# Table of Contents

Unambiguous Triplet Array Beamforming and Calibration Algorithms To Facilitate An Environmentally Adaptive Active Sonar Concept

Georgios Haralabus and Alberto Baldacci .................................................. 479

A Chorus Of Whales: Evaluation Of Sequential and Batch Approaches To Time-Series Tracking

Odile Gerard, Stefano Coraluppi, Walter Zimmer and Peter Willett .................. 485

Underwater Acoustic Communications With Multi-Carrier Modulation

Andrey K. Morozov and James C. Preisig ..................................................... 491

Cross-Spectral Phase Method For Distinguishing Waves From Turbulence In Single-Point Boundary Layer Flow Measurements

Weichang Li and Albert J. Williams .............................................................. 497

High-Fidelity Model For Sonar Interrogation Of Bottom and Surface Targets In Shallow Water

Thomas E. Giddings and Joseph J. Shirron .................................................... 503

Acoustic Behavior Of Beaked Whales, With Implications For Acoustic Monitoring

Peter L. Tyack, Mark P. Johnson, Walter M.X. Zimmer, Natacha Aguilar De Soto and Peter T. Madsen ............................................ 509

A Kernel Machine Framework For Feature Optimization In Multi-Frequency Sonar Imagery

J.R. Stack, R. Arrieta, X. Liao and L. Carin .................................................. 515

On The Use Of The Stochastic Matched Filter For Ship Wake Detection In SAR Images

Fabien Chaillan and Philippe Courmontagne ............................................... 521

Development Of An Integrated Acoustical-Optical Platform For Detecting Groundfish

Jianing Zhang, Zhenhai Wang, Ernest Bernard, Christopher J. Jakubiak, Jennifer L. Miksis-Olds .................................................. 527

Automated Classification Of Beaked Whales and Other Small Odontocetes In The Tongue Of The Ocean, Bahamas

Susan Jarvis, Nancy Dimarzio, Ronald Morrissey and David Morretti .............. 532

The Adaptive Stochastic Matched Filter For SAS Images De-Noising

Philippe Courmontagne, Fabien Chaillan ..................................................... 538

Calibration Of A Steered Phased-Array Sonar For Use In Fish Detection

Ernest Bernard, Christopher J. Jakubiak, Jennifer L. Miksis-Olds, John Penvenne and D.V. Holliday ............................................. 544

Design and Implementation Of A Regional Association For The Gulf Of Mexico Coastal Ocean Observing System

Ann Jochens ................................................................................................. 549

Auvish: An Application-Based Language For Cooperating Auvs

Andrew Rajala, Michael O'Rourke, Dean B. Edwards ..................................... 553

Technology Refresh Of NOAA's Tropical Atmosphere-Ocean (TAO) Buoy System

Chung-Chu Teng, Landry J. Bernard, Pete A. Lessing .................................. 559

Coil-Cord Conductors On Compliant Elastic Moorings

James Irish, Stanley J. Boduch and Walter Paul ........................................... 565

Solid State Attitude Sensor For Low Cost Marine Application

Jon Crowell ................................................................................................. 571

Aquaculture Feed Buoy Control - Part 1: System Controller

Stanley Boduch and James D. Irish .............................................................. 575

Aquaculture Feed Buoy Control - Part 2: Telemetry, Data Handling and Shore-Based Control

James Irish and Stanley J. Boduch ............................................................... 581

Evaluation Of Laser Induced Breakdown Spectroscopy (LIBS) As A New In Situ Chemical Sensing Technique For The Deep Ocean

Anna P. M. Michel, Norman E. Farr, and Alan D. Chave .............................. 587

Engineering Overview Of The University Of New Hampshire's Open Ocean Aquaculture Project

Barbaros Celikkol, Judson Decew, Kenneth Baldwin, Stanley Boduch, Michael Chambers, David W. Fredriksson, Jim Irish, Oystein Patursson, Glen Rice, M. Robinson Swift, Igor Tsukrov, Chad A. Turmelle ............................... 592
# Table of Contents

Design Of A 20-Ton Capacity Finfish Aquaculture Feeding Buoy ................................................................. 599
Chad A. Turmelle, M. Robinson Swift, Barbaros Celikkol, Michael Chambers, Judson Decew, David W.
Fredriksson, Glen Rice, Kurt Swanson

Practical Applications Of Numerical Modeling Using Aquafe: A Case Study .................................................. 605
Judson Decew, Barbaros Celikkol, Glen Rice, Igor Tsukrov

