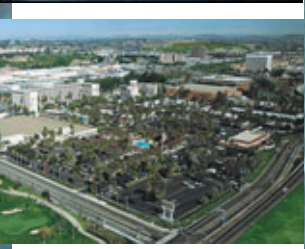




Celebrating the Past... Teaming Toward the Future

September 22-26, 2003
San Diego, California

[Main Menu](#)



Conference Program

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Congratulations to Scripps Institution of Oceanography on Their First 100 Years . . .



The National Oceanic and Atmospheric Administration commends Scripps Institution of Oceanography on the occasion of its Centennial.



Department of Oceanography and Coastal Sciences at LSU Congratulates Scripps Institution of Oceanography on 100 Years



**Woods Hole
Oceanographic Institution**

Woods Hole Oceanographic Institution congratulates Scripps Institution of Oceanography for a century of global discovery



The National Science Foundation wishes Scripps Institution of Oceanography fair winds and following seas as it begins it's second century.



Sea Grant celebrates Scripps Institution of Oceanography's first 100 Years.



**NATIONAL AERONAUTICS
AND SPACE ADMINISTRATION**

The National Aeronautics and Space Administration congratulates Scripps Institution of Oceanography's many contributions to earth science.



The National Geographic Society acknowledges 100 Years of global exploration by Scripps Institution of Oceanography.



The Office of Naval Research salutes Scripps Institution of Oceanography on 100 Years of service to its country.

Photos included in the Scientific Technical portion of this program are from Oceans 1995 held at the Town and Country Hotel and Convention Center

Message from the Chairmen



Robert L. Wernli
Co-chairman, OCEANS 2003
SPAWAR Systems Center San Diego



Charles F. Kennel
Co-chairman, OCEANS 2003
Director, Scripps Institution of Oceanography, UCSD

Welcome to the OCEANS 2003 MTS/IEEE conference and exhibition-and welcome to beautiful San Diego. You are visiting one of the birthplaces of oceanography, where Scripps Institution of Oceanography began 100 years ago. The conference theme, “Celebrating the Past . . . Teaming Toward the Future,” was chosen to commemorate the Scripps centennial-and to acknowledge our exciting, cooperative progress into 21st-century ocean science and technology. Another aspect of San Diego that makes us proud is our diverse array of commercial, academic, military and government organizations that, cooperating together, make our city a center of advanced technology focused on the ocean’s challenges of today and the future.

Each year, the OCEANS conference brings together scientists and engineers with a vast range of scientific knowledge and technological expertise. This year’s conference is more diverse than ever-and has become the largest event of its kind ever held. We are expecting 5,000 attendees from 46 countries. More than 1,000 papers were submitted and we’ll have 800 scientific/technical presentations and 250 exhibitors. A number of

special guests are joining us from government agencies and ocean organizations. And unique events will include the presentation of Scripps’s Nierenberg Prize for Science in the Public Interest to marine ecologist Jane Lubchenco, and the Scripps Centennial Homecoming/Birthday Party. Two luncheons will introduce this year’s award winners from the lead sponsoring societies, MTS and IEEE/OES.

Great thanks are due to our hard-working OCEANS 2003 committee, our team of conference volunteers, and the Scripps Centennial Committee-your combined efforts have taken this event, and this week, beyond our greatest expectations. Well done. We have been delighted by the enthusiastic response of all of our participants, especially considering the budget hurdles being encountered around this nation and our world.

We sincerely hope that you come away from OCEANS 2003 with renewed enthusiasm for ocean science, marine engineering and sea technology, a deeper appreciation for where we’ve been, and eager anticipation for the exhilarating accomplishments that lie ahead.

Message from the Executive Vice Chairman

Welcome to San Diego and the Oceans 2003 MTS/IEEE conference. This magnificent, first time collaboration of many great scientific and engineering societies in a single conference, sponsored by the Marine Technology Society and IEEE-Oceanic Engineering Society, comes during the week of the Centennial celebration of Scripps Institution of Oceanography. On behalf of Scripps, MTS, IEEE-OES, and the 17 co-participating societies, thank you for the effort you made to be here this week to explore the past, present, and future challenges of our science, our technology, and our planet.

When scanning the program, you'll see a dynamic and diverse collection of many academic and engineering disciplines. Tracks have been constructed to minimize competing sessions of complementary subjects, to maximize your enjoyment of this meeting. And please look for the collection of this week's premiere events on the "Centennial Especial" page.

While here at the Town & Country, I hope you'll find time to explore the grounds and discover the many small, hidden places perfect for quiet study or conversations.

The Oceans 2003 conference team is to be commended for their talent, commitment, and collegiality that brought this conference together as a service to our oceanographic community. Among the team we may agree to single out the Oceans2003 Technical Program Chairman, **Jack Jaeger**, for his vast technical knowledge, exemplary dedication, ability to visualize the "Rubik's Cube" of the conference program, sense of humor, and extended support of both publications and website development. He is our "secret weapon" of many MTS

conference successes, and certainly this one. The Publication team of **Vivian and Jack Holland** were amazingly accommodating to authors and committee, especially this VC, remaining always a pleasure to work with. They are the

personification of "unflappable". For another, **Brock Rosenthal's** creative and tireless work as the Oceans2003 Exhibits Chairman, along with his committee, brought together the largest collection of exhibitors ever at an Oceans conference. And, of course, Oceans 2003 co-chair **Bob Wernli**, who painted the dream of the greatest Oceans conference so clearly that the rest of us could see it. Luck is when preparation meets opportunity. He saw it and seized it. Finally, in deed, the Oceans2003 committee, too many to name on this page, but each a dear friend by virtue of their good nature and pursuit of a common goal. Some of us



Kevin Hardy
Executive Vice Chairman
Oceans 2003 MTS/IEEE
Director, Scripps Centennial,
Special Program Development
Scripps Institution of Oceanography/UCSD

have worked together on MTS conferences for over 20 years. We each carried a share of responsibility, and each saw it done. "A man can stand anything except a succession of ordinary days" observed Goethe. We have made these days an adventure. We also thank our families for their help.

This meeting is about each branch of science and engineering, and each person who pushes the frontier out a little further. To our many alumni, former faculty, staff, friends, and colleagues: your alma mater invites you to the Scripps campus on Friday, September 26, for its actual 100th birthday. It will be an event unlike any there before. With confidence in the future, and faith in our purpose, Scripps Institution joins with the global ocean community to continue the work at hand.

Best wishes for a successful stay at Oceans2003.

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Society Liaisons



Norman Estabrook
MTS Liaison
SAIC

Co-Participating Society Liaisons

AGU: Dr. John Orcutt
ASLO: Dr. Russ Moll
ASA: Dr. Peter F. Worcester
ADC: Ross Saxon
AMRS: Bob Chisholm
AMS: Ron McPherson
CEROS: William A. Friedl
TOS: Jennifer Ramarui
UCSD Extension: Tim Johnson



Dan Alspach
IEEE/OES Liaison
ORINCON Defense

International Coordinating Committee

NAME	COMPANY	COUNTRY
Mr. Jerry Boatman	Naval Meteorological and Oceanography Command	USA
Prof. Junzo Kasahara	University of Tokyo	Japan
Prof. Forng-Chen Chiu	National Taiwan University	Taiwan
Mr. William Friedl	CEROS	USA
Prof. Rene Garelo	ENST Bretagne	France
Nestor Granelli	C&C Technologies	Latin America
Dr. Ryusuke Hosoda	Osaka Prefecture University	Japan
Dr. David M. Lane	Heriot-Watt University	UK
Capt. Diann Lynn	U.S. Navy	USA
Mr. Richard Marsh	Tritech International Ltd.	UK
Mr. Tom Pado	Total Marine Technology	Australia
Prof. John Penrose	Curtin University of Technology	Australia
Mr. Roland Person	IFREMER	France
Prof. John Potter	National University of Singapore	Singapore
Dr. Anatoly Sagalevitch	Shirshov Institute of Oceanology	Russia
Dr. Toshitsugu Sakou	Tokai University	Japan
Dr. Alexander Scherbatyuk	Institute of Marine Technology Problems	Russia
Prof. Tamaki Ura	University of Tokyo	Japan
Dr. Christoph Waldmann	University of Bremen	Germany
Dr. John Watson	University of Aberdeen	Scotland
Prof. Bryan Woodward	Loughborough University	UK

Conference Committee



Jack Jaeger, Chair
Technical Program,
Publications
Custom Multimedia
Products



John Benya, Chair
Audio Visual



Ed Vergara, Chair
Registration
SAIC



Jesus Zuniga, Chair
Tutorials
SPAWAR Systems
Center San Diego



Ed Crenshaw, Chair
Student Posters &
Grants
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Publicity
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Joe Hughes, Chair
Sponsorship



Bonita Chamberlain,
Liaison *Underwater*
Film Festival,
Explorers Club



Brock Rosenthal,
Exhibits
Ocean Innovations



Daniel Sternlicht
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Art Teranishi
Technical Program
ORINCON Defense



Barbara Fletcher
Arrangements
SPAWAR Systems
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George Clausen
Exhibits



Leonard Poole
Student Posters &
Grants
Sidus Solutions, Inc.



Steve Koenenick
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SPAWAR Systems
Center,
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Terri Wirth
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Deeanne Edwards
Underwater Film
Festival
Marine Life Photo



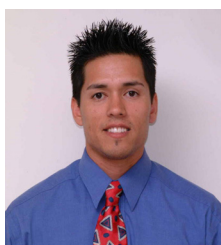
Sandy Liflander
Executive Assistant
ORINCON Defense



Dan Bedore
Student Program
Mechanical Systems
Engineer



Nip Shah
Student Program
Hamilton
Sundstrand



Michael Woods
Golf Tournament
WebsUSA

NOT PICTURED

Bill Sutter
Arrangements Chair
William W. Sutter &
Associates

Bill Hulburd
Exhibits
Advisor

Mark Barnum
Finance Chair
Applied Technology
and Research

Alan Szczepaniak
Student Program,
SPAWAR Systems Center,
San Diego

Nelson Ross
Registration
Advisor

James Walther
Sponsorship
Tension Member
Technologies

John Davis
Exhibits
InterOcean Systems, Inc.

John Schiltz
Exhibits
SAIC

Portrait Photographs by Lucien Bonnafox

Around San Diego

Sights to See

San Diego offers visitors a broad range of beautiful sites from coastal parks to historical landmarks.

Old Town Historical Park

The San Diego Zoo

Balboa Park & Museums

The Wild Animal Park

La Jolla
(shopping district and oceanview restaurants)

Seaport Village
(shopping and harborview restaurants)

The Gaslamp Quarter
(historical downtown dining & music)

Tijuana, Mexico
(approximate 30 minute drive - take your passport if entering Mexico)

The San Diego Mission

Coronado Bridge
(short drive down I-5 to bridge)

Coronado Island
(take Ferry from Broadway Pier)

Getting Around San Diego



1. Qualcomm Stadium
2. Fashion Valley Mall
3. Seaworld
4. Historic Old Town
5. San Diego Zoo & Balboa Park
6. San Diego International Airport
7. Harbor Cruises
8. San Diego Convention Center & Seaport Village

9. The Gaslamp Quarter
----- San Diego Trolley
Qualcomm Stadium, Rio Vista Shopping Center, Mission Valley Mall, Fashion Valley Mall/Town & Country Resort, Historic Old Town, Amtrak Station & Downtown, San Diego Convention Center & Seaport Village, South to Tijuana, Mexico Border



Sea World



San Diego Mission



Wild Animal Park



Balboa Park



Coronado Bridge/Coronado



Torrey Pines

Town and Country Hotel

Directions to the Hotel

From the Airport:

Follow the signs for Interstate 5 North. Take 5 North to 8 East. Exit Hotel Circle and turn left. After going under the freeway underpass, the Town & Country will be on your right, adjacent to Fashion Valley Road.

From El Centro: Interstate 8 East exit 2nd Hotel Circle Exit and turn left going under the overpass.

From Beaches: Interstate 8 West exit Hotel Circle and turn right.

From Interstate 5 North or South: Exit onto Interstate 8 East (El Centro) and exit 2nd Hotel Circle exit, turn left continuing under the overpass.

From Interstate 805 North or South: Interstate 15 North or South & Hwy 163 Exit onto Interstate 8 West (Beaches), exit Hotel Circle and turn right.



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The National Defense Center of Excellence for Research in Ocean Sciences (CEROS) solicits and supports innovative technology development for national maritime military applications and sustained technology-based economic development in Hawaii. CEROS is a unique technology development program operating under a cooperative agreement between the State of Hawaii and the federal Defense Advanced Research Projects Agency (DARPA). CEROS demonstrates that the State can be responsive to the needs of the Department of Defense for state-of-the-art ocean technology development which builds residual benefit for the state.

The CEROS program started in 1993, with a \$5 million supplemental federal appropriation to the High Technology Development Corporation (HTDC). Cognizance for CEROS was transferred to the Natural Energy Laboratory of Hawaii Authority (NELHA) Board of Directors in 1996. The NELHA Board of Directors oversees CEROS operations and grants CEROS its authority to issue State contracts for technical development projects. CEROS functions under NELHA Board cognizance but separate from the

state-supported aquaculture and energy development efforts which are the core function of the NELHA facility.

CEROS is an efficient organization that operates on less than 10% administrative overhead. Since 1993 CEROS has funded 140 technical projects for \$54.6 million through annual competitive solicitations. CEROS contracts help companies develop and demonstrate advanced technologies for submarine, surface and airborne elements of the nation's maritime military forces while supporting new technology-based capabilities and employment opportunities in Hawaii. A 2003 report on CEROS by the Logistics Management Institute of McLean, Virginia found that CEROS funding has produced significant results for the Department of Defense and has made important contributions to the ocean-sciences knowledge base and the economy of the State of Hawaii.

In October 2002, Congress appropriated an additional \$6 million for CEROS. In June 2003, work will commence on the 14 technical projects that comprise the 2003 CEROS Core technical program.



Student Poster and Lanyard Sponsor

The Office of Naval Research coordinates, executes, and promotes the science and technology programs of the United States Navy and Marine Corps through schools, universities, government laboratories, and nonprofit and for-profit organizations. It provides technical advice to the Chief of Naval Operations and the Secretary of the Navy and works with industry to improve technology manufacturing processes.



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Coalition for Enhanced Marine Resources mission is to encourage the development, use and enjoyment of artificial reefs in California. Artificial reefs are thriving marine habitats. In California, some of the top artificial reefs are found at offshore drilling platforms, home to millions of fish, invertebrates and other marine creatures.

With the decommissioning of many of these platforms quickly approaching, CEMR will continue to work with others concerned about protecting and enhancing marine resources to preserve the underwater portion of these rigs in order to save the marine life that thrives there today.

MTS Awards Luncheon

The Marine Technology Society annual awards luncheon provides an excellent venue for meeting and networking with colleagues and other MTS members. MTS President, Ted Brockett will present the annual State of the Society Message. Along with Lockheed Martin Corporation and Compass Publications he will confer the Society's annual awards. The Marine Technology Society will also recognize Gregory Stone, immediate past editor of the MTS Journal, in addition to MTS Past Presidents and the members of the Oceans 2003 MTS/IEEE Conference Committee.

The Awards are:

The Lockheed Martin Award for Ocean Science and Engineering. Conferred by the Lockheed Martin Corporation, Dr. Ted Johnson will present the award that recognizes an individual, company or organization for outstanding accomplishments in marine science, engineering, or technology. This year the Lockheed Martin Award will be given to Dr. Andrew Clark, President, Harris Maritime Communication Services.

Compass Distinguished Achievement Award. Conferred by Compass Publications, Amos Bussmann will present the award that recognizes an individual's significant contributions to the art and science of oceanography and marine technology. This year it is awarded to Dr. James L. Cairns, founder of Ocean Design.

Compass Industrial Award. Conferred by Compass Publications and presented to a for-profit firm for outstanding contributions to the advancement of the science and engineering of oceanography and marine technology. This year it is awarded to RD Instruments.

Compass International Award. Conferred by Compass Publications and presented to an individual, company or organization, outside of the United States, in recognition of outstanding contributions to the advancement of oceanography and marine technology. This year it is awarded to the Manned Submersibles Laboratory of the PP Shirshov Institute of Oceanology, Russian Academy of Sciences.

MTS Outstanding Professional Committee. Presented to a MTS professional committee in recognition of outstanding activities conducted in support of the objectives of the Society. This year it is awarded to the Marine Archaeology Committee, Brett Phaneuf, chair.

MTS Outstanding Section. Presented to a MTS section in recognition of outstanding activities conducted in support of the objectives of the Society. This year it is awarded to the Gulf Coast Section, Laurie Jugan, chair.

MTS Outstanding Student Section. Presented to a MTS student section in recognition of outstanding activities conducted in support of the objectives of the Society. This year it is awarded to the MTS student section at the Massachusetts Institute of Technology.

MTS Special Commendation and Award. Presented to an individual, group or organization in recognition of outstanding accomplishments through individual or team management, leading to significant advances in marine affairs. This year the award is being given to Elizabeth Corbin.

Marine Technology Society Fellows. The Grade of Fellow is limited to MTS members who have made outstanding contributions in support of the Society's mission and who have distinguished accomplishments in their professional fields. This year the title of Fellow is conferred upon Terry Thompson, Jerry Boatman, and Dr. William Phoel.

MTS Charles H. Bussmann Scholarship Award. Presented to an outstanding MTS member undergraduate or graduate student enrolled in a full time accredited marine-related program. This year the scholarship is awarded to Texas A&M University graduate student, Sangsoo Ryu.

The Marine Technology Society Student Scholarship Award. Presented to outstanding MTS member undergraduate(s) and graduate student(s) enrolled in a full time accredited marine-related program. This year the scholarship is awarded to Anna Michel, Marlene Bellman, Rebecca Nadel, Thiago Carvalho, David Newborn, Ryan Halonen and Lindsay Jones.

The Dieter Family Travel Scholarships, which support MTS student travel to the annual Oceans conference, are awarded to Katherine Croff, Michele Greene, and Fraser Dalgleish.

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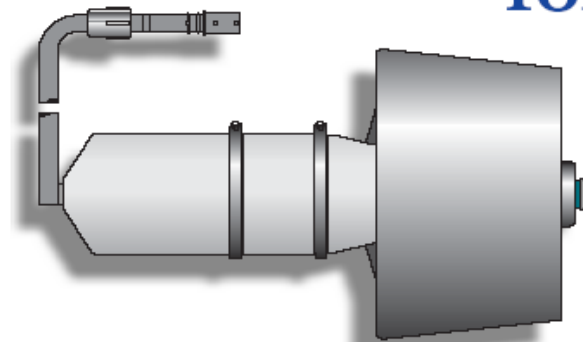
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Centennial Especial

Look for special, non-traditional sessions sprinkled throughout the scientific/technical program on pages 32 through 101. These include:

Tuesday:

'World's Deepest Dive'

Dr. Andy Rechnitzer, *Viking Oceanographics, CA*,
Dr. Don Walsh, *International Maritime Inc., OR*

Offshore Oil Industry Cooperation in Oceanography: Past and Future

Dr. Cortis Cooper, *Energy Technology Company of ChevronTexaco*

'The Impact of the Invention of the Torpedo on the U.S. Navy'

Barbara Moe, *Naval Undersea Museum, WA*

'Installation of Hydroacoustic Data System for Regional Monitoring'

Dr. Jerry Wilson, *Thales Geosolutions, CA*

'The Alaska Cruise Ship Initiative Science Report'

Dr. Alan Mearns, *NOAA HMRS, WA*, Carolyn Hudson Morehouse, *Alaska DEC, AK*

'Global Coral Reef Alliance'

Thomas J. Goreau, *Global Coral Reef Alliance, MA*

'Non-Academic Careers for Marine Scientists'

Cheryl Dybas, *National Science Foundation, VA*

'Underwater Gliders'

Ralf Bachmayer, *Princeton University, NJ*, Dr. Scott Jenkins, *UCSD, CA*

Wednesday:

'Coastal Processes & Evolution'

Dr. Douglas L. Inman, *Scripps Institution of Oceanography/UCSD, CA*

'Scripps' History'

Kevin Hardy, Deborah Day, *Scripps Institution of Oceanography/UCSD, CA*

'Ocean Observatory Programs'

Dr. John Orcutt, *Scripps Institution of Oceanography/UCSD, CA*

'Military AUVs'

Dr. Tom Swean, *ONR, VA*, Steve Castelin, *Coastal Systems Station, FL*

'U.S. National Marine Sanctuary Program'

Dr. Craig MacDonald, *Stellwagen Bank National Marine Sanctuary, MA*, Dr. Steve Gittings, *NOAA MSD, MD*

'Exploring Earth's Oceans'

Capt. Craig N. McLean, *NOAA Office of Ocean Exploration, MD*

'NOAA External Stakeholder Forum'

Vice Admiral Conrad C. Lautenbacher Jr., *NOAA, DC*

'Blue Ribbon Panel on Opening up the Outer Continental Shelf to Exploration'

John Norton Moore, *Myron Nordquist, University of Virginia, VA*

Thursday:

'Ocean Science and Technology in the 21st Century'

Dr. Charles Kennel, *Scripps Institution of Oceanography/UCSD, CA*, Dr. Robert Gagosian, *Woods Hole Oceanographic Institution, MA*

'HF Radar - Advanced Systems and Applications'

Dennis Trizna, *Imaging Science Research Inc., VA*, Prof. John F. Vesecky, *University of California at Santa Cruz, CA*

'International Perspective: The Oceans and the World in the 21st Century'

Prof. Howard Roe, *University of Southampton, UK*

'Ocean Exploration Forum'

Capt. Craig N. McLean, *NOAA Office of Ocean Exploration, MD*

'Passionfish Sustainable Fisheries Forum'

'Tutorial Argos 2-Way Capability: How it works & How to Use it'

Bill Woodward, *Service-Argos, Inc. MD*

Exhibit Hall Hours

Sunday, September 21, 2003

Set-up, 2:00 PM - 6:00 PM

Monday, September 22, 2003

Set-up, 8:00 AM - 4:30 PM

Tuesday, September 23, 2003

9:00 AM - 7:00 PM

5:30 PM - 7:00 PM (Exhibitors' Reception)

Wednesday, September 24, 2003

9:00 AM - 5:30 PM

Thursday, September 25, 2003

9:00 AM - 3:30 PM

Tear down: 3:30 PM - 8:00 PM

Friday, September 26, 2003

(Lower Exhibit Hall B Only)

Tear down: 8:00 AM - 12:00 Noon

STUDENT POSTER COMPETITION

Lower, Exhibit Hall B

Tuesday, Wednesday

9:00 AM to 4:00 PM

To foster development of the next generation of ocean engineers and scientists, OCEANS 2003 MTS/IEEE will host a Student Poster Competition for full-time undergraduate and graduate students who are majoring in oceans related fields of study. Applications have been received from 19 countries, and 27 posters have been selected for display in subjects such as undersea vehicles, sonar signal processing, and physical oceanography. Students will staff their posters at scheduled times throughout the conference and awards for the posters judged exceptional will be presented at the SeaWorld Extravaganza. Support for the Student Poster Competition is provided by a generous grant from the US Office of Naval Research as well as by a portion of conference fees.

Conference Events

Extraordinary Evenings of Underwater Media

Underwater Film Festival I

Sunday, September 21, 2003

and

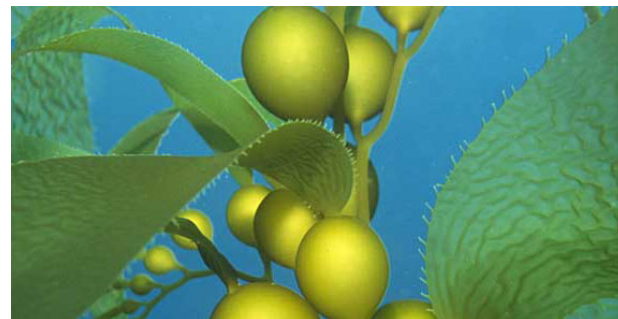
Underwater Film Festival II

Monday, September 22, 2003

7:00 PM to 9:30 PM Golden Ballroom

Two acclaimed San Diego film organizations will host two outstanding evenings of digital films and slides at the San Diego Underwater Film Festival. The Undersea Film Exhibition (UFEX) will present the winners of its Fourth International Competition. The world famous San Diego Underwater Photographic Society (SDUPS) will exhibit its first all digital slide shows. Each evening's unique program of short films and slide shows will utilize a state-of-the-art, large-format digital projection system. Enjoy our artists' visions of the colorful marine life, large and small, from such exotic locales as the tropical waters of the Indo-Pacific and Caribbean to the temperate waters of North America, and, of course our own backyard, San Diego.

Tickets \$10 per evening. Sunday, Sept. 21 and Monday, Sept. 22 from 7:00 PM to 9:30 PM. Golden Ballroom, Town and Country Convention Center. Open seating.



Torrey Pines Golf Course,
La Jolla, CA

Golf Tournament

Sponsored by Harbor Offshore, Inc.

Sunday, September 21, 2003, 12:30 PM

Torrey Pines, boasting two 18-hole golf courses has long been recognized as one of the nation's foremost municipal golf facilities. Situated atop cliffs towering above the Pacific Ocean in San Diego, California, golfers marvel at the views of the coastline and deep ravines. Nature lovers can spot wildlife and the famous Torrey Pines trees that are indigenous to the area.

Bounded by a mountain to the north and the Pacific Ocean to the west, Torrey Pines is truly a "golfer's paradise" that stirs the imagination of golf enthusiasts all over the world.

OCEANS 2003 is proud to offer this year's attendees the unique opportunity to play this course where the PGA Tour hosts the annual Buick Invitational and the Junior World Golf Championship. We'll see you on the links!

Conference Events

Monday, September 23, 2003 Tutorial Program Offers UCSD Continuing Education Credits

Attend any of the 17 scheduled tutorial sessions. UCSD Continuing Education Credit available for a nominal additional processing charge. CEU forms available from instructors. An excellent learning experience.

Early Bird Reception Monday, September 22, 2003 Foyer, 5:00 PM - 7:00 PM

Attendees arriving early may register Monday evening in the foyer of the Town & Country Convention Center. Avoid waiting in line in the morning and join the OCEANS 2003 MTS/IEEE committee for a welcome reception, including light hors d'oeuvres.

Plenary Session Tuesday, September 23, 2003 Golden Ballroom, 8:00 AM - 9:40 AM

The Plenary Session will begin with the conference Opening Ceremonies, followed by presentations that address the areas of ocean exploration, science and exploitation. Join us for these exciting events that include the following speakers: Dr. Don Walsh, International Maritime, Inc., Dr. John Orcutt, Scripps Institution of Oceanography, and Dr. Cortis Cooper, Energy Technology Company of ChevronTexaco. See page 35 for descriptions.

MTS Awards Luncheon Tuesday, September 23, 2003 Grand Ballroom, 12:00 Noon - 1:20 PM

The annual Awards Luncheon for the Marine Technology Society will be held in the Grand Ballroom. Ted Brockett, MTS President, will present the "Annual Message from the President: State of the Society" speech. The Society will confer the Outstanding Section Award, the Compass Awards, and the Lockheed Martin Ocean Science and Engineering Award. In addition, the Society is proud to present two new areas of recognition: the Outstanding MTS Student Section Award and the new Dieter Family Student Travel Scholarship. The luncheon provides an excellent venue for meeting and networking with colleagues and other MTS members. Additional tickets are available for \$35 at the conference registration desk.

Exhibitors' Reception Tuesday, September 23, 2003 Exhibit Hall, 5:30 PM - 7:00 PM

The OCEANS '03 MTS/IEEE Exhibitors invite all attendees to the traditional hosted reception in the exhibit hall. View the products, services and demonstrations in a relaxed atmosphere at the end of opening day.

Exhibit Hall Sand Sculpture (Work in Progress) Tuesday to Thursday Sponsored by



A giant sand sculpture will be created during Oceans 2003 in the lower Exhibit Hall B area. It will be a work in progress Tuesday and Wednesday and on display Thursday. Available for viewing during exhibit hours.

IEEE-OES Awards Luncheon Wednesday, September 24, 2003 Grand Ballroom, 12:00 Noon - 1:20 PM

The annual Awards Luncheon for the Institute of Electrical and Electronic Engineers-Oceanic Engineering Society (IEEE-OES) will be held in the Grand Ballroom and is included with a full conference registration. Dr. Thomas F. Wiener, OES President, presides at the Annual Awards luncheon and presents the "Oceanic Engineering Society Highlights," followed by the presentation of awards: The Distinguished Technical Achievement Award, The Distinguished Service Award, and Fellows award. Additional tickets are available for \$35 at the conference registration desk.

Sea World Extravaganza Wednesday, September 24, 2003 5:30 PM - 10:00 PM

An exclusive, spectacular evening in the park is planned for OCEANS 2003 MTS/IEEE attendees. Cocktails, dinner and several shows are on the schedule. Shuttle transportation will be provided from the Town & Country Convention Center Foyer beginning at 5:30 PM and returning at 10:00 PM. All full-conference registrants receive a ticket for this event; additional tickets may be purchased.

Concurrent Event



Scripps History Session
Wednesday, September 24, 2003
Royal 5 & 6 1:20 PM to 5:20 PM

Co-chaired by Deborah Day, Archivist
and
Kevin Hardy, Centennial Program
Director, Scripps Institution of
Oceanography/UCSD

“This special Scripps Institution of Oceanography history track will explore the ten decades of change in ocean science at Scripps and in the world. Presentations include: “Origins of a Biological Field Station”; “Scripps before the War”; “1930’s: Evenings with T. Wayland Vaughan”; “Writing the First History of Scripps”; “1940’s: Sverdrup’s Biology”; “Scripps in the ‘Golden Age of Oceanographic Exploration,’ 1950-1972”; “The 1960’s: Technology Pushes Ocean Research”; “1970’s: Perspectives of a Woman Oceanographer”; “1980’s: Ocean Acoustic Tomography: Birth of a Technique”; “2003: Exploring the Ocean Basins with Satellites and Ships”. Guest speakers include Professor Philip J. Pauly, Rutgers University; Beatrice Moulton, Professor and co-author of the first history of Scripps; Deborah Day, Archivist; Scripps Institution of Oceanography; Katherine LaFond, Lab Chemist, 1933-36, Scripps Institution of Oceanography; Dr. Fred Spiess, former Director of Scripps Institution of Oceanography; Dr. Kathleen Crane, Author and Scientist; Dr. Walter Munk, Professor Emeritus, Scripps Institution of Oceanography.”

Cyber Café Sponsored by CEROS



Lower Exhibit Hall B

The Cyber Café is a special area on the exhibition floor in Hall B that allows conference participants to get connected while attending Oceans 2003. Visitors can use the Café to check their email and search the Internet during exhibit hours.

Speaker Ready Room, Terrace Salon 3

The Terrace Salon 3 has been reserved at the Convention Center, Monday 4:00 PM to 6:00 PM, Tuesday through Wednesday, 7:00 AM to 7:00 PM, and Thursday 7:00 AM to 3:00 PM, for speakers to practice their technical presentations. Appropriate audio-visual equipment is available.

Thursday, 8:15 AM - 4:30 PM

Room: Golden Ballroom

KEYNOTE SESSION

by Admiral James Watkins, Chair,
President’s Commission on Ocean Policy
and The Honorable Leon Panetta, Chair,
Pew Oceans Commission
Co-moderators, Charles Kennel, Director,
Scripps Institution of Oceanography
and Robert Gagosian, Director,
Woods Hole Oceanographic Institution

- 8:15-8:30 Welcome and Introduction by Charles Kennel
- 8:30-9:00 President’s Commission on Ocean Policy
Report by Admiral James Watkins
- 9:00-9:15 Q&A with Admiral James Watkins
- 9:15-9:45 Pew Oceans Commission Report:
The Honorable Leon Panetta
- 9:45-10:00 Q&A with The Honorable Leon Panetta
- 10:00-10:30 Break
- 10:30-12:30 Federal Agency Perspectives
 - 10:30-10:45 OSTP: The Honorable John Marburger, III,
Director of the Office of Science and Technology
Policy
 - 10:45-11:00 NSF: Dr. Rita Colwell, Director
 - 11:00-11:15 NOAA: Vice-Admiral Conrad Lautenbacher, Jr.,
Administrator
 - 11:15-11:30 Navy: RADM Jay Cohen, Chief of Naval
Research, ONR
 - 11:30-11:45 NASA: The Honorable Sean O’Keefe,
Administrator
 - 11:45-12:15 Q&A with Federal Agency Leaders
- 12:15-1:30 Luncheon Break
- 12:20-12:50 U.S. Senator Diane Feinstein, D-CA (Late program
addition. Check daily schedule at conference to confirm.)
- 1:30-4:30 International Perspective: The Oceans and the World
in the 21st Century - Observing and Understanding
the Global Oceans, Moderator: Prof. Howard Roe,
University of Southampton, UK
 - 1:30-1:45 The growth of International Collaboration over the
Last 50 Years: Prof. C.K. Tseng, Institute of
Oceanology, Qingdao, China
 - 1:45-2:15 International Organizations and Programs,
Dr. Patricio Bernal, Executive Secretary,
Intergovernmental Oceanographic Commission and
Assistant Director General of UNESCO
 - 2:15-2:45 Developing Country Perspectives, Capacity
Building: Dr. Javier Mendieta, CICESE, Mexico,
Director General
 - 2:45-3:15 Break
 - 3:15-3:45 Ocean Science in the 21st Century - Interchange
between the East and the West across the Pacific
Ocean: Mr. Takuya Hirano, JAMSTEC, Japan,
President
 - 3:45-4:15 European Perspectives/Modeling and Data
Assimilation: Jean-Francois Minster, IFREMER,
France, Chairman and Managing Director
 - 4:15-4:30 Wrap up and conclusions, Charles Kennel
- 4:30 Adjourn

Concurrent Events

Tour the Research Vessel *SSV Robert C. Seamans*

**Tuesday, September 23 & Wednesday, September 24
from 2:00 PM until 5:00 PM each day.**

Tours of the most sophisticated research vessel under sail in the United States are available for conference attendees. Please wear your badge to be admitted.

Commissioned in June of 2001, this 134' brigantine is owned by Sea Education Association (SEA) of Woods Hole, Massachusetts and sails the Pacific on programs for college students that offer a rigorous full-credit academic semester. Cruise tracks have included Costa Rica, the Galapagos, Tahiti, Hawaii and the Pacific Northwest.

The vessel is berthed at the Maritime Museum of San Diego, 1306 N. Harbor Drive. Public transportation is available. For directions, please go to SEA's booth #451.

Sea Education Association (SEA), headquartered in Woods Hole, Massachusetts, was founded in 1971. It is the only full-credit undergraduate program in the United States that combines a rigorous curriculum of oceanographic research, maritime studies, and nautical science while under sail. Students of any discipline or major may apply to the 12-week SEA Semester, or 8-week summer session which combine both shore and sea components. At shore, all students live, study and work alongside professional researchers, scholars and mariners. At sea, each student is part of the ship's crew, participating in a watch team that provides experience in every aspect of sailing and scientific research. The shipboard experience provides the opportunity to develop teamwork and decision-making skills as well as self-confidence and a greater respect for others. *Credits are awarded through the institutions the students attend, or through Boston University in association with SEA.*

The San Diego Chapter of The Explorers Club **Tuesday, September 23, 2003 6:00 PM, Pacific Ballroom**

The San Diego Chapter of The Explorers Club invites attendees and out-of-town members of The Explorers Club to a reception, dinner and presentation by Dr. Paul Dayton "Sea Changes--the Effect of Climatic Forcing on Polar Ecosystems."

This will be held at the Town and Country Hotel in conjunction with the Oceans 2003 conference.

Cost: \$45

Social Hour and Viewing of Exhibits: 6PM.

Dinner: 7PM

Presentation: 8PM

For reservations contact: Bonita Chamberlin at 619.445.0735 or <sdexplorersclub@earthlink.net>

Scripps Institution of Oceanography William A. Nierenberg Prize



Dr. Jane Lubchenco

**Wednesday, September 24, 2003
Terrace Pavillion 1:30 PM-5:00 PM**

The 2003 Nierenberg Prize for Science in the Public Interest, honoring the memory of William A. Nierenberg, who led Scripps Institution of Oceanography, UCSD, as director for more than two decades, will be awarded to Dr. Jane Lubchenco, Oregon State University. Dr. Lubchenco is an environmental scientist and marine ecologist who is actively engaged in research, synthesis and communication of scientific knowledge. Her expertise includes coastal oceans, ecosystem dynamics, biodiversity, conservation biology, global warming, and sustainability.

The presentation of the award will be accompanied by a public lecture, followed by a reception.

The prize is named for William Nierenberg (1919-2000), who was a renowned national science leader. He served Scripps Institution as director from 1965 to 1986. The recipient of numerous awards and honors for professional research and public service, Nierenberg was widely known for a long record of national and international service. He served on various panels of the Presidents' Science Advisory Committee. A leading expert in several fields of underwater research and warfare, Nierenberg was primarily known for his work in low-energy nuclear physics.

"The Nierenberg Prize annually honors the memory of William A. Nierenberg by recognizing those who promote science in the public interest," said Scripps Director Charles Kennel. "The prize reflects Scripps's mission to seek, teach, and communicate scientific understanding of the earth for the benefit of society and the environment." Previous recipients are television newsman Walter Cronkite, and renowned biologist Edward O. Wilson.

Concurrent Events

Passionfish Sustainable Fisheries Forum **Thursday, September 25, 2003** **Regency Tower** **1:00 PM-3:00 PM**

Passionfish Foundation is a nonprofit public education project promoting sustainable wild fisheries and aquaculture. The group is launching live and online forums, seafood events with culinary partners, and educational outreach.

Passionfish has assembled a special blue-ribbon panel to meet at Oceans 2003. Preeminent public figures, widely respected local leaders, and experts from diverse disciplines will engage in a spirited and evocative panel discussion of sustainable fisheries. Passionfish participants will explore what is common to both commerce and conservation. Local follow-up will be energetically facilitated through future working groups.

Their approach builds trust by getting stakeholders talking to one another who otherwise would not. By revealing core values rather than dwelling on disagreement, the focus becomes the possibilities, not the problems. The outcome promises to be thought-provoking.

Your participation will help reveal ways coastal communities might assume leadership roles in responsibly promoting sustainable fisheries.

Much of the Passionfish Foundation's work is made possible through a generous grant from the David & Lucile Packard Foundation. Passionfish is for people passionate about the ocean, fishing, and seafood!

Visit their website at <http://www.passionfish.org>



Scripps Centennial **Homecoming Celebration** **Friday, September 26, 2003** **4:00 PM - 10:00 PM** **Scripps' actual 100th birthday!**

Former faculty, staff, alumni, colleagues, and friends are invited to the Scripps Homecoming and Centennial Celebration presented by the Scripps Ancient Mariners on the Pawka Green in front of the 1910 George H. Scripps Building.

At 2:00 PM, buses will start bringing attendees to the Scripps campus for an afternoon and evening Birthday and Homecoming Celebration.

At 4:00 PM, the Saint Augustine high school marching band will play through campus. Food and beverage will be available throughout the evening. Live bands will play beach and popular music throughout the night.

After dark, large images of Scripps past and present will be projected on the south wall of Ritter Hall. We will bury two Time Capsules for the Scripps 150th and 200th year. San Diego City and City of La Jolla Proclamations will be read.

At 9:00 PM, for the first time in its 100 year history, fireworks by Fireworks America will be launched from the Scripps pier!



Poster Sessions

Lower Level Exhibit B Area
Tuesday, Wednesday, Thursday 9:00 AM - 4:00 PM

Tuesday 23 September

Physical Oceanography

Facilitator: Dr. Wolf Berger, Scripps UCSD, CA

Defining Static Correction for Jointly Relocated Earthquakes Along the Blanco Transform Fault Zone Based on SOSUS Hydrophone Data -P2721

Prof. Vincent S. Cronin, *Baylor University, TX* and Prof. Keith A. Sverdrup, *University of Wisconsin-Milwaukee, WI*

Geology & Geophysics

Facilitator: Dr. Patrick Fell, *Northrop-Grumman, VA*

Sea-Floor Properties from the Inversion of 3D Multichannel Seismic Data: A Submarine Mud-Volcanic Flow in the Absheron Block, Offshore Azerbaijan - P2727

Dr. Robert M. Kieckhefer, Mr. Fred Herkenhoff, Mr. Nigel Smith, Mr. Jeff Wright, Mr. Richard Mollenkopf and Ms. Rukhsara Kuliyeva, *ChevronTexaco Exploration & Production Technology Co. CA*

A High Temporal Resolution Optical Flow Meter for Measuring Aqueous Flow in Active Plate Boundary Systems - P2735

Alison L LaBonte and Kevin M Brown, *Scripps Institute of Oceanography, CA*

Exploration of the Narrow-band Signals Field in Marine Bays with Complex Ground Relief

Dr. Anatolii Naumovich Rosenbaum and Dr. Vladimir Ivanovich Korochentsev, *Far-Eastern State Technical University, Russia*

Continued Exploration of the Humboldt Slide using Anisotropy of Magnetic Susceptibility

Kurt Schwehr, Dr. Lisa Tauxe, Dr. Neal Driscoll, *Scripps Institution of Oceanography, CA*

Nile Delta Extratropical Cyclone 2002 Forecast

Mrs. Therese Schneck

Fisheries Science

Facilitator: Dr. Sloan Freeman, *Duke Univ. NC*

The Use of Acoustic Ground Discrimination as a Precursor to the Estimation of Shellfish Abundance - P2736 Dr. Sam K. Naidu and Ms. Elaine M Seward, *Fisheries & Oceans Canada, Canada*

Geochemistry

Facilitator: Dr. Paula Coble, *Univ. of South Florida, FL*

Aqueous Flux Measurements at the Bush Hill Hydrate Mound, Gulf of Mexico - P2739

Dr. Michael D Tryon and Dr. Kevin M Brown, *Scripps Institution of Oceanography, CA*



Oceanography at LSU

Congratulates Scripps on 100 Years!

