Table of Contents

The National Center for the Mississippi River
A Center For Exploring River Culture, Science, and Technology ........................................... 577
Molly W. Sullivan, Douglas J. Meffert, Center for Bioenvironmental Research Tulane and Xavier Universities, R. George Rey, COTS Technology, LLC

Communication Networks I
Session Chair .......................... David E. Everhart
Future Systems Program Manager
NSWCDD Coastal Systems Station
Panama City, FL
Session Co-Chair ........................ John Meyer
Technical Deputy Director (acting)
Commander, CNMOC
Stennis Space Center, MS

Combined Differential Doppler and Time Delay Compensation for an Underwater Acoustic Communication System ........................................... 581
J. S. Dhanoa, R. F. Ormondroyd, Cranfield University, Department of Aerospace, Power and Sensors, Royal Military College of Science, Shrivenham, Swindon, UK

A Network-Centric UUV Acoustic Measurement Range System ........................................... 588
John Walrod, Planning Systems Inc., Long Beach, MS
Craig Nielsen, Keith Hertel, Doug Odell, CDNSWC Acoustic Research Detachment, Bayview, ID

Performance Comparison of RAKE and Hypothesis Feedback Direct Sequence Spread Spectrum Techniques for Underwater Communication Applications ........................................... 594
F. Blackmon, Naval Undersea Warfare Center, Newport, RI, E. Sozer, J. Proakis, Northeastern University, Boston, MA, M. Stojanovic, MIT, Cambridge, MA

A Network Protocol for Multiple AUV Localization ........................................... 604

Communication Networks II
Session Chair .......................... David E. Everhart
Future Systems Program Manager
NSWCDD Coastal Systems Station
Panama City, FL
Session Chair .......................... John Meyer
Technical Deputy Director (acting), Commander, CNMOC, Stennis Space Center, MS

Multiuser Robust CDMA Detection for Underwater Acoustic Communication Channels ........................................... 612
Evriiclea Voudouri-Maniati, Manhattan College Electrical and Computer Engineering Department, Riverdale, NY

Miniature Low Power Network Nodes for Undersea Systems and Sensor Networks ........................................... 619
Mark E. Henderson, John Walrod, D. Wayne Francis, Planning Systems, Inc., Long Beach, MS

Application of BP Neural Network Based PN Code Acquisition System in Underwater DSSS Acoustic Communication ........................................... 627
Jiang-Yao Chen, Shun-Hsyung Chang, Department of Electrical Engineering, National Taiwan Ocean University Keelung, Taiwan

Volume Two

Communication Networks
Session Chair .......................... David E. Everhart
Future Systems Program Manager
NSWCDD Coastal Systems Station
Panama City, FL
Session Chair .......................... John Meyer
Technical Deputy Director (acting), Commander, CNMOC, Stennis Space Center, MS

Oceanographic High Throughput Communications System ........................................... 633
Timothy N. Rosario, James E. Hardiman, Benthos, Inc., North Falmouth, MA
Table of Contents

Numerical Studies of Deep Convection in the Northwestern Mediterranean Sea Using the Coupled Ocean/Atmosphere Mesoscale Prediction System (COAMPS™) .......................... 672
Xiaodong Hong, Richard Hodur, Naval Research Laboratory, Monterey, CA, Paul Martin and James Cummings, Naval Research Laboratory, Stennis Space Center, MS

The Distributed Integrated Ocean Prediction System (DIOPS) ............................................ 680
R. Allard, Naval Research Laboratory, Stennis Space Center, MS, J. Christiansen, T. Taxon, Argonne National Laboratory, Argonne, IL, S. Williams, Anteon, Inc. Middletown, RI, D. Wakeham, Neptune Sciences, Inc., San Diego, CA

Model Predictions of Nearshore Processes near Complex Bathymetry .................................. 685
J.M. Kaihatu, K.L. Edwards, Naval Research Laboratory Oceanography, Stennis Space Center, MS, W.C. O’Reilly, Center for Coastal Studies, La Jolla, CA

Current Measurements - HF Radar
Session Chair ......................... Albert J. Williams 3rd Senior Scientist Woods Hole Oceanographic Institution Woods Hole, MA
Session Co-Chair ... Dr. Donald Barrick, President CODAR Ocean Sensors Los Altos, CA

An HF-Radar Test DeploymentAmidst an ADCP Array on the West Florida Shelf .............. 692
F. J. Kelly, J. S. Bonner, J. C. Perez, J. S. Adams, D. Prouty, D. Trujillo, Conrad Blucher Institute for Surveying and Science, Texas A&M University- Corpus Christi, Corpus Christi, TX, R. H. Weisberg, M. E. Luther, R. He, R. Cole, J. Donovan, C. R. Merz, College of Marine Science, University of South Florida, St. Petersburg, FL

HF Radar surface current measurements in the Mississippi Sound compared to in-situ measurements by ADCP and Lagrangian GPS Surface drifters ...... 699
Arne - R. Diercks, Charles Riley, Ocean Technologies, Stennis Space Center, MS, Vernon L. Asper, University of Southern Mississippi Department of Marine Science, Stennis Space Center, MS

