important area that might also contain considerable hydrocarbon reserves. Appropriate regulation of oil installations can only be accomplished if the ocean impacts can be adequately observed. In summary, the extreme importance of understanding natural and manmade changes in the deep ocean cannot be underestimated as such changes impact fishing, methane release, and animal behavior as clearly described by Dr. Weaver. The need for long term observations of the seabed to regulate the impacts of extraction and fishing activities as well as understand external forcing functions is compelling. The particularly high cost of ocean observing systems is a problem to be reconciled among government and private entities worldwide. Ships cannot be used regularly due both to cost and inability to observe in heavy seas and/or extreme conditions. It was commented by Al Gasiewski that a possible avenue of support might stem from trends toward collective and shared ownership of fisheries, although regulating fisheries in North America is only beginning and in Europe is extremely difficult.

Robert Thomas of Compusult described the GEO portal for ocean observing systems and example of sensor web enablement (SWE). The site developed by Compusult (<http://www.geowebportals.org>) provides a single point access to Earth observation product and service discovery. The goal in developing this software is to find and manage geo-spatial ocean data using simple searches, for example, browsing by social benefit area or location. He described a web services architecture based on sensor providers (weather, in-situ, etc), and users who either do not know about the sensors or have difficulties in interpreting data. A sensor management portal helps with the discovery of the sensors and binds them directly through sensor services. The Sensorbay project is an example of discovering sensors used to monitor a bay in Newfoundland and Labrador traversed by hundreds of oil tankers annually. Real time and archived sensor data was shown to be available from a variety of sensors located in the area. A new SWE implementation project called SensEarth was also discussed. He raised the question of how to use GEOSS and SWE most effectively together. A key issue is getting data into the system of systems, as well as maintaining calibration and bias control as versions of the data sets evolve. Long term commitments for support of SWE project by governments are critical to development and use of these systems. The question has been raised regarding whether the system allows for retroactive adjustment of data if it has been detected that the calibration for the parameter under investigation was not

correct. Currently no provision has been made for that case but in principle this is possible.

The afternoon session was opened with a brief status update by Jay Pearlman, of a U.S. National Academies study commissioned by the U.S. Navy on oceanography through 2025. His updated provided an important glimpse on one of the National Academies' break-out sessions or this study. Dr. Pearlman identified several primary issues addressed by the study, including how research will be done, how to move beyond point measurements (e.g., measuring across the sea floor), how to stimulate use of alternative observing platforms, and how to use model-driven experiments. Sociological factors also impact oceanography as the community looks to the next decades. These include approaches to managing global scale coordinated operations, and the evolution from a research-driven to a mission-driven program. Of more recent interest are biogeochemical fluxes, ocean climate variability, ocean-atmospheric interactions, and use of geoengineering to handle societal problems. From a research perspective, a major priority is understanding the details of the air sea interface, which are not well understood and yet significantly impact climate change. Dr. Pearlman pointed out that interactions between ocean and air are most critical during severe weather when ships cannot make measurements. Alternative methods of observation must be considered in the future.

Presentations during the afternoon were chaired by Udo Gärtner, who provided comments on the need for GEO-linked priorities and observation strategies in the ocean observation community. He noted that there is only one oceanography sub-task in the GEO work plan, and urged the development of a priority and goal setting strategy paper to be forwarded to GEO, and that each speaker provide a clear message toward the goal of creating this strategy.

Dr. Gärtner next introduced Martin Visbeck of the IFM-GEOMAR at the University of Kiel and Hartmut Heinrich from the Federal Maritime and Hydrographic Agency, BSH, who jointly presented a discussion of EurArgo and the past, present and future of Argo. Dr. Visbeck began by addressing the question of "why we need a large scale ocean observing system?" and how we can go about developing such a system in a cost effective manner. He pointed out the need for understanding the time varying large scale ocean characteristics in real time by cost-effective means. To this end, he emphasized the critical importance of international partnerships between GCOS, GOOS and GEO. Two scientific questions were posed as a good example for observatory science: 1) is the ocean overturning changing? and 2) are dissolved O₂ and CO₂ uptake changing in the oceans? He showed a map giving the locations of platforms transmitting ocean data over a 2 day period. These were from a "system" of individual network of surface drifters, moored buoys, voluntary observing ships and Argo floats. Argo floats have no control over the drift trajectory, while gliders already have some degree of control, and commercial and research ships only cover certain locations. The complexity of a thermohaline driven overturning circulation model shows that an understanding of the current declining trend cannot be obtained solely from sparsely sampled ship data. Thus there is a need for observatory systems like moored