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Louisiana State University



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Poster Sessions

Biogeochemical Cycling of Nutrients and Estuarine Fluxes in the Seomjin River Estuary

Mr. Lee Jae Seong, Dr. Jung Rae Hong, Mr. Ko Tae Seung, Dr. Park Jong Soo, Dr. Kim Sung Soo and Dr. Kim Kyu Young, *Marine Environment Management Division, NFRDA, Korea*

Information Technology

Facilitator: John A. Lever, *USNOO, MS*

Rescue of Black Sea Hydrological Data for Regional Classification and Studies of Seasonal and Interannual Variability - P2741

Dr. Alexander M. Suvorov, Dr. Alexey Kh. Khaliulin, Dr. Evgeny A. Godin, Dr. Vladimir N. Belokopytov and Mr. Andrey V. Ingerov, *Marine Hydrophysical Institute of the Ukrainian NAS, Ukraine* and Dr. David R. Palmer, *NOAA/Atlantic Oceanographic and Meteorological Laboratory, FL*

Development of Information-Analytical System on Oceanography of Far Eastern Seas

Mr. Vladimir Igorevich Rostov, V.I. Il'ichev, *Pacific Oceanological Institute FEB RAS, Russia*

Marine Resources

Facilitator: Dr. Grady Tuell, *Univ. of Florida, FL*

Potential for Expansion of Coral Reefs into Higher Latitudes due to Climate Change - P2745

Dr. Gang Liu, Dr. William Skirving, Dr. Alan Strong and Ms. Chunying Liu, *NOAA/NESDIS, MD* and Dr. James Hendee, *NOAA/OAR/AOML, FL*

Developments From Disaster: Florida's Progressive Approach to Long-Term Effects of the 1993 Tampa Bay Oil Spill - P2748

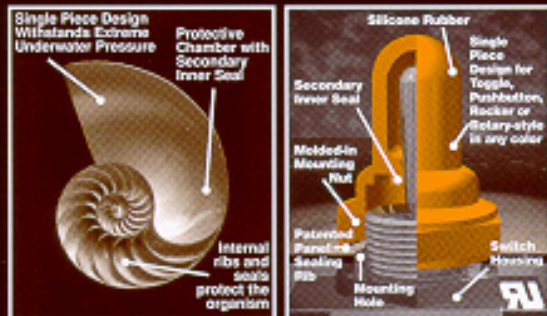
Mr. James Krolick, *FWC/Florida Marine Research Institute, FL*

Positive Marine Impacts Resulting from the Construction of Four Artificial Oil Exploration and Production Islands within the Greater Long Beach/Los Angeles Harbor

Leo M. Rebele and Dr. Jon P. Houghton, *Hart Crowser, Inc., CA*, Linda Arsenault and John Kirby, *THUMS, CA* and Dr. Dennis Lees, *Littoral and Ecological Services, CA*

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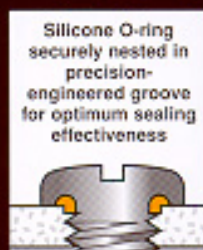
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Poster Sessions

Advanced Technology

Facilitator: Ken Ferer, *Neptune Sciences, VA*

Automated Event Detection in Underwater Video - P2749 Dr. Duane R Edgington, Ms. Karen A Salamy, Mr. Michael Risi and Mr. R E Sherlock, *Monterey Bay Aquarium Research Institute, CA* and Mr. Dirk Walther and Prof. Christof Koch, *California Institute of Technology, CA*

Remote Sensing

Facilitator: Dr. David Weissman, *Hofstra Univ. NY*

Bistatic Mapping Radar Bisar Application: Ocean Surface Image - P2754 Mrs. Mohammed Jaouad, Ben Kassem, *IRCCyN/SETRA, France*, Prof. Ali Khenchaf, *ENSIETA, France*

Examining the Correlation between SeaWiFS Chlorophyll (CHL) and Atmospheric Aerosol Depth (AOD) Time Series at the Global Scale Dr. Albert J. Gabric and Dr. Roger Cropp, *Griffith University, Australia*

Ocean Engineering

Facilitator: Capt. D. Karin Lynn, *U.S. Navy, DC*

PlatREform: Design and Reuse of Offshore Oil Platforms Mr. David Collins, *University of Waterloo, Canada*

Acoustics

Facilitator: Dr. Alex Tolstoy, *ATolstoy Sciences, VA*

Analysis of the Field of Narrow-band Signals Percolating into Marine Bottom Dr. Oleg Viktorovich Abramob and Dr. Vladimir Vladimirovich Korochentsev, *Far-Eastern State Technical University, Russia*

Signal Processing

Facilitator: Dr. James Candy, *Lawrence Livermore National Laboratory, CA*

Multichannel Blind Deconvolution: Application to Marine Seismic - P2761 Mr. Benayad NSIRI, Prof. Jean-Marc BOUCHER and Prof. Thierry CHONAVEL, *ENST Bretagne, France*

An Efficient Doppler Estimation Algorithm for Underwater Acoustic Communications Dr. Yuliang Yang and Mr. Weiqing Zhu, *Chinese Academy of Science, China*

Algorithms Dedicated to Blind Estimations of Relative Times and Angles of Arrival for Passive Acoustic Tomography Processor Adaptive Time Frequency and Spatial Time Frequency Approachs Dr. Gervaise Cedric, Mr. Ioana Cornel, Prof. Quinquis Andre and Mr. Gaucher Damien, *ENSIETA, France*

Feasibility of Passive Oceanic Acoustic Tomography: A Cramer Rao Bounds Approach - P2767 Dr. Gervaise Cedric and Mr. Gaucher Damien, *ENSIETA, France*

Analysis of Signals Spectrum in the Shallow Sea - P2773 Prof. Vladimir Ivanovich Korochentsev, Mr. Andrei Vladimirovich Remezko and Prof. Dmitrii Mironenko, *Far-Eastern State Technical University, Russia*

Vector-phase Measurements of Kinematic Parameters of Acoustic Field - P2779 Prof. Vladimir Ivanovich Korochentsev, Mr. Sergei Ivanovich Kamenev and Mrs. Vera Aleksandrovna Kochetova, *Far-Eastern State Technical University, Russia*

Undersea Vehicles

Facilitator: Drew Michel, *TSC Holdings, Inc. TX*

Design of a Roller-Collector Remotely Operated Vehicle - P2784 Ms. Adrienne F Yandell, Bridget C Brett, Sarah E Sheppard, Jesse L Austin-Breneman, Heather M Brundage, Robin A Radez, Stephen J Fantone, Michael Jordan Stanway and Timothy D Pennington, *MIT, MA*

Wednesday 24 September

Aquatic Science

Facilitator: Dr. Sunny Jiang, *Univ. Of California, Irvine, CA*

The Benthic Infaunal Community of San Diego Bay - P2791 Dr. Timothy D. Stebbins, Mr. Eric Nestler and Mr. Dean Pasko, *City of San Diego Ocean Monitoring Program, CA*

Disorder of Symmetry in the Marine Star-fishes of the Amursky Bay of Japan Sea - P2792 Prof. Yuriy A. Mitrofanov, Mrs. Olga V. Dogadova and Mrs. Vera A. Kochetova, *V. I. Il'ichev Pacific Oceanological Institute of FEBRAS, Russia*

Poster Sessions

Diversity and Population Structure of Uncultured Marine Viral Communities - P2796

Mya Breitbart, Ben Felts, Scott Kelley, Joseph M Mahaffy, James Nulton, Peter Salamon and Forest Rohwer, *San Diego State University, CA*

Bacteriological Monitoring Studies to Identify Sources of fecal Pollution at Baby Beach, Dana Point Harbor, California - P2797

Donna M. Ferguson, Mariam H. Zhouandai, Martin A. Getrich and Dr. Douglas F. Moore, *Orange County Public Health Laboratory, CA*
Dr. Andrew Lissner, *Science Applications International Corporation, CA* and Richard Haimann, *Project Partners, CA*

Enzymatic Degradation of Carrageenan by Halophilic Bacteria from South-West Coast of India

Miss Yasmin Najmuddin Khambhaty, and Mrs. Kalpana Hareshbhai Mody *Central Salt & Marine Chemicals Research Institute, India*

Biomonitoring of Coastal Pollution Status Using Protozoan Communities with a Modified PFU Method - P2801

Prof. Joong Ki Choi, Dr. Kuidong Xu, Dr. Eun Jin Yang and Mr. Kyu Chul Lee, *Inha University, Korea*

Physical Oceanography

Facilitator: Dr. Myrl Hendershott, Scripps UCSD, CA

Heat and Mass Budgets of the Warm Upper Layer of the Tropical Atlantic Ocean in 1979-1999

Dr. Fabrice Vaucclair, *University of São Paulo, Brazil* and Dr. Yves du Penhoat, *LEGOS, France*

Sediment Transport in a High-energy Coastal Environment

Dr. Philip D Osborne and Mr. David B. Hericks, *Pacific International Engineering, PLLC, WA* and Mr. Todd D. Mudge and Mr. Matthew Hull, *SonTek/YSI, Inc., CA*

A Multi-factor Altimeter Wind Speed Retrieval Algorithm

Dr. Youguang Zhang, *Institute of Oceanography, CAS*, Prof. Jie Zhang, *First Institute of Oceanography, SOA*, Dr. Yonggang Ji, *Ocean University of China, China*

Intercomparison of Heat Fluxes in the South Atlantic: Part II: Interannual Variability

Dr. Fabrice Vaucclair and Prof. Ilana Wainer, *IOUSP, Brazil*

Ocean Sciences Education

Facilitator: Dr. Cheryl Peach, Scripps UCSD, CA

The Destruction of Capricorn Seamount: An Example of Subduction Zone Processes and Earth Science Education Outreach

Dr. Kimberly McSherry and Mr. Steven P Miller, *Scripps Institution of Oceanography, CA*

Education Outreach Over the Internet Connects Ocean Researchers to the K-12 Community

Ms. Jean Pennycook, *FUSD Science Office, CA*

Remote Sensing

Facilitator: Dr. David Weissman, Hofstra Univ., NY

A New Mapping Method for Propagating Data - P2804

Mr. Peng Yu, Dr. Jorge Zavala-Hidalgo, Dr. Steven L. Morey, Dr. James J. O'Brien, *COAPS/Florida State University, FL*

QuikSCAT SeaWinds Derived Data Application

Dr. Lei Shi, *SeaSpace Corporation, CA*

Numerical Simulation of Synoptic Circulation of the Black Sea Using the COAMPS Atmospheric Forcing

Mrs. Detelina P. Ivanova, *Naval Postgraduate School, CA*

Acoustics

Facilitator: Dr. Alex Tolstoy, ATolstoy Sciences, VA

Application of the Seafloor Flaky Structure for Navigation of Undersea Vehicles - P2808

Eugeny Maximovich Titov, *Far Eastern State Technical University, Russia*

Signal Processing

Facilitator: Dr. James Candy, Lawrence Livermore National Laboratory, CA

Wideband STAP for Passive Sonar - P2814

Dr. Radhakrishnan Pillai, *C & P Technologies, Inc. NJ* and Dr. Joseph R Guerri, *DARPA/SPO, VA* and Dr. Unnikrishna S Pillai, *Polytechnic University, NY*



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Poster Sessions

Thursday 25 September

Applied Ocean Sciences

Facilitator: David Frost, *Orincon, CA*

Analyzing the Dependence between RADARSAT-1 Vessel Detection and Vessel Heading using a CFAR Algorithm for Use in Fishery Management - P2819

Ms. Karen S Friedman, Mr. William G Pichel, Dr. Pablo Clemente-Colon and Dr. Xiaofeng Li, *NOAA NESDIS, MD*, Dr. Chris Wackerman, Veridian Systems Div., MI
Dr. Fritz Funk and Mary Schwenzfeier, *Alaska Department of Fish and Game, AK*

Measurement of Deep Currents by ADCP Attached on the Real-time Deep Seafloor Observatory - P2824

Mr. Kyohiko Mitsuzawa, *JAMSTEC Seattle Office, WA*, Mr. Ryoichi Iwase, Dr. Kenji Hirata and Dr. Hitoshi Mikada, *JAMSTEC, Japan*
Ms. Riyo Otsuka, *MARINE WORKS JAPAN LTD. Japan*

Results from APEX Deployment in the Gulf of Alaska

Mr. David McShane, Ms. Catherine E. Woody, William C. Smith, Michael Garcia, *National Data Buoy Center, MS*

Real Time Marine Environment Monitoring Based on the DGPS and Wireless Mobile IT Solution

Prof. Yong Chul Park, Prof. Joong Ki Choi, Mr. Hyo Jin Lee, *Inha University, Korea*

Biological Oceanography

Facilitator: Dr. Nancy Knowlton, *Scripps UCSD, CA*

Status of the Harmful Algal Blooms Observing System (HABSOS)

Dr. Tim Orsi and HABSOS Case Study Working Group, *NOAA National Coastal Data Development Center, MS*

A Large Hyperbaric Trap-Respirometer for the Capture and Maintenance of Live Deep-Sea Organisms - P2830

Dr. Jeffrey C. Drazen, Dr. Jim P. Barry, Mr. Larry E. Bird, *Monterey Bay Aquarium Research Institute, CA*

Physical Oceanography

Facilitator: Dr. Bart Chadwick, *SPAWARSYSCEN San Diego, CA*

Frontogenesis and Subsequent Formation of Cold Filaments and Eddies on an Idealized Shelf - P2831

Mr. Erik Kvaleberg, Dr. Steven L. Morey and Dr. James J. O'Brien, *Center for Ocean-Atmospheric Prediction Studies, FSU, FL*

Light Scattering Phase Functions of Turbid Coastal Waters Measured in LEO-15 Experiment in 2000 - P2835

Dr. Vladimir I. Haltrin, Dr. Alan D. Weidemann, *Naval Research Laboratory, MS*, Dr. Michael E. Lee, Dr. Eugeny B. Shybanov, *Marine Hydrophysical Institute, Ukraine*

Light Scattering Phase Functions of Coastal Waters Measured in 2001 LEO-15 Experiment Near New Jersey Coast

Dr. Vladimir I. Haltrin, Dr. Alan D. Weidemann, *Naval Research Laboratory, MS*, Dr. Michael E. Lee, Dr. Eugeny B. Shybanov, *Marine Hydrophysical Institute, Ukraine*

One-Parameter Seawater Light Scattering Phase Function in the Form of Legendre Polynomial Series - P2842

Dr. Vladimir I. Haltrin, *Naval Research Laboratory, MS*

Signal Processing

Facilitator: Dr. James Candy, *Lawrence Livermore National Laboratory, CA*

An Experimental Interferometric Synthetic Aperture Sonar System with Motion Error Compensation

Dr. Tahseen Ali Rafik, *UWIC, UK*

Synthetic Aperture Sonar for a Large Research Vessel: Preliminary Results from R/V Roger Revelle

Davis R. Thomsen, David Sandwell, *Scripps Institution of Oceanography, CA*, Enson Chang, *Dynamics Technology Inc., VA*

Undersea Vehicles

Facilitator: Drew Michel, *TSC Holdings, Inc. TX*

Precision Positioning of a UUV using GPS and Acoustic Measurements

Mr. Neil Harvey Kussat, *Scripps Institution of Oceanography, CA*

ADC/ROV

UI 2004

Underwater Intervention

New Orleans, LA

February 17-19, 2004

Student Posters

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A New Ocean SAR Imaging Process Simulator - SP2845

Mr. Morgan Lamy, *ENST Bretagne, Brest, France*

Pollution In The Nigerian Coastal Waters

Mr. Eyitayo Ifeolu Onadipe, *Dept. of Marine Sciences, University of Lagos, Lagos Nigeria*

Large Events In Ocean Currents - SP2851

Miss Cristina Carollo, *University of Reading, Reading, UK*

The Systematic Optimisation of the Propulsion Efficiency of In-Service Autonomous Underwater Vehicles - SP2857

Mr. Chris D. Fallows, *Environmental Systems Science Centre, University of Southampton, Southampton, UK*

The Design and Construction of a Model Small Waterplane Area Twin Hull Vessel with Dynamic Control System

Miss Sheila E. Saroglou, *Massachusetts Institute of Technology, Cambridge, MA*

Main Lobe Shaping in Wide-Band Linear Arrays - SP2869

Mr. Simone Curletto, *Dept. of Biophysical and Electronic Engineering, University of Genoa, Genoa Italy*

Multi-parameter Instrument Array and Control System (MPIACS): A Software Interface Implementation of Real-time Data Acquisition and Visualization for Environmental Monitoring - SP2875

Mr. Temitope O. Ojo, *Environmental and Water Resources Division, Texas A & M University, College Station, TX*

Simulation and Control of an Autonomous Surface Vehicle

Tannen Van Zweiten, *Department of Ocean Engineering, Florida Atlantic University, Dania Beach, FL*

ROV Project at Cape Fear Community College

Mrs. Nancy Thomas, *Cape Fear Community College, Wilmington, NC*

Design of an Inexpensive Waterproof Housing - SP2880

Jeff Harrington, *Engineering Department, Lake Superior State University, Sault St Marie, MI*

Dynamic Buoyancy Control of an ROV Using a Variable Ballast Tank - SP2888

Kathryn Wasserman, *Massachusetts Institute of Technology, Cambridge, MA*

Tension Leg Platform Design Optimization for Vortex Induced Vibration - SP2894

Meghan Hendry-Brogan, *Massachusetts Institute of Technology, Cambridge, MA*

Time-Frequency Representations For Wideband Acoustic Signals In Shallow Water - SP2903

Mr. Chuen-Song Chen, *University of Rhode Island, Kingston, RI*

Non-Linear Dynamic Analysis With Deterministic And Random Seas: The Case Of Minimum Platforms - SP2908

Ms. Micaela Pilotto, *Massachusetts Institute of Technology, Cambridge, MA*

Comparison of Benthic Cover Trend Between Satellite and In-Situ Datasets (1996-2002) for Reef Ecosystems of the Florida Keys National Marine Sanctuary

David Palandro, *College of Marine Science, University of South Florida, St Petersburg, FL*

Tidal Modulation of Nocturnal Vertical Migration from the Benthos: A High-Resolution Acoustic Analysis - SP2916

Ms. Leslie E. Taylor, *University of South Carolina, Columbia, SC*

¹³⁷Cs Distribution and Geochemistry in Savannah (Georgia) Riverine, Estuarine and Marsh Environments - SP2921

Miss Ursula Wilborn, *College of Marine Science, University of South Florida*

Drag Reduction of an Elastic Fish Model - SP2938

Mr. Karl-Magnus Weidmann McLetchie, *Massachusetts Institute of Technology, Cambridge, MA*

Investigating the Doppler Effect on Measured Travel Times using Acoustic Data

Ms. Kathleen A. Phillips, *University of California San Diego, San Diego, CA*, Dr. Aaron D. Sweeney, *Tohoku University, Japan*

Molecular Recognition of Cyanotoxin and Toxic Cyanobacteria Specific Peptides Using T7 Phage Display

Mr. Ricardo D. Burgos, *University of Puerto Rico Mayaguez Campus, Mayaguez, PR*

Preliminary Determination of Microbial Diversity in Several Soils in Puerto Rico by Using Molecular Analysis and Metagenomic Libraries Generation

Mr. Ramon E. Martinez, *University of Puerto Rico Mayaguez Campus, Mayaguez, PR*

The Role of Eddies in a Laboratory Study of the Antarctic Circumpolar Current - SP2927

Mr. David Sutherland, *Massachusetts Institute of Technology, Cambridge, MA*

The Collapse of Jamaican Coral Reefs: A Case Study in the Lessons of History

Marah J.H. Newman, *University of California San Diego, San Diego, CA*

Calls of North Pacific Right Whales Recorded in the Southeast Bering Sea

Ms. Lisa M. Munger, *University of California San Diego, San Diego, CA*

Rip Current — Beach Cusp Coupled System: Waves, Currents, Sediments and Tides Self-Organize to form a Geometrical Coastal Geomorphology - SP2945

Francis J. Smith, *The University of California, Berkeley, Berkeley, CA*

Decimeter-level Positioning of a UUV Using GPS and Acoustic Measurements

Mr. Neil Harvey Kussat, *Marine Physical Laboratory, University of California San Diego, San Diego, CA*

Numerical Modeling of Tidal and Wind-Driven Circulation in the Meso-American Barrier Reef Lagoon, Western Caribbean - SP2930

D.V. Thattai, *Department of Geological Sciences, University of South Carolina, SC*

Tutorial T1-A (Half Day 8:30 - 12:00) Room: Pacific 3 **Synthetic Aperture Sonar** **Marc Pinto, NATO SACLANT**

Synthetic aperture sonar (SAS) is a revolutionary new technology for bottom imaging. It has quickly matured over the past several years. High resolution (order one to several inches) imageries are now routinely achievable at several hundred meters. However, due to the large integration aperture involved and the potential impact of sound speed variations (e.g., induced by turbulence and internal waves, rough surface and bottom scattering), “motion compensation” alone becomes insufficient when the imaging range is larger than couple of hundred meters. Long-range SAS results to date suggest that it is essential to employ the so-called “autofocus” techniques, derived from the radar community, to mitigate the effects of medium fluctuations as well as residual, uncompensated platform motion error.

In this half of the tutorial we will review long-range SAS imaging results, including images taken from several hundred meters up to several tens of kilometers in range. A number of “enabling technologies,” including the Fourier domain-based fast image formation algorithms, and autofocus techniques such as the map-drift algorithm, the phase gradient algorithm (PGA), and more advanced variants of PGA such as the 2D stripmap phase curvature algorithm, will be presented.

Although long-range SAS processing has been perceived as computationally-intensive, it is now feasible with COTS technology. We will demonstrate such a system and discuss the basic hardware design principles, the real-time SAS system architecture, the processing requirements, and the memory requirements for various applications.

Marc Pinto was born in Wellington, India in 1960. He graduated from Ecole Nationale des Ponts et Chaussées, Paris (France) in 1983. In 1991, he received the PhD degree in Solid State Physics from the University of Orsay. From 1985 to 1989 and 1989 to 1993 he worked as a research engineer for Thomson-CSF, specializing in the application of numerical techniques to magnetic recording. In 1993 he joined Thomson Sintra ASM (now Thales Underwater Systems) as Head of the Signal Processing Group, specializing in research into advanced MCM and ASW sonar. In 1997 he joined the NATO SACLANT Undersea Research Centre, La Spezia, Italy and was appointed Head of the Mine Counter-measures Group. He is presently leading the Program “Minehunting with AUVs”.

Tutorial T1-B (Half Day 1:00 - 4:30) Room: Pacific 3 **Synthetic Aperture Sonar 2; Applications** **Dr. Chang, Dynamic Technology, Inc.**

Synthetic aperture processing is a critical technology for radar which is now close to being mature for sonar for applications, such as mine detection and seafloor mapping. The tutorial will first review Synthetic Aperture Sonar (SAS) design criteria. The Synthetic Aperture Radar (SAR) design, which uses the same transducer for transmission and reception, will be briefly discussed, chiefly to show its limitations in high resolution sonar applications. This SAR design leads to a compromise between along-track resolution and area coverage, which

is most often unacceptable in sonar. The SAS design, which uses a transmitter and a multi-element receive array, will then be introduced. The relations between the along-track resolution, area coverage and the characteristics of the transmitter and receiver array will be reviewed. The criterion for the spatial sampling of a SAS will be established. An advanced SAS design, known as multi-aspect SAS, will be introduced and its relation to the well-known SAR modes of operation, such as squint SAR and spotlight SAR will be discussed as well as the combination of SAS with depth finding using interferometric sonar. The most difficult limiting factor to synthetic aperture imaging quality is the defocusing due to unknown motions of the sonar platform. Micronavigation is introduced as the problem of estimating, with the required sub-wavelength precision, the platform motion during the SAS integration time. Many of the SAS results obtained have made use of data-driven micronavigation techniques based on the Displaced Phase Center Antenna (DPCA) principle. An intuitive understanding of the DPCA will be developed. Then theoretical results on DPCA micronavigation accuracy, including the impact of calibration errors, will be presented. The possible use of inertial instrumentation and optimum filtering for further improvements in micronavigation accuracy will be discussed. The tutorial will be illustrated by simulations as well as numerous results for several at-sea experiments, done in the framework of a collaborative multi-national Joint Research Program coordinated by the NATO SACLANT Undersea Research Centre. These include experiments done on underwater rails as well as an ocean-going SAS demonstrator which features a 100 kHz multi-aspect SAS mounted on a passive towbody.

Dr. Chang is a senior research scientist at Dynamics Technology, Inc. (DTI), where he spent the past 14 years doing research in SAS as well as a wide range of non-acoustic anti-submarine warfare (ASW) technologies. He has a B.S. degree in physics and math from Harvey Mudd College and a Ph.D. in condensed matter physics from the University of California, Santa Barbara. Currently he is serving as the Principal Investigator on a number of navy-funded research projects to develop SAS for buried mine hunting and ASW. He was also one of the principal contributors to the DARPA effort responsible for the recent advancements in SAS.

Tutorial T2-A (Half Day 8:30 - 12:00) Room: Pacific 4 **Efficient Use of ADCPs from Moving Vessels** **Mr. Darryl Symonds, Mr. Jim Rogers, RD Instruments**

This will be a half-day class on mastering ADCPs used on moving vessels. It is intended for people who wish to learn more about efficient and effective use of the ADCP and interpreting its data. The anticipated audience will have some experience with operating ADCPs and working with their data.

Advice about installations and detailed how-to's for working with peripheral devices (e.g., GPS, heading gyro, tilt gyros, etc.) will be presented. Efficient use of the RDI software will be demonstrated for data collection, rapid analysis and exploration of data sets. We will look at interpreting data quality indicators and review specific data sets that reveal signal, noise, interference, transducer alignment issues, range limiting factors, and other common factors that effect data quality. Other topics will include making optimal use of recent additions to

Tutorials

ADCP capability as well as pointers for setting up the ADCP. Checklists for installations and operation will be provided.

Mr. Darryl Symonds, Background not available

Mr. Jim Rogers: Customer Service Manager - RD Instruments. 24 years related industry experience. 14 year employee at RD Instruments having performed the functions of Systems Technician, Field Service Engineer, Field Service Supervisor, and Customer Service Manager. 10 years US Navy - Sonar, specializing in active/passive sonar maintenance, underwater sound propagation, and passive acoustic analysis

Tutorial T2-B (Half Day 1:00 - 4:30) Room: Pacific 4 **Mastering Moored ADCPs: Current and Waves** **Mr. Paul Devine, Dr. Peter Spain, RD Instruments**

This will be a half-day class focused on effective use of moored ADCPs for profiling currents and analyzing multi-directional wave fields. Half the time will be devoted to the ADCP Wave Array. The anticipated audience will have some experience with operating ADCPs and working with their data.

Hardware items will include installation advice and how-to's for working with peripheral devices (e.g., Seabird Microcat CTD, and acoustic, inductive and radio modems). Procedures for rapid analysis and exploration of ADCP data using RDI software will be demonstrated with data sets. Pointers will be provided for interpreting the ADCP data quality indicators (error velocity, correlation, and echo intensity). Firmware discussion will include recent additions to ADCP capability and cover output data formats available for real-time systems.

For the ADCP Waves Array, attendees will learn how to properly configure the ADCP for deployment and use RD Instruments' Waves software for data processing and display. The emphasis will be to prepare ADCP users to collect high quality wave and velocity profile data under a variety of deployment and wave conditions. Discussions will range from wave sampling basics to anticipating the influence of environmental parameters on data quality. Processing options will be outlined with special attention paid to evaluating data quality assurance. Checklists for effective use of moored ADCPs will be provided.

Prior to joining RD Instruments in 1990, Peter Spain completed a Ph.D. in Ocean Physics at the Applied Physics Laboratory, University of Washington, after which he was at Scripps Institution of Oceanography. His research was focused on new instruments used for measuring water transport. During his 13 years in Technical Marketing at RD Instruments in San Diego, California, Peter's role progressed from staff to management in Technical Marketing and Sales and then, for a couple of years, to business unit management (Coastal and Inland Waters). For the past year, Peter has re-entered Scientific And Technical Marketing activities in the ocean.

Tutorial T3 (Full Day 8:30 - 4:30) Room: Pacific 5 **Fiber Optic Design Principles** **Mr. Mike Brininstool, FIBER TECH**

This efficient, two-session tutorial provides the participant with practical techniques necessary to characterize, specify and design fiber optic systems. It is perfectly suited for students wanting an introductory exposure to fiber optics as well as anyone requiring detailed systems design knowledge. The course covers both theoretical and practical aspects of fiber optic technology, with emphasis on applications. It is custom tailored for the fiber optics needs of those in the marine industry. The participants learn how to quickly assess the feasibility of applying fiber optics to their special requirements. Extensive course notes leads the attendee through the entire design process. In the morning session, the fundamental building blocks of fiber optic systems: transmitters, fibers, cables, connectors, couplers, multiplexers and receivers are thoroughly covered. In the afternoon session, learning design at the system level, the student integrates component parameter details into a comprehensive analysis. The tutorial investigates link optimization by considering both power-limited and bandwidth limited regimes. Graphical analyses using design curves are particularly highlighted. Network design topologies and component selection are considered based on their relative advantages and features. Applications to ultra-long/high speed links, video, duplex telemetry, LAN's and fiberoptic sensors are provided. Design procedures are methodically presented and are then coupled with illustrative examples. Attendees are divided into small design groups and work together, first hand, through data link examples using data sheets. The end product of this tutorial is a detailed comprehension of fiber optic systems design.

Mike Brininstool, BSEE, manages FIBER TECH, a consulting firm specializing in fiber optic technology. For the past twenty years he has been exclusively involved in fiber optic research, systems design and instruction. His teaching credits range from one to four-day tutorials to full, 12-week engineering courses at UCSD, the Naval Postgraduate School, Monterey, CA, and the California Department of Transportation. He has published extensively on fiber optic telemetry, measurements and sensors, and holds six U.S. Patents.

Tutorial T4 (Full Day 8:30 - 4:30) Room: Pacific 6 **Side Scan Sonar Workshop** **Mr. Garry Kozak, Klein Associates**

This workshop presents the key concepts needed to understand the state of the art and practical use of side scan sonars. It will cover such topics as the theory, system parameters, and design concerns to resolve such issues as predicting the system performance and accuracy of equipment.

The seminar is geared to the operator, as well as to the manager, who wants a better understanding of Side Scan Sonar techniques.

INTRODUCTION

Course Welcome

Historical Development

Basic Sonar Principles

Applications of Side Scan Sonar

Sub-Bottom Profiler Principles

Applications of Sub-Bottom

Profiling



**The National Oceanic and Atmospheric
Administration commends
Scripps Institution of Oceanography
on the occasion of its Centennial.**

SONAR DESIGN DETAILS

Introduction
Source Level
Pulse Length

Beamwidth Frequency
Multi-beam Principles

UNDERWATER ACOUSTICS

Introduction
Sound Velocity
Spreading
Absorption
Refraction
Mechanisms for Sound to
Return to the Sonar: Reflection

Backscatter (Reverberation)
Time-Variation Gain
Noise (Ambient, Self Made)
Sound in Sediments
Sonar Equation

RECORD INTERPRETATION

Surface Effects
Targets and Shadows
Sonar Design or Function
Towing Conditions

Electrical Noise Distortions
Quantitative Treatment
Sub-Bottom Profiler
Interpretation

FIELD OPERATION

System Installation
Towfish Rigging
Operational Variables

Towfish Positioning
Targets
Safety Concerns

SPECIALTY AREAS

Military Applications
Oil-Field Applications
Geological Applications

General Search and Survey
A.U.V.'s

For the past 25 years, Garry has been employed by Klein Associates of Salem, NH, the technology leader in Side Scan Sonar systems. He is a recognized expert in undersea search operations and travels the world providing consulting and training expertise to Navies and companies who have a critical underwater search need. His responsibilities at Klein include marketing Klein products and providing practical user input to Klein's engineering team on design considerations for the Klein sonar product line.

Tutorial T5 (Full Day 8:30 - 4:30) Room: Pacific 7 **Applications of GPS in Marine Navigation and** **Hydrographic Surveying** **Dr. Ahmed El-Rabbany, Ryerson University**

The Global Positioning System (GPS) is a satellite-based positioning and navigation system, which was developed by the U.S. Department of Defense in early 1970s. GPS provides continuous positioning and timing information, anywhere in the world under any weather condition. GPS has revolutionized the surveying and navigation fields since its early stages of development. Although GPS was originally designed as a military system, its civil applications have grown much faster. To meet the future requirements, the GPS decision makers have studied several options to adequately modify the signal structure and system architecture of the future GPS constellation. The modernization program aims, among other things,

at providing signal redundancy, improving the positioning accuracy, improving the signal availability and the system integrity.

Positioning with GPS can be performed by either of two ways: point positioning or differential positioning. GPS point positioning employs one GPS receiver and is used mainly when a relatively low accuracy is required; for example the ocean navigation phase of marine navigation. GPS differential positioning, on the other hand, employs two GPS receivers simultaneously tracking the same satellites. Carrier-phase or/and code measurements can be used in this mode, depending on the accuracy requirements. The former provides the highest possible (centimeter-level) accuracy, as long as the initial ambiguity parameters are resolved correctly. It is used in applications such as seafloor mapping, tide determination, and dredging. Code-based differential positioning is used when meter-level positioning accuracy is sufficient; for example harbor entrance and approach, and coastal navigation.

There exist some situations in which both accurate positioning and 3-axis attitude (roll, pitch and heading) are required. An example of these is the multibeam echo-sounding surveys (MBES). Because of their wide-swath, multibeam echo sounders require accurate positioning and attitude of the vessel. This is especially important for the outer beams. Multi-antenna GPS systems were developed in the early 90s for the purpose of marine attitude determination. These systems have the advantage that they sense the attitude in a purely kinematical mode, which means that they are immune to external forces. This is particularly important when the survey vessel makes a sharp turn. They suffered, however, from some accuracy limitations; with the noise due to the short distances between the GPS antennas being the most challenging. More recently, a GPS-aided inertial navigation system was developed, which aimed at improving the positioning, attitude and heave solutions by taking advantage of the complementary nature of the GPS and the INS systems. This integration improved the accuracy and reliability of positioning, roll and pitch solutions significantly. However, the accuracy of the heading and heave solutions were relatively low. To overcome the heading limitation, some manufactures have recently developed integrated GPS/INS systems that utilize two GPS receivers and antennas. The two GPS receivers are used to determine the initial GPS-based heading of the survey vessel, which is then blended with the inertial data to produce smoothed final heading information. The heave error is still a limiting factor that degrades the accuracy of the MBES surveys.

This full-day seminar addresses the various aspects of the GPS system, including the GPS modernization, in a simple and systematic manner. The various marine GPS applications are discussed. Emphasis is given to the system requirements for multibeam echo-sounding surveys.

1. Introduction Overview of GPS. GPS Segments. GPS Satellite Generations. Current GPS Constellation. Control Sites. GPS: the Basic Idea. GPS Positioning Service. Why Using GPS?
2. GPS Details GPS Signal Structure. GPS Modernization. GPS Receiver Types. Time Systems. Pseudorange Measurements. Carrier Phase Measurements. Cycle Slips. Linear Combinations of GPS Observables.
3. GPS Errors and Biases – GPS Ephemeris Errors. Satellite and Receiver Clock Errors. Multipath Error. Ionospheric Delay. Tropospheric Delay. Satellite Geometry Measures.

4. Datums, Coordinate Systems and Map Projections – What is a Datum. Geodetic Coordinate System. Conventional Terrestrial Reference System. The WGS 84 and NAD 83 Systems. What Coordinates are obtained with GPS? Datum Transformations.

5. GPS Positioning Modes GPS Point Positioning. GPS Relative Positioning. Static GPS Surveying. Fast (Rapid) Static GPS Surveying. Stop & Go GPS Surveying. Real-Time Kinematic (RTK) GPS. Real-Time Differential GPS (DGPS). Real-Time vs. Postprocessing. Communication (Radio) Link.

7. GPS DATA and Correction Services – Data Service. DGPS/Radiobeacon Systems. Wide Area DGPS Systems. Multi-Site Real-Time Kinematic (RTK) System.

8. GPS Standard Formats RINEX Format. RTCM SC-104 Standards for DGPS Services. NMEA 0183 Format.

9. Marine GPS Applications and System Requirements – Tide. Under-Keel Clearance. Seafloor mapping with single/multi-beam echo sounders. Waypoint Navigation. GPS/INS Integration.

Dr. Ahmed El-Rabbany obtained his Ph.D. degree in GPS from the Department of Geodesy and Geomatics Engineering, University of New Brunswick, Canada. He is currently working as an assistant professor (tenured) at Ryerson University in Toronto, Canada. He also holds an Honorary Research Associate position at the Department of Geodesy and Geomatics Engineering, University of New Brunswick, and an Adjunct Professor position at York University. His areas of expertise include: Satellite positioning and navigation, Integrated navigation systems, Geodesy and Hydrographic surveying. Dr. El-Rabbany has recently published an easy-to-read GPS book, which received a 5-star rating on the Amazon website. He also published numerous refereed journal and conference papers.

Tutorial T6 (Full Day 8:30 - 4:30) Room: Royal 1 **Introduction To Marine Corrosion Engineering** **Mr. James F. Jenkins, CORMAT, Inc.**

Corrosion is a frequent cause of failure of marine systems and contributes heavily to maintenance and repair requirements for marine systems. Marine engineers and scientists frequently do not receive instruction in corrosion engineering as part of their educational curriculum. This tutorial is intended as an introduction to corrosion control for marine systems.

This tutorial will present the fundamentals of corrosion applied to the design, construction, operation and maintenance of structures and equipment that will be used in marine environments. The attendees will be given a better understanding of the fundamentals of corrosion that will improve their ability to understand the corrosion literature, to communicate with experts in marine corrosion, to better integrate corrosion control into system design, to improve their ability to make field changes when required and decrease the likelihood of unnecessary corrosion failures.

Emphasis will be placed on the mechanisms of corrosion in marine environments, the forms of corrosion commonly encountered in marine systems, the characteristics of marine environments that influence corrosion, the methods that can be used to control corrosion in marine

systems, and the integration of corrosion control into system design. The materials provided with the tutorial will consist of an outline text that can be used by the attendees to make systematic notes during the lecture and copies of the visual aids that will be used in the presentation.

Focus and Intended Audience

The focus of the tutorial is on establishing a firm foundation for an increased understanding of marine corrosion. The intended audience is marine systems engineers and scientists and should be equally useful to attendees with significant experience in marine systems as well as those just entering the field.

Introduction

The importance of corrosion
Why engineers and scientists
need to know about corrosion

The Marine Environment
Chemical characteristics

Forms of Corrosion Attack

No corrosion
Uniform attack
Galvanic corrosion
Pitting
Crevice corrosion
Dealloying
Intergranular corrosion

Methods for Corrosion Control

Materials selection
Corrosion testing
Corrosion tolerance
Designing For Corrosion Control
Systematic approaches

James Jenkins has 30 years of experience with the US Navy in corrosion and corrosion control including corrosion of structures in deep and shallow marine environments.

Tutorial T7 (Full Day 8:30 - 4:30) Room: Royal 2 **Qualitative and Quantitative Visualization Techniques** **for Laboratory and Field Applications** **Dr. Peter H.-T. Liu, Omax Corporation**

The course materials represent a collection of the instructor's career work throughout his 30 years of research and development in qualitative and quantitative visualization. The main objective is to demonstrate the flexibility and versatility of various visualization techniques for a broad range of applications from studying flow phenomena, understanding naval hydrodynamics, classifying ocean species, to navigating ROVs for underwater applications. Optimum utilization of visualization techniques for a laboratory and field deployments will be discussed through the presentation of a series of case studies. Emphasis will be made to derive maximum quantitative information from the visualization results. A step-by-step presentation of visualization techniques applied to laboratory modeling and field observations will serve to demonstrate their utility for oceanographic research and engineering applications. The presentation will begin with an introduction and review of qualitative visualization techniques, using different tracers and illumination sources operating in different modes.

Quantitative visualization techniques evolved from their qualitative counterparts will then be presented to demonstrate their "whole field" capability as opposed to conventional "point

measurement” techniques. The advances from 2-D, 3-D, to stereoscopic imaging methods together with field deployable camera calibration algorithms will be discussed. The trend of utilizing video- and PC-based systems for real-time capture, display and archive of stereoscopic images and concurrent on-line/on-demand 3-D measurement will be explored. The instructor will present in detail a stereoscopic imaging and measurement system (SIMS), developed under a DoC/NOAA 2-Phase Small Business Innovative Research (SBIR) project and published in the proceedings of the Oceans 2001 Conference, as an example to demonstrate the power of quantitative visualization. A prototype SIMS has been delivered to the University of Connecticut for deployment in future oceanographic expeditions.

The instructor will also discuss his most recent work on a stereoscopic imaging method, taking advantage of the versatility of fluorescent dyes. A CD containing the course materials in the Microsoft PowerPoint format will be made available to registered participants.

- Introduction • Background • Basics of photogrammetry
- Fundamentals of close range photogrammetry • Camera calibration
- Facilities (Laboratory and Field) • Case studies of Dyes – versatile tracers for qualitative and quantitative Flow Visualization • Wind and breaking waves • Effects of oil slick on wind and breaking waves • Shallow water analogy – hypersonic simulator
- Laboratory simulation of plume dispersion (effects of stability and complex terrain) • Vortex dynamics and kinematics
- Wakes in stratified flows (Naval Hydrodynamics)
- Aircraft wakes • Unsteady vortex phenomena
- Modeling of mixing of large ocean current systems
- Dynamic stall of wings • Laser dye fluorescent method for studying mixing in turbulent jets of Particle Tracking and Kinetics
- Particle trajectories in turbulent boundary layers (2D)
- Particle trajectories in turbulent boundary layers (3D)
- Measurements of water droplets and abrasive speed in ultrahigh-pressure (UHP) abrasive waterjets (AWJs)
- Full-scale modeling of drilling-bit hydraulics • Method of Thin Dye Layers • Internal waves • Turbulent spots • Fluorescent imaging methods for 3D velocity measurements in 2-phase flows
- River and coastal morphology • Flowslides and debris flows of Misc methods • Thermal Analysis Microscope (TAM) • IR flaw detection of Flow Visualization in the Field • Full-scale wind turbine wakes • Smoke tracers for visualization of wing-tip vortices • Rocket smoke trails for measuring velocity deficit turbine wake • Stereoscopic imaging and measurement system (SIMS) for • ocean/marine deployment\
- Performance improvement • Conclusions • References and acknowledgment

Dr. Liu received his Ph. D. degree from Colorado State University in 1972. After completing a postdoctoral fellowship at the National Center for Atmospheric Research. He joined QUEST Integrated, Inc. and affiliations in 1973 and has established a consulting service since October 2001. His expertise spans both basic and applied research, as well as development in experimental fluid mechanics and related fields, particularly quantitative visualization for laboratory and field applications. Dr. Liu has conducted laboratory experiments to investigate flow phenomena including pollutant transport, wind waves, breaking waves, wakes, internal waves, vortex dynamics, drag reduction, and ultrahigh-pressure fluidjets, abrasive-fluidjets, and 2-phase liquid-granular flows in rivers and on ocean floors. He has also developed instruments using laser-based, fiber-optic, visible, and IR sensors.

Tutorial T8 (Half Day 8:30 - 12:00) Room: Royal 3 AUV Technology and Application Basics Mr. William Kirkwood, Mr. Mark Sibenac, Mr. Hans Thomas, Dr. James Bellingham, MBARI

AUV Application Basics is a short course that provides an overview of AUV technology and operations. The objective is to provide an overview of what available AUV systems provide and best practices for their use. The class is targeted at scientists interested in using AUVs for oceanographic applications. The attendee will gain basic understanding of AUV types, technologies, and navigation techniques, including discussion of the comparative strengths of AUVs and alternative methods of data collection.

The attendee will also be provided an understanding of tradeoffs in AUV operations, including power estimation, endurance considerations, and mission structure to acquire the desired data sets. Key points are illustrated by applications and results from the Monterey Bay Aquarium Research Institute's (MBARI) Dorado AUV and other AUV operations. Topics include: Basic AUV technology, AUV at-sea Operation, Payload Considerations, Mission Planning, Upper and Mid-Water AUV missions, Benthic and Mapping AUV missions, Data Collection and Reduction, AUV Integration into Sampling Networks, and a look at coming AUV advances. This class is intended for scientists interested in applying AUVs to particular problems, persons interested in AUV applications and the impact of AUV technology, and graduates in oceanographic fields seeking a broader understanding about the application of AUV platforms.

William Kirkwood is Associate Director of Engineering at the Monterey Bay Aquarium Research Institute. Mr. Kirkwood is Program Manager of the Dorado AUV Program at MBARI. Mr. Kirkwood is also Program Manager for the ALTEX (Atlantic Layer Tracking EXperiment) mission with operations in the Arctic, operating as far north as 82 degree latitude. Previously Mr. Kirkwood was the Program Manager and Mechanical Designer of MBARI's purpose built remotely operated vehicle Tiburon.

Mark Sibenac is the Systems Engineer for the Multibeam AUV under development at MBARI. Mr. Sibenac is also the lead Electrical Engineer for the Dorado vehicle systems. He was involved with robotic platforms prior to joining MBARI as part of Carnegie Mellon University's Robotics Institute.

Hans Thomas is an engineer for the Dorado Program. His work focuses on AUV navigation, software, and systems integration. Prior to coming to MBARI, Mr. Thomas worked for over 10 years at NASA and Carnegie Mellon University on several robotic systems. His primary interests are in navigation, mechanisms, and locomotion.