WetNet™, A Multi-Client, Marine Communication Network .............................................. 637
Sinjin Smith, Ray Kolar, Robert F. Varley, Harris Government Communications Systems Division, Palm Bay, FL

SATCOM for Marine-Based Unmanned Systems ................................................................. 645
Robert F. Varley, Raymond Kolar, Sinjin Smith, Harris Government Communications Systems Division, Palm Bay, FL

Coral Reef Resources
Session Chair ........................ Grady Tuell, Ph.D. Optech International Stennis Space Center, MS

Box Model Analysis for the Estimation of the Water Mass Transport in Coral Reef Region, Japan .......... 654
Susumu Kanno, Fuyo Ocean Development and Engineering Co., Ltd., Taitou-ku, Japan, Yasuo Furushima, Shingo Murakami, Japan Marine Science and Technology Center, Kanagawa, Japan, Mineo Okamoto, Tokyo University of Fisheries, Tokyo, Japan

Characteristics of physical environment of Japanese coral reef region in Sekisei lagoon (Okinawa prefecture, JAPAN) ................................................................. 660
Yasuo Furushima, Japan Marine Science and Technology Center (JAMSTEC), Kanagawa, Japan, Mineo Okamoto, Tokyo University of Fisheries, Tokyo, Japan, Satoshi Nijima, Kyushu University Amakusa Marine Biological Laboratory, Kumamoto, Japan, Susumu Kanno, Fuyo Ocean Development and Engineering Co., Ltd., Tokyo, Japan

Coupled Models
Session Chair ........................ John M. Harding Head, NRL Ocean Dynamics & Prediction Branch Naval Research Laboratory Stennis Space Center, MS

Session Chair ........................ Laurie Jugan AVP Stennis R&D Group Planning Systems Incorporated Stennis Space Center, MS

Preliminary Results from a Global Ocean/Atmosphere Prediction System .............................. 667
Table of Contents

Current Measurements -Instrumentation
Session Chair .................... Albert J. Williams 3rd
Senior Scientist
Woods Hole Oceanographic Institution
Woods Hole, MA

Session Co-Chair ................ Dr. Sicco Kamminga
President
Ingenieursbureau S.D. Kamminga BV
AK Zoetermeer, NL

Analog Output from a Differential Travel-Time Current Meter ............................................. 708
Oceanographic Institution, Nobska Development Corporation

Pipe MAVS, a Deep-Ocean Flowmeter .................... 713
Albert J. Williams 3rd, Woods Hole Oceanographic Institution, Woods Hole, MA, Tor Bjorklund, University of
Washington School of Oceanography, Seattle, WA
Allan Zemanovic, Nobska Development, Inc., Mashpee, MA

A Field Study of Horizontal Current Profilers ............. 718
K. L. Earwaker, D. McNally, H. H. Shih, Center for Operational Oceanographic Products and Services, Silver
Spring, Maryland

Current Measurements -
Intercomparisons and Real Time Measurements
Session Chair .................... Albert J. Williams 3rd
Senior Scientist
Woods Hole Oceanographic Institution
Woods Hole, MA

Session Co-Chair .... Dr. Archie Todd Morrison III
Chief Engineer
McLane Research Lab. Inc.
East Falmouth, MA

Comparison of Current Meters in a Coastal Environment ......................................................... 724
R. D. Rowsell, M. G. Skafel, Environment Canada National Water Research Institute, Burlington, Ontario, Canada

Intercomparison of MAVS with VACM, VMCM, FSI 2-D, and Aanderaa RCM 11
Current Meters from a Mooring ........................................... 730
Albert J. Williams 3rd, Woods Hole Oceanographic Institution, Woods Hole, MA

Coastal Current Measurements Using an ADCP
In a Streamlined Sub-surface Mooring Buoy ............. 736
Richard W. Bourgerie, H.H. Shih, NOAA’s Ocean Service, Silver Spring, MD, Teresa L. Garner,
Environmental Careers Organization, Silver Spring, MD

Data Access/Retrieval/Display
Session Chair .................... Joe Stinus, Director
National Coastal Data Development Center
Stennis Space Center, MS

Session Co-Chair .... Stephanie Alfieris Myrick
Computer Scientist
Naval Research Laboratory
Stennis Space Center, MS

How to Distribute Real-Time Marine Observations for Meteorologists .................................. 742
David B. Gilhousen, National Data Buoy Center, Stennis Space Center, MS

View_HDF: Visualization and Analysis Tool for Hierarchical Data Format Files ....................... 744
Kam-Pui Lee, Peter L. Spence, Science Applications International Corporation, Hampton, VA

Data Mining Ocean Model Output at the Naval Oceanographic Office Major
Shared Resource Center ......................................................... 751
Pete Gruzinskas, Naval Oceanographic Office, Stennis Space Center, MS, Andy Haas, Ludwig Goon, Northrop
Grumman Information Technology, Stennis Space Center, MS