arrays in the boundary currents and Argo floats in the oceans' interior. Other critical variables include placing dissolved oxygen sensors on Argo float systems to monitor the effects of the recently discovered loss of dissolved oxygen (ocean de-oxygenation). This could also help to constrain dissolved CO₂ and impact ocean carbon uptake rates and the associated ocean acidification. A total of ~3,300 Argo floats are operating presently, starting from only a handful in 1998, making this a truly global ocean observing system. While the Argo system has reached 100% completion, other networks such as the moored observatories have not been fully implemented. Taken together about ~60% of the sustained ocean observing system in support of GCOS and GOOS has to date been implemented. Almost half of the global Argo float network is supported by the USA, followed by Japan. Almost one quarter comes from Europe and is managed by EuroArgo. More than 26 nations are involved in Argo at various levels of support ranging from float provision, deployment of floats to data processing and data quality control. Looking into the future in several regions of the globe where more detailed ocean information is needed, gliders will supplement the global Argo array. Many gliders today carry a more complete sensor package including dissolved oxygen and fluorescence. Fluorescence allows an estimate of the chlorophyll-A of the ocean, which at the surface can also be seen from satellite systems on only on cloud free days. For the subtropics, the chlorophyll-A concentrations peak below the surface at depths below 50 m, which is below the penetration depth for satellites observations and can only be detected by in-situ systems. Input from IEEE workshop attendees to the World Climate Conference (August '09, in Geneva) and the OCENOB09 workshop (October '09, in Venice) would be valuable. Both of those conferences will help define the expectations of sustained ocean information based on ocean observations and models. GEO and its network of partners can help to communicate the relevance of sustained ocean information for a range of societal benefit areas.

Harmut Heinrich followed Dr. Visbeck by addressing the evolution of the Argo array toward a sustainable operational observing system. Fixing the EuroArgo structure to GMES seems a good way to secure long term support. He proposed initiating a European infrastructure to be paid partly by the EC and partly by Member states, for long term cooperation over 10 to 20 years. There is a need to develop a legal framework for cooperation, an operational structure and, a membership scheme with contributions such like direct money or float contributions or data management). An important goal is to strengthen the user community through capacity building and education.

Henry Ruhl of the U.K. National Oceanography Centre, Southampton described the concept of ocean observatories as "unmanned system[s], at fixed site[s], of instruments, sensors, and command modules connected to land either acoustically or via a seafloor junction box to a surface buoy or a fiber optic cable." He emphasized the importance of such sites in delivering data that impact nearly all GEOSS societal benefit areas. Many international programs that share common objectives that benefit from ocean observatory measurements (e.g. OceanSITES and the Integrated Marine Biogeochemistry and Ecosystem Research [IMBER]). He outlined ESONET NoE

(www.esonet-noe.org) science objectives as contributing to oceanographic science over a broad range of time scales and for studies of geohazard (seismic) events, gas hydrates, seabedwater column interaction, ocean warming, ocean acidification, and linking surface dynamics, seasonal and longer-term variation, and ecosystems in the deep ocean (e.g., Ocean Thermohaline Circulation, El Niño Southern Oscillation, Ocean CO₂ uptake and acidification). Hydrothermal vents have a significant impact on local circulation and ecology and influence chemistry of the ocean over timescales similar to Ocean Thermohaline Circulation. But, their dynamics are poorly documented. Surface dynamics also readily impact transport, biological, and chemical processes in the deep sea. Major ocean regions like the Atlantic and Southern Ocean have average deep water ages (time since last exposure to the surface) of a few hundred years. Their long-term change will impact climate in the future throughout the IPCC (www.ipcc.ch) scenario time window and beyond. Several instrument types and supporting infrastructure are needed depending on the setting and observation requirements, including cables, moorings, acoustic links, gliders, AUVs, and mooring arrays. Mobile systems like gliders, AUVs, and benthic rovers are useful for providing spatial context to point measurements. The DELOS deep-water environmental long-term observatory system (www.delos-project.org) was discussed as being able to provide ecological monitoring in active areas of oil and gas extraction. DELOS was also noted as having an important capacity building aspects, an important aspect of GEOSS.