Dr. Bellingham is the Director of Engineering at the Monterey Bay Aquarium Research Institute. His personal research interests revolve around the development and use of Autonomous Underwater Vehicles (AUVs). In the process of developing these vehicles, he spent considerable time at sea, leading over 20 AUV expeditions to remote locations. Jim received his Ph.D. in physics from the Massachusetts Institute of Technology in Cambridge, MA, in 1988 and is a founder of Bluefin Robotics Corporation, a manufacturer of AUVs located in Cambridge, Massachusetts.

Tutorials

Tutorial T9 (Half Day 8:30 - 12:00) Room: Royal 4 **Introduction To Seafloor Geotechnical** **Engineering Properties** **Mr. Herb Herrmann, NFESC**

This tutorial is an introduction to seafloor geotechnical engineering properties, and is designed primarily for non-geotechnical engineers. It will be particularly useful to other types of engineers, as well as to geologists, geophysicists and oceanographers who need a stronger background and understanding of seafloor soil properties relating to geotechnical applications. This tutorial will provide a basic background in seafloor soil engineering characteristics and properties, their relative importance in different applications, means of soil property measurement and the many problems therewith, and typical conditions, profiles and ranges of properties. Approaches to site survey and methods of site and property characterization are covered in some detail, as are sampling, and laboratory and in-situ engineering property measurements. While engineering properties are emphasized, index and classification properties and their various correlations with engineering properties are reviewed. Variations of engineering behavior under static, long-term, dynamic and cyclic loading conditions are covered. Emphasis will be placed on providing a strong background and understanding of the nature of seafloor soils from an engineering behavior perspective, engineering properties of concern, and on their typical values and means of determination. Practical methods of site surveying and evaluation will be covered.

Mr. Herrmann has been actively engaged in the field of Seafloor Engineering for several decades. He holds undergraduate and graduate degrees in geotechnical engineering from M.I.T. and has done significant additional post graduate study in the fields of Ocean, Seafloor and Geotechnical engineering at the University of California, Berkeley and the University of Maryland. He has also been a part-time faculty member, teaching in this field at the University of Southern California. He has authored or co-authored several dozen professional and technical papers in this field, and contributed to several books. He has spent the bulk of his professional career with the Navy's Ocean Facilities Program, involved in research, development and engineering directed at seafloor property measurement techniques, site surveying and site characterization, seafloor interaction modeling and prediction, design of smaller foundations, development of diver tools, and cable and pipeline installation and protection. He has been an active member of the Marine Technology Society's Seafloor Engineering Committee for many years, and is the Committee's current Chair. He is also a member of ASCE, ASTM, the Naval Institute and Sigma Xi, and is a registered Professional Engineer in the state of California.

Tutorial T10 (Half Day 8:30 - 12:00) Room: Royal 5 **Intellectual Property Rights** **Dr. Wendy K. Buskop, Buskop Law Group**

Intellectual Property (IP) exists in various forms, i.e. patents, trademarks copyrights and trade secrets, for various new materials, new methods and new software usable in any industry.

Building an IP portfolio is more simple in 2003 and less expensive than in years past due to one particular decision from the US Supreme Court (affectionally known as the Festo case) and a major legislative decision to provide for inexpensive "provisional patent applications," which are useful in protecting ideas, methods, compositions, software, processes, and apparatus that are not yet completely tested or finished.

Intellectual property in 2003 is economically important as (1) an asset, (2) a marketing tool and (3) as a tool to protect market share. Intellectual property can be traded, licensed and assigned like real property, to create income from "outside" traditional avenues used in a business.

We will discuss how to identify what is protectable and how to build a cost effective IP portfolio.

Intellectual Property (IP) exists in various forms, i.e. patents, trademarks copyrights and trade secrets, for various new materials, new methods and new software usable in any industry.

- * Intellectual Property— What Can Be Patented?
- * Types Of Patent Filings— Utility and Provisional Filings
- * Other Intellectual Property
- * Copyrights
- * Trade Secrets
- * Trademarks
- * Building an IP Strategy

Wendy Buskop drafted her first patent application in 1980. Intellectual property experience since 1982, with many years in-house experience with Fortune 500 companies. Served as Vice President of International Licensing of a Fortune 100 Company. Authored various articles in the fields of copyright law and trademark law. Served as an Adjunct Professor, Texas Southern University in patent law. Currently teaches monthly CLE on intellectual property basics. Wendy is the Managing Patent Attorney for Buskop Law Group located in Houston, Texas. This patent boutique of two patent attorneys and a patent agent specializes in patent, trademark, copyright and related matters. Practice provides extensive licensing services for manufacturing clients. Patent technology includes NASA-contracted software inventions, subsea technology including remotely operated vehicles, and jack up rig technology, as well as trademark counterfeiting of jewelry and watch designs.

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February 17-19, 2004**



**NATIONAL AERONAUTICS
AND SPACE ADMINISTRATION**

**The National Aeronautics and Space Administration
congratulates Scripps Institution of Oceanography's
many contributions to earth science.**

Tutorials

Tutorial T11 (Half Day 8:30 - 12:00) Room: Royal 6 **Introduction to Wireless Sensor Networks** **Mr. Ken Arnold, *Wireless Innovation Inc.***

Wireless sensor nets have the potential to make an enormous impact by enhancing productivity, performance, efficiency, and enabling new processes that have been impractical until recently. The number of potential sensor points is staggering: according to marketing firm Harbor Research, the potential North American market is in the billions of sensor points in just a few of the identifiable market segments. Combined with embedded processors, large networks of sensors will become ubiquitous in the near future. And the best applications probably haven't even been conceived yet.

This tutorial surveys existing sensor networks, current research, applications areas, emerging standards, and future trends. Wireless sensor networks have characteristics that are unique in comparison to wireless computer and phone systems, dictating different approaches. The large and expanding number of transducer types imply a number of different solutions, often resulting in the need for intelligent sensors. A number of communication approaches will be discussed, each with its own advantages and disadvantages. Relevant standards, including IEEE-1451, IEEE-802.15.4, and Zigbee will also be introduced. Finally, the emergent trends will be discussed, including the potential opportunities and risks.

Ken Arnold is founder and CTO of Wireless Innovation Inc., a provider of wireless sensor networks. He is also the Program Coordinator and instructor at UCSD Extension in the Engineering department. Ken has an extensive background in the design, application, hardware, software and system engineering aspects of embedded computing and wireless communication systems. With over 25 years of experience, he holds several patents, is the author of several papers, articles and two books. Intellectual Property (IP) exists in various forms, i.e. patents, trademarks copyrights and trade secrets, for various new materials, new methods and new software usable in any industry.

Tutorial T12 (Half Day 1:00 - 4:30) Room: Royal 3 **Battery Systems: Primary and Secondary Cells** **Mr. Ken Arnold, *Wireless Innovation, Inc.***

The widespread use of primary (non-rechargeable) and secondary (rechargeable) batteries has resulted in a proliferation of battery designs, and the demand for higher performance energy storage. Recent advances in battery chemistry have increased the options available to the designer of energy storage systems. This diverse selection of battery technologies, coupled with improvements in manufacturing technology, power management, charging and control techniques, has increased the options available to the designer of energy storage systems. This seminar is intended to give the student a basic understanding of battery system design and application. The seminar covers two aspects of system design: battery chemistry and application design. The topics covered in the battery chemistry section include: chemical-energy storage theory, primary and secondary cell types, commercially available products, failure mechanisms, and safety considerations. Application design topics include system design requirements, maintenance, advanced charging techniques,

performance optimization, support circuit design, fault condition handling, supervisory controls, and future trends in battery powered systems. Practical design examples are used to illustrate the concepts covered in the seminar.

Ken Arnold is President of HiTech Equipment Corporation, where he supervises the design and development of battery powered systems such as wireless data systems, security systems, pagers, and communications devices employing primary and secondary energy storage systems. Ken is an instructor of Electrical and Computer Engineering courses at the University of California at San Diego, Extended Studies, where he has instructed a number of different courses since 1982 and is also the Program Coordinator for the Embedded Computer Engineering courses and certificate program at UCSD. Ken is author of the book "Embedded Controller Hardware Design" and he is also listed in "Who's Who in California."

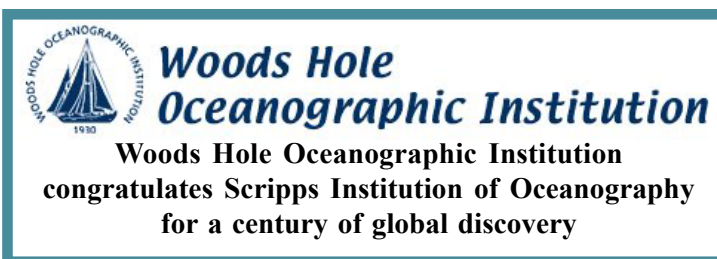
Tutorial T13 (Half Day 1:00 - 4:30) Room: Royal 4 **Underwater Optical Imaging: Theory and Practice** **Dr. Jules Jaffe, *Scripps Institution of Oceanography***

Underwater Optical Imaging is an important area of ocean engineering which considers the physics and engineering aspects of the design and deployment of underwater optical imaging systems. Subject matter which will be included in the tutorial will be:

- (1) an examination of the basic physics of the propagation of light in the ocean,
- (2) the computer modeling of underwater light propagation,
- (3) practical considerations in configuring an underwater imaging system including sensors and lights,
- (4) an up to date survey of both commercial and research systems, framed in the context of the basic knowledge as listed above.

Material provided to the attendees will consist of both literature survey as well as transparencies used by the instructors. An additional demonstration by local companies who specialize in the manufacture of underwater optical imaging systems is also planned.

Jules S. Jaffe has been working in underwater optical imaging since 1984 when he participated in designing the ARGO system that found the Titanic. Since that time he has been working on designing, deploying and analyzing the data from a "next generation" of underwater optical imaging systems. Most recently, his group fabricated a laser line scan system for 3-dimensional imaging of the sea floor. Other projects recently underway concern the use of sensitive underwater cameras for sensing stress induced changes in coral fluorescence.



Tutorial T14 (Half Day 1:00 - 4:30) Room: Royal 5 Target Classification Architectures; The Class-Specific Method Dr. Baggenstoss, NUWC

When sorting out the wide variety of acoustic signals in the ocean, classifiers encounter a fundamental limit called the curse of dimensionality. But is this limit imposed by the problem itself, or by the existing architectures? This tutorial introduces the class-specific method for constructing classifiers which avoid the curse of dimensionality. This revolutionary technique blends signal and image processing with classification theory and promises to revolutionize the classification field. The curse of dimensionality is not a limitation of classifiers in general. Indeed, human observers do not encounter the problem when classifying sounds and images among myriad other possibilities after having observed something once or twice. The curse of dimensionality affects only classifiers which operate in a common high-dimensional feature space. The class-specific method, based on a new theorem, is an extension of classical theory which allows classifiers to be constructed using class-dependent features, yet is solidly based on the optimal Bayesian classifier. The approach is more in line with human observers, who internalize the characteristics of a given sound or image using features only found in that class. A case of something for nothing? No. Avoiding the curse of dimensionality comes with a price - the necessity to carefully design class-dependent processing for each class rather than using a common "general-purpose" set of features. Yet the price is well worth it. The tutorial offers both theoretical and practical knowledge, including many examples. Examples include classification of marine mammal sounds. Common design pitfalls are highlighted. Students are expected to have a basic understanding of signal processing and probabilistic methods in classification. A CD of practical class-specific software will be distributed as part of the course.

I. Theory. A. Classical Classification Theory. B. The Curse of Dimensionality. C. The PDF Projection Theorem. 1. Optimality 2. Fixed Reference Hypothesis 3. Floating Reference Hypothesis. D. The Chain Rule and Class-Specific Modules. E. The Class-Specific Classifier.

II. Design Considerations. A. Choosing Features. B. Choosing Reference Hypothesis. C. Model Validation. III. Examples. A. Autoregressive Model Features. B. Order Statistic Features. C. A Robust Autoregressive/HMM Classifier.

Dr. Baggenstoss received his PhD in electrical engineering (statistical signal processing) at the University of Rhode Island (URI) in 1990. Since then he has been applying signal processing and hypothesis testing (classification) to sonar problems. From 1979 to 1996, he was with Raytheon Co, Portsmouth, RI. He

joined the Naval Undersea Warfare Center (NUWC) Newport, RI, in 1996 where he is today. He is the author of numerous conference and journal papers in the field of signal processing and classification and has taught part-time as an adjunct professor of Electrical Engineering at the University of Connecticut, Storrs. He is the recipient 2002 URI Excellence Award in Science and Technology.

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Tutorials

Tutorial T15 (Half Day 1:00 - 4:30) Room: Royal 6 **Practical Analog and Digital Control System Design**

Mr. Barry L. Dorr, Dorr Engineering

This half-day tutorial provides attendees with the engineering design skills required for designing feedback control systems using both analog and digital components. The tutorial bridges the gap between the theorist who works purely with transfer functions and the technician who relies on intuition and 'tweaking'. Attendees will learn basic concepts of feedback control systems with an emphasis on systems containing both analog and digital components. The course begins with a review of frequency response methods for s domain and z domain transfer functions, important to defining the control problem. This information is then used to develop basic concepts such as identification of loop topologies and transfer functions, performance criteria, steady state error, compensation, and stability. We then present illustrative examples of control system design, using MathCAD, which can usually be tailored by the attendee to match a wide variety of real-world design problems.

The intended audience includes technical program managers, engineers, and high level technicians. Attendees will build a criteria for performance evaluation of control systems.

- Basic Analog and Digital Feedback Structures.
- Magnitude and Phase Response for Analog and Digital systems.
- Evaluate stability of analog and digital servo systems.
- Determine loop constants and component values for analog and digital second order systems based on various performance criteria.
- Evaluate the effects of delay in analog and digital feedback loops and design methods when delay is present.

Mr. Dorr is the owner and president of Dorr Engineering Services, Inc., located in San Marcos, CA. DESI specializes in

the development of products and algorithms for land mobile data communication and industrial control. Mr. Dorr has over 20 years of signal processing experience in the areas of RF modem design, digital radio design, industrial control systems, and audio signal processing. He has taught numerous in-house workshops for corporate clients. He holds a BSEE (1984) from California Polytechnic State University and an MSEE (1989) from San Diego State University. He holds a patent for a self-calibrating digital FM radio system, and three patents for methods for multiplexing voice and data over cellular radio systems. Mr. Dorr is a registered Professional Engineer in the state of California.



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Plenary Speakers

“Exploration: Has Everything Been Discovered?”

Speaker: Don Walsh, Ph.D.

A common perception is that our planet has been explored; there is little left to find. This is wrong, there is much to be found. This brief presentation will consider some of today's frontiers of exploration and the engineering needed to exploit them.

Also it is important to understand the difference between exploration and adventuring. Exploration

increases man's knowledge through fieldwork while adventuring pits individuals against physical difficulties. If you dive to 500 feet to study a class of marine organisms, it is exploring. If you do it simply to set a record, then it is adventuring. Real exploration is the precursor of scientific knowledge. The oceans are the best example of everything has not been discovered. In fact, we have hardly begun.

“Ocean Science at 100: Historical Precedents and Future Directions”.

Speaker: Dr. John Orcutt

Dr. John Orcutt, Scripps Institution of Oceanography/UCSD, Deputy Director, Assoc. Vice Chancellor of Marine Sciences, Secretary of the Navy/Chief of Naval Operations Oceanography Chair, President-Elect, AGU

Since its inception in 1903, the San Diego marine laboratory that became the Scripps Institution of Oceanography has continuously sought or developed the finest equipment necessary to pursue marine science. The end of the Second World War brought a new seagoing capability to Scripps Institution and other research centers in the form of

ships capable of circling the planet. The next decades witnessed extraordinary explorations greatly enhancing the breadth of oceanographic knowledge.

Scientists are now at the threshold in which exploration will once again become an important direction for oceanography, driven by the need to link oceanographic disciplines. Adaptation of 21st century technologies will provide researchers new vantage points for observations that most certainly will lead to new discoveries with myriad benefits for all mankind.

Offshore Oil Industry Cooperation in Oceanography: Past and Future

Speaker: Dr. Cortis Cooper

Though not well publicized, the Oil Industry has a long tradition of cooperation on oceanographic R&D within the Industry, with government agencies, and with academic institutions. Some examples during the past decade include: i) measurements of the Yucatan through-flow, ii) development of a Loop Current forecast model, iii) investigation of hurricane alleys in the Gulf of Mexico, and iv) measurement of intensified

bottom currents in the Gulf of Mexico. These efforts can be characterized as cutting edge research on important applied engineering problems.

Dr. Cooper will provide an overview of these diverse efforts and identify qualities that made them successful, cooperative efforts, then explore some of the future oceanographic problems of interest to the Industry and how we might cooperate.

Scientific/Technical Program

Tuesday, 10:00 AM - 12:00 PM
Room: Pacific 5

Applied Ocean Sciences Co-Chairs

Dr. Jiayan Yang, *WHOI, MA*
David Frost, *Orincon, CA*

Time: 10:00 AM

Operator Access to Acoustically Networked Undersea Systems Through the Seaweb Server 1
Mr. Christopher L. Fletcher, Mr. Joseph A. Rice,
Robert K. Creber, *US Govt / SpawarSysCen., San Diego, CA*

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Dr. Jerry C. Wilson
Thales Geosolutions, CA

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Scientific/Technical Program

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The World's Deepest Dive

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Dr. Don Walsh, *International Maritime Incorporated*

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Barbara Moe, *Naval Undersea Museum, WA*



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Geology & Geophysics

Co-Chairs

Dr. Achim Kopf, *Scripps UCSD, CA*

Andrew Chermack, *Occidental Petroleum, CA*

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Mr. Keith von der Heydt, *Woods Hole Oceanographic*

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Woods Hole, MA

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Norway; Dr. Pierre Briole, *Institut de Physique du Globe*

de Paris (IPG); France; Dr. G. Etiope, *Istituto Nazionale*

Di Geofisica E Vulcanologia, Italy; Dr. Michel Masson,

Capsum Technologie GmbH, Germany; Dr. S. Smolders,

Thales Geosolutions SA/NV, Belgium; Dr. V. Lykousis,

National Centre for Marine Research (NCMR) , Greece

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Scientific/Technical Program

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Communications

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Dr. C. David Chadwell, *Scripps UCSD, CA*

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Mr. David W. Harvey, *Naval Oceanographic Office, MS*

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Scientific/Technical Program

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Marine Resources

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Dr. John Wiltshire
Univ. of Hawaii SOEST, HI

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Jack Liebster, *California Coastal Conservancy, CA*

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Fisheries Science

Co-Chairs

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Dr. Rodney M. Fujita, *Environmental Defense, NY*

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Eric Gottshall
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IEEE
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Underwater Technology
Taipei, Taiwan
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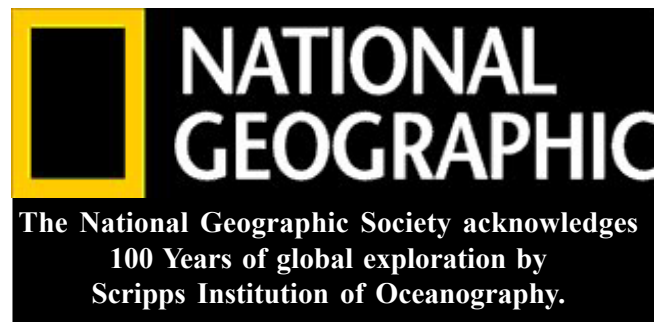
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Scientific/Technical Program

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NATIONAL AERONAUTICS
AND SPACE ADMINISTRATION

The National Aeronautics and Space Administration
congratulates Scripps Institution of Oceanography's
many contributions to earth science.



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Woods Hole Oceanographic Institution
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for a century of global discovery

Scientific/Technical Program

Tuesday, 1:20 PM - 3:20 PM

Room: Sunset

Advanced Oceanographic Ships

Chair **John Bash**, *Univ. of Rhode Island, RI*

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HMS Scott Ring Laser Gyro Navigator

Integration 538

Mr. Martin E. Leblang, Mr. Steven J. Dunham, Mr. Fred Pappalardi, *Space and Naval Systems Warfare Center, San Diego, CA*

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Design of a Small, Multi-Purpose,

Autonomous Surface Vessel 544

Dr. Alexander Leonessa, Mr. Miguel Vidal, Mr. Jeremiah Mandello, Mr. Yannick Morel, *Florida Atlantic University, Dept. of Ocean Eng., FL*

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Cycloidal Propulsion - the Silent Manoeuvring

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Tuesday, 1:20 PM - 3:20 PM

Room: Sheffield

Acoustical Oceanography II

Co-Chairs **Dr. Kevin Heaney**, *Orincon, VA*
Dr. Peter Worcester, *Scripps UCSD, CA*

Time: 1:20 PM

An Analytic Smoothing of an Internal Wave

Sound Speed Model 557

Mrs. Katherine C. Hegewisch, Dr. Nicholas R Cerruti, Prof. Steven Tomsovic, *Washington State University Physics Department, WA*

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Entropy of Acoustical Beams

in a Random Ocean 558

Dr. Andrey K. Morozov, Dr. John A. Colosi, *Woods Hole Oceanographic Institution, MA*

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Prof. Igor B. Esipov, *N. Andreev Acoustics Institute, Russia*

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Dr. John Allison Fornshell, *National Museum of Natural History, Department of Invertebrate Zoology, Wash., DC*
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Miss Karen Kelly, *Baylor College, TX*

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Dr. Kenneth G. Foote, *Woods Hole Oceanographic Institution, MA*, Dr. Roger T. Hanlon, *Marine Biological Laboratory, MA*, Annette E. Henry, *California Department of Fish and Game, CA*, Prof. Alfred Hochstaedter, *Monterey Peninsula College, CA*, Prof. Rikk Kvitek, *California State University Monterey Bay, CA*, Deidre Sullivan, *Monterey Peninsula College, CA*

Scientific/Technical Program

Tuesday, 1:20 PM - 3:20 PM

Room: Hampton

Inversion

Co-Chairs

Dr. Peter Gerstoft, *Scripps UCSD, CA*
Dr. Lisa M. Zurk, *MIT Lincoln Laboratory, MA*

Time: 1:20 PM

Shallow Water Tomography with a Sparse

Array During the Intimate'98 Sea Trial 571

Paulo Felisberto, Sergio Jesus, *Universidade do Algarve*
SiPLAB, Portugal

Yann Stéphan, Xavier Démoulin, *CMO/EPHOM, France*

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Mid-Frequency Geoacoustic Inversion of Source Tow Data from the ASIAEX East

China Sea Experiment 576

Miss Chen-Fen Huang, Prof. William S. Hodgkiss, *Marine*
Physical Laboratory, Scripps Institution of
Oceanography, CA

Time: 2:00 PM

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Dr. William S. Hodgkiss, Dr. Peter Gerstoft, Mr. James J.
Murray, *Marine Physical Laboratory, Scripps Institution*
of Oceanography, CA

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Prof. Woojae Seong, and Mr. Cheolsoo Park, *Seoul National*
University, Korea (Republic)

Dr. Peter Gerstoft, Dr. David Battle, *Scripps Institution of*
Oceanography, UCSD, CA

Time: 2:40 PM

Estimates of Geoacoustic Model Parameters from Inversions of Horizontal and Vertical

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Mr. Dag Tollefsen, *Norwegian Defence Research*
Establishment, Norway

Dr. Michael J. Wilmut, Dr. Ross Chapman, *School of Earth*
and Ocean Sciences, Canada

Time: 3:00 PM

Geoacoustic Model Parameter Estimation Using a Bottom Moored Hydrophone Array 598

Dr. Ross Chapman, Dr. Michael J. Wilmut, Mr. Matthew
Barlee, *University of Victoria, Canada*

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Room: Windsor

Biologically Inspired Signal Processing Algorithms

Chair

Patrick W. Moore

SPAWARSYSCEN, San Diego, CA

Time: 1:20 PM

Biosonar Model for Improved Range Accuracy

in a Noisy Environment 604

Nicola Neretti, Nathan Intrator, Mark I. Sanderson, James A.
Simmons, Leon N. Cooper, *Brown University, Providence,*
RI

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Evidence for Acoustic Imaging Capability in a Bottlenose Dolphin 611

Dr. Richard A. Altes, *Chirp Corp., CA*

Dr. Lois A. Dankiewicz, *Science Applications International*
Corporation, CA, Mr. Patrick W. Moore, *SPAWAR Systems*
Center San Diego, CA, Dr. David A. Helweg, *Pacific*
Island Ecosystems Research Center, HI

Time: 2:00 PM

A Filterbank Model for Echo Delay

Estimation in Biosonar 619

Dr. Mark I. Sanderson, Dr. Nicola Neretti, Dr. Nathan
Intrator, Dr. James Simmons, *Brown University, RI*

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Target Echo Processing in the Dolphin's

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Dr. Gennadi L. Zaslavskiy, *Ramot, Tel-Aviv University,*
Israel

Time: 2:40 PM

Characterization of Various Fluids in Cylinders from Dolphin Sonar Data in the Interval Domain 629

Dr. Claudia Lainscsek, Dr. Irina F. Gorodnitsky *University of*
California, San Diego, CA

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Dr. Gennadi L. Zaslavskiy, *Ramot, Tel-Aviv University,*
Israel

Scientific/Technical Program

Tuesday, 1:20 PM - 3:20 PM

Room: Garden 1

AUV Navigation

Co-Chairs

Richard Blidberg, *AUSI, NH*
Dr. P.C.E. An, *Florida Atlantic Univ., FL*

Time: 1:20 PM

Performance of an AUV Navigation

System at Arctic Latitudes 642

Mr. Rob S. McEwen, Mr. Hans Thomas, *Monterey Bay Aquarium Research Institute, CA*

Mr. Donald Weber, Mr. Frank Psota, *Kearfott Guidance and Navigation Corporation, NJ*

Time: 1:40 PM

A Comparison of AUV Navigation Performance:

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Dr. Edgar An, *Florida Atlantic University, FL*

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Control of AUV Under Current Interaction 663

Mr. Kangsoo Kim, Prof. Tamaki Ura, *Underwater Tech. Research Center, IIS, University of Tokyo, Japan*

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Model Experiment of a Launcher of a

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Hirotomo Ando, Kenkichi Tamura, Katsuya Maeda, Michio Ueno, Tadashi Nimura, Katsuhisa Hisamatsu, Nobuhiro Saeki, Yashuhiro Wada, *National Maritime Research Institute, Japan*

Time: 2:40 PM

Visual Servoing for Underwater Docking of an Autonomous Underwater Vehicle with

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Pan-Mook Lee, Bong-Hwan Jeon, Sea-Moon Kim, *Korea Research Institute of Ships & Ocean Engineering, KORDI, Republic of Korea*

Time: 3:00 PM

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Isurus AUV 683

Anibal Matos, Nuno Cruz, Fernando Lobo Pereira, *Faculdade de Engenharia da Universidade do Porto, Portugal*

Tuesday, 1:20 PM - 3:20 PM

Room: Garden 2

ROV Control

Chair

Drew Michel, *TSC Holdings, Inc., TX*

Time: 1:20 PM

Preliminary Identification of a Dynamical Plant Model for the Jason 2 Underwater

Robotic Vehicle 688

Prof. Louis L Whitcomb, Dr. David A. Smallwood, *Johns Hopkins University, MD and Woods Hole Oceanographic Institution, MA*

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User-Assisted Trajectory Generation of

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Sergio Loureiro Fraga, João Borges de Sousa, Fernando Lobo Pereira, *University of Porto, Portugal*

Time: 2:00 PM

Controlling the Dynamic Positioning of a ROV 702

Mr. Wallace Bessa, *Technical University Hamburg-Harburg, Germany*

Time: 2:20 PM

Integrated Maneuver and Control

Design for ROV Operations 703

Mr. Rui Manuel F. Gomes, Mr. João B. Sousa, Mr. Fernando L. Pereira, *FEUP - Universidade do Porto, Portugal*

Time: 2:40 PM

Multivariable Saturating Control and Anti-Windup Control for the Phantom

500 Body Motion: a Comparison 711

Dr. Jean-Pierre Folcher, *Laboratoire I3S CNRS/UNSA, France*



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Scientific/Technical Program

Tuesday, 3:40 PM - 5:20 PM

Room: Pacific 5

Coastal Observing Systems II

Co-Chairs

Catherine Woody, *NOAA NDBO, MS*
Mohsen Badiy, *Univ. of Delaware, DE*

Time: 3:40 PM

NEOS: the North East Ocean Observing

System by: Scott Glenn & NEOS Partners 712

Dr. Scott M. Glenn, *Rutgers University, NJ*

Time: 4:00 PM

Carolinas Coastal Ocean Observing and Prediction

System: Enhancing the U.S. Integrated Ocean

Observing System Through Improved Regional

Coastal Observations and Services 713

Madilyn Fletcher, *Belle W. Baruch Institute for Marine and Coastal Sciences, University of South Carolina, SC,*

Leonard J. Pietrafesa, *College of Physical and Mathematical Sciences, North Carolina State University, NC,*

Lian Xie, Earle N. Buckley, *Department of Marine, Earth and Atmospheric Sciences, North Carolina State University, NC,*

Dwayne E. Porter, *Belle W. Baruch Institute for Marine and Coastal Sciences, Department of Environmental Health Sciences, School of Public Health, University of South Carolina, SC,*

Marvin K. Moss, *Center for Marine Science, University of North Carolina at Wilmington, NC*

Time: 4:20 PM

Bonne Bay Ocean Observatory 725

Mr. Keith M. Brown, *Satlantic Incorporated, Canada*

Dr. Brad de Young, *Memorial University of Newfoundland, Canada*

Time: 4:40 PM

Automated Control of a Fleet of Slocum Gliders

Within an Operational Coastal Observatory 726

E. Creed, J. Kerfoot, C. Mudgal, S. Glenn, O. Schofield,

Rutgers University, Institute of Marine & Coastal

Sciences, NJ, C. Jones, D. Webb, *Webb Research Corp.,*

MA, T. Campbell, *Dinkum Software, MA,* M. Twardowski,

WET Labs, Inc., OR, G. Kirkpatrick, J. Hillier, *Mote Marine Laboratory, FL*

Time: 5:00 PM

AUV Surveys of Bioluminescence and Coastal

Processes in the Monterey Bay 731

Mr. Hans J. Thomas, Mr. Mark Sibenac, Dr. Steven

Haddock, Dr. Christen M. Herren, Dr. Mark Moline

Ms. Shelley Blackwell, Mr. Richard Henthorn, Mr. Robert

Fuhrmann, Mr. Erich Rienecker, Dr. John Ryan, *Monterey*

Bay Aquarium Research Institute, CA

Tuesday, 3:40 PM - 5:20 PM

Room: Pacific 6

Fate, Effects and Management of Wastewaters

Discharged from Commercial Passenger Vessels: The Alaska Cruise Ship Initiative Science Report, and Beyond

Co-Chairs

Carolyn Hudson Morehouse

Alaska DEC, AK

Dr. Alan Mearns, *NOAA HMRS, WA*

Time: 3:40 PM

An Assessment of Fecal Coliform Bacteria in

Cruise Ship Wastewater Discharge 733

Charles McGee, *Orange County Sanitation District, CA*

Lincoln C. Loehr, *Heller Ehrman, WA*

Time: 4:00 PM

Biological and Ecological Effects of Wastewater

Discharges from Cruise Ships in Alaska 737

Alan Mearns, Dr. C.J. Beegle-Krause, *Hazardous*

Materials Response Division, NOAA, WA

Michael S. Stekoll, *University of Alaska, AK*

Dr. Kenneth J. Hall, *University of British Columbia, Canada*

Dr. Michael Watson, *U.S. Environmental Protection Agency, Region 10, WA*

Dr. Marlin Atkinson, *University of Hawaii, HI*

Time: 4:20 PM

Evaluation of New Technology for Shipboard

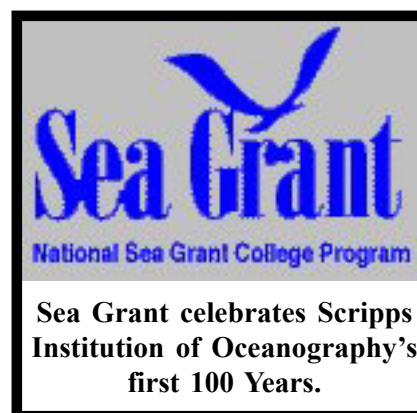
Wastewater Treatment 748

W. David Eley, *Cape International Inc., AK*

Carolyn Hudson Morehouse, *Department of Environmental Conservation, AK*



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Scientific/Technical Program

Tuesday, 3:40 PM - 5:20 PM
Room: Pacific 7

**Global Coral Reef Alliance
Chair**

Thomas J. Goreau,
Global Coral Reef Alliance, MA

Time: 3:40 PM

**Global Change in Ocean Circulation from Satellite
Sea Surface Temperature Records: Implications
for the Future of Coral Reefs, Fisheries, and
Climate Change 754**
Dr. Thomas J. Goreau, *Global Coral Reef Alliance, MA*,
Raymond L. Hayes, *Howard University, Wash. DC*

Time: 4:00 PM

**Restoring Coral Reefs, Oyster Banks, and Fisheries by
Seawater Electrolysis: Coastal Zone Management and
Tourism Applications 755**
Dr. Thomas J. Goreau, *Global Coral Reef Alliance, MA*,
Wolf Hilbeertz, *Sun & Sea, Thailand*, A. Azeez A. Hakeem,
Banyan Tree Maldives, Maldives, Randall Dodge, *Taman
Sari, Indonesia*, Gabriel Despaigne, *Asociacion Oceanica
de Panama, Panama*, Cody Shwaiko, *Komodo Foundation,
Indonesia*



Tuesday, 3:40 PM - 5:20 PM
Room: Royal 1

**Geodasy
Co-Chairs**

Dr. Yehuda Bock, Scripps UCSD, CA
Dr. Fred Spiess, Scripps UCSD, CA

Time: 3:40 PM

**Improved Global Marine Gravity By Re-Tracking
Altimeter Waveforms 756**
Prof. David T. Sandwell, *Scripps Institution of
Oceanography, CA*

Time: 4:00 PM

**Progress in Measurement of Seafloor Strain
in the Deep Ocean 757**
Dr. Fred N. Spiess, Dr. Dave Chadwell, *Scripps Institution
of Oceanography, UCSD, CA*

Time: 4:20 PM

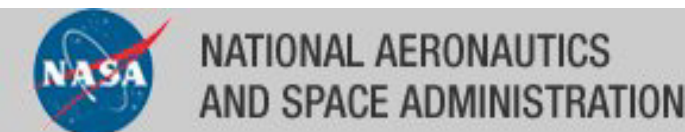
**Real-Time Positioning and Navigation for
Ocean Applications 757**
Dr. Yehuda Bock, *University of California San Diego, CA*
Dr. C. David Chadwel, Dr. Fred Spiess, *Scripps Institution
of Oceanography, UCSD, CA*

Time: 4:40 PM

**Integrating Bathymetry, Topography, and Shoreline,
and the Importance of Vertical Datums 758**
Dr. Bruce B. Parker, Dr. Dennis G. Milbert, Dr. Kurt W.
Hess, Mr. Stephen K. Gill, *NOAA/National Ocean Service,
MD*

Time: 5:00 PM

**GPS/Acoustic Seafloor Positioning Experiment in
the Subduction Zone of the Japan Trench 765**
Prof. Hiromi Fujimoto, Dr. Satoshi Miura, Dr. Aaron Depaul
Sweeney, Mr. Minoru Ito, *Tohoku University, Japan*
Mr. Yukihiro Osada, Prof. Toshihiko Kanazawa, *University
of Tokyo, Japan*



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Scientific/Technical Program

Tuesday, 3:40 PM - 5:20 PM

Room: Royal 2

Ocean Sensing Chair

Kim McCoy,
Ocean Sensors, CA

Time: 3:40 PM

**Alaskan Peninsula Deployment of Laser Airborne
Bathymetric System 770**
Mr. Mark John Sinclair, Mr. Darren John Stephenson, Mr.
Rhys Matthew Barker, *Tenix LADS, Inc., MS*

Time: 4:00 PM

Oceanographic Profiler for Shallow Water 780
Mr. Jeffrey Casale, Mr. Jon Stephen Merrill, Mr. Rich
Sullivan, Dr. Diane DiMassa, Dr. Alex Fowler, *University of
Massachusetts at Dartmouth, MA*

Time: 4:20 PM

**The Evolution of a Deep Water Current Meter, the
Argonaut-MD 786**
Mr. Todd D. Mudge, Dr. Vadim Polonichko, *SonTek/YSI,
Inc., CA*

Tuesday, 3:40 PM - 5:20 PM

Room: Royal 3

Assimilation & Prediction Chair

Dr. John M. Harding, *USNOO, MS*

Time: 3:40 PM

**Water Level Prediction Skill of an Operational
Marine Forecast Using a Hybrid Kalman Filter
and Time Series Modeling Approach 790**
Dr. Jacob V.T. Sørensen, Dr. Henrik Madsen, *DHI Water &
Environment, Denmark*

Time: 4:00 PM

**Tropical Air-Sea Interaction in the Navy Coupled
Data Assimilation/Modeling System 791**
Dr. Maria K. Flatau, Dr. Paul May, Dr. James Cummings,
Naval Research Laboratory, CA

Time: 4:20 PM

**Performance Evaluation of Two Neural
Network-Based Models for Predicting
Sea Ice Concentration 792**
Dr. Ahmed El-Rabbany, Mr. Mohamed El-Diasty, *Ryerson
University, Canada*



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Oceanography fair winds and
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it's second century.



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Scientific/Technical Program

Tuesday, 3:40 PM - 5:20 PM

Room: Royal 4

Artificial Reefs Chair

C. Michael Bailey, *NOAA NMFS, CA*

Time: 3:40 PM

Artificial Reef Site Selection: Geophysical Surveys for San Clemente Kelp Reef 793
Mr. Neil Marshall, Mr. Tim Norall, *EcoSystems Management Associates, Inc., CA*
Mr. Robert Grove, *Southern California Edison, CA*
Dr. M. Hany S. Elwany, *Scripps Institution of Oceanography, CA*

Time: 4:00 PM

Assessing the Ecological Risk of Creating Artificial Reefs from Ex-Warships 804
Dr. Robert K. Johnston, Heather Halkola, William J. Wild, R. George, C. In, R. Gauthier, *US Navy Space and Naval Warfare Systems Center, CA*, M. Bell, R. Martore, *South Carolina Department of Natural Resources, SC*

Time: 4:20 PM

Benthic Community Settled on an Artificial Reef in the Western Adriatic Sea (Italy) 812
Dr. Gianna Fabi, Dr. Sarine Manoukian, Dr. Monica Panfili, Dr. Cristiano Solustri, Dr. Alessandra Spagnolo, *ISMAR-CNR, Italy*

Time: 4:40 PM

Investigating Terrain Changes Around Two Artificial Reefs By Using the Multibeam Echosounder (Western Adriatic Sea, Italy) 813
Dr. Gianna Fabi, Dr. Sarine Manoukian, Dr. Alessandra Spagnolo, *ISMAR-CNR, Italy*

Time: 5:00 PM

HMCS Yukon Artificial Reef Monitoring Project - Data Collection Using Volunteer Research Divers 815
Noelle Barger, *San Diego Oceans Foundation, CA*



Tuesday, 3:40 PM - 5:20 PM

Room: Royal 5

Marine Mammals Abundance, Distribution, Seasonality Co-Chairs

Arthur Teranishi, *Orincon, CA*
Dr. Jay Barlow, *NOAA NMFS, CA*

Time: 3:40 PM

Seasonality of Blue and Fin Whale Calls West of the Antarctic Peninsula 818
Ana Sirovic, John A. Hildebrand, Sean M. Wiggins, *Scripps Institution of Oceanography, CA*, Sue E. Moore, *National Marine Mammal Laboratory, NOAA/NMFS, WA*
Mark A. McDonald, *Whale Acoustics, CO*, Deborah Thiele, *School of Ecology and Environment, Deakin University, Australia*

Time: 4:00 PM

Advances in Density and Abundance Estimation for Cetaceans Using Geospatial Modeling 819
Ms. Megan C. Ferguson, *Scripps Institution of Oceanography, CA*, Dr. Jay Barlow, Dr. Lisa Ballance, Dr. Tim Gerrodette, Dr. Paul Fiedler, *NOAA/Southwest Fisheries Science Center, CA*

Time: 4:20 PM

Cetacean Abundance in the Eastern Tropical Pacific 820
Tim Gerrodette, *Southwest Fisheries Science Center*, Jaume Forcada, *British Antarctic Survey*

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Automated Model-Based Localization of Sperm Whale Clicks 821
Dr. Christopher O. Tiemann, Dr. Michael B. Porter, *Science Applications International Corporation, CA*

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Spatial and Temporal Patterns in Visual and Acoustic Detection Rates of Blue Whales in the Southern California Bight 828
Ms. Erin Marie Oleson, Dr. Sean M. Wiggins, Dr. John A. Hildebrand, *Scripps Institution of Oceanography, CA*
Mr. John Calambokidis, *Cascadia Research Collective, WA*
Dr. Mark A. McDonald, *whaleacoustics.com, CO*

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Oceans '04 Techno-Ocean '04
Kobe, Japan
November 9-12, 2004

Scientific/Technical Program

Tuesday, 3:40 PM - 5:20 PM

Room: Royal 6

Underwater Imaging

Co-Chairs

Dr. Jules S. Jaffe, *Scripps UCSD, CA*

Dr. Frank Caimi, *Florida Tech, FL*

Time: 3:40 PM

A Holographic System for Subsea Recording and Analysis of Plankton and Other Marine

Particles (HOLOMAR) 830

Dr John Watson, S. Alexander, V. Chalvidan, G. Craig, G.L.

Foresti, S. Gentili, D.C. Hendry, H. Nareid, M.A. Player, *Aberdeen University, Scotland, UK*, A. Diard, *Quantel, France*, G.G. Pieroni, *Udine, Italy*, P.R. Hobson, J.J.