DA_MAP: Data Analysis and Model Assessment Portal ......................................................... 756
Sachin Kumar Bhat, John van der Zwaag, Jim Corbin, Fazilatur Rahman, Engineering Research Center,
Mississippi State University, Stennis Space Center, MS

xxxii
Table of Contents

Data Assimilation and Prediction I
Session Chair .................. John M. Harding, Head
NRL Ocean Dynamics & Prediction Branch
Naval Research Laboratory
Stennis Space Center, MS
Session Co-Chair .......................... Laurie Jugan
AVP Stennis R&D Group
Planning Systems Incorporated
Stennis Space Center, MS

Ocean Prediction Capabilities
(Present & Future) at the
Naval Research Laboratory ............................ 763
J. Harding, R. Preller, R. Rhodes, Oceanography Division,
Naval Research Laboratory, Stennis Space Center, MS

An Operational Real-Time Eddy-Resolving 1/16°
Global Ocean Nowcast/Forecast System ............. 769
O. M. Smedstad, Planning Systems Inc., MSAAP, Stennis
Space Center, MS, H. E. Hurlburt, E. J. Metzger, R. C.
Rhodes, J. F. Shrayer, A. J. Wallcraft, Naval Research
Laboratory, Stennis Space Center, MS, A. B. Kara, Florida
State University, Center for Ocean-Atmospheric Prediction
Studies, Tallahassee, FL, C. P. Murray, Naval
Oceanographic Office, Stennis Space Center, MS

Real-time Ocean Data Assimilation and
Prediction with Global NCOM ....................... 775
C. Rowley, C. Barron, L. Smedstad, R. Rhodes, Naval
Research Laboratory, Stennis Space Center, MS

Data Assimilation and Prediction II
Session Chair ................. John M. Harding, Head
NRL Ocean Dynamics & Prediction Branch
Naval Research Laboratory
Stennis Space Center, MS
Session Co-Chair ...................... Laurie Jugan
AVP Stennis R&D Group
Planning Systems Incorporated
Stennis Space Center, MS

MASDA – MODAS Adaptive
Sampling Decision Aid ............................. 781
Mona J. Collins, NRL 7183, Stennis Space Center, MS
Donald R. DelBalzo, NRL 7183, Stennis Space Center, MS
Charlie N. Barron, NRL 7323, Stennis Space Center, MS

Predictive Skill, Predictive Capability
and Predictability in Ocean Forecasting ................ 787
A.R. Robinson, P.J. Haley, Jr., P.F.J. Lermusiaux,
W.G. Leslie, Harvard University, Cambridge, MA

Advanced Interdisciplinary Data Assimilation:
Filtering and Smoothing via Error Subspace
Statistical Estimation .................................. 795
P.F.J. Lermusiaux, A.R. Robinson, P.J.H. Haley,
W.G. Leslie, Harvard University, Division of Engineering
and Applied Sciences, Cambridge, MA

Data Assimilation and Prediction III
Session Chair .................. John M. Harding, Head
NRL Ocean Dynamics & Prediction Branch
Naval Research Laboratory
Stennis Space Center, MS
Session Co-Chair ............................. Laurie Jugan
AVP Stennis R&D Group
Planning Systems Incorporated
Stennis Space Center, MS

Implementation of an Infrastructure to Support
Operation and Evaluation of
Gulf of Mexico Models .................................. 803
Richard Patchen, Dynalysis of Princeton, Princeton, NJ
John Blaha, Naval Oceanographic Office, Stennis Space
Center, MS

Performance Metrics and Skill Assessment Methods
Demonstrated Using Numerical Model Results
for the Gulf of Mexico ................................. 810
H. James Herring, Dynalysis of Princeton, Princeton, NJ
John P. Blaha, Naval Oceanographic Office, Stennis Space
Center, MS

An Operational Forecast Modeling System
for the Mississippi Sound/Bight ....................... 816
Alan F. Blumberg, Quamrul Ahsan, Honghai Li,
HydroQual, Inc., Mahwah, NJ, John Blaha, Naval
Oceanographic Office, Stennis Space Center, MS

The Calibration/Validation of a Mississippi
Sound/Bight Model ..................................... 823
Quamrul Ahsan, Alan F. Blumberg, Honghai Li,
HydroQual, Inc., Mahwah, NJ, John Blaha, Naval
Oceanographic Office, Stennis Space Center, MS

xxxiii
Table of Contents

Data Assimilation and Prediction IV
Session Chair .................. John M. Harding, Head NRL Ocean Dynamics & Prediction Branch Naval Research Laboratory Stennis Space Center, MS

Session Co-Chair .................. Laurie Jugan AVP Stennis R&D Group Planning Systems Incorporated Stennis Space Center, MS

An Estimation of Ekman and Geostrophic Current over the Texas-Louisiana Shelf ............... 834
K.-J. Joseph Yip, R. O. Reid, Department of Oceanography Texas A&M University, College Station, TX