A Contribution To The Problem Of Mapping Seabed Transition Zones ......................................................... 611
Laure Amate and Maria-Joao Rendas

Tow Test Results Of An Aquapod Fish Cage ........................................................................................................ 617
Judson Decew, Steve Page, Chad A. Turmelle, Jim Irish

Boston Harbor Sediment Quality Responds To Cleanup .................................................................................. 623
Carlton D. Hunt, Deirdre Dahlen, Stacy Pala, Maury Hall, Ken Key

Matched-Field Inversion In The East China Sea With Tabu Search ............................................................... 627
Zoi-Heleni Michalopoulou, James H. Miller and Gopu R. Poity

Field Tests Of A New Camera/LED Strobe System ......................................................................................... 631
Jonathan Howland, Norman Farr and Honumant Singh

MIMO Multi-Access Passive Time Reversal Communications ...................................................................... 635
H.C. Song, W.S. Hodgkiss, W.A. Kuperman and T. Akal and M. Stevenson

Shipboard Measurements Of Coherent Microwave Backscatter from the Ocean ............................................. 641
William J. Plant, William C. Keller, and Kenneth Hayes

Prototype Of A Stereoscopic Vision System To Improve Image Quality In Turbid Waters During Underwater
Inspections ......................................................................................................................................................... 644
Rogelio Morales and Demian Pereira

Perceptual Feature Identification For Active Sonar Echoes ........................................................................... 648
Scott Philips, James Pitton and Les Atlas

Conductivity Probe and Stereo Camera Measurements Of Roughness During SAX04 ................................. 654
Brian T. Hefner, Dajun Tang and C.C. Wang

Multi-Static Sonar Tracking Incorporating Environmentally-Adaptive SNR Estimates ............................... 659
W. Krout, James W. Pitton, Warren L. J. Fox

Fish And Shellfish Monitoring In Boston Harbor And Massachusetts Bay - 1992 Through 2005 .................. 665
Lisa Lefkovitz, L.F., S. Pala, C. Hunt, M. Hall, and M. Moore

Line Of Sight Guidance With Intelligent Obstacle Avoidance For Autonomous Underwater Vehicles ........... 669
Xiaoping Wu, Zhengping Feng, Jimao Zhu and Robert Allen

Fatally Entangled Right Whales Can Die Extremely Slowly ........................................................................... 675
Michael J. Moore, Andrea Bogomolni, Robert Bowman, Philip K. Hamilton, Charles T. Harry,
Amy R. Knowlton, Scott Landry, David S. Rotstein, and Kathleen Touhey

AUV Behavior Algorithm While Inspecting Of Partly Visible Pipeline ......................................................... 678
Alexander V. Inzartsev, Alexander M. Pavin

Modeling The Operation and Maintenance Cost Of Large Scale Tidal Current Turbine Farm .................... 683
Ye Li and H. Keith Florig

The Pipeline Identification Method Basing On AUV's Echo-Sounder Data ............................................... 689
Alexander Pavin

Ocean Observing Systems: Vision and Details ................................................................................................. 695
Gene Massion

Towards Multi-Frequency Imaging and Analysis Of Sub-Surface Targets Using SAS .............................. 701
P. T. Gough, M. A. Noonchester, A. J. Hunter, and M. P. Hayes

Experimental Investigation Of Internal Tide Generation By Two-Dimensional Topography ...................... 707
Paula Echeverri
# Table of Contents

Estimating Parameter Uncertainties In Geoaoustic Inversion By a Neighbourhood Approximation Algorithm ................................. 711
Kunde Yang, N. Ross Chapman and Yuanliang Ma

Modeling The Underwater Sound Field Excited By A Rapidly Moving Source In Air With Wavenumber Integration ........................................ 717
Yipeng Zhang, Yuanliang Ma, Kunde Yang

Advances In High-Frequency Active Sonars For Countering Asymmetric Threats In Littoral Waters ........................................... 722
Brian G. Ferguson, Kam W. Lo and Ron J. Wyber

Intertidal Sedimentary Structures and Their Formation Mechanisms In Sandy, Muddy, and Sand-Mud Layered Flats ........................................ 728
Y. Watabe and S. Sassa

MMT 3000 - Small AUV Of New Series Of IMTP FEB RAS ........................................ 734
Vitaly E. Gornak, Alexander V. Inzartsev, Oleg Yu. Lvov, Youri V. Matvienko, Alexander Ph. Scherbatsyuk