Robert Weller of Woods Hole Oceanographic Institute (WHOI) discussed OceanSITES, an international effort to maintain a long term time series global array of ocean stations. Because of the diversity of phenomena it is difficult to create an observatory to deal with episodic events as well as long term monitoring. Ocean time series observations have unique value, including high sample rates, sustained data flow, and high accuracy and vertical coverage. Post calibration of data sets is viewed as important, as well as collocation of physical and biogeochemical sensors. A new initiative to deploy several observatories with long term operational support, the OOI pioneer array, was described and may soon be approved. Regional scale sites locations include off the coast of Washington (near the Columbia river), and on the East coast. A fourth global site is to be added for climate relevance. In addition, Australia is putting in a time series site south of Tasmania (IMOS). Each site will be multiplatform and multidisciplinary. Glider and AUV docks will be provided for profiling needs. Some implementations may use a regional scale cable for power, otherwise ~250 W power capability (primarily for a steered antenna) will be sought. Four open ocean global sites will be located locations of deep water formation. Several products are planned and are described as <http://www.oceansites.org>. The OOI sites will increase the demand for model and remote sensing fields that provide content for operational and scientific purposes.

The final speaker of the workshop was Keir Becker from the Rosenstiel School of Marine and Atmospheric Science at the University of Miami, who spoke on the Integrated Ocean Drilling Program (IODP). The 2004–2013 IODP Initial Science Plan drives the program of three drilling ships. The three main themes for IODP are 1) the deep biosphere and

the seafloor ocean, 2) ocean environmental change, processes, and effects, and 3) solid Earth cycles and geodynamics. An important application of the IODP is the installation of seafloor observatories, including broadband seismic installations and instrumented borehole seals, also known as CORKs (Circulation Obviation Retrofit Kits). These seafloor hydro-geological observatories provide information on fluids flow below the sea floor, sea floor tectonic and tidal stress, seafloor state variables, and other parameters using new sensor packages. Linkage of several CORKs to a regional cable observatory at Neptune Canada is a priority, along with the Nankai Trough observatory. IODP plans to continue collaboration with seafloor observatory science programs. However, no formal coordination mechanism exists. Dr. Becker closed by presenting his perspective for the future: of the IODP: long term in-situ sensors still need to be developed, and their long term reliability is critical. The use of ROV systems for deployment may need to be coordinated. However, an overriding issue is the funding shortfalls facing IODP and some ocean observatory programs.

GEOSS Workshop Breakout Discussion

The workshop breakout process was motivated by Prof. Gasiewski. Three workshop breakout topics were identified as follows:

A. Ocean Information Systems

- 1) What are the critical issues in ocean observing systems moving beyond the current state of the art?
- 2) What is a desirable mix of ocean observing resources needed to resolve these issues?
- 3) How can GEOSS facilitate monitoring the Arctic on a sustained basis

B. Architecture, Standards & Data Policy

- 1) What are the desired features of ocean data sets and ocean information systems for interoperability?
- 2) How can observations and model output be generalized to be used in workflow compositions?
- 3) How can ocean data be made more readily available to users (similar to land and met data sets)?

C. How can we encourage GEOSS data sharing principles?

- 1) Engendering Collaboration & Support
- 2) How do we engender international collaboration in ocean observing on a sustained basis?
- 3) How can GEO/GEOSS help in achieving the needs of the oceanographic community?

Workshop Recommendations

The workshop breakout sessions occupied most of the second half of the afternoon. The following overall recommendations were provided by the three workshop breakout groups:

A. Ocean Information Systems. (Group Lead: Phil Weaver) To move beyond the state of the art in ocean observing systems the first breakout group offered the following suggestions:

- Focus on the problems involved in getting developmental systems to operational status e.g. dockable AUVs, biological sampling devices
- Improve endurance of AUVs by extending maintenance schedules for some sensors (e.g., optical) sensors.