A Rapidly Relocatable Prediction System: Operational Implementation and Validation .......... 841
Germana Peggion, University of Southern Mississippi Stennis Space Center, MS, Daniel Fox, Charlie Barron, Naval Research Laboratory Stennis Space Center, MS

The Operational Evaluation of the Navy’s Globally Relocatable Tide Model (PCTides) .......... 847
R.H. Preller, P.G. Posey, G.M. Dawson, Naval Research Laboratory, Stennis Space Center, MS

A Web-Based GUI for the Set Up and Maintenance of Wave Models at the Naval Oceanographic Office .... 853
J. C. Cranford, D. Oliver, P. D. Wilz, M. E. Woodward, Planning Systems, Inc., Stennis Space Center, MS

Data Assimilation and Prediction V
Session Chair .................. John M. Harding Head, NRL Ocean Dynamics & Prediction Branch Naval Research Laboratory Stennis Space Center, MS

Session Co-Chair .................. Laurie Jugan AVP Stennis R&D Group Planning Systems Incorporated Stennis Space Center, MS

The Development of an Operational SWAN Model for NGLI .................... 859
James D. Dykes, Naval Oceanographic Office, Stennis Space Center, MS, Y. Larry Hsu, W. Erick Rogers, Naval Research Laboratory, Stennis Space Center, MS

Predicting Sea Ice Conditions for Marine Operations in Ice-Covered Waters ...................... 867
M. El-Diasty, A. El-Rabbany, G. Auda, Department of Civil Engineering, Ryerson University, Toronto, Ontario, Canada

Estimating sea ice thickness distributions and modeling their evolution in time .................. 877
K. R. Dedrick, National/Naval Ice Center, Virginia Polytechnic Institute and State University, Marine Information Resources Corporation, Ellicott City, MD,

DMEFS: A Web Portal for METOC Modeling ........ 884
Avichal Mehra, Jim Corbin, Tomasz Haupt, Sachin Bhate, Engineering Research Center, Mississippi State University, Stennis Space Center, MS

Data Bases
Session Chair .................. John A. Lever Chief Information Officer Naval Oceanographic Office Stennis Space Center, MS

Design of a Naval Research Laboratory (NRL) System for Area of Interest Access to Large Volumes of Bathymetric Data ........................................ 891
Frank McCreedy, Ruth Wilson, Kevin Shaw, Naval Research Laboratory, Stennis Space Center, MS
Jim Braud, Naval Oceanographic Office, Stennis Space Center, MS,

Managing Heterogeneous Databases to Support Diverse Product Requirements ............... 895
Wade Ladner, Naval Oceanographic Office, Hydrography Department, Stennis Space Center, MS, Jeff Moseley, Naval Oceanographic Office, Office of the Chief Information Officer, Stennis Space Center, MS

VGRID: A Generic, Dynamic HDF5 Storage Model for Georeferenced, Grid Data ................ 900
Chad A. Steed, Naval Research Laboratory, Stennis Space Center, MS, James E. Braud, The Naval Oceanographic Office, Stennis Space Center, MS, Kim A. Koehler, Neptune Sciences, Inc., San Diego, CA
Diving
Session Chair ...................... Dr. Sylvia A. Earle
Explorer in Residence
National Geographic Society
Washington, DC
Session Co-Chair ..................... Bill Phoel, Ph.D.
President
Undersea Research Foundation International
Toms River, NJ

Electronic Diving Data Collection during Monitor Expedition 2001 .............................. 908
D.G. Southerland, D.L. Davidson, Navy Experimental Diving Unit, Panama City, FL

Manned Evaluation of a Diver Heater Using Hydrogen Catalytic Reactions ...................... 913
M. L. Nuckols, Ocean Engineering Program, U.S. Naval Academy, Annapolis, MD, K. W. VanZandt, Deep Submergence Branch, Coastal Systems Station, Panama City, FL

Hydrogen Fuel Storage / Delivery for a Diver Heater Using Hydrogen Catalytic Reactions ...................... 919
K. W. Lindler, Mechanical Engineering Department, U.S. Naval Academy, Annapolis, MD, M. L. Nuckols, Ocean Engineering Program, U.S. Naval Academy, Annapolis, MD

An Overview of Diving in Contaminated Water ...................................................... 925
W. A. Steigleman, III, U.S. Navy Experimental Diving Unit, Panama City, FL

Reestablishing a National Man in the Sea Program .............................................. 930
William C. Phoel, Phoel Associates, Inc., Toms River, NJ

Electro-Magnetic Detection I
Session Chair ...................... Ted R. Clem
Coastal Systems Station
Panama City, FL
Session Co-Chair ...................... Dr. Mike Wynn
Senior Research Physicist
NSWC, Dahlgren Division
Coastal Systems Station
Panama City, FL

Magnetic Anomaly Sensing System for Mine Countermeasures Using High Mobility Autonomous Sensing Platforms ........................................ 937
Roy Wiebert, Brian Price and Jalal Hyder, Naval Surface Warfare Center, Dahlgren Division, Coastal Systems Station, Panama City, FL