Nebrensky, *Brunel University, UK*, A. Pescetto, S. Serpico,

A. Trucco, *University of Genova, Italy*, R.S. Lampitt, K.

Saw, K. Tipping, *Southampton Oceanography Centre, UK*

Time: 4:00 PM

Precision Underwater Positioning for In-Situ Laser

Raman Spectrographic Applications 838

Mr. William J. Kirkwood, Dr. Sheri White, Mr. Richard

Henthorn, Mr. Scott Jensen, Mr. Mark Brown, Ms. Karen

Salamy, Edward T. Peltzer, Peter Brewer, *Monterey Bay*

Aquarium Research Institute, CA

Time: 4:20 PM

Study of the Effectiveness of Infrared LED

Source for Underwater Night Photography 844

Prof. Hsin-Hung Chen, Prof. Chau-Chang Wang, Mr. Jin-Min

Li, Mr. Yu-Hung Hsiao, Mr. Yi-Cheng Tsai, *Inst. of*

Undersea Technology, National Sun Yat-sen University,

Taiwan, Dr. Tung-Yung Fan, *National Museum of Marine Biology and Aquarium, Taiwan*



Tuesday, 3:40 PM - 5:20 PM

Room: Sunrise

Large-Scale Ocean/Atmospheric Coupling

Co-Chairs

Dr. Tim Liu, *NASA JPL, CA*

Dr. Larry F. Bliven, *NASA GSFC WFF, VA*

Time: 3:40 PM

Quantifying Upper Ocean Response to Surface

Wind Field Forcing During an MJO 845

Dr. Ralph F. Milliff, *Colorado Research Associates*

Division, NWSA, CO

Dr. William G. Large, *National Center for Atmospheric Research, CO*

Time: 4:00 PM

The Northern Annular Mode in

Atmosphere-Ocean Coupling 846

Dr. Kathryn Ann Kelly, *University of Washington, WA*

Time: 4:20 PM

Coupling Between the Atmosphere and Asian

Marginal Seas 847

Dr. W. Timothy Liu, Dr. Xiaosu Xie, *Jet Propulsion*

Laboratory, CA

Prof. Shang-Ping Xie, *International Pacific Research Center, HI*

Time: 4:40 PM

Mixed-Layer Heat Budget Associated with

ENSO, IOD, and PDO Inferred from Satellite

Ocean Data Assimilation 848

Dr. Tong Lee, *Jet Propulsion Laboratory, California*

Institute of Technology, CA

Time: 5:00 PM

Our Recent Understanding About the Eddies

in the South China Sea 849

Dr. Dongxiao WANG, *South China Sea Institute of*

Oceanology, CAS, China



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Scientific/Technical Program

Tuesday, 3:40 PM - 5:20 PM

Room: Sunset

Offshore Structures

Chair

Dr. Subrata K. Chakrabarti

Offshore Structure Analysis Inc., IL

Time: 3:40 PM

Development of Offshore Monitoring Platform

“SOLAReS” for SOLAS..... 850

N. Takatsu, *Kawasaki Shipbuilding Corporation*, T. Kimoto, *Kimoto Electric Co., Ltd.*, H. Mikasa, *Horiba, Ltd.*, K. Harada, *National Institute of Advanced Industrial Science and Technology*, S. Watanabe, *Japan Marine Science and Technology Center*, M. Uematsu, *Ocean Research Institute, University of Tokyo*, S. Tsunogai, *Hokkaido University, Japan*

Time: 4:00 PM

Technical Feasibility of “ECOPLATFORM” -

Technology Integration for the 21st Century..... 857

Ryusuke Hosoda, Shigemochi Murota, Satoshi Nakatani, *Osaka Prefecture University, Japan*

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Structure for Clean Energy Conversion..... 866

Prof. Ken Takagi, Mr. Wataru Yano, Mr. Koichiro Yamamoto, *Osaka University, Department of NA & OE, Japan*

Time: 4:40 PM

Load-Out Operation of South Pars Gas Field - Phase 1

Production Platform in the Persian Gulf..... 873

Mr. Mohammad Khalaj Amir Hosseini, *M.S., IRAN MARINE INDUSTRIAL COMPANY (SADRA), Iran*

Time: 5:00 PM

Real Sea Experiment of Ocean Nutrient Enhancer

“Takumi” Upwelling Deep Ocean Water..... 881

Dr. Kazuyuki Ouchi, *Ouchi Ocean Consultant, Inc., Japan*
Mr. Alan John Murphy, *Southampton University, United Kingdom*

Tuesday, 3:40 PM - 5:20 PM

Room: Sheffield

Acoustical Oceanography III

Co-Chairs

Dr. Kevin Heaney, *Orincon, VA*

Dr. Peter Worcester, *Scripps UCSD, CA*

Time: 3:40 PM

Ambient Noise Imaging - First Deployments of

ROMANIS and Preliminary Data Analysis 882

Dr. P. Venugopalan, Mr. Mandar A. Chitre, Prof. John R. Potter, Mr. Eng Teck Tan, Mr. Koay Teong Beng, Mr. Sheldon B. Ruiz, Ms. Soo Pieng Tan, *National University of Singapore/Acoustic Research Laboratory, Singapore*

Time: 4:00 PM

Origins of Directionality in Snapping Shrimp

Sounds and Its Potential Applications 889

Mr. Mandar A. Chitre, Mr. Koay Teong Beng, Dr. John R. Potter, *Acoustic Research Laboratory, Tropical Marine Science Instit., Singapore*

Time: 4:20 PM

Angular Dependence of Statistical Distributions for Backscattered Signals: Modelling and Application to Multibeam Echosounder Data 897

G. Le Chenadec, J.M. Boucher, X. Lurton, Jean-Marie Augustin, Sr., *Ifremer, France, ENST-Bretagne, France*



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Washington, DC

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Scientific/Technical Program

Tuesday, 3:40 PM - 5:20 PM

Room: Hampton

Tuesday, Time: 3:30-5:30

Room: Windsor

Matched Field Processing

Co-Chairs

Dr. Lisa M. Zurk

MIT Lincoln Laboratory, MA

Dr. Peter Gerstoft, *Scripps UCSD, CA*

Time: 3:40 PM

High-Frequency Broadband Matched Field

Processing in the 8-16 kHz Band 904

Dr. Martin Siderius, Dr. Michael B. Porter, *SAIC, CA*,
Vincent K. McDonald, *Space and Naval Warfare Systems Center, CA*

Time: 4:00 PM

Time-Reversal Imaging of Distant Targets

in a Shallow Water Channel 911

Lawrence Carin, *Duke University, NC*
Luise Couchman, *Naval Research Laboratory, DC*

Time: 4:20 PM

Source Depth Estimation Using Matched Field Processing and Frequency-Wavenumber Transform

912

Mrs. Barbara Nicolas, Mr.
Jérôme Mars, Mr. Jean-Louis
Lacoume, *Laboratoire des
Images et signaux, France*

Time: 4:40 PM

On the Use of Time- Frequency Methods in the Oceanic Passive Tomography Context

917

André Quinquis, Cornél
Ioana, *ENSIETA, France*,
Krystel Frezza-Boin, Jean-
Claude Le Gac, *Centre
Militaire d'Océanographie,
EPSHOM, France*

Time: 5:00 PM

Quantitative Ambiguity Analysis for Matched-Field Source Localization Under Spatially Correlated Noise Field

922

Dr. Wen Xu, *RD
Instruments, CA*, Dr. Christ
D. Richmond, *MIT Lincoln
Laboratory, MA*

Non-academic Careers for Marine Scientists

Chair

Cheryl Dybas, *National Science Foundation, VA*

Speakers:

Jeff Payne, *Deputy Director, NOAA's Coastal Services Center, Charleston, SC*

Sarah Horrigan, *Science Budget Examiner, U.S. Office of Management and Budget, Washington, DC*

Dot Leonard, *President, Ocean Equities, Ltd., (aquaculture firm), Annapolis, MD*

Frank Cynar, *Science Editor, Elsevier (formerly Academic) Press, San Diego, CA*

Paul Joyce, *Dean, Sea Education Association ("Sea Semester"), Woods Hole, MA*

Steve Greenlee, *Vice-President, ExxonMobil, Inc., Houston, TX*

Eric Mathur, *Vice-President, Diversa, Inc., San Diego, CA*

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Scientific/Technical Program

Tuesday, 3:40 PM - 5:20 PM

Room: Garden 1

AUV Control

Co-Chairs

Richard Blidberg, *AUSI, NH*
Dr. P.C.E. An, *Florida Atlantic Univ., FL*

Time: 3:40 PM

Advanced Mission Management for Long-Range

Autonomous Underwater Vehicles 928

Mr. Torsten Pfuetszenreuter, *Ilmenau Technical University, Germany*

Time: 4:00 PM

Using a High Order Sliding Modes for Diving

Control a Torpedo Autonomous

Underwater Vehicle 934

Mr. Tomas Salgado-Jimenez, Mr. Bruno Jouvencel, *LIRMM-CNRS, France*

Time: 4:20 PM

Experimental Results of an Autonomous Underwater

Vehicle "Urashima" 940

Dr. Satoshi Tsukioka, *Japan Marine Science and Technology Center, Japan*

MTS/IEEE

Oceans '04 Techno-Ocean '04

Kobe, Japan

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Tuesday, 3:40 PM - 5:20 PM

Room: Garden 2

Underwater Gliders

Co-Chairs

Ralf Bachmayer, *Princeton University, NJ*
Dr. Scott A. Jenkins, *UCSD, CA*

Time: 3:40 PM

UW Gliders 946

Dr. Scott A. Jenkins, *SIO / UCSD, CA*

Time: 4:00 PM

Advanced Glider Concepts for Missions Beyond

Oceanographic Vertical Profiling 947

Dr. Douglas E. Humphreys, *Vehicle Control Technologies, Inc., VA*, Mr. Clayton Jones, *Webb Research Corp., MA*

Time: 4:20 PM

Alternatives for Enhancement of Transport Economy in Underwater Gliders 948

Dr. Scott A. Jenkins, Dr. Jeff Sherman, *Scripps Institution of Oceanography, CA*, Dr. Douglas E. Humphreys, *Vehicle Control Technologies, Inc., VA*, Mr. Jim Osse, *University of Washington, WA*, Mr. Clayton P. Jones, *Webb Research Corp. MA*, Prof. Naomi E. Leonard, Mr. Joshua G. Graver, *Princeton University, NJ*

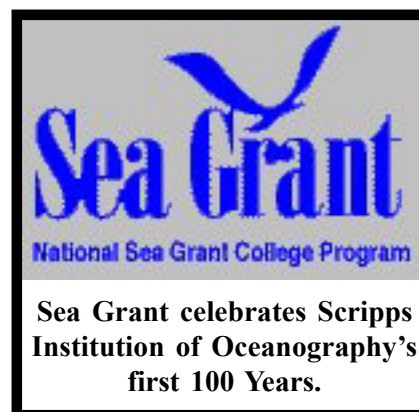
Time: 4:40 PM

Glider Control: A Close Look Into the

Current Glider Controller Structure and

Future Developments 951

Dr. Ralf Bachmayer, Mr. Joshua G. Graver, Prof. Naomi E. Leonard, *Princeton University, NJ*



Scientific/Technical Program

Wednesday, 8:00 AM - 10:00 AM
Room: Pacific 5

Plume Sensing I Chair

Dr. Chuanmin Hu
Univ. of South Florida, FL

Time: 8:00 AM

Mapping Ocean Bathymetry Using an AUV Equipped of an Altimeter:

A Terrain-Driven Approach..... 955
Dr. Joao D. Rendas, *CNRS-I3S, France*

Time: 8:20AM

Field Results of Multi-UUV Missions Using

Ranger Micro-UUVs 956
Brett Hobson, Bryan Schulz, Mathieu Kemp, Ryan Moody,
Heather Pinnix, Jim Meyer, Mathew St. Clair, *Nekton
Research, LLC, NC*

Time: 8:40 AM

Chemical Plume Tracing Experimental

Results with a REMUS AUV 962
Jay A. Farrell, Shuo Pang, *University of California,
Riverside, Department of Electrical Engineering, CA,*
WeiLi, *California State University - Bakersfield,
Department of Computer Science, CA,* Richard Arrieta,
*SPAWARSYSCEN-San Diego, Ocean Technology Branch,
CA*



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Wednesday, 8:00 AM - 10:00 AM
Room: Pacific 6

Coastal Processes and Evolution: Multi-Decadal Forcing Chair

Dr. Douglas L. Inman
Scripps Institution of Oceanography, UCSD, CA

Time: 8:00 AM

Variability in the Wave Climate of the North Pacific: Links to Inter-Annual

and Inter-Decadal Variability 969
Dr. Nicholas E. Graham, *Scripps Institution of
Oceanography, CA*

Time: 8:20 AM

ENSO and Winter Storms in California 973
Dr. Daniel R. Cayan, Dr. Peter Bromirski, *Scripps Institution
of Oceanography and US Geological Survey, CA*

Time: 8:40 AM

Variability of Storm-Forced Extreme Sea

Levels Along the U.S. West Coast..... 974
Dr. Peter D. Bromirski, Dr. Reinhard E. Flick, *Integrative
Oceanography Division, Scripps Institution of
Oceanography, CA*

Time: 9:00 AM

Tide and Sea Level Fluctuations from

Days to Decades 979
Dr. Reinhard E. Flick, *California Department of Boating
and Waterways, CA*
Peter D. Bromirski, *Scripps Institution of Oceanography,
CA*

Time: 9:20 AM

The Influence of Climate on the Flux of Sediment to the Coastal Ocean 981

Dr. James P.M. Syvitski, *Institute of Arctic & Alpine
Research, University of Colorado at Boulder, CO*



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Environmental Monitoring, Remote Sensing & Pollution Control

NOVEMBER

Undersea Defense/Antisubmarine Warfare

DECEMBER**

Diving, Underwater Vehicles & Imaging
Underwater Intervention 2004, February 17-19, New Orleans, LA

2004

JANUARY

Annual Review and Forecast

FEBRUARY**

Instrumentation: Measurement, Processing & Analysis
Oceanology International, March 16-19, London, England

MARCH

Electronic Charting/Vessel Management/Ports & Harbors/Dredging

APRIL**

Offshore Technology/Ocean Engineering
Offshore Technology Conference, May 3-7, Houston, Texas

MAY**

Communications, Telemetry, Data Processing
Shipnet China 2004, June 22-25, Dalian, China

JUNE

Seafloor Mapping/Sonar Systems/Vessels

JULY

Deck Gear, Cable, Connectors & Power Systems

AUGUST

Ocean Resources Development & Coastal Zone Management

SEPTEMBER**

Geophysical Exploration/Seafloor Engineering
SEG 2004, October 10-15, Denver, Colorado

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SEPTEMBER/OCTOBER

Ocean data processing & interpretation

*Offshore Europe, Aberdeen, UK

*Oceans 2003, San Diego, CA

Editorial closing date July 15

Advertising closing date July 30

NOVEMBER/DECEMBER

Surface & Subsea navigation & precise positioning

Editorial closing date September 15

Advertising closing date September 30

JANUARY/FEBRUARY 2004

ROVs/AUVs/Towed Bodies/Diving

*Underwater Intervention 2004, New Orleans, LA

Editorial closing date November 14

Advertising closing date November 28

MARCH/APRIL

Oceanographic instrumentation; environmental monitoring

*OI London, UK

Editorial closing date January 15

Advertising closing date January 30

MAY/JUNE

Offshore Renewables

Connectors/cables/winches

Editorial closing date March 15

Advertising closing date March 30

JULY/AUGUST

Seabed mapping & sub-bottom profiling

Editorial closing date May 14

Advertising closing date May 28

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Schedule At-A-Glance

SUNDAY SEPT. 21, 2003

TIME	ROOM#	FUNCTION
1230		GOLF TOURNAMENT AT TORREY PINES
1400-1800	Exhibit	
	Hall A&B	Exhibit Hall Set-up
1700-1900	Foyer	Registration
1900-2100	Golden Ballroom	FILM FESTIVAL I

MONDAY SEPT. 22, 2003

TIME	ROOM#	FUNCTION
0700-1330	Foyer	Registration
0800-1830	Exhibit	
	Hall A&B	Exhibit Hall Set-up
0900-1600	Exhibit	
	Hall B	Student Poster Set-up
		TUTORIALS
0830-1200	Pacific 3	T1A-Synthetic Aperture Sonar (Full Day)
	Pacific 4	T2A-Efficient Use of ADCPs from Moving Vessels (Full Day)
	Pacific 5	T3 - Fiber Optic Design Principles\ (Full Day)
	Pacific 6	T4 - Side Scan Sonar Workshop (Full Day)
	Pacific 7	T5 - Applications of GPS in Marine Navigation and Hydrographic Surveying (Full Day)
	Royal 1	T6 - Introduction to Marine Corrosion Engineering (Full Day)
	Royal 2	T7 - Qualitative and Quantitative Visualization Techniques for Laboratory and Field Applications (Full Day)
	Royal 3	T8 - AUV Technology and Application Basics
	Royal 4	T9 - Introduction to Seafloor Geotechnical Engineering Properties
	Royal 5	T10- Intellectual Property Rights
	Royal 6	T11- Introduction to Wireless Sensor Networks
1200-1300		BREAK
1300-1630	Pacific 3	T1B-Synthetic Aperture Sonar No. 2; Applications
	Pacific 4	T2B-Mastering Moored ADCPs: Currents and Waves
	Pacific 5	T3 - Fiber Optic Design Principles (Full Day)
	Pacific 6	T4 - Side Scan Sonar Workshop (Full Day)
	Pacific 7	T5 - Applications of GPS in Marine Navigation and Hydrographic Surveying (Full Day)
	Royal 1	T6 - Introduction to Marine Corrosion Engineering (Full Day)

Royal 2	T7 - Qualitative and Quantitative Visualization Techniques for Laboratory and Field Applications (Full Day)
Royal 3	T12- Battery Systems; Primary and Secondary Cells
Royal 4	T13- Underwater Optical Imaging; Theory and Practice
Royal 5	T14- Target Classification Architectures; The Class-Specific Method
Royal 6	T15- Practical Analog and Digital Control System Design

1700-1900 Grand Foyer **EARLY BIRD RECEPTION/REGISTRATION**

1900-2130 Golden Ballroom **FILM FESTIVAL II**

TUESDAY SEPT. 23, 2003

TIME	ROOM#	FUNCTION
0700-1700	Foyer	Registration
0700-0800	Pacific Ballroom	SPEAKERS BREAKFAST
0800-0940	Golden Ballroom	PLENARY SPEAKERS
		Dr. Don Walsh, International Maritime Incorporated
		Dr. John Orcutt, Scripps Institution of Oceanography
		Dr. Cortis Cooper, ChevronTexaco
0900-1600	Exhibit Hall B	POSTER PAPERS
	Exhibit Hall B	STUDENT POSTERS
0900-1900	Exhibit Hall A&B	Exhibit Hall Hours
0940-1000		BREAK
1000-1200	Pacific 5	Applied Ocean Science
	Pacific 6	Installation of Hydroacoustic Data System for Regional Monitoring
	Pacific 7	The World's Deepest Dive
	Royal 1	Geology & Geophysics
	Royal 2	Communications
	Royal 3	Information Technology
	Royal 4	Marine Resources
	Royal 5	Fisheries Science
	Royal 6	Environmental Technology
	Sunrise	WINDSAT Sensing of Ocean Surface Winds
	Sunset	Ocean Engineering
	Sheffield	Acoustical Oceanography
	Hampton	Acoustical Signal Processing
	Windsor	Animal Models and Biometric Systems
	Garden 1	Academic AUVs
	Garden 2	Undersea Vehicles

Schedule At-A-Glance

TUESDAY TIME ROOM# SEPT. 23, 2003 FUNCTION

1200-1320	Grand Ballroom	MTS AWARDS LUNCHEON
1320-1520	Pacific 5	Coastal Observing Systems I
	Pacific 6	Fate, Effects and Management of Wastewaters Discharged from Commerical Passenger Vessels: The Alaska Cruise Ship Initiative Science Report, and Beyond
	Pacific 7	Geology & Geophysics II
	Royal 1	Paleoceanography/Oceanography
	Royal 2	Communications Networks
	Royal 3	Modeling & Simulation
	Royal 4	Coral Reefs
	Royal 5	Marine Mammals Technological Innovations
	Royal 6	Buried Mine Hunting
	Sunrise	Radar Sensing of Rain and Influence on Wind Measurements
	Sunset	Advanced Oceanographic Ships
	Sheffield	Acoustical Oceanography II
	Hampton	Inversion
	Windsor	Biologically Inspired Signal Processing Algorithms
	Garden 1	AUV Navigation
	Garden 2	ROV Control
1520-1540		BREAK
1540-1720	Pacific 5	Coastal Observing Systems II
	Pacific 6	Fate, Effects and Management of Wastewaters Discharged from Commerical Passenger Vessels: The Alaska Cruise Ship Initiative Science Report, and Beyond
	Pacific 7	Global Coral Reef Alliance
	Royal 1	Geodosy
	Royal 2	Ocean Sensing
	Royal 3	Assimilation & Prediction
	Royal 4	Artificial Reefs
	Royal 5	Marine Mammals Abundance, Distribution, Seasonality
	Royal 6	Underwater Imaging
	Sunrise	Large-Scale Ocean/Atmospheric Coupling
	Sunset	Offshore Structures
	Sheffield	Acoustical Oceanography III
	Hampton	Matched Field Processing
	Windsor	Non-academic Careers for Marine Scientists
	Garden 1	AUV Control
	Garden 2	Underwater Gliders
1730-1900	Exhibit Hall A/B	EXHIBITORS' RECEPTION
	Pacific Ballroom	SAN DIEGO EXPLORERS CLUB

WEDNESDAY TIME ROOM# SEPT. 24, 2003 FUNCTION

0700-1700	Foyer	Registration
0700-0800	Pacific Ballroom	SPEAKERS BREAKFAST
0800-1000	Pacific 5	Plume Sensing I
	Pacific 6	Coastal Processes & Evolution: Multi-Decadal Forcing
	Royal 1	Physical Oceanography I
	Royal 3	Marine Policy
	Royal 4	Ocean Observatory Programs
	Sunrise	Quik SCAT Vector Winds: Validation & Applications
	Sunset	Ropes & Tension Members I
	Sheffield	Boundary Interaction
	Hampton	Image Processing
	Windsor	SONAR CAD/CAC I
	Garden 1	Military AUVs
	Garden 2	Academic AUVs II
0900-1600	Exhibit Hall B	POSTER PAPERS
	Exhibit Hall B	STUDENT POSTERS
0900-1730	Exhibit Hall A&B	Exhibit Hall Hours
0940-1000		BREAK
1000-1200	Pacific 5	Aquatic Science
	Pacific 6	Coastal Processes & Evolution: Millenial Scale Forcing
	Pacific 7	Science, Technology and Management in the US National Marine Sanctuary
	Royal 1	Physical Oceanography II
	Royal 2	Navigation & Positioning
	Royal 4	Exploring Earth's Oceans
	Sunrise	Advances in Satellite Altimetry for Ocean Monitoring
	Sunset	Ropes & Tension Members II
	Sheffield	Acoustic Applications
	Hampton	Arrays & Processing
	Windsor	SONAR CAD/CAC II
	Garden 1	Military AUVs II
	Garden 2	NOAA External Stakeholder Forum
1200-1320	Grand Ballroom	IEEE/OES AWARDS LUNCHEON
1320-1520	Pacific 5	Aquaculture
	Pacific 6	Coastal Processes & Evolution: Modeling the Evolution of Littoral Cells
	Pacific 7	Science, Technology and Management in the US National Marine Sanctuary
	Royal 1	Current Measurements
	Royal 2	Telemetry/Modems I
	Royal 4	Exploration, Education, Bringing Oceans to the Classroom
	Royal 5/6	SCRIPPS HISTORY SESSION
	Sunrise	Data Products for Satellite Instruments
	Sunset	Moorings

Schedule At-A-Glance

WEDNESDAY SEPT. 24, 2003

TIME	ROOM#	FUNCTION
1320-1520	Sheffield Hampton Windsor Garden 1 Garden 2	Acoustic Validation Beamforming Acoustic Detection Military AUVs III Blue Ribbon Panel on Opening up the Outer Continental Shelf to Exploration
1330-1700	Terrace Pavillion	SCRIPPS AWARDS WILLIAM A. NIERENBERG PRIZE BREAK
1520-1540		
1540-1720	Pacific 5 Pacific 7 Royal 1 Royal 2 Royal 3 Royal 4 Royal 5/6 Sunrise Sunset Sheffield Hampton Windsor Garden 1	Plume Sensing II Industry Participation Meteorology Telemetry/Modems II COSEE II Exploration Technology, Tools for Inner and Outer Space SCRIPPS HISTORY SESSION II Remote Sensing of Wave Dynamics & Bulk Properties Cables & Connectors Small UUV Sonar Signal Analysis Acoustic Classification Military AUVs IV
1740-2200		SEA WORLD EXTRAVAGANZA

THURSDAY SEPT. 25, 2003

TIME	ROOM#	FUNCTION
0700-1500	Foyer	Registration
0700-0800	Pacific Ballroom	SPEAKERS BREAKFAST
0815-1215	Golden Ballroom	KEYNOTE SESSION, Admiral James Watkins, Chair, President's Commission on Ocean Policy and The Honorable Leon Panetta (See page 17 for details)
0900-1530	Exhibit Hall A&B	Exhibit Hall Hours
0900-1600	Exhibit Hall B	POSTER PAPERS BREAK
0940-1000		
1000-1200	Pacific 5 Pacific 7 Royal 1 Royal 3 Royal 4 Royal 6 Sunrise Sunset	Operational Oceanography Biological Oceanography Ocean Circulation Ocean Science Education I Ocean Energy I Electro-Magnetic HF Radar-Advanced Systems and Applications Seafloor Engineering I

THURSDAY SEPT. 25, 2003

TIME	ROOM#	FUNCTION
1000-1200	Sheffield Hampton Windsor Garden 1 Garden 2	Array Applications Methods for Improved Localization Synthetic Aperture Sonar Unmanned Underwater Vehicles Argos 2-Way Capability: How it Works & How to Use it
1200-1300		Lunch Break
1300-1500	Pacific 5 Pacific 7 Royal 1 Royal 3 Royal 4 Royal 6 Sunrise Sunset Sheffield Hampton Windsor Garden 1 Garden 2 Terrace Pavillion	Real Time Monitoring Planktonic Food Webs Oceanographic Instrumentation I Marine Technology Education Ocean Energy II Video Image Mosaicing HF Radar-Advanced Systems and Applications II Seafloor Engineering II Sensors & Projectors Acoustic Navigation and Localization SAS Focusing I UUV Control Manned & Human Powered Vehicles Passionfish Sustainable Fisheries Forum
1300-1600	Golden Ballroom	INTERNATIONAL PERSPECTIVE The Oceans and the World in the 21st Century. (See page 17 for details) BREAK
1500-1520		
1520-1700	Pacific 5 Pacific 7 Royal 1 Royal 3 Royal 6 Sunset Sheffield Windsor Garden 1 Garden 2	Cross Cutting Issues Industry Participation II Oceanographic Instrumentation II Ocean Science Education II Image Processing Bouy Technology Data Acquisition and Storage SAS Focusing II UUV Control II Human Powered Submarines
1530-2000	Exhibit Hall A	Exhibit Hall Tear Down (Upstairs)

FRIDAY SEPT. 26, 2003

TIME	ROOM#	FUNCTION
1600-2200	Scripps Campus	SCRIPPS CENTENNIAL HOMECOMING CELEBRATION WITH FIREWORKS

Scientific/Technical Program

Wednesday, 8:00 AM - 10:00 AM

Room: Royal 1

Physical Oceanography I

Co-Chairs

Dr. Mary Altalo, SAIC, CA
Patrick Hudson, John Hopkins, APL, MD

Time: 8:00 AM

Collaborative Nautical Charting and Scientific Seabed Mapping Missions:

A Case Study in the Northwestern

Hawaiian Islands 986

Benjamin K. Evans, Dennis Hill, *NOAA Oceans and Coasts, Office of Coast Survey, WA*, Joyce E. Miller, *NOAA Fisheries, Coral Reef Ecosystem Initiative, HI*, Dr. John R. Smith, *Hawaii Undersea Research Laboratory, HI*, Jeremy B. Weirich, *NOAA Research, Office of Ocean Exploration, MD*

Time: 8:20 AM

Plane-Based Calibration for Multibeam

Sonar Mounting Angles 987

Prof. Chau-Chang Wang, Mr. Kuang-Che Yang, Mr. Zhi-Wei Her, Prof. Sen-Wen Shyue, Mr. Liu-Huang Chon-Lon
Institute of Undersea Tech., N. Sun Yat-sen U., Taiwan

Time: 8:40 AM

Analogous Response of the North Pacific Intermediate Water to 20th Century and Glacial Age Climate Changes 988

Dr. Guillermo Auad, Dr. Arthur J. Miller
Scripps Institution of Oceanography - UCSD, CA
Dr. James P. Kennett
University of California, Santa Barbara, CA

Time: 9:00 AM

Tropical Atlantic and Indian Ocean Influences on the Terrestrial and Marine Resources of Africa 989

Prof. Mark R. Jury, *University of Zululand, South Africa*

Time: 9:20 AM

Digital Atlas and Evaluation of the Influence of Inter-Annual Variability on Climate Analyses 990

Dr. Alexander M. Suvorov, Dr. D.R. Palmer, Dr. Alexey Kh. Khaliulin, Dr. Evgeny A. Godin, Dr. V.N. Belokopytov
Marine Hydrophysical Institute of the Ukrainian NAS, Ukraine, Dr. David R. Palmer, *NOAA Atlantic Oceanographic and Meteorological Laboratory, FL*

Wednesday, 8:00 AM - 10:00 AM

Room: Royal 2

Marine Policy

Co-Chairs

James Burgess, NOAA NMFS, MD
William Friedl, CEROS, HI

Time: 8:00 AM

Doing Tangible, Applied, Community Based Marine Restoration in the U.S.: The TNC/CRP

Experience 996

Dr. Robert J. Wilder, *The Nature Conservancy, CA*

Time: 8:20 AM

Legal Regulation of Ocean Energy Systems 997

Ms. Carolyn Elefant, *Law Offices of Carolyn Elefant, MD*

Time: 8:40 AM

Comparison on the Characteristics of Natural Sound of Waves and Imitation Sound of

Waves in Terms of Comfort Level 998

Prof. Masatoshi Katayama, *Kyushu Kyoritsu University, Japan*

Time: 9:00 AM

Environmental Engineering

Grade A Shock Tests 1004

Mr. Juanito DelRosario, Mr. Steven P. Murphy, *SPAWAR Systems Center, San Diego, CA*

Time: 9:20 AM

Ecosystem-Based Management- A New Goal Under NOAA's Strategic Plan 1011

Mr. James P. Burgess, *National Oceanic and Atmospheric Administration, MD*

Time: 9:40 AM

A Tidal Habitat Restoration Success Story - The Union Slough (WA) Restoration Project 1015

Dr. Jon P. Houghton, James E. Starkes, *Hart Crowser, Inc., WA*



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Scientific/Technical Program

Wednesday, 8:00 AM - 10:00 AM

Room: Royal 3

Data Access & Visualization

Co-Chairs

Joe Stinus, *NOAA NCDDC, SC*

Lindsay Gee

Interactive Visualization Systems, Canada

Time: 8:00 AM

SIOExplorer: IT for Research and Education 1016

Mr. Stephen P. Miller, Dr. Hubert Staudigel, Dr. Catherine

Johnson, Deborah Day, Dr. John Helly

Scripps Institution of Oceanography, CA

Time: 8:20 AM

New Developments in Internet-Based

Delivery of MetOc Data to Warfighters 1020

Ms. Elizabeth Warner, Dr. Roy Ladner, Udaykiran

Katikaneni, *Naval Research Laboratory, MS*

Mr. John Shea, *SPAWARSSYSCOM, CA*

Time: 8:40 AM

Spatio-Temporal Data Access for

Information-Based Decision Making 1025

Dr. Roy Ladner, Elizabeth Warner, Dr. Fred Petry, *Naval*

Research Lab, MS

Time: 9:00 AM

EnVis/Hum: High-Resolution Ocean

Model Visualization and Display 1030

Mr. Michael A. Chupa, Mr. Jace A. Mogill, Mr. Derek W.

Irby, Dr. Robert J. Moorhead

Mississippi State University / ERC, MS

Dr. Jay F. Shriver, Mr. Peter M. Flynn

Naval Research Laboratory, MS

Time: 9:20 AM

Parallel Software Solutions for Processing

Hydrographic Data 1032

Dr. M.J. Miller, *The Naval Research Laboratory, Geary*

Layne, *The Naval Research Laboratory, Jim Braud, The*

Naval Oceanographic Office, Dr. Krzysztof Sarnowski,

Hydrographic Science Research Center, Naval Research

Laboratory, Stennis Space Center, MS

Wednesday, 8:00 AM - 10:00 AM

Room: Royal 4

Ocean Observatory Programs

Chair

Dr. John A. Orcutt

Scripps Institution of Oceanography, UCSD, CA

Time: 8:00 AM

Project Neptune: An Innovative, Regional Cabled Ocean Observatory in the Northeast Pacific 1038

Dr. John R. Delaney, *University of Washington, WA,*

Dr. Christopher R. Barnes, *University of Victoria, Canada,*

Dr. Patricia Beauchamp, *Jet Propulsion Laboratory, CA,*

Dr. Alan Chave, *Woods Hole Oceanographic Institution,*

MA, Dr. Marcia McNutt, Monterey Bay Aquarium

Research Institute, CA, Dr. John Madden, Institute of

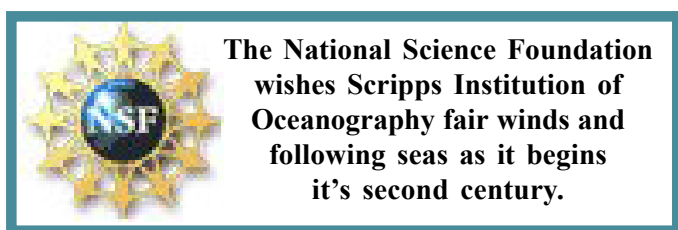
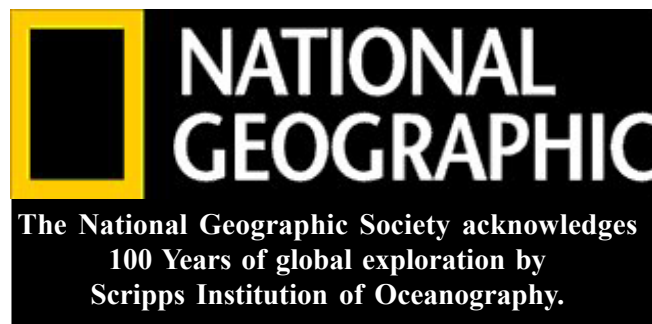
Pacific Ocean Science and Technology, Canada

Time: 8:20 AM

Dynamics of Earth and Ocean Systems (DEOS) 1043

Prof. John A Orcutt, *Scripps Institution of Oceanography,*

CA



Scientific/Technical Program

Wednesday, 8:00 AM - 10:00 AM

Room: Sunrise

Quik SCAT Vector Winds:

Validation & Applications

Co-Chairs Charlie Hopkins, Planning Systems Inc., CA
Dr. Mark A. Bourassa, Florida State Univ., FL

Time: 8:00 AM

Validation of QSCAT Vector Winds

with Air-Sea Interaction Spar Fluxes 1044
Prof. Hans C. Graber, Prof. Mark A. Donelan, *University of Miami, FL*

Michael Caruso, *Woods Hole Oceanographic Institution, MA*

Dr. Vincent J. Cardone, *Oceanweather, Inc., CT*

Time: 8:20 AM

QuikSCAT Wind Retrievals for

Tropical Cyclones 1045
Dr. Simon Yueh, Dr. Bryan Stiles, Dr. W. Timothy Liu
Jet Propulsion Laboratory, CA

Time: 8:40 AM

Fine Resolution Satellite-Based

Winds for Episodic Events 1046
Dr. Mark A. Bourassa, Prof. James J. O'Brien
Florida State University, FL

Time: 9:00 AM

A New Temporal Interpolation Method for High-Frequency Vector Wind Fields 1050
Dr. Jorge Zavala-Hidalgo, Dr. Mark A Bourassa, Dr. Steven L Morey, Dr. James J. O'Brien, Mr. Peng Yu
COAPS/Florida State University, FL

Wednesday, 8:00 AM - 10:00 AM

Room: Sunset

Ropes & Tension Members I

Co-Chairs

Melvin St. John, *TMT Labs, CA*

Jeffrey Hayden, *MARAD, DC*

Time: 8:00 AM

Ropes and Tension Members

Committee Meeting
John Flory, *Tension Technology International, NY*

Time: 8:20 AM

Improving Bend-Over-Sheave Fatigue

Fiber Ropes 1054
Dr. Forrest E. Sloan, Rick Nye, Mr. Tom Liggett, *The Cortland Companies, NY*

Time: 8:40 AM

Fatigue and Residual Strength of

Fiber Tuglines 1058
Eric McCorkle, Rafael Chou, Danielle Stenvers, *Samson Rope Technologies, WA*, Paul Smeets, Martin Vlasblom, Edwin Grootendorst, *DSM High Performance Fibers, The Netherlands*

Time: 9:00 AM

Proper Use of Fiber Ropes on

Capstans and Bitts 1064
Mr. John F. Flory, *Tension Technology International, NY*
John H. Hagedorn, *United States Merchant Marine Academy, NY*



Sponsors of the Sand Sculpture



The National Aeronautics and Space Administration congratulates Scripps Institution of Oceanography's many contributions to earth science.



The National Oceanic and Atmospheric Administration commends Scripps Institution of Oceanography on the occasion of its Centennial.

Scientific/Technical Program

Wednesday, 8:00 AM - 10:00 AM

Room: Sheffield

Boundary Interaction

Chair

Dr. D. J. Tang

Univ. of Washington APL, WA

Time: 8:00 AM

Modeling the Effects of Surface Sediments and Small Scale Bathymetry Upon High-Frequency

Shallow Water Reverberation 1070

Mr. Melvin D Wagstaff, *Naval Oceanographic Office, MS*

Ms. Ruth Eta Keenan, *Science Applications International Corporation, MA*

Time: 8:20 AM

Acoustic Echo Formation -

A Filter Theory Approach 1071

Prof. Adam Zielinski, *University of Victoria, Canada*

Dr. Jaroslaw Tegowski, *Institute of Oceanology, Poland*

Time: 8:40 AM

Wave Reflection from POROUS Ocean Sediment with Depth-Dependent Properties

 1076

Mr. Keun-Hwa Lee, Prof. Woojae Seong, *Seoul National University, Korea (Republic)*

Time: 9:00 AM

Acoustic Wave Scattering from a Rough Seabed Over a Sediment Layer with Generalized-Exponential Density and Inverse-Square

Sound Speed Profiles 1082

Prof. Jin-Yuan Liu, Mr. Sheng-Hsiung Tsai, Chung-Ray Chu, Yung-Hong Wu, Ms. I-Chun Lin, *National Sun Yat-sen University, Taiwan*

Time: 9:20 AM

Analysis of the Field of Narrow-Band

Signals Percolating Into Marine Bottom 1090

Prof. Genadii Petrovich Turmov, *Far-Eastern State Technical University, Russia*

Wednesday, 8:00 AM - 10:00 AM

Room: Hampton

Image Processing

Chair

Dr. Harry Cox, *Orincon, CA*

Time: 8:00 AM

High Rate Acoustic Link for

Underwater Video Transmission 1091

Costas Pelekanakis, Milica Stojanovic, *Massachusetts*

Institute of Technology, MA

Lee Freitag, *Woods Hole Oceanographic Institution, MA*

Time: 8:20 AM

3D Acoustic Image Segmentation by a

RANSAC-Based Approach 1098

L. Tao, U. Castellani, A. Fusiello, V. Murino, *Dipartimento di Informatica, University of Verona, Italy*

ADC/ROV

UI 2004

Underwater Intervention

New Orleans, LA

February 17-19, 2004

IEEE

UT '04

Underwater Technology

Taipei, Taiwan

April 20-23, 2004

MTS/IEEE

Oceans '04 Techno-Ocean '04

Kobe, Japan

November 9-12, 2004

MTS/IEEE

Oceans 2005

Washington, DC

September 19-23, 2005



Student Sponsor

Scientific/Technical Program

Wednesday, 8:00 AM - 10:00 AM

Room: Windsor

SONAR CAD/CAC I

Co-Chairs

Dr. Gerald J. Dobeck
Coastal Systems Station, FL
Dr. Daniel D. Sternlicht
Dynamics Technology, Inc.