- Evaluate event response versus duration requirements. Do we always need an observatory, or are AUVs or gliders acceptable?
- Improve ability to upgrade/modify/maintain gliders.
- Develop compatibility criteria for different sensors/measurements that potentially interfere.
- Focus complex sensor development (e.g., pH sensors) in certain key areas.
- Provide rewards for observation ocean scientists for (e.g.) taking long term risks in making observations.
- Count digital object identifier (DOI) downloads for data sets so scientists get credit for observations.
- Develop a science plan for addressing the key questions

Regarding the mix of ocean resources needed the first breakout group suggested to:

- Maintain abroad mix of technology, including cabled and stand-alone observatories. A large, high cost program can detract from many other programs.
- Consider leveraging win-win linkages to industry (e.g. hydro-carbon industry platforms, wind energy platforms, etc...)

Monitoring of the Arctic presents a particularly pressing concern due to the high rate and large and imminent impact of global change there. It was suggested that since Arctic change represents a key societal issue it would be valuable to identify what to measure and to determine means of immediate measurements, including those under the ice cap.

B. Architecture, Standards & Data Policy. (Group Lead: Robert Thomas) The second breakout group provided a number of responses to the posed questions. The desired features of ocean data sets and ocean information systems for interoperability include metadata, standardization of output, semantics (ontologies), error bars, and quality flags. A best practices wiki was proposed to facilitate quality control. For archived data a processing flag is needed to indicate processing, and a measure of service supervision needed. The question has been raised regarding how data that are not adequately flagged shall be treated. It was suggested to publish them in real time but to not archive them.

Regarding how observations and model output can be generalized to be used in workflow compositions, the group recommended storage of both models and raw data. To make ocean data more readily available to users across a wide community with highly diversified interests recommendations included easy plug-ins and tools and “cook book” guides for interoperability. Funding agency support was listed as a concern.

The group recommended that GEOSS data sharing principles can be encouraged by adding value to data through GEOSS (e.g., fusion of data streams, provision of reference data sets, etc...).

C. Engendering Collaboration and Support. (Group Lead: Bob Weller) Several recommendations were provided by the third breakout group on how to engender international collaboration in ocean observing on a sustained basis. These included:

- Promoting common demonstrations, demonstration experiments, and common interests in ocean data science and quality assurance.
- Agreeing upon commonality in observing plans, standards, and back bones, and capacity building; It was questioned why

the ocean observation community was not joining with other systems and parts of the earth observing network.

- Placing more emphasis on uses for industry, energy and applications, collaboration with industry (e.g., in surface wave measurements)
- Focusing observing system development on education, politics (recreation, fisheries), and safety
- Sharing ideas and design through collaboration and training
- Providing more real time data to promote open access.
- Engaging main oceanographic centers owning ocean systems?

Regarding how to engender international collaboration in ocean observing on a sustained basis it was suggested that the oceanography community needs to learn more about societal benefits to the extent that they convert their message to societal benefits. For example, people need to be further educated about the effects of sea level rise.

As to how GEO/GEOSS can help in achieving the needs of the oceanographic community, the following was offered:

- GEO should help with the formulation of an ocean community of practice
- GEO should support intergovernmental formalization of interoperability and coordination of an operational mission for ocean observations. This could include coordinated funding
- GEO support is requested for Identification and coordination of societal benefits from ocean data.

Udo Gärtner provided closing comments for the workshop, encouraging the attendees to coordinate ocean observation requirements in further related activities such as a GEO community of practice in ocean observation. Starting with the vision of a global operational oceanography observation system it was noted that there is not a comparable body to the WMO for oceanography, and it would be of interest to GEO for help regarding the notion of an operational oceanography mission based on societal benefits. Further noting that meteorological observations have a longer history than ocean observations it would be appropriate to consider such a mission at this time.