Polatomic Advances in Magnetic Detection .......... 945
Robert E. Slocum, Gary Kuhlman, Larry Ryan, Don King, Polatomic, Inc., Richardson, TX

Evaluation of the Polatomic P-2000 Laser Pumped He-4 Magnetometer/Gradiometer ......................... 952
D. Overway, T. Clem, J. Bono, J. Purpura, G. Allen, Coastal Systems Station, Panama City, FL, H. Van Wye, D. King, Polatomic, Inc., Richardson, TX

Of The Question Concerningly Development of Strict Seish Theory in the Seas with Intricate Bottom Relief .................................. 961
V. I. Korochentsev, V.A. Kochetova, S.A. Shevkun, Far-Eastern State Technical University, Russia, Vladivostok

Electro-Magnetic Detection II
Session Chair ...................... Dr. Mike Wynn
Senior Research Physicist
NSWC, Dahlgren Division
Coastal Systems Station
Panama City, FL
Session Co-Chair ...................... Ted R. Clem
Coastal Systems Station
Panama City, FL

Active Broadband Electromagnetic Detection and Classification of Buried Naval Mines .......................... 966
I.J. Won, Steve Norton, Bill SanFilipo, Frank Funak, Geophex, Ltd., Raleigh, NC

Active Electromagnetic Detection of Objects Buried in the Sea Bottom ........................................ 974
John Bono, Naval Surface Warfare Center, Dahlgren Division, Panama City, FL

Measurement of Magnetic Noise Characteristics on Select AUVs with some Potential Mitigation Techniques ................................ 978
George I. Allen, John Purpura, David Overway, Naval Surface Warfare Center, Dahlgren Division, Panama City, FL
Table of Contents

Magnetic Sensor Operation On Board an AUV: Magnetic Noise Issues and a Linear Systems Approach to Mitigation ........................................ 985
Mike Wynn, John Bono, Naval Surface Warfare Center, Dahlgren Division, Panama City, FL

Electro-Optic Signal and Image Processing
Session Chair .......................... Dr. Jack Lloyd
Senior Physicist
Air Mine Countermeasures Division
NSWC-DD Coastal Systems Station
Panama City, FL
Session Co-Chair ..................... Jeff W. Rish III
Head, Electro-opting Sensing and Surveillance Technology Branch
NSWC-DD Coastal Systems Station
Panama City, FL

Electro-Optic Identification Research Program .......... 994
James S. Taylor, Jr., Modeling and Prediction Branch, Coastal Systems Station, Panama City, FL, Mary C. Hulgan, Airborne Systems Development Branch, Coastal Systems Station, Panama City, FL

Process for the Development of Image Quality Metrics for Underwater Electro-Optic Sensors ............ 1003
James S. Taylor, Jr., Coastal Systems Station, Panama City, FL, Brett Cordes, Coastal Systems Station, Panama City, FL

Investigation of Photometric Stereo Method for 3-D Shape Recovery from Underwater Imagery .......... 1010
Shahriar Negahdaripour, H. Zhang, X. Han, Electrical and Computer Engineering Department, University of Miami, Coral Gables, FL

On the Way to Solve Lighting Problems in Underwater Imaging .............................................. 1018
Rafael Garcia, Tudor Nicosevic, Xevi Cufí, Computer Vision and Robotics Group, Institute of Informatics and Applications University of Girona, Girona, Spain

Electronic Chart Systems
Session Chair ............ Darrell Smith, CDR USN (Ret)
Research Associate
Hydrographic Science Research Center
The University of Southern Mississippi
Stennis Space Center, MS
Session Co-Chair .................... Doug Brunt
Manager Electronic Charting
Canadian Hydrographic Service
Ottawa, Canada

Next Generation ECDIS for Commercial and Military Uses .............................................. 1025
Bohdan Pillich, SevenCs, Hamburg, Germany,
Christina Schack, Nielsen+Partner, Hamburg, Germany

Electronic Chart Display Overlay Development at the Naval Oceanographic Office for Use in Tactical Applications .............................................. 1033
Steven P. Harrison, Maxim F. van Norden, Naval Oceanographic Office, Stennis Space Center, MS

U.S. Navy Progress in Electronic Navigation .............. 1038
Dave Gillard, Paul K. Heim II, Navigator of the Navy Staff, U.S. Naval Observatory, Washington, DC

NOAA's Electronic Navigational Chart Program .............................................. 1042
Nicholas E. Perugini, NOAA, Office of Coast Survey, National Ocean Service, NOAA, Silver Spring MD,

Three Dimensional Navigation ...................................... 1046
Kevin Peterson, SPAWARSYSCEN, Naval Amphibious Base Little Creek, Norfolk, VA

Environmental Protection and Compliance Applications
Session Chair ........................ James Barbera
Ocean Engineering Society
Rockville, MD
Session Co-Chair ...................... Dr. John Lathrop
Head, Littoral Warfare Sensing Technologies
Coastal Systems Station
Panama City, FL