Time: 8:00 AM

Normalization of Ambient Background Intensity in High-Resolution Sonar Imagery and Its Impact on Mine Detection and Classification 1102

Dr. Gerald J. Dobeck, *NSWC Coastal Systems Station, FL*
Dr. David F. Naar, Dr. Stanley D. Locker, Dr. Peter Howd,
Dr. Albert C. Hine, Mr. Brian T. Donahue, Mr. Justin Brodersen, *Naval Research Laboratory, FL*

Time: 8:20 AM

Use of Texture Measures in Improving Mine Classification Performance 1103

Dr. Martin Glen Bello, *Alphatech, Inc., MA*
Dr. Gerald J. Dobeck, *NSWC Coastal Systems Station, Dahlgren Division, FL*

Time: 8:40 AM

Relevance Vector Machine Feature Selection and Classification for Underwater Targets 1110

Lawrence Carin, *Duke University*; Gerald Dobeck, *NSCS, FL*

Time: 9:00 AM

Processing String Fusion Approach Investigation for Automated Sea Mine Classification in Shallow Water 1111

Dr. Tom Aridgides, Dr. Manuel F. Fernández, *Lockheed Martin Naval Electronics & Surveillance Systems, NY*
Dr. Gerald J. Dobeck, *NSWC, Coastal Systems Station Dahlgren Division, FL*

Time: 9:20 AM

Real-Time Performance of Fusion Algorithms for Computer Aided Detection and Classification of Bottom Mines in the Littoral Environment 1119

Charles M. Ciany, Mr. William C. Zurawski, *Raytheon Company, RI*
Dr. Gerald J. Dobeck, *NSWC Coastal Systems Station, Dahlgren Division, FL*

Wednesday, 8:00 AM - 10:00 AM

Room: Garden 1

Military AUVs

Co-Chairs

Dr. Tom Swean, ONR, VA
Steve Castelin
Coastal Systems Station, FL

Time: 8:00 AM

Conformal Hull Search Using the Harbor Defense CetusII AUV 1126

Mr. Gary M. Trimble
Lockheed Martin Perry Technologies, CA

Time: 8:20 AM

NAVOCEANO Seahorse AUV Participation in the Giant Shadow Experiment 1127

Dr. John E. Dzielski, Dr. Sekhar Tangirala, Dr. Charles R. Zentner, Mr. Mark J. Bregar, Mr. Dennis L. McDowell, *Applied Research Laboratory / Penn State University, PA*
R. P. Swanson, Jr., *Naval Oceanographic Office, Stennis Space Center, MS*

Time: 8:40 AM

A Solar-Powered Autonomous Underwater Vehicle 1132

James Jalbert, John Baker, John Duchesney, Paul Pietryka, William Dalton, *Acoustikos Div. Falmouth Scientific, Inc., D.R. Blidberg, Steve Chappell, Autonomous Undersea Systems Institute, Robert Nitzel, Technology Systems, Inc., Dr. Ken Holappa, Private Consultant*

Time: 9:00 AM

The HUGIN 1000 Autonomous Underwater Vehicle for Military Applications 1141

Per Espen Hagen, Nils Størkersen, *Norwegian Defence Research Establishment (FFI), Norway*, Karstein Vestgård, Per Kartvedt, *Kongsberg Simrad AS Royal Norwegian Navy Mine Warfare Flotilla, Norway*

Time: 9:20 AM

A Toolbox of Aiding Techniques for the HUGIN AUV Integrated Inertial Navigation System 1146

Bjørn Jalving, Kenneth Gade, Ove Kent Hagen, *Norwegian Defence Research Establishment, Norway*, Karstein Vestgård, *Kongsberg Simrad, Norway*

Scientific/Technical Program

Wednesday, 8:00 AM - 10:00 AM
Room: Garden 2

Academic AUVs II Co-Chairs

Dr. P.C.E. An,
Florida Atlantic University, FL
Richard Blidberg, *AUSI, NH*

Time: 8:00 AM

A Wearable Vehicle Interface for Augmented Reality in Operating AUVs 1154
R. Damus, Jim Morash, C. Chrysostomidis, *MIT Seagrant AUV Lab, MA*

Time: 8:20 AM

Development of an Autonomous Underwater Vehicle for Sub-Ice Environmental Monitoring in Prudhoe Bay, Alaska 1161
Mr. Charles Lee Frey, Dr. Stephen Wood, *Florida Institute of Technology, FL*

Time: 8:40 AM

A Deep Sea AUV "MR-X1" for Scientific Work 1174
Hiroshi Yoshida, Taro Aoki, Takashi Murashima, Satoshi Tsukioka, Hidehiko Nakajoh, Tadahiro Hyakudome, Shojiro Ishibashi, *JAMSTEC, Japan*, Ryoko Sasamoto, *Tokyo University of Mercantile Marine, Japan*

Time: 9:00 AM

Time Optimal Control for Underwater Robot Manipulators Based on Iterative Learning Control and Time-Scale Transformation 1180
Mr. Norimitsu Sakagami, Prof. Sadao Kawamura
Ritsumeikan University, Japan

Time: 9:20 AM

Optimization of the Hydrodynamic Performance of an In-Service AUV 1187
Prof. Grant E. Hearn, *Southampton University & Southampton Oceanography Centre, United Kingdom*
Mr. Alan J. Murphy, *Southampton University, United Kingdom*
Mr. Chris D. Fallows, Mr. Maaten Furlong,
Southampton Oceanography Centre, United Kingdom

Wednesday, 10:00 AM - 12:00 PM
Pacific 5

Aquatic Science Chair

Dr. Sunny Jiang
Univ. Of California, Irvine, CA

Time: 10:00 AM

Anthropogenic Radionuclides and Radioecological Situation in the Sea of Japan 1188
Dr. Mikhail Mikhailovich Domanov, Miss Elena Grigorevna Vodaynaay, *PP.Shirshov Institute of Oceanology, Russian Academy of Sciences, Russia*, A.I. Svininnikov, *Pacific Oceanology Institute, Russia*
Ms. Maksim Viktorovich Vladimirov, *Ministry of Russian Federation of Civil Defence, Emergencie, Russia*
Mr. Oleg Leonidovich Kuznetsov, *Ministry of Russian Federation of Civil Defence, Emergencie, Russia*
Dr. Valery Vladimirovich Kobylaynsky
Federal Research Center MCB «Electron, Russia

Time: 10:20 AM

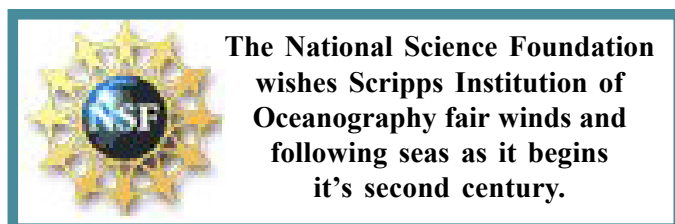
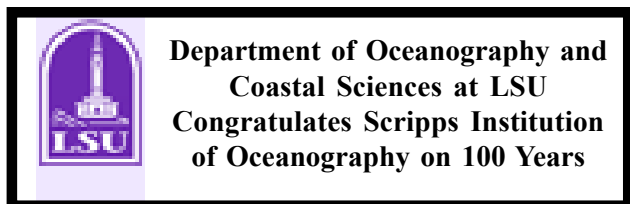
Bio-composting of Distillary Waste to Control Water Pollution 1194
Dr. Ashok Kumar Ghosh, Dr. Bihari Singh, Dr. Nupur Bose, Mr. K.K.Tiwari, *Department of Environment and Water Management, A.N.College, India*

Time: 10:40 AM

Study of "Trophic Status" of a Pond Through Diurnal Profiling 1199
Dr. Ashok K. Ghosh, Dr. Pankaj Kumar, Dr. Nupur Bose, *Department of Environment and Water Management, A.N.College, India*

Time: 11:00 AM

Toxicity of Emamectin Benzoate in Commercial Fish Feed to Adults of the Spot Prawn and Dungeness Crab 1205
Graham C. van Aggelen, Michelle R. Linssen *Environment Canada-Pacific Environmental Science Centre, Canada*
Richard Endris, *Schering-Plough Animal Health Corporation, NJ*



Scientific/Technical Program

Wednesday, 10:00 AM - 12:00 PM

Room: Pacific 6

Coastal Processes and Evolution: Millennial Scale Forcing

Chair **Dr. Douglas L. Inman**
Scripps Institution of Oceanography, UCSD, CA

Time: 10:00 AM

Terraces on a Rising Coast 1209
Wolfgang H. Berger, *Scripps Institution of Oceanography, CA*

Time: 10:20 AM

**Step-Like Rise of Post-Glacial Sea Level
and Geological Implications** 1213
Rev. John D. Milliman, *School of Marine Science, College
of William and Mary, VA*
Dr. J. Paul Liu, *Woods Hole Oceanographic Institution, VA*

Time: 10:40 AM

**Budgeting Postglacial Sedimentation
History on the Santa Cruz, California
Mid-Continental Shelf** 1214
Dr. Eric E. Grossman, Dr. Steve L. Eittreim, Dan M. Hanes,
Michael E. Field, Brian D. Edwards, Stewart J. Fallon,
Roberto J. Anima, *US Geological Survey, CA*
Stewart J. Fallon, *Lawrence Livermore National
Laboratory, CA*

Time: 11:00 AM

**Cliff Erosion and Bluff Retreat Along the
California Coast** 1219
Dr. Gary B. Griggs, Ms. Kiki B. Runyan, *University of
California, Santa Cruz, CA*

Time: 11:20 AM

**The Roles of Tectonic Subduction and the
Earth's Changing Climate in the Morphologic
Evolution of the Oregon Coast** 1228
P.D. Komar, *College of Oceanic & Atmospheric Sciences,
Oregon State University, OR*, J.C. Allan, *Oregon
Department of Geology and Mineral Industries, Coastal
Field Office, OR*

Wednesday, 10:00 AM - 12:00 PM

Room: Pacific 7

Science, Technology and Management in the U.S. National Marine Sanctuary

Co-Chairs **James Lindholm**
*Stellwagen Bank National
Marine Sanctuary, MA*
Dr. Steve Gittings, *NOAA MSD, MD*

Time: 10:00 AM

**SWiM in Marine Sanctuaries: the Challenge of
Monitoring a System of Protected Areas** 1232
Dr. Steve Gittings, *NOAA/National Marine Sanctuary
Program, MD*

Time: 10:20 AM

**Movement Patterns and Site Utilization of
Fishes as Determined By Acoustic
Telemetry: Implications for the
Design of Marine Reserves** 1235
James Lindholm, *NOAAs Stellwagen Bank National
Marine Sanctuary, MA*
Peter Auster, *National Undersea Research Center at the
University of Connecticut, CT*
Les Kaufman, *Boston University Marine Program, MA*
Steven Miller, *National Undersea Research Center at the
University of North Carolina, NC*
Greg Stone, *New England Aquarium, MA*

Time: 10:40 AM

**Using Laser Line Scan Imaging Technology to
Assess Deepwater Seafloor Habitats in the
Monterey Bay National Marine Sanctuary** 1238
Mary M. Yoklavich, Churchill B. Grimes, *NOAA NMFS
SWFSC, Santa Cruz Laboratory, CA*
W. Waldo Wakefield, *NOAA NMFS NWFSC, OR*



**Woods Hole
Oceanographic Institution**

Woods Hole Oceanographic Institution
congratulates Scripps Institution of Oceanography
for a century of global discovery

Scientific/Technical Program

Wednesday, 10:00 AM - 12:00 PM

Room: Royal 1

Physical Oceanography II

Chair

Dr. Molly O. Baringer

NOAA AOML, FL

Dr. Myrl Hendershott

Scripps UCSD, CA

Time: 10:00 AM

20th Century Sea Level Change: an Enigma 0

Prof. Walter Munk, *Scripps Institution of Oceanography UCSD, CA*

Time: 10:20 AM

Wind-Driven Shelf/Basin Exchange on a Broad Arctic Shelf: The Joint Roles of Ice Cover Extent and Shelfbreak Bathymetry 1239

Dr. David C. Chapman, *Woods Hole Oceanographic Institution, MA*, Dr. Eddy Carmack, *Institute of Ocean Sciences, Canada*

Time: 10:40 AM

Temporal Variability of the Upper Ocean Southeast the Kerguelen Plateau 1240

Dr. Xiaojun Yuan, Dr. Douglas G. Martinson, *Lamont-Doherty Earth Observatory of Columbia University, NY*
Prof. Zhaoqian Dong, *Polar Research Institute of China, China*



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Wednesday, 10:00 AM - 12:00 PM

Room: Royal 2

Navigation & Positioning

Co-Chairs

Michael E. Trenchard, *NRL SSC, MS*

Mr. Sunil Bisnath, *The University of Southern Mississippi, MS*

Time: 10:00 AM

The Use of A GPS-Equipped Buoy for Water Level Determination 1241

Mr. Sunil Bisnath, Dr. David Wells, Dr. Stephan Howden
The University of Southern Mississippi, MS
Dr. Gregory Stone, *Louisiana State University, LA*

Time: 10:20AM

Demonstration of a Moving-Map System for Improved Precise Lane Navigation of Amphibious Vehicles and Landing Craft 1247

Ms. Maura C. Lohrenz, Ms. Stephanie S Edwards, Ms. Stephanie A Myrick, Mr. Marlin L Gendron, Mr. Michael E Trenchard, *Naval Research Laboratory, MS*

Time: 10:40 AM

Implementation of a ROV Navigation System Using Acoustic/Doppler Sensors and Kalman Filtering 1255

Mr. Michel Blain, Régis Houde, *Hydro-Québec*
Mr. Sylvain Lemieux, *École de technologie Supérieure, Canada*

Time: 11:00 AM

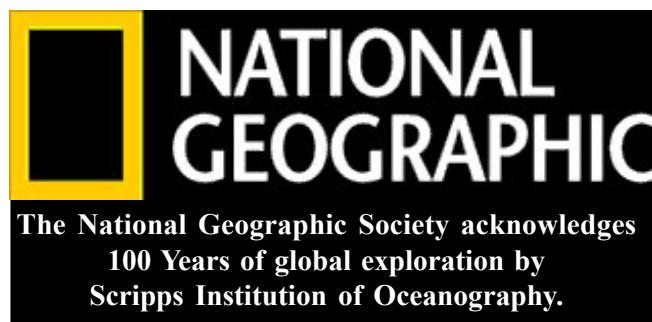
Improved AUV Navigation using Side-Scan Sonar 1261

Dr. Ioseba Tena Ruiz, Dr. Yvan Petillot, Prof. David M Lane,
Heriot-Watt University, Scotland

Time: 11:20 AM

Robust Terrain Navigation with the Correlation Method for High Position Accuracy 1269

Ingemar Nygren, Magnus Jansson, *Department of Signals, Sensors and Systems, Royal Institute of Technology (KTH), Sweden*



Scientific/Technical Program

Wednesday, 10:00 AM - 12:00 PM

Room: Royal 3

COSEE I

Chair

Dr. Sharon Walker

Univ. of Southern Mississippi, MS

Dr. Cheryl Peach, *Scripps UCSD, CA*

Time: 10:00 AM

The Centers for Ocean Science Education

Excellence (COSEE) Initiative:

A Network-Wide Perspective 1278

Dr. Susan B. Cook, *National Science Foundation, VA*

Time: 10:20AM

NER-COSEE: Strategies to Involve Research

Scientists in Ocean Science Education 1279

Andrea Thorrold, Deborah K. Smith, *Woods Hole*

Oceanographic Institution, MA

Carolyn Levi, William Spitzer, *New England Aquarium, MA*

Bob F. Chen, *University of Massachusetts, MA*

Time: 10:40 AM

Mid-Atlantic Center for Ocean Sciences

Education Excellence 1280

Michael P. De Luca, Janice McDonnell, *Rutgers Institute of Marine and Coastal Sciences, NJ*

Liesl Hotaling, *Stevens Institute of Technology, NJ*

Laura Murray, *University of Maryland, MD*

Michael C. Newman, *Virginia Inst. of Marine Science, College of William & Mary, VA*

Time: 11:00 AM

Southeast Center for Ocean Sciences

Education Excellence: Building Connections

Between Ocean Scientists and Educators

Through Partnerships 1281

Dr. Lundie Spence, Dr. Carrie Thomas, *SouthEast COSEE, NC*



Sponsors of Student Posters and Lanyards

Wednesday, 10:00 AM - 12:00 PM

Room: Royal 4

Exploring Earth's Oceans

Chair

Capt. Craig N. Mc Lean

NOAA Office of Ocean Exploration, MD

Time: 10:00 AM

Exploration in the South Atlantic Bight:

Discovery of New Resources with

Pharmaceutical Potential 1283

Shirley A. Pomponi, Amy E. Wright, John K. Reed, *HARBOR BRANCH Oceanographic Institution, Inc., FL*

Time: 10:20 AM

Explorations of Active Volcanic Sites

in the Pacific Ocean - Preliminary Results

from the Submarine Ring of Fire Ocean

Exploration Program 1285

Dr. Robert W. Embley, *NOAA - Pacific Marine,*

Environmental Laboratory, OR, Dr. Edward T. Baker,

NOAA - Pacific, Marine Environmental Laboratory, WA

Time: 10:40 AM

High-Resolution Multibeam Mapping and

Submersible Surveys of Topographic Features

in the Northwestern Gulf of Mexico 1286

Emma L. Hickerson, George P. Schmahl, Doug C. Weaver

Flower Garden Banks National Marine Sanctuary/NOAA,

TX, James V. Gardner, *Pacific Seafloor Mapping Team, U. S. Geological Survey, CA*

Time: 11:00 AM

Marine Archaeological Exploration

of the Black Sea 1287

Dwight F. Coleman, Robert D. Ballard, Todd Gregory,

Institute for Archaeological Oceanography, University of

Rhode Island Graduate School of Oceanography, RI,

and, Institute for Exploration, CT

Time: 11:20 AM

Digital Video Needs for Oceanographic Images

for the National Oceanic and Atmospheric

Administration (NOAA): Phase 2 1292

Ms. Dottie Anderson, Ms. Janice Beattie, Ms. Mary Lou

Cumberpatch, Ms. Anna Fiolek, *National Oceanic and*

Atmospheric Administration, MD

Time: 11:40 AM

A Towed Sea-Floor Source for

Seismic Exploration 1297

Dr. Allan Wayne Sauter, Prof. LeRoy M. Dorman

Scripps Institution of Oceanography, CA

Scientific/Technical Program

Wednesday, 10:00 AM - 12:00 PM

Room: Sunrise

Advances in Satellite Altimetry for Ocean Monitoring
Co-Chairs
Dr. Russell Keith Raney
John Hopkins Univ. APL, MD
Eric Gottshall
SPAWARSYSCEN San Diego, CA

Time: 10:00 AM

Evaluation of an Oil Spill Trajectory Model Using Satellite-tracked, Oil-Spill-Simulating Drifters 1303
Dr. James Michael Price, Dr. Mark Reed, Dr. Walter R. Johnson, Dr. Zhen-Gang Ji, Mr. Charles F. Marshall, Ms. Gail B. Rainey, *U. S. Minerals Management Service, VA*,
Dr. Mathew K. Howard, Prof. Norman L. Guinasso, *Texas A and M University, TX*

Time: 10:20 AM

Operational Oceanographic Applications for the Wide Swath Ocean Altimeter 1312
Dr. Gregg A. Jacobs, *Naval Research Laboratory, MS*

Time: 10:40 AM

The Delay-Doppler Radar Altimeter: Robust and Improved Measurement Capabilities 1313
Dr. Russell Keith Raney, Dr. J. Robert Jensen, Dr. David L. Porter, *Johns Hopkins University Applied Physics Laboratory, MD*

Time: 11:00 AM

Ocean Observations with a Space-based Delay-Doppler Altimeter Constellation 1317
Dr. David L. Porter, Dr. R. Keith Raney, Dr. J. Robert Jensen, *Johns Hopkins University Applied Physics Laboratory, MD*

Time: 11:20 AM

GEOSAT Follow-on GFO Radar Altimeter Satellite Performance 1321
Mr. Jay L Finkelstein, *Space System Consultant, IL*
Mr. Mort Rau, *Computer Sciences Corp., VA*
Dr. James McMillan, *Software Process Engineering Consulting Services, MD*

Time: 11:40 AM

Radar Method for Atmospheric Stratification Condition Unambiguous Determination By Synergy Data of Sea Surface Altimetric and Scatterometric Observations 1322
Prof. Arakelyan Artashes, *Institute of Radiophysics & Electronics, Armenia*
Dr. Hambaryan Astghik, *Ecoserv Remote Observation Centre Co.Ltd, Armenia*

Wednesday, 10:00 AM - 12:00 PM

Room: Sunset

Ropes & Tension Members II
Chairs
Odoardo Lopez
Coordinated Equipment Co, CA
Mark Huntley
Whitehill Manufacturing Co., PA

Time: 10:00 AM

Experimental Study for Small Diameter Flexible Lines 1323
Dr. Petru Petrina, Dr. Stuart L Phoenix
Cornell University, NY

Time: 10:20 AM

A Tensioning System for Use with Synthetic Ropes 1329
Dr. Eric A Johnson, *Advanced Design Consulting, Inc, NY*
Dr. Petru Petrina, Dr. Stuart L Phoenix, *Cornell University, NY*

Time: 10:40 AM

Optical Scanning Apparatus for Ropes Non-Destructive Test Monitoring System 1335
Mr. Nicholas O'Hear, *Tension Technology International, Netherlands*

Time: 11:00 AM

Theoretical Study on Rotation of Doubly Layered Torque Balance Cable 1342
Mr. Yusuke Yano, Dr. Shinichi Takagawa, *Japan Marine Science and Technology Center, Japan*

Time: 11:20 AM

The Prediction of Cyclic Load Behaviour and Modulus Modulation for Polyester and Other Large Polymer Ropes 1348
C.M. Leech, S.J. Banfield, M.S. Overington, *Tension Technology International Ltd and M. Lemoel SBM Inc., England*

Time: 11:40 AM

Designing SPM Hawsers to Today's Requirements 1353
Mr. Louis F. Hoppe, *Bexco, Belgium*

Scientific/Technical Program

Wednesday, 10:00 AM - 12:00 PM

Room: Sheffield

Acoustic Applications

Chair

Dr. Brett Castile
Orincon, CA

Time: 10:00 AM

Acoustic Detection of Ultra-High

Energy Neutrinos 1360

Prof. Giorgio Gratta, Mr. Yue Zhao, *Stanford University, CA*, Mr. Justin Vandenbroucke, *Universky of California, Berkeley, Ca*, Dr. Nikolai Lehtinen, *University of Hawaii, Manoa, HI*

Time: 10:20 AM

Acoustic Lens Camera and Underwater Display Combine to Provide Efficient and Effective Hull and Berth Inspections 1361

Edward O. Belcher, *Applied Physics Laboratory, University of Washington, WA*, Dennis G. Gallagher, *Diving & Life Support Systems Division, NSWCDD-Coastal Systems Station, FL*, CWO2 Jeffery R. Barone, *Shore Intermediate Maintenance Activity, FL*, Ronald E. Honaker, *Human Systems Integration & Engineering, NSWCDD-Coastal Systems Station, FL*

Time: 10:40 AM

Underwater Acoustic Modem Using

Multi-Carrier Modulation 1368

Dr. Lam F. Yeung, Ms. Robin S. Bradbeer, Mr. Eric Law, Angus Wu, *City University of Hong Kong, China*

Time: 11:00 AM

Estimating the Spatial and Temporal Distribution of Snapping Shrimp Using a Portable, Broadband

3-Dimensional Acoustic Array 1376

Mr. Koay Teong Beng, Mr. Mandar Chitre, Mr. Tan Eng Teck, Dr. John R. Potter, *Acoustic Research Lab, TMSI, National University of Singapore, Singapore*

Wednesday, 10:00 AM - 12:00 PM

Room: Hampton

Arrays & Processing

Co-Chairs

Geoff Edelson, *BAE Systems, NH*
Dr. Leroy Dorman, *Scripps UCSD, CA*

Time: 10:00 AM

Calibration of Sonobuoy Compass Via

Arrival Time Inversion 1377

Dr. Kevin J. Delaney, Mr. Jim Alsup, Mr. Peter Sullivan
AETC, Incorporated, CA

Time: 10:20 AM

Model-Based Detection in a Noisy

Shallow-Water Enviromnent 1380

Dr. Edmund J. Sullivan, *OASIS Inc.*
Dr. James V. Candy, *Lawrence Livermore National Laboratory, CA*, Dr. William M. Carey, *Boston University, MA*

Time: 10:40 AM

Multipath Cancellation Using a Maximum

Likelihood Approach 1381

Dr. John E. Piper, *Coastal Systems Station, FL*

Time: 11:00 AM

Nulling Crosstalk in Underwater Communication with an Adaptive Time-Reversal Mirror 1382

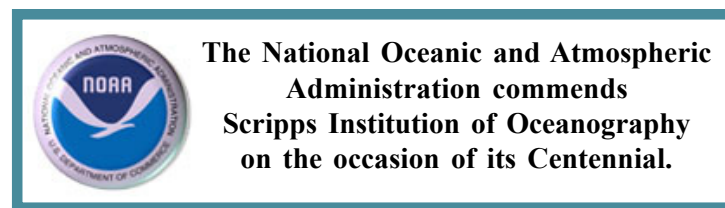
J.S. Kim, K.C. Shin, *Korea Maritime University, Korea (Republic)*

Time: 11:20 AM

Nearfield Noise Identification with a Passive Array in the Underwater Anechoic

Basin at KRISO 1389

Sea-Moon Kim, Youngcheol Choi, Yong-Kon Lim, *Korea Research Institute of Ships and Ocean Engineering (KRISO), Korea*



Scientific/Technical Program

Wednesday, 10:00 AM - 12:00 PM

Room: Windsor

SONAR CAD/CAC II

Co-Chairs

Dr. Daniel D. Sternlicht

Dynamics Technology, Inc.

Dr. Gerald J. Dobeck

Coastal Systems Station, FL

Time: 10:00 AM

Computer-Aided Detection and Classification of Minelike Objects Using Template-Based

Features 1395

Dr. John A. Fawcett, *DRDC- Atlantic, Canada*

Time: 10:20 AM

A Model-Based Approach to Mine Detection and Classification in Sidescan Sonar 1402

Mr. Scott Frank Reed, Dr. Yvan Robert Petillot, Dr. Judith Marion Bell, *Heriot-Watt University, United Kingdom*

Time: 10:40 AM

High-Frequency Acoustic Inversion Using a Military Mine-Hunting Sonar 1408

Mr. Frank W. Bentrem, Mr. John Sample, Dr. Dale Bibee, Mr. Mike Harris, Mr. Will Avera, *Naval Research Laboratory, MS*

Time: 11:00 AM

Tracking Benthic Boundaries Using a Profiler Sonar: a Mixture Model Approach 1409

Christian Barat, Maria João Rendas, *Laboratoire I3S, (Informatique, Signaux et Systèmes de Sophia Antipolis), FRANCE*



Wednesday, 10:00 AM - 12:00 PM

Room: Garden 1

Military AUVs II

Co-Chairs

Steve Castelin

Coastal Systems Station, FL

Dr. Tom Swean, *ONR, VA*

Time: 10:00 AM

User Operational Evaluation System of Unmanned Underwater Vehicles for Very Shallow Water Mine Countermeasures 1417

Mr. David L Clegg, *EDO Professional Services, CA*
Michael Peterson, *Naval Special Clearance Team ONE, CA*

Time: 10:20 AM

REMUS UUV Navigation Accuracy Testing 1424

Mr. Tim John McTrusty, Mr. John David Dudinsky
U.S. Navy Coastal Systems Station, FL

Time: 10:40 AM

Hydrodynamic Modeling of LMRS Unmanned Underwater Vehicle and Tow Tank Test Validation 1425

Dr. Yuh-Lin Hwang, *The Boeing Company / Unmanned Underwater Vehicle Systems, CA*

Time: 11:00 AM

Simulation Validation for a Unmanned Semi-Submersible Vehicle 1431

Mr. Louis J. Larkin, Mr. Carl J. Thomsen
Lockheed Martin NESS, FL

Time: 11:20 AM

Modularized Unmanned Vehicle Packages for the Littoral Combat Ship Mine Countermeasures Missions 1437

Mr. Robert Schnoor, *US Office of Naval Research, VA*

Time: 11:40 AM

A Low-Frequency Sonar for Sensor-Adaptive, Multi-Static, Detection and Classification of Underwater Targets with AUVs 1440

Mr. Donald Patrick Eickstedt, Prof. Henrik Schmidt
Massachusetts Institute of Technology, MA

Scientific/Technical Program

Wednesday, 10:00 AM - 12:00 PM

Room: Garden 2

NOAA External Stakeholder Forum

Chair

Joyce Wood

Office of Strategic Planning, NOAA, MD

Time: 10:00 AM

NOAA's Future

Vice Admiral Conrad C. Lautenbacher Jr., *NOAA*

Facilitated dialog sessions

Dialog session reports/discussion

Closing Remarks



MTS/IEEE
Oceans 2005
Washington, DC
September 19-23, 2005



Student Sponsor

Wednesday, 1:20 PM - 3:20 PM

Room: Pacific 5

Aquaculture

Chair

Mr. Paul A. Curtis

Hubbs-SeaWorld Research Institute, CA

Time: 1:20 PM

Viral Nervous Necrosis (VNN) in White Seabass, *Atractoscion nobilis*, Cultured in Southern California, and Implications for Marine Fish Aquaculture

1448

Mr. Paul A Curtis, Mr. Mark Drawbridge, *Hubbs-SeaWorld Research Institute, CA*, Dr. Mark S. Okihira, *California Department of Fish and Game, CA*, Dr. Toshihiro Nakai, *Hiroshima University, Japan*, Dr. Ronald P. Hedrick, Dr. Mark Adkison, *University of California, Davis, CA*

Time: 1:40 PM

Open Ocean Aquaculture Engineering II

1454

Kenneth C. Baldwin, Barbaros Celikkol, David Fredriksson, Rob Swift, Igor Tsukrov, *University of New Hampshire, NH*

Time: 2:00 PM

The Use of Continuous Monitoring Technology to Quantify Water Quality Change from Caged Rainbow Trout Aquaculture

1465

Mr. Gregor K. Reid, Prof. Richard D. Moccia
University of Guelph, Canada

Time: 2:20 PM

On the Growth Acceleration By Iron Fertilizer on Algae Enhancement Technology

1466

Dr. Kyoichi OKAMOTO, Prof. Kenji Hotta, *Dept. Oceanic Arch. & Eng., Nihon University, Japan*

Time: 2:40 PM

Spermal Activity and Change in Pacific Salmon Features

1467

Prof. Yuriy A. Mitrofanov, Mrs. Olga V. Dogadova, Mrs. Vera A. Kochetova, *V.I. Il'ichev Pacific Oceanological Institute, Russia*

Time: 3:00 PM

The Variability in the Features in Some Wild and Fish Hatchery Populations of Pacific Salmon

1474

Mrs. Olga V. Dogadova, Prof. Yuriy A. Mitrofanov, Mrs. Vera A. Kochetova, *V.I. Il'ichev Pacific Oceanological Institute of FEB RAS, Russia*

Scientific/Technical Program

Wednesday, 1:20 PM - 3:20 PM
Room: Pacific 6

Coastal Processes and Evolution: Modeling the Evolution of Littoral Cells

Chair **Dr. Douglas L. Inman**
*Scripps Institution of
Oceanography, UCSD, CA*

Time: 1:20 PM

Beach Changes in the Oceanside Littoral Cell 1479
Richard Seymour, *UCSD La Jolla, CA*

Time: 1:40 AM

**Archaeological Proxies for Sediment
Flux to Holocene Littoral Cells of
Southern California** 1480
Dr. Patricia M. Masters, *Scripps Institution of
Oceanography, CA*

Time: 2:00 PM

**Process Model for Terrace Formation and
Shoreline Evolution** 1483
Dr. Scott A. Jenkins, Prof. Douglas L. Inman, *Scripps
Institution of Oceanography, UCSD, CA*

Time: 2:20 PM

**Modeling the Future of
Sand Beaches** 1485
Prof. Douglas L. Inman, Dr. Scott A. Jenkins, Dr. Patricia M.
Masters, *Scripps Institution of Oceanography, UCSD, CA*

Time: 2:40 PM

**The Role of the AES Powerplant in
Surf Zone Water Quality of Huntington
State Beach, California** 1487
Dr. Antony David Greenwood Jones, Mr. Wade Major
KOMEX, CA

Wednesday, 1:20 PM - 3:20 PM
Room: Pacific 7

Science, Technology and Management in the US National Marine Sanctuary

Co-Chairs **Dr. Steve Gittings, NOAA MSD, MD**
James Lindholm
*Stellwagen Bank National
Marine Sanctuary, MA*

Time: 1:20 PM

**Biogeographic Assessments of NOAA National
Marine Sanctuaries: The Integration of Ecology
and GIS Technology** 1489
Mark E. Monaco, Matt S. Kendall, Jamison L. Higgins,
*NOAA/NOS National Centers for Coastal Ocean Science
Center for Coastal Monitoring and Assessment,
Biogeography Program, Charles E. Alexander, Mitchell S.
Tartt, National Marine Sanctuaries Program, MD*

Time: 1:40 PM

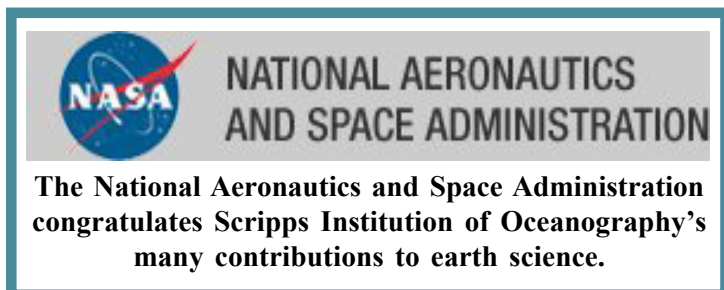
The Race to Save the Monitor 1499
John Broadwater, *Monitor National Marine Sanctuary The
Mariners Museum, VA*

Time: 2:00 PM

**Repair of Coral Reefs Following
Large Vessel Groundings** 1500
Mr. Richard Spadoni, *Coastal Planning & Engineering,
FL, Mr. Harold Hudson, National Oceanic and
Atmospheric Administration, FL*



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Scientific/Technical Program

Wednesday, 1:20 PM - 3:20 PM

Room: Royal 1

Current Measurements

Co-Chairs

Dr. A. Sandy Williams, *WHOI, MA*
Eric Slater, *Scripps UCSD, CA*

Time: 1:20 PM

Field Testing of an Instrument to Measure Near-Surface Currents

from Offshore Platforms 1504

Jerry Mullison, *RD Instruments, CA*

Caroline Nicholas, Cathryn Primrose, *Fugro GEOS, TX*

Time: 1:40 PM

Electronic Crosstalk and Linearity in the Acoustic Travel-Time Current Meter, MAVS 1510

Dr. Albert J. Williams, III, *Woods Hole Oceanographic Institution, MA*

Dr. Archie Todd Morrison, III, *Nobska Development, Inc., MA*

Time: 2:00 PM

Summer Surface Circulation on the Gascoyne Continental Shelf 1516

Lai Mun Woo, Charitha Pattiaratchi, *University of Western Australia/Center for Water Research, Australia*

Time: 3:00 PM

Observations of Langmuir Circulation and Internal Waves 1523

Dr. Jerome A. Smith, Prof. Robert Pinkel, *Scripps Institution of Oceanography, CA*

Time: 3:20 PM

Towards an Operational Spaceborne System for High-Resolution Current Measurements in Coastal Areas 1524

Dr. Roland Romeiser, *Institute of Oceanography, University of Hamburg, Germany*

Mr. Hartmut Runge, Dr. Helko Breit, Dr. Michael Eineder, *Remote Sensing Technology Institute, German Aerospace Center, Germany*

Prof. Pierre Flament, *School of Ocean & Earth Science & Technology, Univ. Hawaii, HI*

Telemetry/Modems I

Co-Chairs

Dr. Milica Stojanovic
MIT, MA
Lee Freitag, *WHOI, MA*

Time: 1:20 PM

Performance of Adaptive Channel Equalization

Techniques: DFEs, Time-Reversal, and Connections to Adaptive Array Processing 1531

Dr. James Preisig, *Woods Hole Oceanographic Institution, MA*

Time: 1:40 PM

A Comparative Evaluation of Joint Versus Sequential Demodulation of Spatially Modulated Underwater Acoustic Telemetry Signals 1532

Dr. Daniel B. Kilfoyle, *Science Applications International Corporation, MA*

Time: 2:00 PM

A New Multi-Channel Spatial Diversity Technique for Long Range Acoustic Communications in Shallow Water 1533

Dr. Pierre-Philippe J. Beaujean, Mr. Emmanuel P. Bernault, *Florida Atlantic University (FAU), FL*

Time: 2:20 PM

Sea Trial Results of a Chaotic Direct-Sequence Spread Spectrum Underwater Communication System 1539

Stephane Azou, Prof. Gilles Burel, *Lab. d'Electronique et Systemes de Telecoms / IUP IIA, France*

Mr. Laurent Le Duff, Mrs. Christine Pistre
Groupe d'Etudes Sous-Marines de l'Atlantique, France

Time: 2:40 PM

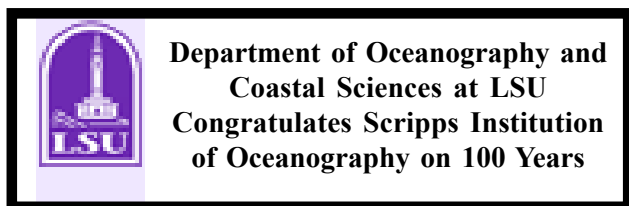
Iterative Equalization for Underwater Acoustic Channels - Potentiality for the Trident System 1547

Mr. Gerard Lapierre, Mr. Joel Labat, Mr. Joel Trubuil, *ENST Bretagne, France*

Time: 3:00 PM

A Tri-Modal Directional Modem Transducer 1554

A.L. Butler, Dr. J.L. Butler, *Image Acoustics, Inc., MA*, W. Dalton, J. Baker, P. Pietryka, *FSI/Acoustikos, Inc., MA*, J.A. Rice, *Space and Naval Warfare Systems Center, CA*, and *Naval Postgraduate School, CA*



Scientific/Technical Program

Wednesday, 1:20 PM - 3:20 PM

Room: Royal 4

Exploration, Education, Bringing Oceans to the Classroom

Chair **Paula Keener-Chavis**, NOAA CSC, SC

Time: 1:20 PM

Ocean Exploration Through NOAA: Collaborations for Excellence In Exploration and Education..... 1561

Ms. Paula Keener-Chavis, *NOAA - Office of Ocean
Exploration, MD*

Time: 1:40 PM

NOAA Ocean Explorer Web Site..... 1562

Brian Johnson, *NOAA National Ocean Service, MD*

Time: 2:00 PM

ROV Competitions for Students: Developing the Next Generation of Ocean Explorers, Scientists, Technologists, and Engineers 1563

Ms. Jill Marie Zande, Ms. Deidre Ellen Sullivan, *Marine
Advanced Technology Education (MATE) Center, CA*

Time: 2:20 PM

Sound in the Sea: Hands-on Experience with NOAA Vents Program 1565

Haru Matsumoto, Sharon Nieuwark, Matt Fowler, Joe Haxel,
Sara Heimlich, David K. Mellinger, Robert Dziak
Cooperative Institute of Marine Resources
Christopher G. Fox, *NOAA/PMEL, OR*

Time: 2:40 PM

Volcanoes of the Deep Sea: Giant Screen Film Format as a Catalyst to Enrich Informal Learning at Science Education Centers..... 1572

Ms. Janice D. McDonnell, Mr. Eric Simms, Mr. Michael P.
De Luca, *Rutgers the State University of New Jersey, NJ*



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Wednesday, 1:20 PM - 5:20 PM

Room: Royal Palm Salon 5 & 6

SCRIPPS HISTORY SESSION

Co-Chairs

Deborah Day,

Scripps Institution of Oceanography, CA

Kevin Hardy

Scripps Institution of Oceanography, CA

Dr. Charles Kennel, Director, Opening Remarks

1:20 PM Origins of a Biological Field Station

Dr. Philip J. Pauly, Professor, *Department of
History, Rutgers University, NJ*

2:00 PM Scripps Before the War

Deborah Day, Archivist, *Scripps Institution of
Oceanography, UCSD Libraries, CA*

2:20 PM 1930's: Evenings with T. Wayland Vaughan

Katherine LaFond, Lab Chemist, 1933-36,
Scripps Institution of Oceanography, CA

2:40 PM Writing the First History of Scripps

Beatrice Moulton, Professor, *U.C. Hastings
College of Law, CA*

3:00 PM 1940's: Sverdrup's Biology

John McGowan, Professor Emeritus, IOD, *Scripps
Institution of Oceanography, CA*

3:20 PM BREAK

**3:40 PM Scripps in the "Golden Age of Oceanographic
Exploration"**

Bob Fisher, Marine Geologist Emeritus, GRD,
Scripps Institution of Oceanography, CA

**4:00 PM The 1960's: Technology Pushes Ocean
Research**

Fred Spiess, Professor, *Marine Physical Lab,
Scripps Institution of Oceanography, CA*

**4:20 PM 1970's: Perspectives of a Woman
Oceanographer**

Kathleen Crane, Author, Program Manager, *Arctic
Research Office, NOAA, MD*

**4:40 PM 1980/s: Ocean Acoustic Tomography: Birth
of a Technique**

Walter Munk, Professor Emeritus, IGPP, *Scripps
Institution of Oceanography, CA*

**5:00 PM 2003: Exploring the Ocean Basins with
Satellites and Ships**

David Sandwell, Professor, IGPP, *Scripps
Institution of Oceanography, CA*

Scientific/Technical Program

Wednesday, 1:20 PM - 3:20 PM

Room: Sunrise

Quik SCAT Vector Winds: Validation & Applications

Co-Chairs

Charlie Hopkins

Planning Systems Inc., CA

Dr. Mark A. Bourassa

Florida State University, FL

Time: 1:20 PM

NOAA's Goes R - Next Generation Satellite 1573

Eric J. Miller, *NOAA/NESDIS, SSMCI, MD*, Michael

Madden, *UTA, VA*, Robert Reining, *MITRE, VA*, John Linn,

Lauraleen O'Connor, *Mitretek Systems, VA*

Time: 1:40 PM

MODIS Ocean and Atmospheric

Applications Using Terascan Software 1580

Dr. Kota Prasad, Dr. Robert L. Bernstein, *SeaSpace*

Corporation, CA

Time: 2:00 PM

Oceansat's Ocean Color Monitor:

An Instrument Whose Time Has Come 1581

Mr. Michael F. Crowley, Dr. Robert Bernstein, Dr. Kota

Prasad, *SeaSpace Corporation, CA*

Dr. Scott Glenn, *Rutgers University Coastal Ocean*

Observation Lab, NJ

Time: 2:20 PM

Satellite Data Assimilation for Naval Undersea

Capability Improvement 1582

Peter C. Chu, Michael D. Perry, *Naval Postgraduate*

School, CA, Eric L. Gottshall, *SPAWAR, CA*, David S.

Cwalina, *Naval Undersea Warfare Center, RI*

Time: 2:40 PM

DOD-Tailored Environmental Products from Near

Real-Time Terra/Aqua Modis in Support

of Operation Iraqi Freedom 1593

Dr. Steven D. Miller, Mr. Jeff D. Hawkins, Dr. Joe Turk, Mr.

Tom Lee, Mr. Kim Richardson, Mr. John Kent

Naval Research Laboratory, CA

Time: 3:00 PM

Impact of Seawinds Scatterometer Data on

Ocean Surface Analysis and Weather Prediction 1598

R. Atlas, S.C. Bloom, J. Ardizzone, E. Brin, J. Terry,

Laboratory for Atmospheres NASA/Goddard Space Flight

Center, MD, T-W. Yu, *NOAA/NCEP, MD*

Wednesday, 1:20 PM - 3:20 PM

Room: Sunset

Moorings

Co-Chairs

Darrell Milborn, *WHOI, MA*

Carlos Mayoral, *USNOO, MS*

Time: 1:20 PM

MBARI New Anti-biofouling Shutter 1602

Lance McBride, Mark Brown, Mike Kelley, Mike Risi,

Monterey Bay Aquarium Research Institute, CA

Time: 1:40 PM

The Use and Testing of Compasses and

Magnetometers at the National

Data Buoy Center 1606

Dr. Eduardo D. Michelena, Ms. Regina L. Moore

National Data Buoy Center, MS

Time: 2:00 PM

Reduction of Cable Resistance by Helicalridge

Type Faring 1612

Mr. Shinichi Hosoya, Mr. Hidenori Shibata, *Nippon Marine*

Enterprises Ltd., Japan, Shigeru Okita, *Universal Zosen*

Corporation, Japan

Time: 2:20 PM

Coupled Dynamic Analysis of Thruster-Assisted

Turret-Moored FPSO 1613

Mr. Sangsoo Ryu, Prof. M.H. Kim, *Texas A&M University,*

TX

Time: 2:40 PM

Attempting High Resolution Full Water Column

Current Measurements Utilizing an Array of

ADCP's Off Oahu, Hawaii 1621

Mr. Stephen Craig Cumbee, *US Naval Oceanographic*

Office, MS



Scientific/Technical Program

Wednesday, 1:20 PM - 3:20 PM
Room: Sheffield

Acoustic Validation Co-Chairs

Dr. Kenneth Foote, *WHOI, MA*
Dr. Kirk Jenne, *NUWC, RI*

Time: 1:20 PM

**Advances in Developing a High-Frequency
Sonar Calibration Facility** 1622
Mr. Terence R. Hammar, Dr. Kenneth G. Foote, Mr. Stephen
P. Liberatore, *Woods Hole Oceanographic Institution, MA*

Time: 1:40 PM

Calibrating Two Scientific Echo Sounders 1625
Dr. J. Michael Jech, *Northeast Fisheries Science Center,
NOAA-NMFS, MA*
Dr. Dezhang Chu, Dr. Kenneth G. Foote, Mr. Terence R.
Hammar, *Woods Hole Oceanographic Institution, MA*
Mr. Lawrence C. Hufnagle, Jr., *Northwest Fisheries
Science Center, NOAA-NMFS, WA*

Time: 2:00 PM

Comparing Two Scientific Echo Sounders 1630
Dr. J. Michael Jech, *Northeast Fisheries Science Center,
NOAA-NMFS, MA*, Dr. Kenneth G. Foote, Dr. Dezhang Chu,
Mr. Stephen P. Liberatore, *Woods Hole Oceanographic
Institution, MA*

Time: 2:20 PM

Calibrating a Multibeam Sonar in a Sea Well 1633
Dr. Dezhang Chu, Dr. Kenneth G. Foote, Mr. Terence R.
Hammar, Mr. Stephen P. Liberatore, *Woods Hole
Oceanographic Institution, MA*
Mr. Lawrence C. Hufnagle, Jr., *Northwest Fisheries
Science Center, NOAA-NMFS, WA*

Time: 2:40 PM

**Calibrating a 200-kHz Multibeam Sonar in a
Large Freshwater Tank** 1637
Dr. Dezhang Chu, Dr. Kenneth G. Foote, *Woods Hole
Oceanographic Institution, MA*
Mr. Lawrence C. Hufnagle, Jr., *Northwest Fisheries
Science Center, NOAA-NMFS, WA*
Prof. Kenneth C. Baldwin, Prof. Larry A. Mayer, Mr.
Andrew McLeod, *University of New Hampshire, NH*

Time: 3:00 PM

**The Underwater Sound Reference Division - A
National Resource for the Underwater
Acoustics Community** 1638
Mr. Kirk E. Jenne, Mr. Anthony Paolero
Naval Undersea Warfare Center, RI

Wednesday, 1:20 PM - 3:20 PM
Room: Hampton

Beamforming Co-Chairs

Geoff Edelson, *BAE Systems, NH*
Dr. William S. Hodgkiss
Scripps UCSD, CA

Time: 1:20 PM

Motion Compensated Beamforming 1639
Raymond Kraszewski, *Naval Undersea Warfare Center,
Keyport, WA*

Time: 1:40 PM

**A New Blind Adaptive Beamformer for
Underwater Communications** 1640
H.S. Hung, H.Y. Hsiao, Y.L. Chien, *Department of
Electrical Engineering, National Taiwan Ocean
University, Taiwan*

Time: 2:00 PM

**Theoretical and Experimental Studies on
Broadband - Constant Beamwidth
Beamforming for Circular Array** 1647
Yixin Yang, Chunru Wan, *Nanyang Technological
University, Singapore*, Chao Sun, *Northwestern
Polytechnical University, China*

Time: 2:20 PM

**Broadband Beamspace DOA
Estimation Algorithms** 1654
Dr. Yixin Yang, Dr. Chunru Wan *Nanyang Technological
University, Singapore*, Dr. Chao Sun, *Northwestern
Polytechnical University, China*

Time: 2:40 PM

**A Robust Deviation-Based Beamformer with
Improved Angular Resolution** 1661
Dr. Qinghua Ye, Dr. Haining Huang, Xinyi He, Dr. Chunhua
Zhang, *Institute of Acoustics, Chinese Academy of
Sciences, China*

Time: 3:00 PM

**Tracking Highly Correlated Sources Via
Multi-Stage Constant Modulus Array** 1662
Chao Sun, Jie Zhuo, *Institute of Acoustical Engineering
Northwestern Polytechnical University, P.R.China*

Scientific/Technical Program

Wednesday, 1:20 PM - 3:20 PM

Room: Windsor

Acoustic Detection

Co-Chairs

Dr. Gerald J. Dobeck

Coastal Systems Station, FL

Dr. Daniel D. Sternlicht

Dynamics Technology, Inc.