Student Engineering Video Competition

\$5,000 in Scholarship Awards to Be Presented in 2009–10 IEEE-USA Online Engineering Video Competition on ‘How Engineers Make a World of Difference’

WASHINGTON (17 September 2009) – IEEE-USA is launching the organization’s third online engineering video competition for undergraduate students on “How Engineers Make a World of Difference.” IEEE-USA will present four scholarship awards totaling \$5,000 to undergraduates who create the most effective 90-second video clips reinforcing for an 11-to-13-year-old audience how engineers improve the world. Entries must be submitted through YouTube by midnight Eastern Time on Friday, 15 January 2010. Winning entries will be announced and shown during Engineers Week, 14–20 February 2010.

Entries in the 2009–10 competition should provide an individual profile of an engineer and how he or she makes “a world of difference.” Entries will be judged on their effectiveness in reaching the target audience by portraying engineers as “real people” who seek to make life better, as well as on their originality, creativity and entertainment value.

First prize is: \$2,000; second prize, \$1,500; and third prize, \$1,000. The first-place winner will also receive up to \$1,000 to cover travel expenses to receive his/her award at the IEEE-USA Annual Meeting in Nashville, Tenn., on 6 March 2010.

Further, a special award for \$500 will be presented for the most innovative and effective showing of a video entry to a “tweener” target audience. This could involve presenting the

video entered in the competition at a university engineering expo for K-12 students, in a middle school classroom, with a scout group, or in another setting with 11-to-13-year-olds.

For the first time, the video competition is open to all U.S. undergraduate students regardless of academic discipline. However, at least one undergraduate participant must be an IEEE student member. For the third consecutive year, the competition will be judged by two engineering graduate Ph.D. students, Andrew Quecan and Suzette Aguilar; and by Nate Ball, engineer-host for PBS’ “Design Squad.”

For more information on how to enter the IEEE-USA Online Engineering Video Scholarship Competition and to upload an entry on YouTube, visit http://www.ieeeusa.org/communications/video_competition.

Information on how to become an IEEE student member is available at <http://www.ieee.org/web/membership/join/join.html>.

IEEE-USA advances the public good and promotes the careers and public policy interests of more than 210,000 engineers, scientists and allied professionals who are U.S. members of IEEE. IEEE-USA is part of IEEE, the world’s largest technical professional society with 375,000 members in 160 countries. See <http://www.ieeeusa.org>.

Contact: Pender M. McCarter
Senior Public Relations Counselor, IEEE-USA
Phone: 1 202 530 8353
E-mail: p.mccarter@ieee.org

SONAR/ASDIC-Experiments, Discoveries and A Little Bit of Controversy: A Brief History

Anne Marie Gant

The modern term Sonar is actually an acronym which stands for Sound Navigation and Ranging. The technique employs sound propagation underwater to navigate, communicate or detect. A sonar can be passive or active. This term, however was not in use universally until about 1960, prior to that sonar devices were called ASDICs. That name came about during WWI and referred to the Anti-Submarine Detection Investigation Committee.¹ Whatever name is used, controversy surrounds who deserves credit for “inventing sonar.”

Some would start this tale in 1490 with Leonardo Da Vinci. He observed “If you cause your ship to stop, and place the head of a long tube in the water and place the other side of the tube to your ear, you will hear ships at a great distance from you.”² Some would start in 1822. It was then that Jean-Daniel Colloden lowered a bell into Lake Geneva Switzerland. By striking that bell with a hammer and studying the vibrations of a sensor suspended under another boat Colloden calculated, with some accuracy, the speed of sound as it traveled underwater. Four years later Jacques Sturm, a French mathematician, conducted experiments and calculated the speed of sound in water with greater accuracy. His experiments and those of others showed density and elasticity to be important attributes contributing to the speed of sound through water.³



In 1880, Pierre and Jacques Curie discovered the piezoelectric effect. The decades which followed that discovery saw the development of acoustical detection devices. In 1906 Lewis Nixon, a naval architect, is credited with inventing a passive listening device to detect icebergs.