Field Measurement on the Comfort Level of Acoustic Environment in Coastal Zone ..................... 1051
Masatoshi Katayama, Faculty of Engineering, Kyushu Kyoritsu University, Yahatanishi-ku, Kitakyushu, Japan

xxxvi
Survey of Latent Hazard of a Sunken Tanker,  
Kyung Shin .......................................................... 1057
Sung Hoon Byun, Hyeuk Jin Choi, Moon Jin Lee, Chang  
Gu Kang, Korea Research Institute of Ships and Ocean  
Engineering, KORDI, Yusung-gu, Daejeon, Republic of  
Korea

The Application of EZ-Gram Sonar Display  
Aids to the Marine Mammal Monitoring on  
Navy Undersea Ranges (M3R) System ...................... 1064
Robert J. Barton III, Susan Jarvis, Raymond J.  
Rowland, Dave Moretti, Naval Undersea Warfare Center,  
Newport, RI

The use of Conductivity Probes to locate Animal  
Burrows in Mangrove Swamps .................................. 1071
S.F. Heron, Physics Department, Marine Geophysics  
Laboratory, James Cook University, Australia, Department  
of Physics, Georgetown University, Washington DC  
S.E. Hollins, P.V. Ridd, Physics Department, Marine  
Geophysics Laboratory, James Cook University, Australia

Integrating Ocean Acoustic Propagation Models  
and Marine Mammal Auditory Models ...................... 1078
Haw-Jye Shyu, Roger Hillson, US Naval Research Lab,  
Washington, DC

Environmental Sensors  
and Systems
Session Chair .......................... Dr. John Lathrop  
Head, Littoral Warfare Sensing Technologies  
Coastal Systems Station  
Panama City, FL  
Session Co-Chair ..................... James Barbera  
Ocean Engineering Society  
Rockville, MD

Synthesis of antennas located in a sea bay .......... 1085
V. I. Korochentsev, G.P. Turmov, V.V. Korochentsev, Far  
Eastern State University, Russia, S. A. Shevkun, Far Eastern  
State Technical University, Russia

AutoSurvey: Current Integration and the  
AutoSurvey Planner ............................................. 1091
Donald L. Brandon Jr., Brian S. Bourgeois, Naval  
Research Laboratory, Stennis Space Center, MS

A Model Based System for Simultaneously  
Estimating Bathymetry and Sound Speed  
Profile Characteristics - Non-Isovelocity  
Simulation Results.............................................. 1098
D. B. Cousins, BBN Technologies, Middletown, RI  
J. H. Miller, Department of Ocean Engineering, University  
of Rhode Island, Narragansett R.I.

Are Ultra Low Frequency Waves Suitable  
For Detection? .................................................. 1109
B. Nicolas, J. Mars, J-L. Lacoume, Laboratoire Des  
Images Et Des Signaux, Institut National Polytechnique de  
Grenoble, Saint Martin d'Hères, France, D. Fattaccioli,  
DGA/DCE/CTSN/SN/SF

Geographic Information Systems
Session Chair ............ Stephanie Alfferis Myrick  
Computer Scientist  
Naval Research Laboratory  
Stennis Space Center, MS
Session Co-Chair ............. Joe Stinus, Director  
National Coastal Data Development Center  
Stennis Space Center, MS

Brokering Meteorological and  
Oceanographic Information in Support of  
Military Operations Using GIS Technology .......... 1114
James D. Dykes, Todd E. Hancock, Naval Oceanographic  
Office, Stennis Space Center, MS

Comparisons of National Vertical and Chart Datums  
with WGS 84 (EGM96) Geoid ................................. 1121
P. Fell, M. Tanenbaum, Naval Surface Warfare Center  
Dahlgren, VA

Assessing the Vulnerability of the Mississippi  
Gulf Coast to Coastal Storms Using an On-Line  
GIS-Based Coastal Risk Atlas ................................. 1127
Kelly Boyd, Rex Hervey, Jason Stradtner, Neptune  
Sciences Inc., National Coastal Data Development Center,  
Stennis Space Center, MS
Table of Contents

Geology and Geophysics
Session Chair ............................. Dr. Patrick Fell
Naval Surface Warfare Center
Dahlgren VA

Determining Geological Provinces in Mediterranean Sea Sediment Core Samples Using Magnetic Susceptibility of Sapropels and Volcanic Ash ...................................................... 1134
Carter L. Gehman, Gene V. Kelly, Naval Oceanographic Office, Stennis Space Center, MS

New Developments in Deep-Towed Seismic Acquisition ....................................... 1139
W. T. Wood, J. F. Gettrust, U. S. Naval Research Laboratory, Stennis Space Center, MS

Side-Scan Sonar Investigations and Hydroacoustic ‘Bubble’ Quantification in an Area of Surface-Near Gas Hydrate Occurrences: Recent Studies from Hydrate Ridge, Offshore Oregon .............................................. 1143
J. Greinert, PhD, I. Klaucke, PhD, GEOMAR Research Center for Marine Geosciences, Kiel, Germany, P. Gimpel, PhD, Kiel, Germany