Time: 1:20 PM

Detection and Classification of Submerged Threats in Very Shallow Water Using the Quiet Interlude Processing System (QUIPS)

1669

Dr. James H. Wilson, Mr. Robert H. Prater, Ms. Josie P.

Fabre, *Neptune Sciences, Inc., CA*

Time: 1:40 PM

Implementation of a Real-Time System to Detect the Position of Underwater Objects

1673

Shun-Hsyung Chang, Chin-Pin Chou, Tony Lu, Fu-Sheng Lu,

National Taiwan Ocean University, Taiwan, R.O.C.

Time: 2:00 PM

Underwater Sound Detection Based on Hilbert Transform Pairs of Wavelet Bases

1680

Prof. Shun-Hsyung Chang, Mrs. Fu-Tai Wang, *National*

Taiwan Ocean University, Taiwan

Time: 2:20 PM

Comparison of Quadratic Phase Coupling Detectors on Sonar Data

1685

S. McLaughlin, Mika Levonen, Ron Lennartsson, John

Robinson,, Leif Persson, *University of Edinburgh, U.K.*

Time: 2:40 PM

Contact Depth Localization- Sensitivity to Environmental Variability

1691

Sudha S. Reese, Keith Peters, Mark Vaccaro, *Naval*

Undersea Warfare Center, RI

Time: 3:00 PM

CFAR Detection of Targets Under Directional Noise Background

1697

Qing Wang, Chunru Wan, Yixin Yang,

Nanyang Technological University, Singapore

Military AUVs III

Co-Chairs

Dr. Tom Swean, ONR, VA

Steve Castelin

Coastal Systems Station, FL

Time: 1:20 PM

A New Navy Deep-Water Oceanographic Survey Vehicle: the Naval Oceanographic Office's Semi-Autonomous Mapping System (SAMS)

1703

A. MacNaughton, R.P. Swanson, Jr., R.H. White, *Stennis*

Space Center, MS

Time: 1:40 PM

Semi-Autonomous Mapping System

1709

Christopher von Alt, Ben Allen, Thomas Austin, Ned

Forrester, Lee Freitag, Robert Goldsborough, Matthew Grund,

Michael Purcell, Roger Stokey, *Woods Hole Oceanographic*

Institution, MA

Time: 2:00 PM

Synthetic Aperture Sonar on AUV

1718

Jose E. Fernandez, James T. Christoff, Daniel A. Cook,

Naval Surface Warfare Center, FL

Time: 2:20 PM

Gambit MCM AUV: Overview and System Performance

1723

J.N. Morrison, B.S. Evans, T.S. James, K.D. Allen,

QinetiQ., Marine and Acoustics Centre, UK

Time: 2:40 PM

Robust Wide-Band Synthetic Aperture Sonar Processing on an AUV Platform

1730

Sean Chapman, I. Campbell, *QinetiQ, United Kingdom*

Time: 3:00 PM

A Modular Approach for Sensor Integration on the REMUS Vehicle

1731

Mr. Andrew Dreiling, Mr. G. Hong, Mr. Brian Granger, Mr. V.

Djapic, Mr. R. Arrieta, *Space and Naval Warfare Systems*

Center San Diego, CA, Mr. M. Dock, Nomadics, Inc., OK,

Mr. R. Stokey, *Woods Hole Oceanographic Institution,*

MA



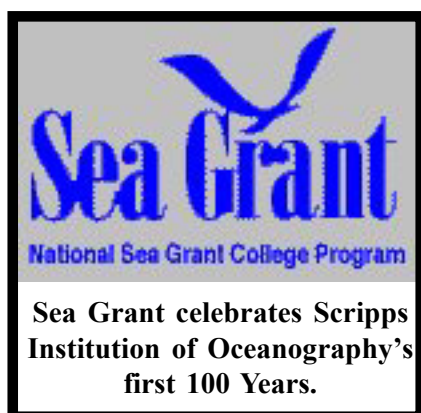
Scientific/Technical Program

Wednesday, 1:20 PM - 3:20 PM
Room: Garden 2

Blue Ribbon Panel on Opening up the Outer Continental Shelf to Exploration

Co-Chairs

John Norton Moore
University of Virginia, VA
Myron Nordquist
University of Virginia, VA



Wednesday, 3:40 PM - 5:20 PM
Room: Pacific 5

Plume Sensing II Chair

Dr. Chuanmin Hu
Univ. of South Florida, FL

Time: 3:40 PM

Trial of Hydrothermal Plume Sensing Using Newly Developed ISFET pH Sensor 1732
Masanori Kyo, *Japan Marine Science and Technology Center, Japan*
Kiminori Shitashima, *Central Research Institute of Electric Power Industry, Japan*
Yoshiaki Maeda, Yuichi Koike, *Environmental Research Co. Ltd., Japan*
Teruo FUJII, Masahiko Sairaiji, *University of Tokyo, Japan*

Time: 4:00 PM

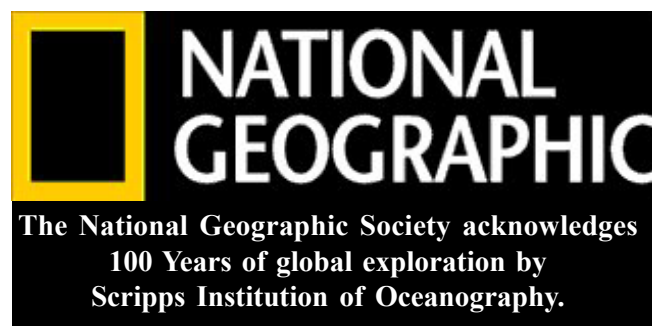
A Modified Velocity Projection Method for Estimating the Subsurface Velocity Structure of the Chesapeake Bay Outflow Plume 1738
Prof. Avijit Gangopadhy, *University of Massachusetts at Dartmouth, MA*
Dr. Colin Y. Shen, Dr. George O. Marmorino, Dr. Richard P. Mied, Dr. Thomas E. Evans, *Naval Research Laboratory, WV*

Time: 4:20 PM

Remote Sensing Reflectance in the Near Infrared Derived from SeaWiFs: Implications for River Plume Particle Size Distribution, Atmospheric Correction, and Bio-Optical Algorithms 1739
Dr. Chuanmin Hu, *University of South Florida, FL*

Time: 4:40 PM

Variability of Photosynthetically Usable Radiation in River-Dominated Coastal Waters 1740
Dr. Mark D. Dowell, Dr. Janet W. Campbell, Joseph E. Salisbury, Timothy S. Moore, *University of New Hampshire, NH*



Scientific/Technical Program

Wednesday, 3:40 PM - 5:20 PM

Room: Pacific 7

Industry Participation

Co-Chairs

David Frost, *Orincon*
Craig Okuda, *MBARI, CA*

Time: 3:40 PM

MOTN - A Model for Employing a Collaborative Strategy to Foster Economic and Technological Success in The Marine & Oceanographic Community 1741

Mr. Steven G. Withrow, Mr. Hugh A. Murphy, *Marine & Oceanographic Technology Network, MA*

Time: 4:00 PM

The Ocean Technology Workshop Series: The Importance of Offering Technical Training to Equipment Users 1746

Mrs. Maggie Linskey Merrill, *Marine and Oceanographic Technology Network, MA*

ADC/ROV
UI 2004
Underwater Intervention
New Orleans, LA
February 17-19, 2004



Wednesday, 3:40 PM - 5:20 PM

Room: Royal 1

Meteorology

Chair

Dr. Edward Johnson, *USNOO, MS*

Time: 3:40 PM

Amazing 2002 Monsoon 1751

Dr. Maria K. Flatau, Dr. Piotr J. Flatau, Dr. Jerrome Schmidt, *Naval Research Laboratory, CA*

Dr. Dan Rudnick, *Naval Research Laboratory, CA*

Time: 4:00 PM

In-Stride Littoral Battlespace Oceanographic Characterization 1752

Philip G. Renaud, *Naval Oceanographic Office, MS*

Time: 4:20 PM

Investigation of a Coastally Trapped Disturbance 1758

William T. Thompson, *Naval Research Laboratory, CA*,
Stephen D. Burk, John Lewis

Time: 4:40 PM

Mesoscale Eddy Formation and Shock Features Associated with a Coastally Trapped Disturbance 1763

Stephen D. Burk, William T. Thompson, *Naval Research Laboratory, CA*

Time: 5:00 PM

Fast Winds and The Hydraulic Nature of California's Summer Marine Layer 1771

Dr. Clive E. Dorman, *Scripps Institution of Oceanography, CA*, Dr. Darko R. Koracin, *Desert Research Institute, University of Nevada Reno, NV*

Time: 5:20 PM

Modeling of California's June Wind, Wind Stress and Curl of the Wind Stress 1772

Dr. Darko R. Koracin, Travis McCord, Domagoj Podnar, *Desert Research Institute, University of Nevada Reno, NV*



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Scientific/Technical Program

Wednesday, 3:40 PM - 5:20 PM

Room: Royal 2

Telemetry/Modems II

Co-Chairs

Lee Freitag, *WHOI, MA*
Dr. Milica Stojanovic, *MIT, MA*

Time: 3:40 PM

Measurements and Modeling of the Underwater Communications Channel for Three

Shallow Water Environments 1773

Dr. T. Martin Siderius, Dr. Michael Porter, Dr. Paul Hursky,
Science Applications International Corporation, CA
Mr. Vincent McDonald, *SPAWAR, CA*

Time: 4:00 PM

Time Frequency Coding in Underwater

Acoustic Communication 1780

Yu Wang, *Northwestern Poly-technical University, China, China*

Time: 4:20 PM

A Digital Acoustic Transceiver for Underwater

Communication without PLL and DLL 1781

Youngchol Choi, Sea-Moon Kim, Jong-Won Park, Yong-Kon Lim, *Korea Research Institute of Ships and Ocean Engineering (KRISO)/KORDI, Korea, Hak-Lim Ko, Hoseo University, Korea*

Time: 4:40 PM

Ultrasonic Link for Improved Incoherent

Data Transmission in Horizontal

Shallow Water Channels 1786

Konstantin G. Kebkal, *State Oceanarium of Ukraine, Ukraine, Rudolf Bannasch, Sergey G. Yakovlev, Evologics GmbH, Germany, Alexey G. Kebkal, Technical University Kiev, Institute of Applied System Analysis, Ukraine*

Time: 5:00 PM

Performance Enhancement of Blind Adaptive

Equalizers Using Environmental Knowledge 1793

Florian Schulz, Rolf Weber, Andreas Waldhorst, Johann F. Böhme, *Department of Electrical Engineering and Information Sciences, Ruhr-Universität Bochum, Germany*



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Wednesday, 3:40 PM - 5:20 PM

Room: Royal 3

COSEE II

Co-Chairs

Dr. Sharon Walker,
Univ. of Southern Mississippi, MS
Paula Keener-Chavis, *NOA CSC, SC*

Time: 3:40 PM

Center for Ocean Sciences Education Excellence -

Central Gulf of Mexico (COSEE:CGOM) 1800

Sharon H. Walker, *The University of Southern Mississippi-College of Marine Sciences-J.L. Scott Marine Education Center and Aquarium & Mississippi-Alabama Sea Grant Consortium, MS, John J. Dindo, Dauphin Island Sea Lab, Jessica A. Kastler, Louisiana Universities Marine Sciences Consortium, LA, Michael S. Spranger, Florida Sea Grant University of Florida, FL, Richard K. Tinnin, The University of Texas Marine Science Institute, TX, Robert D. Brook, Mississippi State University, MS*

Time: 4:00 PM

California Center for Ocean Sciences

Education Excellence 1817

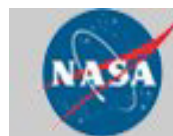
Sharon R. Franks, Cheryl L. Peach, *Scripps Institution of Oceanography, CA*
Craig Strang, Roberta Dean and Catherine Halversen, *Lawrence Hall of Science, CA*
Deidre Sullivan, *MATE Center, Monterey Peninsula College, CA*

Time: 4:20 PM

Are We Adequately Preparing Students

for Ocean Occupations? 1818

Deidre E. Sullivan, Dr. Tom Murphree and Bruce Ford, *California COSEE/MATE Center, CA*



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AND SPACE ADMINISTRATION**

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Administration commends
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on the occasion of its Centennial.**

Scientific/Technical Program

Wednesday, 3:40 PM - 5:20 PM

Room: Royal 4

Exploration Technology, Tools for Inner and Outer Space
Chair

Justin Manley,
NOAA Office of Ocean Exploration, MD

Time: 3:40 PM

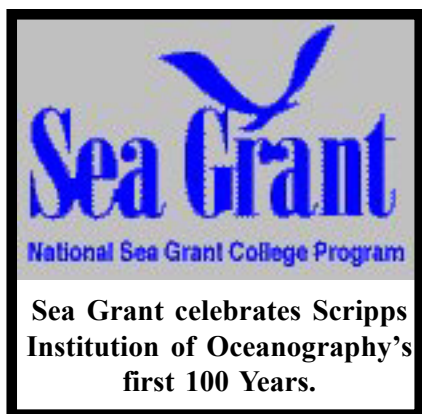
Autonomous Ocean Exploration 0
Dr. Dana Yoerger, *Woods Hole Oceanographic Institute, MA*

Time: 4:00 PM

From Offshore Oil to the International Space Station, Technology Development for Exploration 0
Mark Johnson, *Deepwater Research, Houston, TX*

Time: 4:20 PM

THE LINK PROJECT: A NOAA and NASA Partnership 1819
E. Lindstrom, *NASA Oceanography Program Scientist,*
A. McCurdy, *NASA Oceanography Outreach/EnterACKed,* J. Manley, *NOAA Office of Ocean Exploration/Mitretek Systems*



Wednesday, 3:40 PM - 5:20 PM

Room: Sunrise

Remote Sensing of Wave Dynamics & Bulk Properties
Co-Chairs

Dr. William J. Plant
University of Washington APL, WA
Dr. Richard Crout, NMOC, MS

Time: 3:40 PM

Bound Waves and Radar Backscattering from the Sea Surface 1824
Dr. Stanislav Alexandrovich Ermakov, Mrs. Irina Andreevna Sergievskaya, Mr. Yuri Borisovich Shchegolkov, *Institute of Applied Physics, Russian Academy of Sciences, Russia*

Time: 4:00 PM

Bound Waves and Sea-Surface Slopes 1825
Dr. William J. Plant, *University of Washington, WA*

Time: 4:20 PM

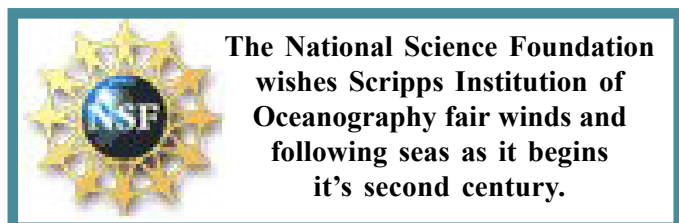
Ocean Environment Sensing using Polarimetric and Interferometric SAR 1829
D. Schuler, M. Sletten, T. Ainsworth, J.S. Lee, *Naval Research Laboratory, Washington DC,* S. Frasier, *Electrical and Computer Eng. Dept., University of Massachusetts, MA,* B. Holt, *Jet Propulsion Lab, CA*

Time: 4:40 PM

New Sea Surface Salinity Product in the Tropical Indian Ocean Estimated from Outgoing Longwave Radiation 1835
Bulusu Subrahmanyam, James J. O'Brien, *The Florida State University, FL,* V.S.N. Murty, *National Institute of Oceanography, India*

Time: 5:00 PM

Insights Gained from a TRMM Microwave and Infrared Sea Surface Temperature Comparison 1839
Lucrezia Ricciardulli, Frank J. Wentz, *Remote Sensing Systems, CA*



Scientific/Technical Program

Wednesday, 3:40 PM - 5:20 PM

Room: Sunset

Cables & Connectors

Co-Chairs

Tom Coughlin

Tomas Coughlin and Associates, TX

Pamela Hurst, *Lockheed-Martin, FL*

Time: 3:40 PM

Operational Considerations for

Underwater-Mateable Connectors 1843

G.E. Brown, *SEA CON® Advanced Products, CA*

Time: 4:00 PM

Water Blocking and Reterminating at Sea

of Flooded High Voltage Cable..... 1849

Robert E. Lindberg, *RELTEK, CA*

Time: 4:20 PM

Submarine Cable Infrastructure Defense

Against Terrorist Aggression 1850

Mr. Robert T. Bannon, *Bannon International Consulting LLC, PA*

Mr. Douglas Burnett, *Holland & Knight LLP, NY*

Time: 4:40 PM

Submarine Communications Cable for

Deep-Sea Application 1862

Mr. Gary Waterworth, Mr. Ian Watson, *Alcatel Optical Networks, United Kingdom*

Time: 5:00 PM

Novel Current to Current Converter for Mesh-like Scientific Underwater Cable Network

- Concept and Preliminary Test Result 1868

Kenichi Asakawa, *Japan Marine Science and Technology Center, Japan*, Junichi Kojima, *KDDI Laboratories, Japan*, Jun Muramatsu, *NEC Corporation, Japan*, Tatsuo Takada, *JAMSTEC, Japan*

Time: 5:20 PM

Wet-Mateable Optics: Very High Performance, Small Form Factor, Harsh Environment Wet

Mateable Optic Connectors 1874

Mr. David A. Jenkins, *Ocean Design Inc, FL*

IEEE

UT '04

Underwater Technology

Taipei, Taiwan

April 20-23, 2004

Wednesday, 3:40 PM - 5:20 PM

Room: Sheffield

Small UUV Sonar

Co-Chairs

John M. Impagliazzo

Tetrattech, MA

Bruce Johnson

NAVSEA EOD, MD

Time: 3:40 PM

A Low Power Imaging and Obstacle Avoidance

Sonar for Small UUVs 1875

Mr. John M. Impagliazzo, Dr. Alice M. Chiang, Dr. Steven R. Broadstone, *Terattech Corporation, MA*

Time: 4:00 PM

High Frequency Side Scan Sonar for Target

Reacquisition and Identification 1882

Thomas E. Wilcox, *Marine Sonic Technology, Ltd., VA*

Barbara Fletcher, *Space and Naval Warfare Systems Center, San Diego, CA*

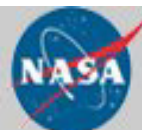


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Scientific/Technical Program

Wednesday, 3:40 PM - 5:20 PM
Room: Hampton

Signal Analysis Co-Chairs

Dr. Harry Cox, *Orincon, CA*

Time: 3:40 PM

Accurate Doppler Velocity Estimation using a Non-Linear Frequency-Modulated

Acoustic Pulse 1888
Mr. Jasdeep S. Dhanoa, Prof. Richard F. Ormondroyd, Dr.
Evan J. Hughes, *Cranfield University, United Kingdom*

Time: 4:00 PM

Fractional Fourier Transform Techniques

Applied to Active Sonar 1894
Mika J. Levonen, *Swedish Defence Research Agency, Sweden*,
Stephen McLaughlin, *University of Edinburgh, Scotland*

Time: 4:20 PM

Conditioning of Sonar Data 1900
Mr. Mika Levonen, Dr. Leif Persson, *Swedish Defence Research Agency, Sweden*

Time: 4:40 PM

Parameterization of Turbulent Mixing Models Derived from Microstructure Data Processing. Applications to Environmental Research

..... 1905
Mr. Jaume Piera, *Department of Signal Theory and Communications (UPC), Spain*
Mr. Jordi Catalan, *Centre d'Estudis Avançats de Blanes (CEAB, CSIC), Spain*
Ms. Janice Norton, *Hydroid, Inc., MA*

Wednesday, 3:40 PM - 5:20 PM
Room: Windsor

Acoustic Classification Co-Chairs

Dr. Daniel D. Sternlicht
Dynamics Technology, Inc.
Dr. Gerald J. Dobeck
Coastal Systems Station, FL

Time: 3:40 PM

Underwater Target Classification Using Canonical Correlations

..... 1906
Mr. Ali Pezeshki, Prof. Mahmood R. Azimi-Sadjadi, Mr.
Louis L. Scharf, Mr. Marc Robinson, *Colorado State University, CO*

Time: 4:00 PM

Acoustic Detection and Classification of Fluid-Filled Cylinders

Embedded in Sediments 1912
Prof. Bryan Woodward, Dr. Paul Andrew Lepper,
Loughborough University, United Kingdom

Time: 4:20 PM

Passive Sonar Recognition and Analysis Using Hybrid Neural Networks

..... 1917
B.P. Howell, S. Wood, *Department of Marine and Environmental Systems*, S. Koksai, *Department of Math, Florida Institute of Technology, FL*



Student Sponsor



Scientific/Technical Program

Wednesday, 3:40 PM - 5:20 PM

Room: Garden 1

Military AUVs IV

Co-Chairs

Steve Castelin

Coastal Systems Station, FL

Dr. Tom Swean, *ONR, VA*

Time: 3:40 PM

Remus 100 Transportable Mine

Countermeasure Package 1925

Mr. Christopher J. von Alt, *Hydroid, Inc., MA*

Time: 4:00 PM

Countermining Operations in Very Shallow Water and

Surf Zone: The Role of Bottom Crawlers 1931

Tony Aponick, *Foster-Miller, Inc., MA*, Chuck Bernstein,
NSWC – Coastal Systems Station, FL

Time: 4:20 PM

The Detection of Explosives Using

Robotic Crawlers 1941

Mr. Rodolfo T. Arrieta, *Coastal Systems Station, FL*

Time: 4:40 PM

VSW Navigation/Communications Assessment 1947

Mr. R. Dale Rhinehart, Mr. Patrick C. McDermott
Coastal Systems Station, FL

MTS/IEEE

Oceans '04 Techno-Ocean '04

Kobe, Japan

November 9-12, 2004



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Thursday, 8:15 AM - 4:30 PM

Room: Golden Ballroom

KEYNOTE SESSION

by Admiral James Watkins, Chair,
President's Commission on Ocean Policy
and The Honorable Leon Panetta, Chair,
Pew Oceans Commission

Co-moderators, Charles Kennel, Director,
Scripps Institution of Oceanography
and Robert Gagosian, Director,
Woods Hole Oceanographic Institution

- 8:15-8:30 Welcome and Introduction by Charles Kennel
- 8:30-9:00 President's Commission on Ocean Policy
Report by Admiral James Watkins
- 9:00-9:15 Q&A with Admiral James Watkins
- 9:15-9:45 Pew Oceans Commission Report:
The Honorable Leon Panetta
- 9:45-10:00 Q&A with The Honorable Leon Panetta
- 10:00-10:30 Break
- 10:30-12:30 Federal Agency Perspectives
 - 10:30-10:45 OSTP: The Honorable John Marburger, III,
Director of the Office of Science and Technology
Policy
 - 10:45-11:00 NSF: Dr. Rita Colwell, Director
 - 11:00-11:15 NOAA: Vice-Admiral Conrad Lautenbacher, Jr.,
Administrator
 - 11:15-11:30 Navy: RADM Jay Cohen, Chief of Naval
Research, ONR
 - 11:30-11:45 NASA: The Honorable Sean O'Keefe,
Administrator
 - 11:45-12:15 Q&A with Federal Agency Leaders
- 12:15-1:30 Luncheon Break
- 12:20-12:50 U.S. Senator Diane Feinstein, D-CA (Late program
addition. Check daily schedule at conference to confirm.)
- 1:30-4:30 International Perspective: The Oceans and the World
in the 21st Century - Observing and Understanding
the Global Oceans, Moderator: Prof. Howard Roe,
University of Southampton, UK
 - 1:30-1:45 The growth of International Collaboration over the
Last 50 Years: Prof. C.K. Tseng, Institute of
Oceanology, Qingdao, China
 - 1:45-2:15 International Organizations and Programs,
Dr. Patricio Bernal, Executive Secretary,
Intergovernmental Oceanographic Commission and
Assistant Director General of UNESCO
 - 2:15-2:45 Developing Country Perspectives, Capacity
Building: Dr. Javier Mendieta, CICESE, Mexico,
Director General
 - 2:45-3:15 Break
 - 3:15-3:45 Ocean Science in the 21st Century - Interchange
between the East and the West across the Pacific
Ocean: Mr. Takuya Hirano, JAMSTEC, Japan,
President
 - 3:45-4:15 European Perspectives/Modeling and Data
Assimilation: Jean-Francois Minster, IFREMER,
France, Chairman and Managing Director
 - 4:15-4:30 Wrap up and conclusions, Charles Kennel
- 4:30 Adjourn

Scientific/Technical Program

Thursday, 10:00 AM - 12:00 PM
Room: Pacific 5

Operational Oceanography Chair

R. Preller, *NRL SSC, MS*

Time: 10:00 AM

NOAA's Coastal Oceanographic Applications and Services of Tides and Lakes

(COASTAL) Program 1948
Kristen A. Tronvig, *National Oceanic and Atmospheric
Administration (NOAA)/National Ocean Service (NOS)/
Center for Operational Oceanographic Products and
Services (CO-OPS), MD*

Time: 10:20 AM

Ocean Prediction at the U. S. Naval

Research Laboratory 1954
R. Preller, G. Jacobs, R. Rhodes, *Stennis Space Center, MS*

Time: 10:40 AM

Developing an Operational Wave, Surf, and Tide Forecasting System for the United States Navy Meteorology and

Oceanography Community 1955
Dean R. Wakeham, *Neptune Sciences, Inc., CA*
Richard Allard, *Stennis Space Center, MS*

Time: 11:00 AM

Real-Time Operational Oceanography at the Naval Oceanographic Office

..... 1962
John Harding, E. Johnson, J. Rigney, W. Schulz, *Stennis
Space Center, MS*

Thursday, 10:00 AM - 12:00 PM
Room: Pacific 7

Biological Oceanography

Co-Chairs

Dr. Nancy Knowlton, *Scripps UCSD*

Dr. Lisa Levin, *Scripps UCSD*

Time: 10:00 AM

Biodiversity and Natural History of the

**Opisthobranch Fauna at Bahia de Los Angeles,
Baja California** 1963
Hans Bertsch, *College of Oceanography, CA*

Time: 10:20 AM

Degradation of Solid and Muddy Organic Matter of

Blue Mussels by *Bacillus* sp. 1964
Haruo Mimura, Kenji Maeda, Shinichi Nagata, *Kobe
University of Mercantile Marine, Japan*

Time: 10:40 AM

Biodiversity, Feeding and Reproduction

of Copepods of Chennai Coast India. 1968
Mr. Altaff Kareem, Mrs. Dilshad Begum I., Mr. Gopikrishna
Mantha, Mr. Sivakkumar K., *The New College, India*



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Scientific/Technical Program

Thursday, 10:00 AM - 12:00 PM

Room: Royal 1

Ocean Circulation

Co-Chairs

Captain Charles Green, *U.S. Navy, CA*

Dr. Bart Chadwick

SPAWARSYSCEN San Diego, CA

Time: 10:00 AM

Model Supported AUV Freshwater

Distribution Surveys in the Upper

Layers of Deep Fjords 1969

Martin Ludvigsen, Øyvind Tangen Ødegaard, Ingrid Ellingsen,

Bjoern Sortland, *Norwegian University of Science and*

Technology, Norway

Time: 10:20 AM

The Role of Spiral Eddies in the Non-Linear

Instability at a Two-Geofluid Interface 1976

Dr. Fatos Hoxhaj, *Institute of Hydrometeorology, Albania*

Thursday, 10:00 AM - 12:00 PM

Room: Royal 3

Ocean Science Education I

Co-Chairs

Paula Keener-Chavis, *NOAA CSC, SC*

Dr. Cheryl Peach, *Scripps UCSD, CA*

Time: 10:00 AM

Ocean Science Concept Mapping: What Do

People Need to Know About Ocean Sciences 1977

Robert F. Chen, Daniel Brabander, Robert Stevenson, Robert

Beattie, *UMassBoston, MA*

Tracey Crago, *WHOI Sea Grant, MA*

Sukey Padawer, *New England Aquarium, MA*

Time: 10:20 AM

Ocean Exploration Through NOAA: Collaborations

for Excellence In Exploration and Education 1979

Paula Keener-Chavis, *NOAA - Office of Ocean*

Exploration, SC

Time: 10:40 AM

Exploring the Deep with Teachers - Using

Teacher Input to Drive Education and

Outreach Plans 1980

Liz Goehring, *Penn State University, PA,*

Véronique Robigou, *University of*

Washington, WA

Time: 11:00 AM

REVEL - Research and Education:

Volcanoes,

Exploration and Life 1981

Véronique Robigou, *University of*

Washington, WA

Time: 11:20 AM

Educational Outreach Efforts of the

Monterey Bay Aquarium Research

Institute (MBARI) 1982

G.I. Matsumoto, *Monterey Bay Aquarium*

Research Institute, CA

Time: 11:40 AM

Ocean Institute High School Internship

Program: Inspiring and Educating

Students

About the Ocean Environment 1986

Ms. Deidre Marissa Cavazzi, *Ocean*

Institute, CA

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Scientific/Technical Program

Thursday, 10:00 AM - 12:00 PM
Room: Royal 4

Ocean Energy I Co-Chairs

Ann Marie Harmony, *POEMS, CA*
Dr. James H. Wilson
Neptune Sciences, Inc, CA

Time: 10:00 AM

**Matching Grid-Connected Power with the
Economics of Ocean Power Generation.....** 1987
Mr. Steven Jay Mueller, *Renergy Pacific Corporatin, CA*

Time: 10:20 AM

**AquaBuoy – The Offshore Wave Energy Converter
Numerical Modeling and Optimization** 1988
Alla Weinstein, Göran Fredrikson, Lennart Claeson, Jan
Forsberg, Mary Jane Parks, *AquaEnergy Group, USA*
Dr. Kim Nielsen, Morton Sand Jenses, *RAMBØLL,*
Denmark, Dr. Kambiez Zandiyeh, *DUNLOP Oil & Marine,*
UK, Prof. Peter Frigaard, Morten Kramer, Thomas Lykke
Andersen, *Aalborg University, Denmark*

Time: 10:40 AM

**The Helical Turbine and Its Applications
for Tidal and Wave Power.....** 1996
Dr. Alexander M. Gorlov, *Northeastern University, MA*

Time: 11:00 AM

**A Hybrid Photovoltaic-Wind Power System for
the National Data Buoy Center's Coastal Marine
Automated Network** 1997
P.A. Lessing, NOAA, *Stennis Space Center, MS*



Thursday, 10:00 AM - 12:00 PM
Room: Royal 6

Electro-Magnetic Co-Chairs

Dr. Ted Clem
Coastal Systems Station, FL
Dr. W. Mike Wynn
Coastal Systems Station, FL

Time: 10:00 AM

**Magnetic Anomaly Guidance System for
Mine Countermeasures Using Autonomous
Underwater Vehicles** 2002
Roy Wiegert, *Naval Surface Warfare Center, Coastal
Systems Station, FL*

Time: 10:20 AM

**Electromagnetic Scattering from Large Aspect Ratio
Lossy Dielectric Solids in a Conducting Medium** 2011
Gary Steven Sammelmann, *Coastal Systems Station, FL*

Time: 10:40 AM

**Nonlinear Signal Processing of Ocean
Electromagnetic Data** 2017
Dr. Michael L. Larsen, Dr. Jeff Ridgway, Dr. Cy H.
Waldman, Dr. Michael Gabbay, Brad Battista, Rod Buntzen,
Information Systems Labs
Dr. C.D. Rees, *SPAWAR, CA*

Time: 11:00 AM

**Magnetic Sensor Operation Onboard a UUV:
Magnetic Noise Investigation using a
Total-Field Gradiometer** 2018
J.T. Bono, D.J. Overway, W.M. Wynn, *Naval Surface
Warfare Center Coastal Systems Station, FL*

Time: 11:20 AM

Ring Thruster With Magnetic Bearings 2023
Leszek Matuszewski, K. Falkowski, *Trechnical University
of Gdańsk, Faculty of Ocean Engineering, Poland*



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Scientific/Technical Program

Thursday, 10:00 AM - 12:00 PM
Room: Sunrise

HF Radar—Advanced Systems and Applications

Co-Chairs

Dennis Trizna

Imaging Science Research, Inc., VA

Prof. John F. Vesecky

University of California at Santa Cruz, CA

Time: 10:00 AM

Posteriori Estimation of Low Altitude Propagation

Loss from Radar Sea Clutter Data 2032

Peter Gerstoft, William S. Hodgkiss, *Scripps Institute of Oceanography, CA*, L. Ted Rogers, *SPAWAR Systems Center, CA*

Time: 10:20 AM

Performance of a VHF Ocean Surface Radar

in the Surf Zone 2037

M.L. Heron, A. Prytz, *Marine Geophysical Laboratory James Cook University, Australia*

Time: 10:40AM

Surface Transport and Mixing in Monterey Bay I:

Objective Surface Current Maps 2043

Dr. Bruce L. Lipphardt, Jr., Dr. A.D. Kirwan, Jr., *University of Delaware, DE*, Dr. C.E. Grosch, *Old Dominion University, VA*, Dr. Jeffrey D. Paduan, *Naval Postgraduate School, CA*, Dr. S. Wiggins, Dr. D. Small, *University of Bristol, UK*, Dr. K. Ide, *UCLA, CA*

Time: 11:00AM

Surface Transport and Mixing in Monterey Bay II.

Synoptic Summaries of Particle Motions 2044

Dr. Des Small, Prof. Stephen Wiggins, *University of Bristol, UK*, Prof. A.D. Kirwan, Jr., Dr. Bruce Lipphardt, Jr., *University of Delaware, DE*, Dr. Kayo Ide, *UCLA, CA*, Prof. C.E. Grosch, *Old Dominion University, VA*, Prof. Jeffrey Paduan, *Naval Postgraduate School, CA*

Time: 11:20AM

Surface Transport and Mixing in Monterey Bay III:

Variability from Hours to Years 2045

Prof. A. D. Kirwan, Jr., Dr. B.L. Lipphardt, Jr., *University of Delaware, DE*, Prof. S. Wiggins, Dr. D. Small, *University of Bristol, UK*, Prof. C. Grosch, *Old Dominion University, VA*, Prof. J. Paduan, *Naval Post Graduate School, CA*, Dr. K. Ide, *UCLA, CA*

Time: 11:40AM

HF Radar Measurements of Surface

Wind Field 2046

Prof. John F. Vesecky, Mrs. Jessica Drake, Dr. Kenneth Laws, Dr. Calvin Teague, *University of California at Santa Cruz, CA*, Dr. Frank Ludwig, *Stanford University, CA*

Thursday, 10:00 AM - 12:00 PM
Room: Sunset

Seafloor Engineering I

Chair

Herb Herman, *NFESC, CA*

Time: 10:00 AM

Three-Dimensional Hydrodynamic Model

for Prediction of Falling Cylinder

Through Water Column 2047

Peter C. Chu, Chenwu Fan, Ashley Evans, Athony Gilles, *Stennis Space Center, CA*

Time: 10:20 AM

Requirements for Monitoring

Environmental Impact of Seafloor

Cables: Issues and Answers 2058

Mr. Dallas J. Meggitt, *Sound & Sea Technology, WA*
Mr. Jeffrey V. Wilson, *Naval Facilities Engineering Service Center, CA*

Time: 10:40 AM

Method for Predicting Foundation

Stability for Equipment Placed on

Grade in a Seafloor Environment 2063

D.G. True, *Consultant, CA*

Time: 11:00AM

Penetration of Cylindrical Objects in

Soft Mud 2068

Charles Aubeny, Wayne Dunlap, *Texas A&M University, TX*



Scientific/Technical Program

Thursday, 10:00 AM - 12:00 PM
Room: Sheffield

Array Applications Co-Chairs

Dr. Roger Richards, *NUWC, RI*
Kim C. Benjamin, *NUWC, RI*

Time: 10:00 AM

Free-Flooded Ring Transducers: Design Method and Their Interaction in Vertical Arrays 2074
Ender Kuntsal, *International Transducer Corporation (ITC), CA*

Time: 10:20 AM

Calculation of Acoustic Loading on Transducers in the Time Domain 2079
George Benthien, Stephen Hobbs *SPAWAR Systems Center, CA*

Time: 10:40 AM

Improving Arrays for Multi-Angle Swath Bathymetry 2085
John S. Bird, Sabir Asadov, Paul Kraeutner, *Simon Fraser University, Canada*

Time: 11:00 AM

Acoustic Transducer Calibration System 2093
Kenneth C. Baldwin, Larry Mayer, Andrew McLeod, Jarrod Millar, *University of New Hampshire, NH*

Time: 11:20 AM

The Feasibility Study of a Leak Detection System for an Underwater Pipeline 2100
Wuu Wen Lin, *Yung-Ta Institute of Technology & Commerce, Taiwan*

Time: 11:40:AM

Development of a Portable Acoustic Calibration System (PACS) 2105
Mr. Kenneth J. Rhyno, *Defence R&D Canada - Atlantic, Canada*
Mr. Ron Cunningham, *Pernix Technology, Canada*
Mr. David G. Hazen, *Defence R&D Canada, Canada*

Thursday, 10:00 AM - 12:00 PM
Room: Hampton

Methods for Improved Localization Co-Chairs

Dr. Donald Pace, *Orincon, CA*
Mark Owen
SPAWARSYSCEN San Diego, CA

Time: 10:00 AM

Widely-Linear Beamforming 2106
Dr. Todd McWhorter, *Mission Research Corporation, CO*

Time: 10:20 AM

Integrated Multiple-Hypothesis Nonlinear Tracking 2107
Eric Tollefson, Warren Eldredge, Daniel D. Sternlicht, Donald W. Pace, *ORINCON Defense, CA*, Steven L. Anderson, *Metron, Inc., VA*

Time: 10:40 AM

An Neural Extended Kalman Filter Multiple Model Tracker 2111
M.W. Owen, *SPAWAR Systems Center San Diego, CA*, A.R. Stubberud, *University of California, CA*

Time: 11:00 AM

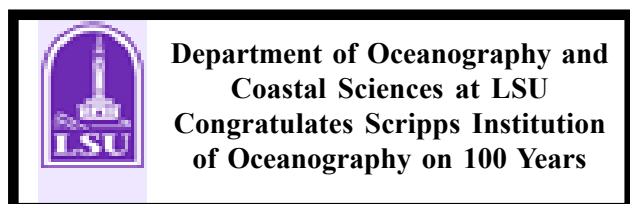
Spectral Feature-Aided Multi-Target Multi-Sensor Passive Sonar Tracking 2120
Dr. Donald W. Pace, Dr. Mahendra Mallick, Dr. Warren Eldredge, *ORINCON Corporation, CA*

Time: 11:20 AM

The Statistical Accuracy of an Arctangent Bearing Estimator 2127
B.H. Maranda, *Defence R&D Canada, Atlantic, Canada*

Time: 11:40 AM

Adaptation and Improvement of ASW Tactical Decision Aid Design to Mine Warfare Tactical Decision Aid 2133
John Dubberley, *Stennis Space Center, MS*



Scientific/Technical Program

Thursday, 10:00 AM - 12:00 PM
Room: Windsor

Synthetic Aperture Sonar Co-Chairs

Dr. Kerry Commander
Coastal Systems Station, FL
Dr. Marc Pinto, *NATO, Italy*

Time: 10:00 AM

Results of a Multi-Static Synthetic

Aperture Sonar Experiment 2138
Anthony D. Matthews, Victor B. Johnson, Randall W. Ball,
Coastal Systems Station, FL

Time: 10:20 AM

Motion Compensation of AUV-Based

Synthetic Aperture Sonar 2143
Daniel A. Cook, James T. Christoff, Jose E. Fernandez,
Coastal Systems Station, FL

Time: 10:40 AM

Reconstructing Seafloor Bathymetry with a Multichannel Broadband InSAR

using Belief Propagation 2149
P.J. Barclay, C.J. Forne, M.P. Hayes, P.T. Gough, *University
of Canterbury, New Zealand*

Time: 11:00 AM

Automated Segmentation of SAS Images

Using the Mean - Standard Deviation Plane
for the Detection of Underwater Mines 2155
Frédéric Maussang, Jocelyn Chanussot, *Laboratoire des
Images et des Signaux, CNRS LIS / ENSIEG, France,*
Alain Hétet, *Groupe d'Etudes Sous-Marines de
l'Atlantique, DGA/DCE/GESMA, France*

Time: 11:20 AM

Automated Shape Classification of Buried Objects with Low Frequency

Multistatic Sonar 2161
Monica Montanari, Joseph R. Edwards, Henrik Schimdt,
Massachusetts Institute of Technology, MA



The National Science Foundation
wishes Scripps Institution of
Oceanography fair winds and
following seas as it begins
it's second century.

Thursday, 10:00 AM - 12:00 PM
Room: Garden 1

Unmanned Underwater Vehicles

Co-Chairs

Claude Brancart, *Next Fish, ME*
Barbera Fletcher
SPAWARSYSCEN San Diego, CA

Time: 10:00 AM

Oscillating Fin Thrusters for Multi-View Classification

Maneuvering on MCM UUVS 2167
Brett Hobson, Mathieu Kemp, *Nekton Research, LLC, NC,*
Ivan Le Goff, Alexander Leonessa, *Florida Atlantic
University, FL*

Time: 10:20 AM

Propulsive Performance of the Autonomous

Underwater Vehicle "C-SCOUT" 2170
Roy Thomas, Neil Bose, *Memorial University of
Newfoundland, Canada,* Christopher D. Williams, *National
Research Council Canada, Institute for Marine
Dynamics, Canada*

Time: 10:40 AM

Development of a Biological Sensor Bay

for the Ranger AUV 2184
Ryan Moody, *Nekton Research LLC, NC*

Time: 11:00 AM

Study of the Underwater Observation

System in Fast Water Current 2189
Hiroshi Sakai, Toshinari Tanaka, *Port and Airport Research
Institute, Japan*

Time: 11:20 AM

"MARINE BIRD", A New Experimental AUV with Underwater Docking and

Recharging System 2195
Toshifumi Fukasawa, Toshihito Noguchi, Tadayuki Kawasaki,
Kawasaki Shipbuilding Corporation, Japan, Makoto
Baino, *Kawasaki Heavy Industries, Ltd., Japan*

Time: 11:40 AM

Autonomous Docking for Intervention-AUVs Using Sonar and Video-Based Real-Time 3d

Pose Estimation 2201
Dr. Jonathan Evans, Paul Redmond, Dr. Costas Plakas, Dr.
Kelvin Hamilton, Prof. David Lane, *Heriot-Watt University,
United Kingdom*

Scientific/Technical Program

Thursday, 10:00 AM - 12:00 PM
Room: Garden 2

Tutorial

Argos 2-Way Capability: How it Works & How to Use it

Bill Woodward, *Service-Argos, Inc., MD*

Thursday, 1:00 PM - 3:00 PM
Room: Terrace Pavillion

Passionfish Sustainable Fisheries Forum

Chair **Kevin Hardy**, *Scripps, UCSD, CA*

Passionfish Foundation is a nonprofit public education project promoting sustainable wild fisheries and aquaculture. The group is launching live and online forums, seafood events with culinary partners, and educational outreach.