Historical events often trigger invention. Reginald Fessenden, a Canadian, whose achievements in radio and broadcasting include the first two-way transatlantic radio transmission in 1906

volunteered his services to the Canadian Government at the start of WWI. Working in London, one of the devices he developed could locate enemy submarines. In 1915 he invented the fathometer for which he won the Scientific American’s Gold Medal in 1929.⁴

Following the Titanic disaster in 1912, German physicist Alexander Behm researched ways to detect icebergs. His discovery of the technique of echo sounding proved to be a great means of measuring ocean depth. His invention was patented in 1913.⁵ In 1920 Behm bounced sound waves off the bottom of the North Sea and went on to found the Behm Echo Sounding Company.⁶



Alexander Behm

With WWI came the need to detect submarines. Fessenden was not the only one in the world working to fill the need. French physicist Paul Langevin, who had been supervised by Pierre Curie in his laboratory classes at the Ecole de Physique et de Chimie Industrielles, was busy at his research;⁷ he is most remembered for work in the field of piezoelectricity.

Rather than crediting a single inventor for the invention of sonar one begins to understand that many contributed to the technique we call sonar. Through their inquisitive nature, their calculations and their instruments they gave the world a means to “see” where our eyes cannot see.

References

- 1 “ASDIC AND SONAR SYSTEMS IN THE RCN,” http://jproc.ca/sari/asd_gen.html.
- 2 “Notable Quotations,” http://www.resonancepub.com/notable_quotes.htm.



Trivia: Alexander Behm was also an avid fisherman and developed fishing tackle such as the Behm-fliege and the Behm Blinker.

- 3 "Understanding surveillance technologies: spy devices, their origins & applications By Julie K. Petersen, CRC PressLLC, Chapter 4, pg 417, 2001.
- 4 "Reginald Fessenden," NationMaster, <http://www.statemaster.com/encyclopedia/Reginald-Fessenden>.
- 5 "Echo Sounding," Absolute Astronomy.com, http://www.absoluteastronomy.com/topics/Echo_sounding
- 6 "1900s," Marine Exploration Logbook, <http://thethunderchild.com/TechnoOcean/Timelash/1900s/1900s.html>.
- 7 "Paul Langevin," <http://www.ob-ultrasound.net/langevin.html>.

Advice on Going to Sea

Robert Goodwin

Now son, if you have love for the sea
 And think you should sailing go,
 One little gem of advice take from me,
 Because from experience I know.

My advice to you is to become a mate,
 Of the wheelhouse and bridge have no fear.
 But let me warn you before it's too late,
 Don't study to be a first engineer.

A mate's life is one of comparative ease,
 His clothes so seldom he soils.
 He stands his watch out in the cool breeze,
 While far down below the engineer toils.

The engineer's work in the grease and the heat
 Boy, take it from me, it's no fun,
 Sweating and swearing, trying the job to complete,
 While out on deck the mate suns.

So whatever it takes, my boy, be a mate
 Or even the ship learn to steer.
 But regardless of place, money, or date,
 You'll rue the day you're a first engineer.



Three sailors sailing on the oceanographic yachts of Prince Albert of Monaco. In: "From the Surface to the Bottom of the Sea" by H. Bouree, 1912 Image courtesy of National Oceanic and Atmospheric Administration/Department of Commerce. Archival Photography by Sean Linehan, NOS, NGS

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MTS/IEEE Seattle OCEANS 2010



September 20 - 23, 2010

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Seattle, the host city, located on beautiful Puget Sound and surrounded by the Olympic and Cascade mountains features world-class restaurants, shopping and entertainment. From its historic Pioneer Square district to the colorful Pike Place Market - the oldest continuously operating farmer's market in the country - to its new outdoor sculpture park, Seattle has something wonderful for everyone.

The annual Oceans conference, jointly sponsored by the Marine Technology Society (MTS) and the Oceanic Engineering Society of the Institute of Electrical and Electronic Engineers (IEEE/OES) is a major international forum for scientists, engineers and responsible ocean users to present the latest research results, ideas, developments and applications in Oceanic Engineering and Marine Technology as well as showcasing new products and services.

The conference venue is the newly renovated and expanded Washington State Convention & Trade Center. Surrounded by fine shops, restaurants, hotels, the WSTC is within walking distance of the Emerald City's iconic sights.

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We look forward to seeing you in Seattle!