Homeland Security I
Session Chair ................................. Dr. Andy Clark
President
HARRIS Maritime Communications
Melbourne, FL
Session Co-Chair ..................... Dr. Donald L. Durham
CEO
Innovative Strategic Advanced Systems
New Orleans, LA

Fleet Numerical Support for Homeland Security in the Wake of 9/11 ................................. 1148
M. A. Rennick, J. E. Joseph, M. J. Schorp, Fleet Numerical Meteorology and Oceanography Center, Monterey, CA

Status of NOAA’s Ocean Activities Relating to Homeland Security .............................. 1152
S. P. DeBow, G. T. Noll, F. Aikman III, D. W. Haines, NOAA Ocean Service, Silver Spring, MD

Homeland Security II
Session Chair ................................. Dr. Andy Clark
President
HARRIS Maritime Communications
Melbourne, FL
Session Co-Chair ..................... Dr. Donald L. Durham
CEO
Innovative Strategic Advanced Systems
New Orleans, LA

“Repel boarders!” Low Tech Warfare in a High Tech Age: A Security Primer for Oceanographic Research Operations ........................................... 1158
Daniel S. Schwartz Vice President, Technical Affairs, Marine Technology Society, Chairman, Security Sub-Committee, UNOLS Research Vessel Operators’ Committee, Manager of Marine Operations, University of Washington

Commercial Ship Self Defense Against Piracy and Maritime Terrorism ...................................... 1164
Brian L. White, Kenneth J. Wydajewski, Arion Systems, Inc., Chantilly, VA

Ship Berthing and Hull Inspection Using the CetusII AUV and MIRIS High-Resolution Sonar ...................... 1172
Gary M. Trimble, Marine Automation and Robotics Lockheed Martin Perry Technologies, Sunnyvale, CA, E. O. Belcher, Applied Physics Laboratory, University of Washington, Seattle, WA.

Homeland Security III
Sessions Chair ................................. Dr. Andy Clark
President
HARRIS Maritime Communications
Melbourne, FL
Sessions Co-Chair ..................... Dr. Donald L. Durham
CEO
Innovative Strategic Advanced Systems
New Orleans, LA

Assessing Offshore Vulnerabilities and Counter-response Capabilities Using RapidOps .................... 1176
Jerry L. Harbour, Idaho National Engineering & Environmental Laboratory, Idaho Falls, ID
## Table of Contents

### Information Processing I

**Sessions Chair** ........................................... V. William Porto  
Exec. V.P. and Chief Mathematician  
Natural Selection Inc.  
La Jolla, CA

**Hand Signal Recognition for Diver - Machine Interface** .......................... 1231  
Chau-Chang Wang, Hong-Chan Hsu, Min-Shine Zeng,  
Institute of Undersea Technology, National Sun Yat-sen University, Kao-Hsiung, Taiwan

**Gaining Tactical Advantage through Undersea Oceanographic Data Collection and Distribution from Navy Platforms by Exploiting Through The Sensor (TTS) Technology and Net-Centric Warfare (NCW) to populate the Virtual Natural Environment (VNE) as Part of the Navy Four Dimensional Cube (4DCube)** ............................... 1237  
Kim A. Koehler, Neptune Sciences, Inc., San Diego, CA  
John G. Kusters, Space and Naval Warfare Systems Command, San Diego, CA

**Implementation of an Upgrade to the Naval Oceanographic Office Information Technology Enterprise** ......................................................... 1247  
David F. Hasenkampf, John A. Lever, Naval Oceanographic Office, Stennis Space Center, MS, Neal A. Martin,  
Henry Newman, Instrumental, Inc., Bloomington, MN

### Information Processing II

**Sessions Chair** ........................................... V. William Porto  
Exec. V.P. and Chief Mathematician  
Natural Selection Inc.  
La Jolla, CA

**Quality Control of Ocean Temperature and Salinity Profile Data** .................. 1253  
Kenneth P. Grembowicz, Betty S. Howell, Naval Oceanographic Office, Stennis Space Center, MS

**Impact of Windowing and Subsampling Algorithms on Acoustic Scattering Strength Databases** ......................................................... 1258  
W. E. Brown, Naval Oceanographic Office, Stennis Space Center, MS, M. L. Barlett, Applied Research Laboratories, The University of Texas at Austin, Austin, TX, R. L. Dicus,  
Science Applications International Corporation, McLean, VA

---

### Processes and Techniques for Providing Critical Data to First Responders to Maritime Security Incidents

**K. J. Wydajewski, B.L. White, Arion Systems, Inc., Chantilly, VA**

### Augmenting and Complementing Current Maritime Domain Awareness Systems Within the Gulf of Mexico Using Fiber Optic Network Systems

**Kevin Peterson, Gulf Fiber Corp., Virginia Hoffman, Global Marine Systems**

### Hydrography

**Sessions Chair** ................................. Leslie Sivak  
Naval Oceanographic Office  
Stennis Space Center, MS