Passionfish has assembled a special blue-ribbon panel to meet at Oceans 2003. Preeminent public figures, widely respected local leaders, and experts from diverse disciplines will engage in a spirited and evocative panel discussion of sustainable fisheries. Passionfish participants will explore what is common to both commerce and conservation. Local follow-up will be energetically facilitated through future working groups.

Their approach builds trust by getting stakeholders talking to one another who otherwise would not. By revealing core values rather than dwelling on disagreement, the focus becomes the possibilities, not the problems. The outcome promises to be thought-provoking.

Your participation will help reveal ways coastal communities might assume leadership roles in responsibly promoting sustainable fisheries.

Much of the Passionfish Foundation's work is made possible through a generous grant from the David & Lucile Packard Foundation. Passionfish is for people passionate about the ocean, fishing, and seafood!



The National Oceanic and Atmospheric
Administration commends
Scripps Institution of Oceanography
on the occasion of its Centennial.

Thursday, 1:20 PM - 3:20 PM
Room: Pacific 5

Real Time Monitoring

Co-Chairs

Stephen K. Gill, *NOAA CO-OPS, MD*
Catherine Woody, *NOAA NDBO, MS*

Time: 1:00 PM

Test Results of the SeaKeepers Ocean

Sensor Module on Remote Platforms 2211

Catherine Woody, *National Data Buoy Center, Stennis Space Center, MS*, Rodney Riley, *Nikolai Fedoroff, Terry Rutledge, Science Applications International Corporation, Stennis Space Center, MS*, Geoffrey Morrison, *Rod Zika, International SeaKeepers Society, UM RSMAS, FL*

Time: 1:20 PM

HIDEX Generation II: A New and Improved Instrument for Measuring

Marine Bioluminescence 2214

Edith A. Widder, *Charles L. Frey, Lawrence J. Borne, Harbor Branch Oceanographic Institution, FL*

Time: 1:40 PM

AUV Reactive Planning: Deepest Point 2222

S. Pang, *J.A. Farrell, University of California, CA*, R.M. Arrieta, *W. Li, SPAWAR Systems Center-San Diego California State University, CA*

Time: 2:00 PM

Real Time Data and ECDIS in a Web-Based

Port Management Package 2227

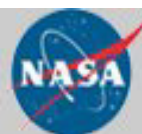
Bohdan Pillich, *SevenCs GmbH, Germany*
Stephen Pearlman, *Chris Chase, InterOcean Systems, Inc, CA*

Time: 2:20 PM

FerryBox – A New System for Automatic Measurement of Biological-Chemical

Parameters from Ferry Boats 2234

Wilhelm Petersen, *Michail Petschatnikov, Friedhelm Schroeder, Franciscus Colijn, GKSS Research Centre, Institute for Coastal Research, Germany*



NATIONAL AERONAUTICS
AND SPACE ADMINISTRATION

The National Aeronautics and Space Administration
congratulates Scripps Institution of Oceanography's
many contributions to earth science.

Scientific/Technical Program

Thursday, 1:20 PM - 3:20 PM
Room: Pacific 7

Planktonic Food Webs

Co-Chairs

Dr. Jed Fuhrman

University of Southern California, CA

Dr. Fereidoun Rassoulzadegan,

Université Pierre & Marie Curie, France

Time: 1:20 PM

Climate Change Effects on Planktonic

Ecosystems: A Five Decade Perspective

from CalCOFI 2238

Dr. Mark D. Ohman, *Scripps Institution of Oceanography, CA*, Dr. Bertha E. Lavaniegos, *Centro de Investigacion Cientifica y Educacion Superior de E, Mexico*

Dr. Greg H. Rau, *University of California, Santa Cruz, CA*

Dr. Ed Brinton, *Scripps Institution of Oceanography, CA*

Time: 1:40 PM

Microbial Control of Oceanic Carbon

Cycle and Implications for Ecosystem

Response to Human-Induced Stresses 2239

Prof. Farooq Azam, Dr. Alexandra Worden, *Scripps Institution of Oceanography, UCSD, CA*

Time: 2:00 PM

Protistan Biodiversity in the Plankton:

New Insights from New Approaches 2240

Dr. David A. Caron, Peter D. Countway, Astrid Schnetzer, Matthew Travao, *University of Southern California, CA*

Time: 2:20 PM

Deriving Ecosystem Properties from

Large-Scale Distributions of Primary

Biological Oceanographic Variables 2241

Prof. Richard B. Rivkin, *Memorial University of Newfoundland, Canada*

Prof. Louis Legendre, Prof. Fereidoun Rassoulzadegan, *Villefranche Oceanography Laboratory, France*



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Thursday, 1:20 PM - 3:20 PM
Room: Royal 1

Oceanographic Instrumentation I

Co-Chair

Kim McCoy, *Ocean Sensors, CA*

Time: 1:20 PM

Performance of Large Volume Water Transfer

Systems During In-Situ Water Sampling 2242

Don W. Pfitsch, Archie T. Morrison III, *McLane Research Laboratories, Inc., MA*

Time: 1:40 PM

Real Time Marine Environment Monitoring Based on the DGPS and Wireless Mobile IT Solution 2247

Prof. Yong Chul Park, Prof. Joong Ki Choi, Mr. Hyo Jin Lee, *Inha University, Korea*

Time: 2:00 PM

Field Evaluation of Revolutionary

CTD Design 2249

Alan Fougere, Mary St. Germain, *Falmouth Scientific, Inc., MA*, F.J. Kelly, *Texas A&M University-Corpus Christi, TX*

Time: 2:20 PM

A Configurable Multi-Sensor Tripod for the Study of Near-Bottom Ocean Processes 2254

R. Birch, M. Clarke, D. Lemon, D. Fissel, *ASL Environmental Sciences, Canada*, P.R. Hill, *Natural Resources Canada, Geological Survey of Canada, Canada*

Time: 2:40 PM

Data from a New High Performance

Horizontal ADCP 2261

Dr. James R. Marsden, Dr. Hening Huang, Mr. Neil Trenaman, *RD Instruments, CA*

Time: 3:00 PM

A Complex of Polarimetric, Combined Active-Passive Sensors of L-, C-, and X-Band of Frequencies for Vessel and Airborne

Application 2262

Dr. Hambaryan Astghik, *ECOSERV Remote Observation Centre Co.LTD, Armenia*

Prof. Arakelyan Artashes, *Institute of Radiophysics & Electronics, Armenia*

Scientific/Technical Program

Thursday, 1:20 PM - 3:20 PM
Room: Royal 3

Marine Technology Education Chair

Dr. Sharon Walker
Univ. of Southern Mississippi, MS

Time: 1:20 PM

ROV Competitions for Students: Improving Marine Technology Education & Helping to Meet Work Force Needs 2263
Ms. Jill Marie Zande, Ms. Deidre Ellen Sullivan
Marine Advanced Technology Education (MATE) Center, CA, Mr. Drew Michel, Marine Technology Society ROV Committee, TX

Time: 1:40 PM

Ocean Observatories Provide an Opportunity for All Citizens to Be Explorers 0
Dr. Blanche W. Meeson, *NASA Goddard Space Flight Center, MD, Dr. Eric Lindstrom, Ocean.US Office, VA*

Time: 2:00 PM

LiMPETS Long-Term Monitoring Program and Experiential Training for Students 2265
Ms. Dawn A. Osborn, *University of California Santa Cruz, CA*

Time: 2:20 PM

Advanced Instrumentation in an Undergraduate Program in Oceanography 2274
Paul Joyce, Jan Witting, Erik Zettler, *Sea Education Association, MA*

Time: 2:40 PM

Regional Ocean Observing Systems Provide an Opportunity for All Citizens to be Explorers 2275
Dr. Blanche W. Meeson, Dr. Eric J. Lindstrom, *Ocean.US, VA*

Time: 3:00 PM

Public Understanding: Applying Models to Solving Real Problems 2277
Leonard Sonnenschein, Marc Lopata, *St. Louis Children's Aquarium, MO*

Thursday, 1:20 PM - 3:20 PM
Room: Royal 4

Ocean Energy II Co-Chairs

Dr. James H. Wilson
Neptune Sciences, Inc., CA
Ann Marie Harmony, *POEMS, CA*

Time: 1:20 PM

Ocean Energy Development: Obstacles to Commercialization 2278
Mr. Christopher W. Eaton, Ms. Ann Marie Harmony
Practical Ocean Energy Management Systems, Inc., CA

Time: 1:40 PM

Recent Developments in Salinity Gradient Power 2284
A.T. Jones, W. Finley, *oceanUS consulting Wader, LLC, CA*

Time: 2:00 PM

The dynamics of Wave Carpet – A novel deep water wave energy design 2288
Paul Mario Koola, Akif Ibragimov, *KBSI, TX*

Time: 2:20 PM

Energy Island 2294
Mr. Dominic Michaelis, *Solar Energy Limited, France*



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Scientific/Technical Program

Thursday, 1:20 PM - 3:20 PM
Room: Royal 6

Video Image Mosaicing Co-Chairs

Dr. Mahmood Azimi-Sadjadi,
Colorado State Univ., CO
Dr. Jack Lloyd
Coastal Systems Station, FL

Time: 1:20 PM

**A Conical Panoramic Stereo Imaging
System for 3-D Scene Reconstruction.....** 2303
Prof. Shahriar Negahdaripour, *Univ. of Miami, FL*
Mr. Pezhman Firoozfam, *Univ. of Miami, FL*

Time: 1:40 PM

**Robust Optical Flow Estimation
Using Underwater Color Images** 2309
Shahriar Negahdaripour, Hossein Madjidi, *University of
Miami, FL*

Time: 2:00 PM

**3-D Photo-Mosaicking of
Benthic Environments** 2317
Mr. Hossein Madjidi, Prof. Shahriar Negahdaripour
University of Miami, FL

Time: 2:20 PM

**Real-Time Geo-Referenced Video Mosaicking with the
MATISSE System** 2319
A.G. Vincent, J. Jouffroy, N. Pessel, J. Opderbecke, M.
Borgetto, V. Rigaud, *Ifremer – Underwater Robotics,
Navigation and Vision Department, France*



Thursday, 1:20 PM - 3:20 PM
Room: Sunrise

HF Radar—Advanced Systems and Applications II
Co-Chairs Prof. John F. Vesecky
University of California at Santa Cruz, CA
Dennis Trizna
Imaging Science Research, Inc., VA

Time: 1:20 PM

**Dual-Use Multi-Frequency HF Radar for
Current Shear Mapping and Ship Target
Classification** 2325
Dr. Dennis B. Trizna, *Imaging Science Research, Inc., VA*

Time: 1:40 PM

**Multi-Frequency HF Radar for Mapping
Current Shear and Vector Winds** 2332
Dr. Dennis B. Trizna, and Dr. Lillian Xu, *Imaging Science
Research, Inc., VA*

Time: 2:00 PM

**Recent Results from a Nested Multi-Static
HF Radar Network for the NorthEast
Observing System (NEOS)** 2335
Dr. Josh T. Kohut, Dr. Scott M. Glenn, Dr. Hugh J. Roarty,
Rutgers University, NJ

Time: 2:20 PM

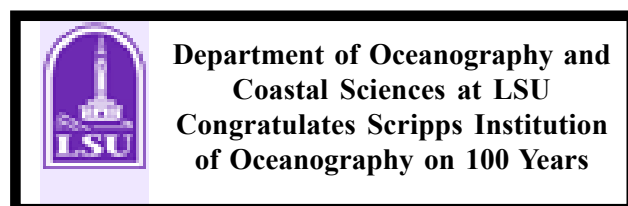
**An Alternate Analysis for the Second-Order
High Frequency Bistatic Radar Cross Section
of the Ocean Surface — Patch Scatter
and its Inversion** 2336
Dr. Eric Gill, Dr. Weimin Huang, Mr. Jianjun Zhang,
Memorial University of Newfoundland, Canada

Time: 2:40 PM

**Examining the Correlation Between SeaWiFs
Chlorophyll (CHL) and Atmospheric Aerosol
Depth (AOD) Time Series at the Global Scale** 2341
Prof. Albert J. Gabric, Dr. Roger Cropp, *Griffith University,
Australia*

Time: 3:00 PM

**Nile Delta Environment and Offshore
Sediment Flux** 2348
Ms. Therese Schneck, *France*



Scientific/Technical Program

Thursday, 1:20 PM - 3:20 PM
Room: Sunset

Seafloor Engineering II Chair

Herb Herman, *NFESC, CA*

Time: 1:20 PM

Mine Burial By SCOUR: Preliminary

Results from the Gulf of Mexico 2349

Michael D. Richardson, Mr. Grant R. Bower, Dr. Kevin B. Briggs, Dr. Paul A. Elmore, Mr. Conrad S. Kennedy, Dr. Philip J. Valent, *Naval Research Laboratory, MS*
Dr. David F. Naar, Dr. Stanley D. Locker, Dr. Peter Howd, Dr. Albert C. Hine, Mr. Brian T. Donahue, Mr. Justin Brodersen, *University of South Florida, FL*
Dr. Thomas F. Wever, Mr. Ralf Luehder, *FWG, Germany*
Dr. Carl T. Friedrichs, Mr. Authur C. Trembanis
Virginia Institute of Marine Science, VA
Mr. Sean Griffin, Mr. John Bradley, *OMNI Technologies INC, LA*
Dr. Roy H. Wilkins, *University of Hawaii, HI*

Time: 1:40 PM

Assessing SCOUR Model Performance

with Experimental Data 2350

Dr. Paul A. Elmore, Dr. Mike D. Richardson, *Naval Research Laboratory, MS*

Time: 2:00 PM

Evaluation and Quantification of Randomness in Free-fall Trajectories of Instrumented Cylinders 2355

Andrei Abelev, *University of Southern Mississippi, MS*,
Philip Valent, N.G. Plant, K.T. Holland, *Naval Research Lab, MS*

Time: 2:20 PM

Shore Protection, Beach Formation, and Production of Building Materials and Energy Using Seawater Electrolysis Technology 2366

Dr. Thomas J. Goreau, *Global Coral Reef Alliance, MA*,
Wolf Hilbertz, *Sun & Sea, Thailand*, A. Azeez A. Hakeem,
Banyan Tree Maldives, Maldives, Jon Allen, *MIT Laser Interferometer Gravitational Wave Observatory, MA*



Sponsors of Student Posters and Lanyards

Thursday, 1:20 PM - 3:20 PM
Room: Sheffield

Sensors & Projectors Co-Chairs

Kim C. Benjamin, *NUWC, RI*
Dr. Roger Richards, *NUWC, RI*

Time: 1:20 PM

A Miniature Vector Sensor for Line

Array Applications 2367

Mr. James Clay Shipps, Mr. Ken Deng
Wilcoxon Research, Inc., MD

Time: 1:40 PM

A Comparison of Underwater Acoustic Performance of Piezoelectric Ceramic

Based Cymbal Projectors 2371

Dr. Thomas R. Howarth, *NAVSEA Division Newport, ID*
Dr. James F. Tressler, *Naval Research Laboratory, DC*

Time: 2:00 PM

A Comparison of the Underwater Acoustic Performance of Single Crystal vs. Piezoelectric

Ceramic Based Cymbal Projectors 2372

Dr. James F. Tressler, *U.S. Naval Research Laboratory*
Dr. Thomas R. Howarth, Dr. Dehua Huang, *NAVSEA Division Newport, RI*

Time: 2:20 PM

High Frequency Triply Resonant Broadband Transducer Array Development at NUWC 2380

Mr. Stephen C. Butler, *Naval Undersea Warfare Center Div Newport, RI*

Time: 2:40 PM

Ultra Wideband Multiple Resonant Transducer 2381

Mr. Alexander L. Butler, Dr. John L. Butler, *Image Acoustics, Inc., MA*



Scientific/Technical Program

Thursday, 1:20 PM - 3:20 PM

Room: Hampton

Acoustic Navigation and Localization

Co-Chairs

Mark Owen

SPAWARSYSCEN San Diego, CA

Dr. Donald Pace, Orincon, CA

Time: 1:20 PM

Acoustic Multipath Identification with

Expectation-Maximization 2388

Dr. Brian S Bingham, Dr. David A Mindell, Dana Yoerger,
Brendan Foley, Warren Seering, *MIT, MA*

Time: 1:40 PM

An Integrated DVL/IMU System for Precise Navigation of an Autonomous

Underwater Vehicle 2397

Mr. Chong-moo Lee, Dr. Seok-Won Hong, Prof. Woo-Jae
Seong, *Korea Ocean Research and Development Institute,
Korea (Republic)*

Time: 2:00 PM

Using Self-Organizing Maps Approach to Pipeline Localization 2398

A. Puttipatjakajorn, B. Jouvencel, T. Salgado-Jimenez,
LIRMM, France

Time: 2:20 PM

Concurrent Navigation and Sea-Bottom Targets Detection Using Acoustic Sensors

on AUV 2404

Mr. Te-Chih Liu, Prof. Henrik Schmidt, *MIT Ocean*

Engineering, MA

Time: 2:40 PM

Improved Bearing Estimates of Weak Signals Using Stochastic Resonance and Frequency Shift Techniques 2410

Dr. Qinghua Ye, Dr. Haining Huang, Dr. Xinyi He, Prof.
Chunhua Zhang, *Institute of Acoustics, Chinese Academy
of Sciences, China*

Thursday, 1:20 PM - 3:20 PM

Room: Windsor

SAS Focusing I

Co-Chairs

Dr. Marc Pinto, NATO, Italy

Dr. Kerry Commander

Coastal Systems Station, FL

Time: 1:20 PM

Stripmap Phase Gradient Autofocus 2414

Mr. Hayden J. Callow, Dr. Michael P. Hayes, Prof. Peter T.
Gough, *Acoustics Research Group, New Zealand*

Time: 1:40 PM

Autofocus of Stripmap SAS Data Using

the Range-Variant SPGA Algorithm 2422

Mr. Hayden J. Callow, Dr. Michael P. Hayes, Prof. Peter T.
Gough, *Acoustics Research Group, New Zealand*

Time: 2:00 PM

The SAR Map-Drift Algorithm Extended for a Multi-Hydrophone SAS 2427

P. T. Gough, M. A. Miller, *University of Canterbury, New
Zealand*

Time: 2:20 PM

Optimizing a Three-Stage Autofocus System for Synthetic Aperture Imaging Using a UAV 2433

Dr. Trevor John Sutton, Prof. Hugh D. Griffiths
University College London, United Kingdom

Mr. Sean A. Chapman, *QinetiQ Bincleaves, United
Kingdom*

Dr. Rob Crook, Mr. Martin Way, *Thales Underwater
Systems, United Kingdom*

Time: 2:40 PM

Signal Processing for AUV Based

Interferometric Synthetic Aperture Sonar 2438

Roy Edgar Hansen, Torstein Olsmo Sæbø, Kenneth Gade,
Norwegian Defence Research Establishment, Norway,
Sean Chapman, *QinetiQ, UK*

Time: 3:00 PM

Image Deconvolution Techniques for Extending the Area Coverage Rate of Synthetic Aperture Sonar 2445

Dr. Enson Chang, *Dynamics Technology, Inc., CA*



Sponsors of the Sand Sculpture

Scientific/Technical Program

Thursday, 1:20 PM - 3:20 PM
Room: Garden 1

UUV Control Co-Chairs

Barbera Fletcher
SPAWARSSYSCEN San Diego, CA
Claude Brancart, *Next Fish, ME*

Time: 1:20 PM

Motion Planning and Control of UVMS:

A Unified Dynamics-Based Approach 2446
Dr. Tarun Kanti Podder, *Monterey Bay Aquarium Research Institute, CA*, Prof. Nilanjan Sarkar, *Research Institute Vanderbilt University, TN*

Time: 1:40 PM

UUV on-Board Path Planning in a Dynamic Environment for the Manta Test Vehicle 2454
Dr. Piero Miotto, Mr. John Wilde, *Draper Laboratory, MA*, Alberico Menozzi, *Naval Undersea Warfare Center, RI*

Time: 2:00 PM

A Graphical Mission Management System for UUV Mission Specification, Control and Analysis 2462
Gary M. Trimble, *Lockheed Martin Perry Technologies, CA*, Mr. Walter A. Aviles, *Novint Technologies, NM*

Time: 2:20 PM

Combining Random and Data-Driven Coverage Planning for Underwater Mine Detection 2463
Dr. Jason R. Stack, Dr. Cheryl M. Smith, *US Navy, Coastal Systems Station, FL*

Time: 2:40 PM

Feasibility Analysis of an 11,000 m Vehicle with a Fiber Optic Microcable Link to the Surface 2469
Ms. Sarah E. Webster, Mr. Andrew D. Bowen, *Woods Hole Oceanographic Institution, MA*



Thursday, 1:20 PM - 3:20 PM
Room: Garden 2

Manned & Human Powered Vehicles Chair

Dr. Nip Shah, *United Technologies, CA*

Time: 1:20 PM

A Fixed-Movable Combination Control System for a Human-Powered Submarine 2475
A. Linklater, D. Grissom, J. Stepanchick
Virginia Polytechnic Institute and State University, VA

Time: 1:40 PM

The Use of Active Control on Human Powered Vehicles 2480
John Hennage, Wayne Neu, *Virginia Tech, VA*

Time: 2:00 PM

Options for Extending the Submerged Endurance of the New Canadian Submarines 2481
Prof. Graham T. Reader, *University of Windsor, Canada*
Dr. Ian J. Potter, *Alberta Research Council, Canada*

Time: 2:20 PM

Human Powered Submarine Arcangelo III 2482
Oscar Gomez Diaz, Alondra Martinez Garcia, Juan Ramos Delgado, *Universidad Veracruzana, Mexico*

Time: 2:40 PM

Active Reconfigurable Control of A Submarine with Indirect Adaptive Control 2491
Mr. Ufuk Demirci, *Turkish Naval Academy, Turkey*
Prof. Feza Kerestecioğlu, *Kadir Has University, Turkey*

Time: 3:00 PM

Determination of a Hydrofoil for the Propulsion System of the 2000 University of California, San Diego Human-Powered Submarine 2496
Mr. Scott J Ketcham, Miss Sarah Bupp, Mr. Alex Garcia, Mr. Mike Scott, *University of California San Diego, CA*



Scientific/Technical Program

Thursday, 3:40 PM - 5:20 PM
Room: Pacific 5

Cross Cutting Issues

Chair **Dr. Theodore Bennett, USNOO, MS**

Time: 3:40 PM

Implementing an Integrated Ocean Observing System for the United States:

Status and Plans 2506

Dr. Eric Lindstrom, Prof. Thomas C. Malone, Prof. Larry
Atkinson, Ms. Muriel Cole, Ms. Rosalind Cohen, Mr. Patrick
Dennis, Dr. Steve Piotrowicz, *Ocean.US, VA*

Time: 4:00 PM

Need for A METOC GRID

Computing Environment 2507

Mr. James H. Corbin, Dr. Avichal Mehra, Sachin Bhate,
Mississippi State University, MS

Time: 4:20 PM

Connecting the “National Backbone” with Regional Observing System Federations in the Integrated Ocean Observing System 2512

Dr. Dean A. Dunn, Mr. Russ Beard, Ms. Susan Starke, Mr.
Joe Stinus, *NOAA/National Coastal Data Development
Center, MS*

Time: 4:40 PM

Building Support for an Integrated Ocean Observing System 2513

Bill Fornes, Penny Dalton, *Consortium for Oceanographic
Research and Education, DC*

Time: 5:00 PM

The National Weather Service (NWS) United States Integrated Sustained Ocean Observing System and the Federal Backbone - The Next Steps, What Can the Federal Backbone Do for You? 2514

Mr. Dan Henderson, *NOAA National Data Buoy Center,
MS*

Thursday, 3:40 PM - 5:20 PM
Room: Pacific 7

Industry Participation II

Co-Chairs

Craig Okuda, MBARI, CA
David Frost, Orincon, CA

Time: 3:40 PM

TBD

Lars Hansen, *MacArtney Offshore*

Time: 4:00 PM

TrackLink: A Broadband Spread Spectrum USBL System

Ning Xiao, *LINKQUEST, CA*

Time: 4:20 PM

New Drop Net for Scientific Research and Commercial Fishing

Kent Thomas, *SCCFA, CA*

Time: 4:40 PM

Acoustic Systems Trainer in the Classroom

Mr. Criag A. Bateman, *ITP/Texas A&M University at
Galveston, TX*



Student Sponsor



The National Science Foundation
wishes Scripps Institution of
Oceanography fair winds and
following seas as it begins
it's second century.

Scientific/Technical Program

Thursday, 3:40 PM - 5:20 PM
Room: Royal 1

Oceanographic Instrumentation II

Chair **Kim McCoy**, *Ocean Sensors, CA*

Time: 3:40 PM

Data from New Shallow Water ADCP 2521
Dr. Hening Huang, Dr. James R. Marsden, *RD Instruments, CA*

Time: 4:00 PM

A Newly Developed Wave Monitoring System on Ocean Platform 2522
Tetsuro Ikebuchi, Naoyuki Takatsu, Toshiyuki Kita, Norihito Okada, *Kawasaki Heavy Industries, LTD., Japan*
Wataru Koterayama, Masahiko Nakamura, *Research Institute for Applied Mechanics, Kyushu University, Japan*, Satoshi Fujii, Kenji Sato, *Okinawa Subtropical Environment Remote-Sensing Center, Communications Research Laboratory, Okinawa*

Time: 4:20 PM

Using Moored Buoy Observations to Assess and Improve a Circulation Model in Near-Real-Time 2530
Dr. Frank L. Bub, Dr. Charles W. Horton, Melody A. Clifford, Dennis Krynen, Richard Myrick
Naval Oceanographic Office, MS

Time: 4:40 PM

Five-Year Operation of the Oceanographic Research Vessel Mirai 2537
Chizuru Saito, Hiroyasu Momma, Shozo Tashiro, Katsura Shibata, *Japan Marine Science and Technology Center (JAMSTEC), Japan*



Thursday, 3:40 PM - 5:20 PM
Room: Royal 3

Ocean Science Education II

Co-Chairs **Dr. Cheryl Peach**, *Scripps UCSD, CA*
Dr. Sharon Walker, *Univ. of Southern Mississippi, MS*

Time: 3:40 PM

Education: A Vital Ingredient in Scientific Programmes - A Southern African Story 2540
B. Snow, *South African Institute for Aquatic Biodiversity, Coelacanth Programme, South Africa*

Time: 4:00 PM

Engaging Ocean Science Researchers in Informal Science Education 0
Shelley Glenn, Danielle Adler, *Birch Aquarium at Scripps Institution of Oceanography, CA*

Time: 4:20 PM

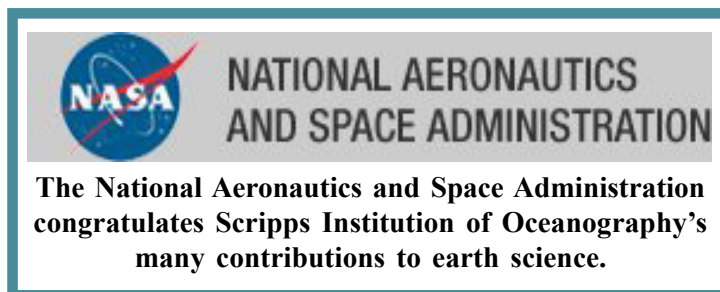
Bridging the Gap Between Ocean Science and Education: Creating Effective Partnerships Through Informal Educational Institutions 2544
Mr. Eric M. Solomon, Mr. Harry Helling, *Ocean Institute, CA*

Time: 4:40 PM

Ocean Scientists the Next Generation: Meeting the Changing Needs of Graduate Students 0
Dr. Paula G. Coble, Ms. Teresa Greely, Ms. Cynthia Leard, *University of South Florida, FL*

Time: 5:00 PM

Why Do We Have an Ocean?? 2545
Dr. Hal D. Palmer, *Veridian Systems Division, VA*



Scientific/Technical Program

Thursday, 3:40 PM - 5:20 PM

Room: Royal 4

Ocean Exploration Forum

Chair

Capt. Craig N. McLean

NOAA Office of Ocean Exploration, MD

Thursday, 3:40 PM - 5:20 PM

Room: Royal 6

Image Processing

Co-Chairs

Dr. Jack Lloyd

Coastal Systems Station, FL

Dr. Mahmood Azimi-Sadjadi

Colorado State Univ., CO

Time: 3:40 PM

On Reconstruction of 3-D Volumetric Models of Reefs and Benthic Structures from Image Sequences of a Stereo Rig 2553

Mr. Hongsheng Zhang, Prof. Shahriar Negahdaripour
University of Miami, FL

Time: 4:00 PM

Detection of Small Targets in Ocean Wave Clutter Using Panchromatic Time Series Imagery 2560

Dr. John P. Dugan, Ms. Cynthia C. Piotrowski, Mr. David C. Campion, Arete Associates, VA

Time: 4:20 PM

A Feasibility Study of Using Color Indexing for Reef Fish Identification 2566

Prof. Hsin-Hung Chen, Inst. of Undersea Technology,
National Sun Yat-sen University, Taiwan

Time: 4:40 PM

An Integrated Vision-Based Positioning System for Video Stabilization and Accurate Local Navigation and Terrain Mapping 2567

Miss Caroline Barufaldi, Mr. Pezhman Firoozfam, Prof. Shahriar Negahdaripour, University of Miami, FL

Thursday, 3:30 PM - 5:30 PM

Room: Sunset

Oceanographic Buoy Systems

Chair

Dr. Walter Paul, WHOI, MA

Time: 3:40 PM

Dynamic Modeling and Actual Performance of the MOOS Test Mooring 2574

J. Andrew Hamilton, Mark Chaffey, Ed Mellinger, Jon Erickson, Lance McBride, MBARI, CA

Time: 4:00 PM

Transition of the Deep-ocean Assessment and Reporting of Tsunamis Network – A Technology Transfer from NOAA Research to NOAA Operations 2582

B. Taft, L. Bernard, C. Teng, K. O'Neil, C. Demers, NOAA/NDBC Stennis Space Center, MS, C. Meinig, S. Stalin, M. Eble, NOAA/PMEL, WA

Time: 4:20 PM

Telemetry Environmental Monitoring Buoy and Mooring 2589

J.D. Irish, D.W. Fredriksson, WHOI, MA

Time: 4:40 PM

The GoMOOS Moored Buoy Design 2596

Mr. John P. Wallinga, Dr. Neal R. Pettigrew, University of Maine, ME



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Scientific/Technical Program

Thursday, 3:40 PM - 5:20 PM
Room: Sheffield

Data Acquisition and Storage

Co-Chairs

Dr. Roger Richards, *NUWC, RI*
Kim C. Benjamin, *NUWC, RI*

Time: 3:40 PM

Fine-Spatial-Scale Measurement of the Mid-Frequency (1 kHz-10 kHz) Ocean Noise

Field with a Vertical Billboard Array 2600

Dr. Gerald Lynden D'Spain, Jeff Skinner, Greg Edmonds,
William S. Hodgkiss, David Ensberg, Richard A. Harriss,
*Marine Physical Lab, Scripps Institution of
Oceanography, CA*

Time: 4:00 PM

A High Speed Acoustic Data Acquisition System Using Mostly COTS Components 2601

Jeffrey D. Skinner, Gregory L. Edmonds, David E. Ensberg,
Gerald L. D'Spain, William S. Hodgkiss
*Scripps Institution of Oceanography/Marine Physical
Laboratory, CA*

Time: 4:20 PM

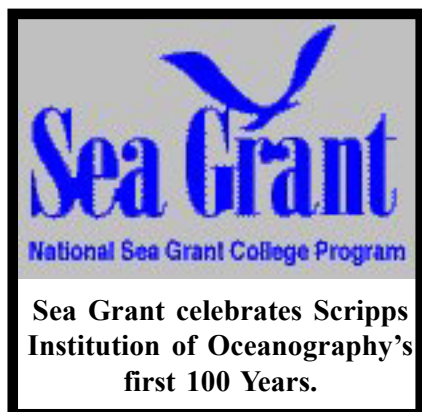
The ONR Five Octave Research Array (FORA) at Penn State 2607

Dr. Kyle M. Becker, Dr. John R. Preston, *The Pennsylvania
State University/Applied Research Lab., PA*

Time: 4:40 PM

A 16-Element Autonomous Receiving Array 2611

Dr. William S. Hodgkiss, Mr. Jeffrey D. Skinner, Mr. Richard
A. Harriss, *Scripps Institution of Oceanography/Marine
Physical Laboratory, CA*



Thursday, 3:40 PM - 5:20 PM
Room: Windsor

SAS Focusing II

Co-Chairs

Dr. Kerry Commander
Coastal Systems Station, FL
Dr. Marc Pinto, *NATO, Italy*

Time: 3:40 PM

3-D Acoustic Imaging of

Broadband SAS Data 2615

Dr. JoEllen Wilbur, Mr. James Christoff, Mr. Daniel Cook,
Coastal Systems Station, Dahlgren Division, NSWC, FL

Time: 4:00 PM

Contrast Optimisation of Coherent Images 2622

Steven A. Fortune, Dr. Michael Hayes, Prof. Peter Gough,
*Acoustics Research Group, University of Canterbury,
New Zealand*

Time: 4:20 PM

Simulation of Multiple-Receiver Broadband

Interferometric SAS Imagery 2629

Mr. Alan J. Hunter, Dr. Michael P. Hayes, Prof. Peter T.
Gough, *Acoustics Research Group, University of
Canterbury, New Zealand*

Time: 4:40 PM

Statistics of Synthetic Aperture

Sonar Images 2635

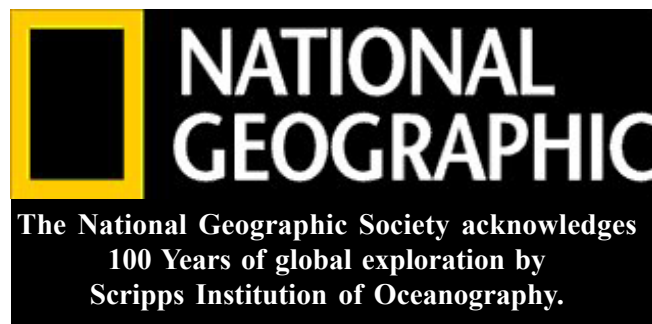
Prof. Alfred Hanssen, Mr. Jonas Kongsli, *University of
Tromsø, Norway*, Dr. Roy Edgar Hansen, *Norwegian
Defence Research Establishment, Norway*, Sean Chapman
QinetiQ, UK

Time: 5:00 PM

Blind Separation of Signal and Multipath Interference for Synthetic

Aperture Sonar 2641

Ivars P. Kirsteins, *Naval Undersea Warfare Center, RI*



Scientific/Technical Program

Thursday, 3:40 PM - 5:20 PM
Room: Garden 1

UUV Control II Co-Chairs

Claude Brancart, *Next Fish, ME*
Barbera Fletcher
SPAWARSYSCEN San Diego, CA

Time: 3:40 PM

An Optimal Control for Multiple Unmanned Underwater Crawling Vehicles 2649
Dr. Kwang-Hwa Lee, *Coastal Systems Station, FL*

Time: 4:00 PM

Hybrid Simulation of a Distributed Control System for the "C-Scout" Autonomous Underwater Vehicle (AUV) 2650
Steve Taylor, Dr. Neil Bose, Dr. Siu O'Young
Memorial University of Newfoundland, Canada

Time: 4:20 PM

Autotracker: AUV Embedded Control Architecture for Autonomous Pipeline and Cable Tracking 2651
Dr. Jonathan Evans, Dr. Yvan Petillot, Paul Redmond, Prof. David Lane, *Heriot-Watt University, United Kingdom*

Time: 4:40 PM

Multivariable Optimal Control of an Autonomous Underwater Vehicle for Steering and Diving Control in Variable Speed 2659
Bong-Hwan Jeon, Pan-Mook Lee, Ji-Hong Li, Seok-Won Hong, Yeon-Gyu Kim, *Korea Research Institute of Ships & Ocean Engineering, KORDI, Republic of Korea*, Jihong Lee, *Chungnam National Univeristy, Republic of Korea*



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Thursday, 3:40 PM - 5:20 PM
Room: Garden 2

Human Powered Submarines

Chair Dr. Nip Shah, *United Technologies, CA*

Time: 3:40 PM

Human Powered Submarine Propeller Design 2665
Brian Ellis, Daniel Wacholder, *University of California, CA*

Time: 4:00 PM

Human Powered Submarine Hull Design 2671
Soren Harrison, Gregory Burton, *University of California, CA*

Time: 4:20 PM

Human Powered Submarine Hull Construction 2674
Soren Harrison, Gregory Burton, *University of California, CA*

Time: 4:40 PM

Manufacturing Processes of Composite Materials for a Human-Powered Submarine 2678
A.J. Maisano, *Virginia Polytechnic Institute and State University, VA*

Time: 5:00 PM

Manned Submersible Technology: Opening the Ocean to Scientific Study 2682
Mr. William Kohnen, *SEAmagine Hydrospace Corporation, CA*



Message From The Exhibits Director

Welcome to the Oceans 2003 Exhibits:

We are pleased to offer you two floors of exhibits featuring goods and services spanning the entire spectrum of marine technology as well as displays highlighting programs from educational institutions, government agencies and non-profit organizations. We even have a few specialty retailers to make it easy to find unique items to bring back home with you.

Don't miss the sand sculpture that will be created in the lounge area of the Lower Exhibit Hall. Downstairs you will also find the Poster Sessions, cyber café, and a snack concession.

Contact information on all the exhibitors can be found in the Exhibitors Program and in the conference proceedings. The DVD version of the proceedings also contains hundreds of pages of exhibitor product information and marketing materials.

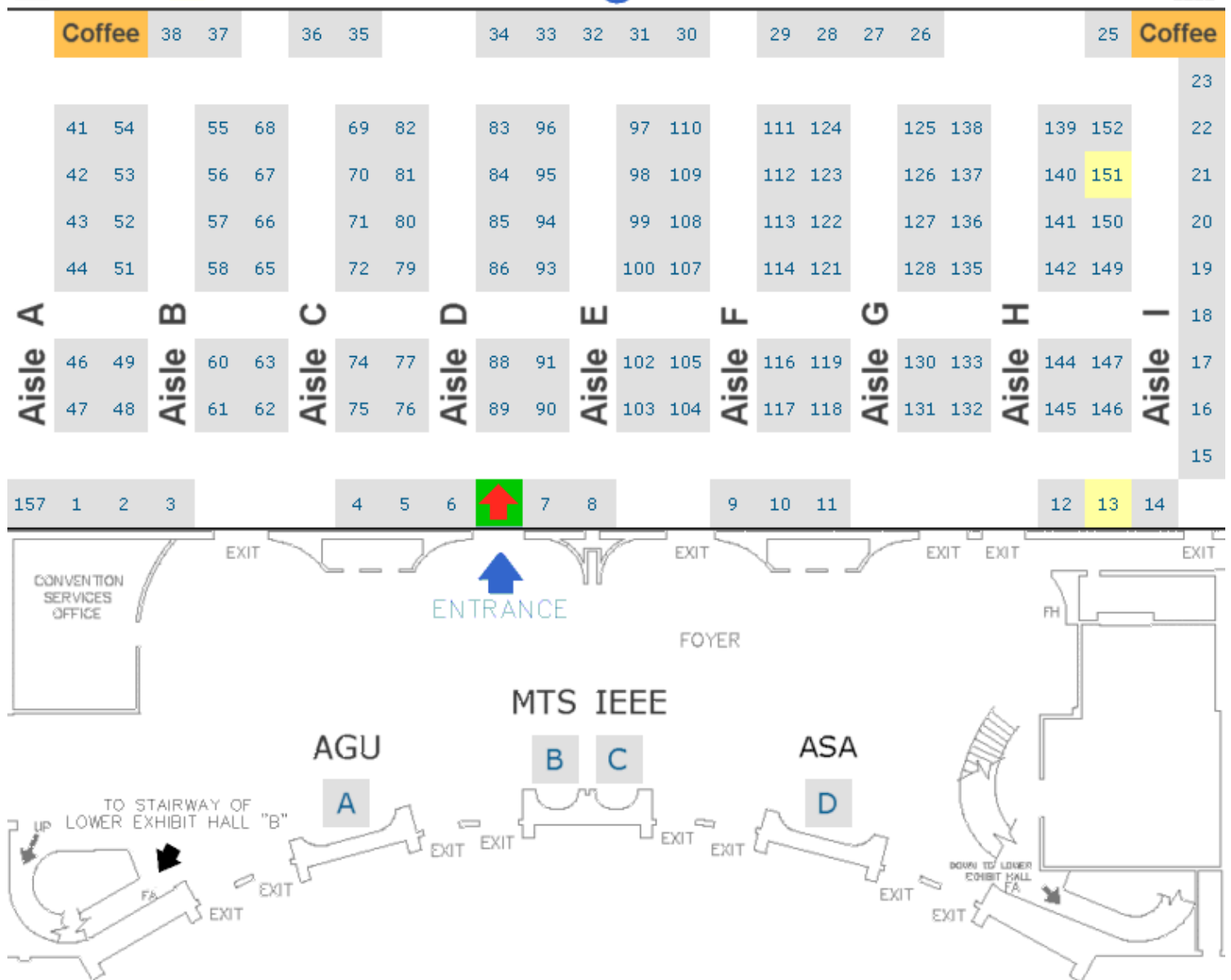
We hope your visit to the exhibits area is enjoyable and enlightening.

Brock J. Rosenthal
Exhibits Director

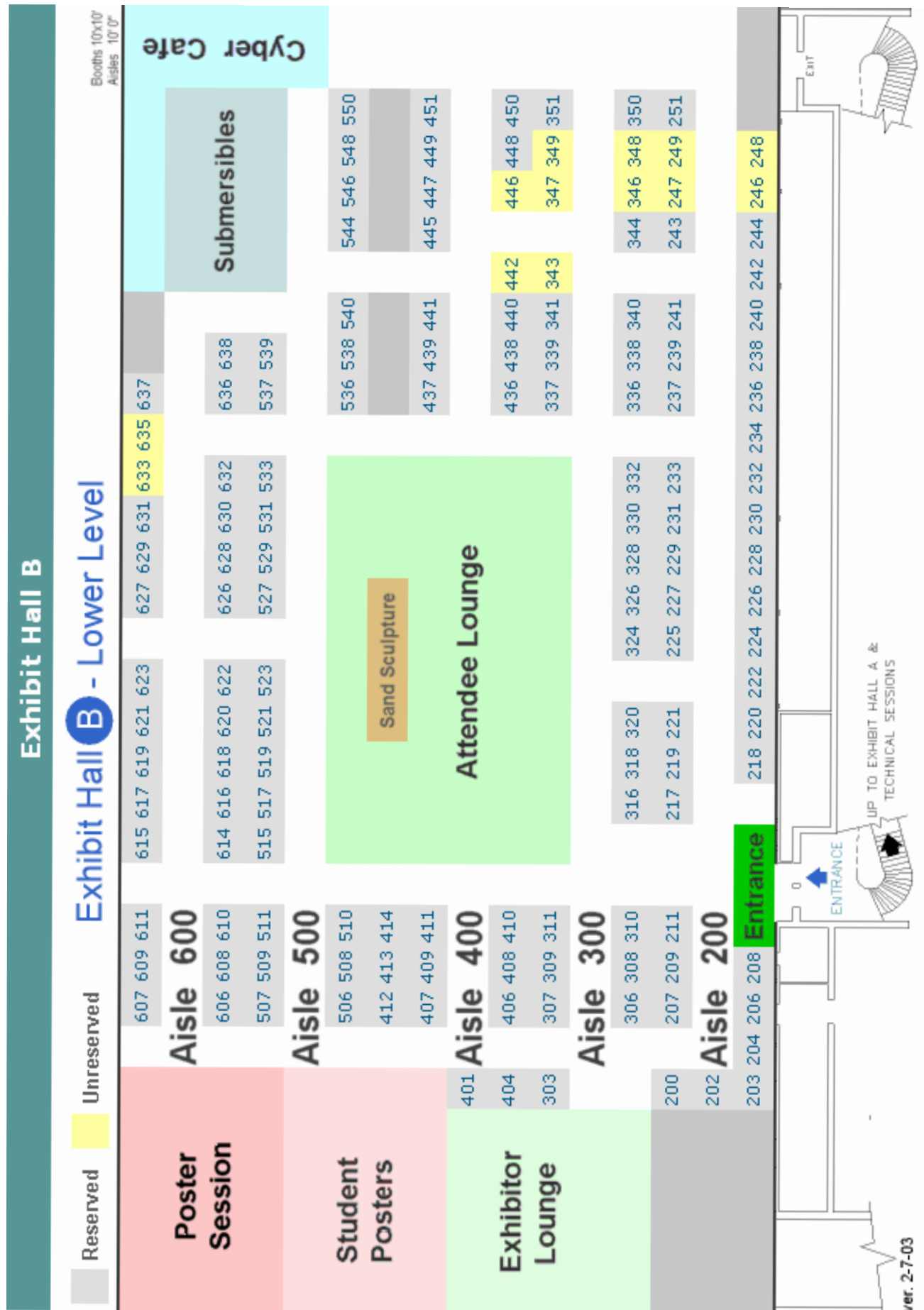
Exhibit Hall A

Exhibit Hall A - Atlas Ballroom

ALL BOOTHS 8x10
ALL AISLES 10'-0"



Floor Plan - EXHIBIT HALL B



Exhibitor, Hall, and Booth

For Full Description of Company and Contact Information see Exhibitor Program and DVD

Exhibitor	Hall	Booth #	Exhibitor	Hall	Booth #
Aanderaa Instruments, Inc.	Hall A	Booth: 51-52	C-MAP SYSTEMS	Hall B	Booth: 338
Acoustical Society of America	Hall A	Booth: D	CODAR Ocean Sensors	Hall B	Booth: 511
AGU	Hall A	Booth: A	College of Oceaneering	Hall B	Booth: 449
Anteon Corporation	Hall A	Booth: 2	CORE	Hall A	Booth: 126
APM Hexseal	Hall A	Booth: 33	Cortland Cable Company	Hall B	Booth: 506
Applanix	Hall B	Booth: 409	CRP Group	Hall A	Booth: 29
Applied Geomechanics	Hall B	Booth: 232	D & A Instrument Company	Hall A	Booth: 81
Applied Microsystems Ltd.	Hall A	Booth: 110	Deep Development Corp.	Hall A	Booth: 16
ASL Environmental Sciences Inc.	Hall A	Booth: 67	Deep Ocean Engineering Inc.	Hall B	Booth: 621
ASLO	Hall A	Booth: 43	Deep Sea Systems International	Hall A	Booth: 54
Association of Diving Contractors International	Hall B	Booth: 204	Deep Submersible Pilots Association	Hall B	Booth: 203
AUVSI	Hall B	Booth: 550	DeepSea Power and Light	Hall A	Booth: 6
Axys Environmental Systems	Hall A	Booth: 139	Desert Star Systems	Hall B	Booth: 228
Benthos, Inc.	Hall B	Booth: 222+224	DOER	Hall B	Booth: 626
Biospherical Instruments	Hall B	Booth: 508	DPS Technology	Hall A	Booth: 26
BIRNS, Inc.	Hall A	Booth: 3	Dynacon, Inc.	Hall A	Booth: 102-105
C & C Technologies, Inc.	Hall A	Booth: 108	EDO Electro-Ceramic Products	Hall A	Booth: 142-149
C&W Diving Services, Inc.	Hall B	Booth: 226	Elsevier	Hall A	Booth: 135-136
case4less.com	Hall A	Booth: 138	Enterprise Electronics Corporation	Hall A	Booth: 30
Cases Plus, Inc.	Hall A	Booth: 37	Environmental Careers Organization	Hall B	Booth: 447
Chesapeake Technology, Inc.	Hall B	Booth: 620			
CICEET	Hall A	Booth: 140			

Exhibitor, Hall, and Booth

For Full Description of Company and Contact Information see Exhibitor Program and DVD

Exhibitor	Hall	Booth #	Exhibitor	Hall	Booth #
Envirotech LLC	Hall B	Booth: 206	Hydroid, Inc.	Hall B	Booth: 309
ESRI	Hall B	Booth: 242-244	HYDROLAB/OTT	Hall B	Booth: 628
Eureka Chemical Co.	Hall A	Booth: 21	Hydroscience Technologies, Inc.	Hall B	Booth: 507
EvoLogics GmbH	Hall B	Booth: 200	IEEE	Hall A	Booth: C
Falmat Inc.	Hall A	Booth: 7-8	Ikon Mining & Exploration	Hall B	Booth: 437-439-441
Falmouth Scientific, Inc	Hall B	Booth: 221			
Fugro	Hall A	Booth: 22	IMAGENEX	Hall A	Booth: 20
General Oceanics Inc	Hall B	Booth: 241	Impulse Enterprise	Hall A	Booth: 32
GeoAcoustics	Hall B	Booth: 303	Insite Pacific	Hall A	Booth: 69
GeoAcoustics	Hall B	Booth: 404	In-Situ, Inc	Hall A	Booth: 44
Geometrics	Hall B	Booth: 608	Interactive Visualization Systems	Hall A	Booth: 109
GLOBALSTAR	Hall A	Booth: 17	International Industries, Inc.	Hall B	Booth: 231-330
Guildline Instruments Inc.	Hall B	Booth: 306			
Hafmynd ehf	Hall A	Booth: 18	International Ocean Systems	Hall B	Booth: 230
Harbor Branch-Ocean Engineering and Production	Hall A	Booth: 46-49	International Transducer Corp.	Hall A	Booth: 128
Harbor Offshore Inc.	Hall B	Booth: 629	InterOcean Systems, Inc.	Hall B	Booth: 515+517
Harris Maritime Communications (MCS)	Hall A	Booth: 88-91	Int'l Autonomous U/W Vehicle Competition	Hall B	Booth: 548
Hawaii Ocean Science and Technology	Hall A	Booth: 86 & 93	ITP Ltd. - Feedback Inc.	Hall A	Booth: 11
			Ixsea Oceano SAS	Hall B	Booth: 225
Historical Diving Society	Hall B	Booth: 248	Ixsea Oceano SAS	Hall B	Booth: 227
HOBILabs, Inc.	Hall B	Booth: 234	Japan Marine Science and Technology Center	Hall A	
Hydro International/GITC bv	Hall B	Booth: 631	Klein Associates	Hall B	Booth: 328
			Kluwer Academic Publishers	Hall B	Booth: 617

Exhibitor, Hall, and Booth

For Full Description of Company and Contact Information see Exhibitor Program and DVD

Exhibitor	Hall	Booth #	Exhibitor	Hall	Booth #
Knudsen Engineering Limited	Hall B	Booth: 407	MTS- San Diego Section	Hall B	Booth: 544
Kokes Marine Technologies, LLC	Hall B	Booth: 211	NASA EOS	Hall A	Booth: 132-133
Kongsberg Simrad	Hall A	Booth: 60-63	NASA/EOSDIS	Hall A	Booth: 130-131
L-3 Communications/Sea Beam Instruments	Hall B	Booth: 401	National Imagery and Mapping Agency	Hall B	Booth: 237
LinkQuest Inc.	Hall B	Booth: 318	NAUTILUS MARINE SERVICE GmbH	Hall A	Booth: 53
Lockheed Martin Orincon	Hall B	Booth: 308+310	Naval Meteorology & Oceanography Command	Hall A	Booth: 116-119
Loughrea Research	Hall B	Booth: 229	Naval Research Laboratory	Hall B	Booth: 220
Louisiana State University, School Of The Coast and Environment	Hall B		Naval Undersea Warfare Center	Hall A	Booth: 151
Marine & Oceanographic Technology Network (MOTN)	Hall B	Booth: 630	Naval Undersea Warfare Center Divsion Newport	Hall A	Booth: 152
Marine Advanced Technology Education (MATE) Center	Hall A	Booth: 70	Nekton Research, LLC	Hall B	Booth: 537
Marine Magnetics	Hall B	Booth: 311	Neptune Sciences, Inc.	Hall B	Booth: 610
Marine Sonic Technology, Ltd.	Hall A	Booth: 127	Nexergy	Hall B	Booth: 637
Marine Technology Reporter	Hall B	Booth: 619	NFESC	Hall B	Booth: 618
Marine Technology Society	Hall A	Booth: B	NOAA	Hall A	Booth: 111-114, 121-124
Materials Systems Inc.	Hall A	Booth: 65	Nova Ray, Inc.	Hall B	Booth: 240
McLane Research Laboratories Inc	Hall B	Booth: 615	NovaSol	Hall A	Booth: 95
Mecco, Inc.	Hall B	Booth: 632	NSWC Carderock	Hall B	Booth: 622
Metocean Data Systems	Hall A	Booth: 4-5	NUWC	Hall A	Booth: 66
Minerals Management Service	Hall A	Booth: 141	Ocean Design	Hall A	Booth: 34
Mooring Systems, Inc.	Hall B	Booth: 611			

Exhibitor, Hall, and Booth

For Full Description of Company and Contact Information see Exhibitor Program and DVD

Exhibitor	Hall	Booth #	Exhibitor	Hall	Booth #
Ocean Imaging Systems	Hall B	Booth: 611	RD Instruments	Hall B	Booth: 521+523
Ocean Innovations	Hall B	Booth: 217+219	RESON Inc.	Hall A	Booth: 31
Ocean Marine Industries	Hall B	Booth: 208	Richard Brancker Research Ltd.	Hall B	Booth: 209
Ocean News & Technology	Hall A	Booth: 12	Roper Resources	Hall A	Booth: 19
Ocean Sensors	Hall B	Booth: 508	San Diego Oceans Foundation	Hall B	Booth: 445
Ocean Specialists Services	Hall A	Booth: 99	Santa Barbara City College-Marine Technology Dept.	Hall B	Booth: 546
Ocean Systems	Hall B	Booth: 238	Schleifring North America	Hall A	Booth: 25
Oceanic Imaging Consultants, Inc.	Hall A	Booth: 84+85	Science & Technology International	Hall A	Booth: 83
Oceans/Techno Ocean 2004	Hall A	Booth: 42	Science Applications International Corporation	Hall A	Booth: 75-77
Odom Hydrographic Systems	Hall B	Booth: 332	Sea Con/Brantner & Associates, Inc.	Hall B	Booth: 527+529
Open Seas Instrumentation	Hall B	Booth: 337	Sea Education Association	Hall B	Booth: 451
Optech	Hall B	Booth: 236	Sea Sciences, Inc.	Hall A	Booth: 137
Orcina Limited	Hall A	Booth: 35	Sea Technology Magazine	Hall B	Booth: 406
ORE Offshore	Hall B	Booth: 609	Sea-Bird Electronics, Inc.	Hall A	Booth: 9-10
Pacific Gyre	Hall B	Booth: 239	Seabotix	Hall B	Booth: 316
Pacific Missile Range Facility	Hall A	Booth: 96	SEAmagine	Hall B	Booth: 636+638
Paroscientific, Inc.	Hall A	Booth: 80	Seimac Limited	Hall B	Booth: 243
Passionfish	Hall B	Booth: 440	Sensor Technology Ltd	Hall B	Booth: 539
Phoenix International, Inc.	Hall A	Booth: 14	Sequoia Scientific, Inc.	Hall A	Booth: 27
Pressure Systems, Inc.	Hall A	Booth: 15			
Prevco Subsea Housings	Hall A	Booth: 100			
Prizm, Inc	Hall B	Booth: 623			
Quester Tangent Corporation	Hall A	Booth: 68			

Exhibitor, Hall, and Booth

For Full Description of Company and Contact Information see Exhibitor Program and DVD

Exhibitor	Hall	Booth #	Exhibitor	Hall	Booth #
Service Argos, Inc.	Hall A	Booth: 1 & 157	The Oceanographic Society	Hall B	Booth: 438
Sidus Solutions, Inc.	Hall B	Booth: 320	The OceanScience Group	Hall B	Booth: 510
Sippican Inc.	Hall B	Booth: 218	TMT Laboratories	Hall A	Booth: 107
Sonardyne	Hall A	Booth: 28	Transportable Case Supply Center	Hall B	Booth: 338
Sonatech, Inc.	Hall A	Booth: 97-98	Trimble Navigation	Hall B	Booth: 207
Sonotronics	Hall A	Booth: 41	Tritech International Limited	Hall A	Booth: 79
SonTek/YSI, Inc.	Hall B	Booth: 533	Triton Elics	Hall B	Booth: 614
Sound Ocean Systems	Hall A	Booth: 74	TSKA	Hall A	Booth: 150
South Bay Cable Corp.	Hall A	Booth: 82	Undersea Camp	Hall B	Booth: 540
SPAWAR Systems Center	Hall A	Booth: 71-72	UNDERWATER INTERVENTION	Hall B	Booth: 202
Spearhead Exhibitions Ltd	Hall B	Booth: 606	United State Coast Guard	Hall B	Booth: 307
SSC San Diego Ocean Systems Division	Hall A		University of Puerto Rico/Mayaguez	Hall B	Booth: 412
SSC San Diego Robotic Systems Branch	Hall A		Vaisala Inc.	Hall A	Booth: 38
Stenmar Sonovision	Hall B	Booth: 233	Veridian	Hall B	Booth: 408+410
Subconn Inc.	Hall A	Booth: 57-58	VideoRay	Hall B	Booth: 607
Subsea Technologies, Inc.	Hall B	Booth: 519	VT TSS (UK) Ltd.	Hall B	Booth: 326
Sunwest Technologies	Hall B	Booth: 324	Wader LLC	Hall A	Booth: 23
Tenix LADS, Inc.	Hall A	Booth: 125	WET Labs, Inc.	Hall B	Booth: 616
Thales Geosolutions (Pacific) Inc.	Hall B		Wyland Foundation	Hall B	Booth: 536-538
The National Defense Center of Excellence for Research in Ocean Sciences (CEROS)	Hall A	Booth: 94	YSI Environmental, Inc.	Hall B	Booth: 531

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The IEEE Oceanic Engineering Society (IEEE OES) again has the pleasure to invite authors and delegates to the International Symposium on Underwater Technology, UT'04. Consistent with previous UT conferences, the IEEE OES plans another fantastic bi-annual event, which will not only attract all the eminent scholars, students, and experts in this UT field for technical communications through presentations and discussions, but also create a remarkable environment to indulge all delegates in the frontier of underwater science and technology. The UT'04 consists of three days of technical presentations with keynote speeches/ discussions, and a first-day technical/sightseeing tour. The conference will also entertain the delegates by various social functions, including 1) reception, 2) banquet, and 3) last-day culture tour. Be sure to be in Taipei in April 2004, and use the opportunity to present your scientific work and experiences through technical discussions in an informal atmosphere together with persons you already know and the new you will meet.

The organizers are soliciting abstracts from both industry and academia that focus on near term development and applications in the underwater environment within the following suggested headings:



**Underwater Acoustic
and Signal Processing
Underwater Positioning
Underwater Observation
Underwater Vehicles and Robotics
Underwater Construction
Underwater Bio-related Technology**

Authors are welcome to address additional useful topics related to UT not listed above. A one-page abstract with name, address, affiliation, phone and fax number, and e-mail address must be submitted to the technical committee by e-mail at ut04@mail.na.ntu.edu.tw. Or use the abstract form on <http://ut.na.ntu.edu.tw/ut04>, click the abstract submission, fill in the form electronically and send.

Key Dates

October 17, 2003; Abstract Submission

November 21, 2003; Abstract Acceptance

February 20, 2004; Paper Submission

IEEE UT'04 Website: <http://ut.na.ntu.edu.tw/ut04>

Call for Papers / Posters / Exhibits

OCEANS'04 MTS/IEEE / TECHNO-OCEAN'04



**Bridges Across
the Oceans**

OCEANS'04 MTS/IEEE
TECHNO-OCEAN'04

November 9-12, 2004 Kobe, Japan

OTO'04 is a joint international convention,
combining annual "OCEANS" symposium and exhibition in the US with those of "Techno-Ocean",
biennially being held in Japan since 1986. The first "OCEANS" in Asia in its three-decade-long history,
tied with the tenth anniversary event of "Techno-Ocean". Please join us!

Organizers

IEEE/OES
MTS



CJO (Consortium of the Japanese Organizers)

IEEE/OES Japan Chapter

MTS Japan Section

Techno-Ocean Network (TON)

Japan Marine Science and Technology Center (JAMSTEC)

Kobe Convention and Visitors Association (KCVA)

Call for Papers and Posters

Venue ; Kobe Convention Center

Important dates ; Abstract Deadline : April 15, Thu., 2004

Notification of Acceptance: May 31, Mon., 2004

Camera-ready full paper : August 1, Sun., 2004

Others ; Call for Tutorials will be announced at OCEANS'03 in San Diego.

Technical Program Chair : Dr. Shinichi Takagawa, Japan Marine Science and Technology Center

e-mail : takagawa@jamstec.go.jp

Further information will be available soon on the website

www.oceans-technoocean2004.com

Information on Kobe



**Bridges Across
the Oceans**

OTO'04
TOKYO-OHASE 2004



- A leading port city and a center of ocean industries, with population of 1.5 million.
- Home to residents from 100 different countries.
- Blessed with beautiful environment, such as an attractive waterfront and Rokko mountains.
- Close to historical cities like Kyoto, Nara.
- Easy access from Kansai International Airport, an artificial island.



Kobe Convention Center



Call for Exhibits

**Make presence of your
technologies, services
and capabilities at OTO'04,
a pacific-wide convention!**

Venue ; Kobe Convention Center

Booth ; Exhibition space of 3,800m²
will accommodate 160 booths
(3m×3m)

Further information will be available soon on the website

www.oceans-technoocean2004.com

Marine Technology Society Membership Application and MTS Journal Subscription Request



- ☐ *Yes, I want to become a member of the Marine Technology Society.*
- ☐ *I wish to purchase a subscription to the print version of the MTS Journal. (MTS Journal online is a free member benefit not available to non-members.)*
- ☐ *I'm not ready to join at the present time, but I would like to receive news and information from MTS. Please keep my name on your mailing list. (Please fill in member information section and return to MTS.)*

MEMBER INFORMATION (Please fill in the address where MTS publications and correspondence should be sent.)

Name: _____ Company (if applicable): _____
Title: _____ Email: _____
Phone: _____ FAX: _____
Address: _____

MEMBERSHIP CATEGORIES

- ☐ **MEMBER: \$75** Any person with active professional interest in the marine field or a closely related field. Includes the online version of the Journal.
- ☐ **ASSOCIATE: \$75** Any person with an interest in the marine field and supporting MTS objectives. Includes the online version of the Journal.
- ☐ **STUDENT: \$25** Must be a full-time undergraduate or graduate student. Includes the online version of the Journal.
- ☐ **PATRON:** Any person supporting MTS objectives by *contributing \$100 or more annually*. (Contribution above \$75 dues is tax deductible.) Includes the online version of the Journal.
- ☐ **EMERITUS: \$40** Any person who is retired from active professional interest in the marine field. Includes the online version of the Journal.
- ☐ **LIFE: \$1000** One-time payment. Includes both the online version of the Journal and the paper copy of the Journal.
- ☐ **CORPORATE Fortune 500: \$2000** Any corporation endorsing the objectives, policies and activities of MTS. May appoint 16 representatives to the Society, who have the same rights and privileges as Members. Includes the online version of the Journal for each representative. The main contact receives a subscription to the paper copy of the Journal.
- ☐ **CORPORATE Non-Fortune 500: \$1000** Any corporation endorsing the objectives, policies and activities of MTS. May appoint 11 representatives to the Society, who have the same rights and privileges as Members. Includes the online version of the Journal for each representative. The main contact receives a subscription to the paper copy of the Journal.
- ☐ **BUSINESS: \$550** Any business firm whose gross annual income is less than \$4 million endorsing the objectives, policies and activities of MTS. May appoint six representatives to the Society, who have the same rights and privileges as Members. Includes the online version of the Journal for each representative. The main contact receives a subscription to the paper copy of the Journal.
- ☐ **INSTITUTION: \$550** Any library, government unit or other qualified nonprofit organization endorsing the objectives, policies and activities of MTS. May appoint six representatives to the Society, who have the same rights and privileges as Members. Includes the online version of the Journal for each representative. The main contact receives a subscription to the paper copy of the Journal.

MTS JOURNAL PRINT VERSION SUBSCRIPTION

Domestic Subscription

- ☐ Member Rate: Journal Subscription.....\$ 25
- ☐ Non-Member Rate: Journal Subscription.....\$120

Foreign Subscription

- ☐ Member Rate: Journal Subscription.....\$ 50
- ☐ Non-Member Rate: Journal Subscription.....\$135

Marine Technology Society Membership Application (continued)

EDUCATIONAL INFORMATION

Please fill out the following information about yourself:

- Check your highest level of education:

☐ High School Diploma ☐ Associate (2 yr.) Degree ☐ Four Year Degree ☐ Graduate Degree ☐ Doctorate

- Check all that apply: ☐ B.S. ☐ B.E. ☐ B.A. ☐ M.S. ☐ M.A. ☐ M.E. ☐ Ph.D. ☐ Sc.D.

- Do you have a P.E. license? ☐ YES ☐ NO

BUSINESS/PROFESSIONAL INFORMATION

Name of current employer: _____

Your employer's primary line of business at your location: _____

If you don't work for an employer, please identify your business: _____

If military, rank: _____

Your principal job function/responsibilities:

☐ Engineering Management
☐ Science Management
☐ Sales
☐ Marketing
☐ Administration
☐ Policy Making, Regulatory
☐ Public Affairs
☐ Engineering Design
☐ Mechanical Engineering
☐ Software Engineering
☐ Education/Teaching
☐ Legal
☐ Consulting
☐ Retired
☐ Other (please specify) _____

Your job title:

☐ President/CEO/COO
☐ Owner/Partner
☐ VP, Senior Manager
☐ Project Manager, Engineering
☐ Project Manager, Other
☐ Corporate VP, Engineering
☐ Engineering Director
☐ Chief/Senior Engineer
☐ Chief/Senior Scientist
☐ Project Manager
☐ Engineer
☐ Operations VP
☐ Scientist
☐ Other (please specify) _____

Check areas of interest:

☐ Autonomous Underwater Vehicles
☐ Dynamic Positioning
☐ Manned Underwater Vehicles
☐ Ocean Energy
☐ Oceanographic Instrumentation
☐ Remote Sensing
☐ Remotely Operated Vehicles
☐ Underwater Imaging
☐ Marine Geodesy
☐ Marine Living Resources
☐ Mineral Resources
☐ Ocean Pollution
☐ Oceanographic Ships

☐ Physical Oceanography & Meteorology
☐ Seafloor Engineering
☐ Buoy Technology
☐ Cables & Connectors
☐ Marine Archaeology
☐ Diving
☐ Marine Materials
☐ Moorings
☐ Offshore Structures
☐ Ropes & Tension Members
☐ Coastal Zone Management
☐ Marine Education
☐ Marine Law & Policy
☐ Marine Recreation
☐ Merchant Marine
☐ Marine Security
☐ Ocean Economic Potential
☐ Other (please specify) _____

Optional Information:

☐ Male ☐ Female What is your age? ☐ Under 30 ☐ 30-40 ☐ 41-50 ☐ 51-60 ☐ Over 60

MEMBERSHIP AND JOURNAL PAYMENT

Payment Method: ☐ Check Enclosed ☐ Master Card ☐ Visa ☐ Diners Club ☐ Am Ex

Make checks payable to the Marine Technology Society (U.S. funds only)

Card #: _____ Expiration Date: _____

Signature: _____ Date: _____

TOTAL PAYMENT:

Membership: \$ _____

Journal: \$ _____

TOTAL: \$ _____

Four easy ways to join!

Mail: Send application with check or credit card info to:
Marine Technology Society / 5565 Sterrett Place, Suite 108 / Columbia, MD 21044

Fax: Fax application to: 410-884-9060 (credit card payments only)

Online: Apply online at www.mtsociety.org

Phone: Contact us at: 410-884-5330

Code: Oceans 2003

**IEEE**

2003 Membership Application

web application at www.ieee.org/join

Please complete this application, typing or printing clearly in capital letters. Sign and return to:

IEEE Admission and Advancement445 Hoes Lane, PO Box 1331
Piscataway, NJ USA 08855-1331

Phone: +1 800 678 IEEE (4333) (US & Canada)

or +1 732 981 0060 (worldwide)

Fax: +1 732 981 0225 • Email: new.membership@ieee.orgPlease attach
your business
card here**Or complete our web application at www.ieee.org/join****1 > PERSONAL INFORMATION**

Please provide all information requested; incomplete applications cannot be processed.

PRINT your name as you wish it to appear on your membership card and all correspondence. Circle your last/surname as a key identifier for the IEEE database. **Do not exceed 40 characters or spaces per line. USE ONLY English characters and abbreviate only if more than 40 characters and spaces per line.**

Title First/Given Name Middle Last/Family/Surname

Home Address

Street Address

City State/Province

Postal Code Country

Home Phone

Date of Birth DAY MONTH YEAR ☐ Male ☐ FemaleAre you now or were you ever a member of the IEEE? ☐ Yes ☐ No If yes, please provide, if known:

MEMBERSHIP NUMBER

GRADE YEAR MEMBERSHIP EXPIRED

2 > EDUCATIONAL INFORMATION

▶ Print complete school/name information. No abbreviations please. First degree received information is vital to proper grade assignment. You may attach a resumé to provide additional details.

A

First Professional Degree Received Program/Course of Study

College/University Campus

State/Province Country Month/Year Received

B

Highest Technical Degree Received Program/Course of Study

College/University Campus

State/Province Country Month/Year Received

3 > BUSINESS/PROFESSIONAL INFORMATION

Company Name

Department/Division

Title/Position

Years in Current Position

Years in the Profession Since Graduation

☐ PE/P.Eng

State/Province

Business Address

Street Address

City

State/Province

Postal Code

Country

Office Phone

Office Fax

Email Address

Please send all IEEE mail to my: ☐ Home Address ☐ Business Address
If not indicated, mail will be sent to home address.To better serve our members and supplement member dues, the IEEE mailing list is released to other engineering and carefully selected organizations to provide you with information on technical products and services related to your profession. Please check box if you do not wish to have your name released to such organizations. ☐Please check box if you do not wish to have your business contact information or current mailing address included in the IEEE Membership Directory. All members who select this option will only have their name and member grade listed in the directory. ☐**4 > SIGNATURE OF APPLICANT**

I hereby make application for IEEE membership and agree to be governed by the IEEE Constitution, Bylaws, and Code of Ethics.

SIGNATURE

DATE

▶ Application must be signed.

Over Please

5 > AUDIT INFORMATION

This information is used by IEEE magazines to verify their annual circulation. Please refer to the audit codes and indicate your selections in the space provided.

A. What is your employer's primary line of business at your location? If you do not work for an employer, please identify your line of business.

1. Computers
2. Computer Peripheral Equipment
3. Software
4. Office and Business Machines
5. Test, Measurement & Instrumentation Equipment
6. Communications Systems & Equipment
7. Navigation & Guidance Systems & Equipment
8. Consumer Electronics/Appliances
9. Industrial Equipment, Controls & Systems
10. IC's & Microprocessors
11. Semiconductors, Components, Sub-Assemblies, Materials & Supplies
12. Aircraft, Missiles, Space & Ground Support Equipment
13. Oceanography & Support Equipment
14. Medical Electronic Equipment
15. Original Equipment Manufacturers Incorporating electronics in their product (not elsewhere classified)
16. Independent & University Research, Test & Design Laboratories & Consultants (not connected with a mfg. co.)
17. Government Agencies & Armed Forces
18. Companies Using &/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.)
22. Computer/Communications & Data Processing Services

23. Power Production/Generation/Transmission & Distribution
24. Other Commercial Users of Electrical/ Electronic Equipment & Services (not elsewhere classified)
25. Distributor (Reseller, Wholesaler, Retailer)
26. University, College/Other Educational Institutions, Libraries
27. Retired
28. Other (please specify below)

B. What is your principal function?

1. General/Corporate Management
2. Engineering Management
3. Project Engineering Management
4. Research & Development Management
5. Design Engineering Management-Analog
6. Design Engineering Management-Digital
7. Research & Development Engineering
8. Design/Development Engineering-Analog
9. Design/Development Engineering-Digital
10. Hardware Engineering
11. Software Design/Development
12. Computer Science
13. Science/Physics/Mathematics
14. Engineering (not elsewhere specified)
15. Marketing/Sales & Purchasing
16. Consulting
17. Education/Teaching
18. Retired
19. Other (please specify below)

C. What is your principal responsibility?

1. Engineering or Scientific Management
2. Management other than Engineering
3. Engineering Design
4. Engineering
5. Software: Science/Management/Engineering
6. Education/Teaching
7. Consulting
8. Retired
9. Other (please specify below)

D. What is your title?

1. Chairman of the Board/President/CEO
2. Owner/Partner
3. General Manager
4. VP Operations
5. VP Engineering/Div. Engineering
6. Chief Engineer/Chief Scientist
7. Engineering Management
8. Scientific Management
9. Member of Technical Staff
10. Design Engineering Manager
11. Design Engineer
12. Hardware Engineer
13. Software Engineer
14. Computer Scientist
15. Dean/Professor/Instructor
16. Consultant
17. Retired
18. Other Professional/Technical (please specify below)

6 > 2003 MEMBERSHIP RATES

IEEE member dues and regional assessments are based on where you live and when you apply. Please check the appropriate box. Membership is based on the calendar year from 1 January through 31 December. All prices are quoted in US dollars.

RESIDENCE	BETWEEN 16 AUG 2002 - 28 FEB 2003 PAY		BETWEEN 1 MAR 2003 - 15 AUG 2003 PAY	
United States	\$143.00	☐	\$71.50	☐
Canada (includes GST)*	\$133.00	☐	\$66.50	☐
Canada (includes HST)*	\$142.00	☐	\$71.00	☐
Africa, Europe, Middle East	\$121.00	☐	\$60.50	☐
Latin America	\$114.00	☐	\$57.00	☐
Asia, Pacific	\$115.00	☐	\$57.50	☐

* IEEE Canadian Business No. 125634188

Subscriptions to IEEE Spectrum (\$16.00/year) and The Institute are included in membership dues.

PAYMENT METHOD

You may pay for membership by:

- American Express, Visa, MasterCard, Diners Club, Eurocard
- Check — Payable to the IEEE on a bank in the USA or in acceptable local currency
- Money Orders — Payable on a bank in the USA or in acceptable local currency

Minimum Income Provision

Applicants who certify that their prior year's income did not exceed US \$11,000 or equivalent are granted a 50% reduction in: full year dues, regional assessment and fees for one IEEE Society. Please submit written certification with application and payment. Student members are not eligible.

☐ I certify I earned less than US \$11,000 in 2001.

9 > PAYMENT AMOUNT

Please total the Membership dues from above and any Society dues from the side panel.

IEEE Membership Dues **6** \$ _____

Society dues (optional) **7** \$ _____

IEEE-SA/WIE dues (optional) **8** \$ _____

Proceedings of the IEEE (optional) **8** \$ _____

Canadian residents pay

7% GST or 15% HST

Reg. no. 125634188 on Society payment(s) and publications only TAX \$ _____

Amount Paid TOTAL \$ _____

☐ Check ☐ VISA ☐ MasterCard ☐  ☐ 

CHARGE CARD NUMBER

MONTH / YEAR
EXPIRATION DATE

CARDHOLDER'S 5-DIGIT ZIP/PO BOX
(BILLING STATEMENT ADDRESS) USA ONLY

NAME AS IT APPEARS ON CARD

SIGNATURE

7 > SOCIETY MEMBERSHIP OPTIONS

As an IEEE member, you are encouraged to join any Societies that support your technical/professional interests. Each Society membership includes a personal subscription to the core journal, magazine or newsletter of that Society. All prices are quoted in US dollars.

Please check (✓) appropriate boxes

SOCIETIES		BETWEEN 16 AUG 2002 - 28 FEB 2003 PAY		BETWEEN 1 MAR 2003 - 15 AUG 2003 PAY	
Aerospace and Electronic Systems	AES010	23.00	☐	12.00	☐
Antennas and Propagation	AP003	24.00	☐	12.00	☐
Broadcast Technology	BT002	15.00	☐	8.00	☐
Circuits and Systems	CAS004	12.00	☐	6.00	☐
Communications	COM019	25.00	☐	13.00	☐
Components, Packaging, and Manufacturing Technology	CPMT021	12.00	☐	6.00	☐
Computer*	C016	37.00	☐	19.00	☐
Consumer Electronics	CE008	28.00	☐	14.00	☐
Control Systems	CS023	20.00	☐	10.00	☐
Dielectrics and Electrical Insulation	DEI032	15.00	☐	8.00	☐
Education	E025	20.00	☐	10.00	☐
Electromagnetic Compatibility	EMC027	25.00	☐	13.00	☐
Electron Devices	ED015	6.00	☐	3.00	☐
Engineering Management	EM014	30.00	☐	15.00	☐
Engineering in Medicine and Biology	EMB018	32.00	☐	16.00	☐
Geoscience and Remote Sensing	GRS029	14.00	☐	7.00	☐
Industrial Electronics	IE013	10.00	☐	5.00	☐
Industry Applications	IA034	20.00	☐	10.00	☐
Information Theory	IT012	30.00	☐	15.00	☐
Instrumentation and Measurement	IM009	20.00	☐	10.00	☐
Lasers and Electro-Optics	LEO036	18.00	☐	9.00	☐
Magnetics	MAG033	30.00	☐	15.00	☐
Microwave Theory and Techniques	MTT017	14.00	☐	7.00	☐
Neural Networks	NN011	10.00	☐	5.00	☐
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Oceanic Engineering	OEO22	19.00	☐	10.00	☐
Power Electronics	PEL035	12.00	☐	6.00	☐
Power Engineering	PE031	22.00	☐	11.00	☐
Professional Communication	PC026	30.00	☐	15.00	☐
Reliability	RL007	25.00	☐	13.00	☐
Robotics and Automation	RA024	21.00	☐	11.00	☐
Signal Processing	SP001	24.00	☐	12.00	☐
Social Implications of Technology	SIT030	22.00	☐	11.00	☐
Solid-State Circuits	SSC037	14.00	☐	7.00	☐
Systems, Man, and Cybernetics	SMC028	9.00	☐	5.00	☐
Ultrasonics, Ferroelectrics, and Frequency Control	UFFC020	20.00	☐	10.00	☐
Vehicular Technology	VT006	15.00	☐	8.00	☐

* If you are currently an ACM member and wish to join the Computer Society, you may deduct \$5.00 from your full year dues, or \$2.50 from your half year dues.

8 > WE RECOMMEND

Proceedings of the IEEE print ☐ or online ☐	25.00	☐
Proceedings of the IEEE (print and online combination)	30.00	☐
IEEE Standards Association IEEE-SA	10.00	☐
IEEE Women in Engineering WIE	25.00	☐

► **Member-Get-A-Member Recruiters: For MGM credit (issued Sept. 2003), please complete below.**

MEMBER RECRUITER NAME

IEEE RECRUITER'S MEMBER NUMBER (required for MGM)

TRACKING CODE

PROMO CODE

**IEEE**

2003 Student Membership Application

web application at www.ieee.org/join

1 > PERSONAL INFORMATION

Please **PRINT** your name as you wish it to appear on your membership card and all correspondence. Circle your last/surname as a key identifier for the IEEE database. **Do not exceed 40 characters or spaces per line. USE ONLY English characters and abbreviate only if more than 40 characters and spaces per line.**

FIRST/GIVEN NAME MIDDLE LAST/FAMILY/SURNAME

Address During Academic Year

STREET ADDRESS

CITY STATE/PROVINCE

POSTAL CODE COUNTRY

PHONE FAX

EMAIL

Family or Home Address

STREET ADDRESS

CITY STATE/PROVINCE

POSTAL CODE COUNTRY

PHONE

Date of Birth DAY MONTH YEAR ☐ Male ☐ Female

Please send all IEEE mail to my: ☐ Address During Academic Year
☐ Family or Home Address

If not indicated, mail will be sent to Address During Academic Year.

Are you now or were you ever a member of the IEEE? ☐ Yes ☐ No If yes, please provide, if known:

MEMBERSHIP NUMBER

GRADE

YEAR MEMBERSHIP EXPIRED

To better serve our members and to supplement member dues, the IEEE mailing list is released to other engineering and carefully selected organizations to provide you with information on technical products and services related to your profession. Please check box if you do not wish to have your name released to such organizations. ☐

3 > ENDORSEMENT AND SIGNATURE OF APPLICANT

Please print the name and provide the signature and member number of your IEEE Student Branch Counselor. If there is no counselor at your school, please obtain the endorsing signature of a faculty member who is also an IEEE member (membership number is required).

IEEE BRANCH COUNSELOR'S NAME

COUNSELOR'S MEMBER NUMBER

I endorse this application for student membership in the IEEE and certify the degree information as given to be correct and complete.

IEEE BRANCH COUNSELOR'S SIGNATURE

SCHOOL CODE

Please complete and sign this application, printing clearly. Return to:

IEEE Admission and Advancement Department

445 Hoes Lane, PO Box 1331, Piscataway, NJ USA 08855-1331

Phone: +1 800 678 4333 (US & Canada) or +1 732 981 0060 (Worldwide)

Fax: +1 732 981 0225 • Email: new.membership@ieee.orgOr complete our web application at www.ieee.org/join

Current IEEE members: Do not use this form to renew your membership; you will receive a renewal invoice.

2 > EDUCATIONAL INFORMATION

Print complete school/name information. No abbreviations please. This information is required to qualify for Student membership.

UNIVERSITY

SCHOOL OR COLLEGE (IF APPLICABLE)

CAMPUS

STREET ADDRESS

CITY

STATE/PROVINCE

COUNTRY

POSTAL CODE

DEGREE TITLE EXPECTED

EXPECTED GRADUATION DATE Mo/Yr

PROGRAM MAJOR/COURSE OF STUDY

Current Degree Program (check one)

UNDERGRADUATE: ☐ 2 or 3 year ☐ 4 or 5 year GRADUATE: ☐ MASTERS ☐ PH.D.PROGRAM/COURSE OF STUDY: ☐ ELECTRICAL ENG. ☐ COMPUTER ENG. ☐ ELECTRONICS ENG. TECHNOLOGY☐ COMPUTER SCIENCE ☐ ELECTRONICS ENG. ☐ OTHER (PLEASE DESCRIBE)Do you hold other degrees? ☐ YES (complete below) ☐ NO

A HIGHEST TECHNICAL DEGREE HELD

Mo/Yr RECEIVED

PROGRAM MAJOR/COURSE OF STUDY

AREA OF CONCENTRATION

FULL UNIVERSITY NAME, CAMPUS AND PREVIOUS NAME, IF APPLICABLE

CITY/STATE/PROVINCE/COUNTRY

B OTHER DEGREES HELD

Mo/Yr RECEIVED

PROGRAM MAJOR/COURSE OF STUDY

AREA OF CONCENTRATION

FULL UNIVERSITY NAME, CAMPUS AND PREVIOUS NAME, IF APPLICABLE

CITY/STATE/PROVINCE/COUNTRY

I hereby make application for IEEE membership and agree to be governed by the IEEE Constitution, Bylaws, and Code of Ethics.

I am taking at least 50% of a full-time academic program.

SIGNATURE

DATE

▶ Application must be signed.

Over Please

Who Can Join?

IEEE Student membership is open to undergraduate and graduate students who are enrolled in at least 50% of a normal, full-time course of study in electrical, electronics, computer engineering or computer sciences, or in an allied branch of engineering technology or the related arts and sciences.

Stay in Contact

Your life changes daily, and it is a challenge to stay connected. Get a **free** IEEE Personal Email Alias to forward your email wherever you go – you can update your information online anytime and stay connected no matter where you are.

www.ieee.org/alias

4 > 2003 STUDENT MEMBERSHIP RATES

IEEE student dues are based on where you live and when you apply. Please check the appropriate box. A subscription to **IEEE Potentials** magazine is included in US and Canadian membership dues. **IEEE Potentials** is available in other countries for \$5 per year. Membership is based on the calendar year from 1 January through 31 December. **Prices are quoted in US dollars.**

RESIDENCE	BETWEEN 16 AUG 2002 - 28 FEB 2003 PAY	BETWEEN 1 MAR 2003 - 15 AUG 2003 PAY
Dues		
United States	\$30.00 ☐	\$15.00 ☐
Canada (includes GST)*	\$32.00 ☐	\$16.00 ☐
Canada (includes HST)*	\$35.00 ☐	\$17.50 ☐
Other Countries	\$25.00 ☐	\$12.50 ☐

Options for IEEE members

Potentials magazine (outside US and Canada)	\$5.00 ☐	\$3.00 ☐
Proceedings of the IEEE (print ☐ or electronic ☐)	\$25.00 ☐	N/A
Proceedings of the IEEE (combination)	\$30.00 ☐	N/A
Standards Association (IEEE-SA)	\$10.00 ☐ (full year only)	
IEEE Women in Engineering (WIE)	FREE ☐ (full year only)	

*IEEE Canadian Business No. 125634188

Subscriptions to *IEEE Spectrum* (\$16.00/year) and *The Institute* are included in membership dues. A subscription to *IEEE Potentials* (\$5.00/year) is included in US and Canada membership dues.

PAYMENT METHOD

You may pay for membership by:

- American Express, Visa, MasterCard, Diners Club, Eurocard
- Check – Payable to the IEEE on a bank in the USA or in acceptable local currency
- Money Orders – Payable on a bank in the USA or in acceptable local currency

6 > PAYMENT AMOUNT

Please total the Membership dues from above and any Society dues from the side panel.

IEEE Membership Dues [4] \$ _____

Potentials (outside US & Canada only)
Proceedings of the IEEE (optional) [4] \$ _____

Society dues (optional) [5] \$ _____

IEEE-SA dues (optional) [4] \$ _____

Canadian residents pay
7% GST or 15% HST
Reg. no. 125634188
on Society payment(s) only TAX \$ _____

Amount Paid TOTAL \$ _____

☐ Check ☐ VISA ☐ MASTERCARD ☐ DINERS CLUB ☐ EUROCARD ☐ AMERICAN EXPRESS

CHARGE CARD NUMBER _____

MONTH / YEAR _____

CARDHOLDER'S 5-DIGIT ZIP/POSTAL CODE (BILLING STATEMENT ADDRESS) USA ONLY _____

NAME AS IT APPEARS ON CARD _____

SIGNATURE _____

5 > SOCIETY INFORMATION

As an IEEE Student member, you are encouraged to join any Societies in your areas of study and technical interest. Each Society membership includes a personal subscription to the core journal, magazine or newsletter of that Society. **Prices are quoted in US dollars.**

Please check (✓) appropriate boxes		BETWEEN 16 AUG 2002- 28 FEB 2003 PAY	BETWEEN 1 MAR 2003- 15 AUG 2003 PAY
SOCIETIES			
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