**Sessions Co-Chair** ....................... Marian Clough  
Naval Oceanographic Office  
Stennis Space Center, MS

---

**Complete Coastal Mapping with Airborne** ........................................ 1194  
Lidar J. M. Wozencraft, Joint Airborne Lidar Bathymetry Technical Center of Expertise, US Army Corps of Engineers, Mobile, AL

**Tow Vehicle Depth Verification** ............................................... 1199  
M. M. Harris, W. E. Avera, L. D. Bibee, Stennis Space Center, MS

---

**A Comparison of Acoustic Imagery of Sea Floor Features Using a Towed Side Scan Sonar and a Multibeam Echosounder** .................................. 1203  
R.T. DeKeyzer, J.S. Byrne, J.D. Case, B.A. Clifford,  
W.S. Simmons, Science Applications International Corporation, Newport, RI

---

**Dealing with Increasing Data Volumes and Decreasing Resources** .................. 1212  
Jan Depner, Barbara Reed, Naval Oceanographic Office, Stennis Space Center, MS, Shannon Byrne, Jeffrey Parker, Science Applications International Corporation, Newport, RI, Mark Paton, Lindsay Gee, Interactive Visualization Systems Inc., Fredericton, NB, Canada,  
Larry A. Mayer, Colin Ware, Center for Coastal and Ocean Mapping, UNH, Durham, NH

---

**Lessons Learned in Multi-Platform Hydrographic Surveys** ......................... 1223  
Maxim F. van Norden, Scott Ebrite, Douglas J. Cronin,  
Don Ventura, Naval Oceanographic Office, Stennis Space Center, MS
Table of Contents

Knowledge Discovery in Oceanographic Databases:
Issues of Complications in Data Sources .......................... 1264
Roy Ladner, Fred Petry, Naval Research Laboratory, Stennis Space Center, MS

Improving Software Engineering Processes to Support Operational Oceanography ....................... 1271
Jeff Moseley, Naval Oceanographic Office, Stennis Space Center, MS

Volume Three

Localization and Tracking I
Sessions Chair ............ Christopher A. Sermarini
Research Electrical Engineer
NSWCC-Coastal Systems
Panama City, FL

Track Parameterization for an Acoustic Horizontal Line Array .................................................. 1275
Rockie L. Ricks, SPAWAR Systems Center, San Diego, CA

An Iterated-Extended Kalman Filter Algorithm for Tracking Surface and Sub-Surface Targets .......... 1283
John C. Hyland, Coastal Systems Station, Panama City, FL

Bottom Mounted Active Sonar for Detection, Localization, and Tracking ................................. 1291
Chris Eggen, Robert Goddard, Applied Physics Laboratory University of Washington, Seattle, WA

A Kalman Filtering Approach to Wideband Scattering Function Estimation and Tracking .................. 1299
Michael J. Roan, Leon H. Sibul, Applied Research Laboratory, The Pennsylvania State University, State College, PA

Localization and Tracking II
Sessions Chair ............ Christopher A. Sermarini
Research Electrical Engineer
NSWCC-Coastal Systems
Panama City, FL

Feature Tracking and Depth Estimation in Front-Scan Sonar Image Sequences .............................. 1306
Andrea Trucco, Simone Curletto, Alessandro Pesce, Department of Biophysical and Electronic Engineering, University of Genoa, Italy

New Generation Acoustic Positioning Systems .................................................................................. 1312
Donald Thomson, Nautronix Ltd., UK, Scott Elson, Nautronix Inc Nautronix Inc., Houston, TX

Theory of Search for Moving Objects ................................ 1319
Vasily V. Popovich, Yan A. Ivakin, Sergei S. Shaida, St. Petersburg Institute for Informatics and Automation of the Russian Academy of Sciences, St. Petersburg, Russia

Manned Submersibles
Sessions Chair .............................. Mike Harris
Mapping, Charting, and Geodesy Branch Head
Naval Research Laboratory
Stennis Space Center, MS

Technological Evolution ...................................................... 1330
Mark Martin

A Basic Research on the Improvement of Propulsion Maneuvering System and the Automatic Motion Control of SHINKAI6500 .......... 1332
Takuya Shimura, Yasutaka Amitani, Takao Sawa, Yoshitaka Watanabe, Japan Marine Science and Technology Center (JAMSTEC), Yokosuka, Japan

Marine Education I
Sessions Chair ....................... Sharon Walker, Ph.D.
Associate Dean for Outreach
College of Marine Sciences
The University of Southern Mississippi
Director for Education
MS-AL Sea Grant Consortium
Ocean Springs, MS

Leveraging Oceanographic Resources in Teacher and Student Science Programs ......................... 1339
Patricia S. Harrison, Bobbie Thompson, Mark Jarrett, Naval Oceanographic Office, Stennis Space Center, MS

The MATE Model: A Focused Effort to Improve Marine Technical Education & Meet Work Force Needs ......................................................... 1343
Jill Zande, Deidre Sullivan, Saundra Butcher, Marine Advanced Technology Education (MATE) Center, Monterey Peninsula College, Monterey, CA, Tom Murphree, Department of Meteorology, Naval Postgraduate School, Monterey, CA