AUV Propellers: Optimal Design and Improving Existing Propellers For Greater Efficiency ........................................ 740
Kathryn D’Epagnier

Portable Magnetic Gradiometer For Real-Time Localization and Classification Of Unexploded Ordnance ........................................ 747
Roy Wiegert and John Oeschger

Optical Modem Technology For Seafloor Observatories ........................................ 753
N. Farr, A. D. Chave, L. Freitag, J. Preistig, S. N. White, D. Yoerger, and F. Sonnichsen

Boundary Tracking and Rapid Mapping Of A Thermal Plume Using An Autonomous Vehicle ........................................ 759
Christopher J. Cannell, Aditya S. Gadre, Daniel J. Stillwell

Opening a Window to the Sea: The Potential of the Ocean Observatories for Education ........................................ 765
S. M. Glenn, R. Chant, J. Kohut, J. Reinfielder, O. Schofield, J. Mcdonnell

Mission Controller For High Level Control Of Autonomous and Semi-Autonomous Vehicle Operation ........................................ 770
Stephen C. Martin, Louis L. Whitcomb, Dana Yoerger, Hanumaunt Singh

A Robust Visual Attention System For Detecting Manufactured Object In Underwater Video ........................................ 776
Christian Barat and Maria-Joao Rendas

Near Shore Wireless Communication System For Sensor Buoys ........................................ 782
Andy Schneider

GLUCOS: The Great Lakes Urban Coastal Observing System ........................................ 787

Design and Construction Of A Polar Remote Interactive Marine Observatory (PRIMO) ........................................ 792
Vernon Asper, Scott Gallagher, Keith Von Der Heydt, Steven Lerner, Andrew Girard, Kenneth Peal, Emily Miller, Glenn Mcdonald, Jay Sisson, and Chris Griner

Received Signal Parameter Statistics In Random/Uncertain Oceans ........................................ 795

An Investigation Of A Deployed Submerged Grid Mooring System ........................................ 801
Glen Ricea, Stanley Boducha, Judson Decewa, James D. Irishb, M. Robinson Swiftc, Chad A. Turmellea

A New Wavelet Thresholding Approach For SAS Images De-Noising ........................................ 806
Julien Mallet, Philippe Courmontagne.

Significant Events Reported By The NDBC Stations During Hurricane Katrina ........................................ 812
R. H. Bouchard, C. C. Teng, and R. V. Hervey

Time Varying Gain (TVG) Measurements Of A Multibeam Echo Sounder For Applications To Quantitative Acoustics ........................................ 817
Dezhang Chu and Lawrence C. Hufnagle

Field Tests Of The Hybrid Remotely Operated Vehicle (HROV) Light Fiber Optic Tether ........................................ 822
Chris Young, Barbara Fletcher, James Buescher, Dana Yoerger, Andrew Bowen, Louis L. Whitcomb, Robert Mccabe, Matt Heints, Robert Fuhrmann and Chris Taylor
# Table of Contents

## An Automated Morphological Image Processing Based Methodology For Quantifying Coral Cover In Deeper Reef Zones

Jeffrey Kaeli, Hammant Singh and Roy A. Armstrong

## The Estimated Ocean Detector: Derivation and Predicted Performance Under Gaussian Assumptions


## The Value Of Geostationary Satellite Imagery In IOOS, Now and Future

Andrew Lomax, D. W. Colburn and M. K. Galbraith

## Micro System Technology For Marine Measurement

Matt Mowlem, Valerie Chavagnac, Peter Statham, and Peter Burkill, Giuseppe Benazzi, David Holmes, Hywel Morgan, Christoph Haas, Michael Kraft, and Alan Taberham

## Characteristics Of The Atmospheric Boundary Layer In Nantucket Sound

L. I. Ivanov, B.A. Magnell, R.A. Catalano, L. Fagan

## Field Tests Of Acoustic Telemetry For A Portable Coastal Observatory

Marinna Martini, Bradford Butman, Jonathan Ware and Dan Frye

## Emerging Zoonoses In Marine Mammals and Seabirds In The Northeast US

Bogomolni, J. Ellis, R. Gast, B. Harris, M. Pokras, K. Touhey and M. Moore

## Coastal Ocean Observatories Enable Biological Investigations In A Buoyant Plume


## Initial Buried Minehunting Demonstration Of The Laser Scalar Gradiometer Operating Onboard Remus 600


## Current and Future Wet-Mate Connector Technology Developments For Scientific Seabed Observatory Applications

Howard Painter and John Flynn

## The SCOOP Service-Oriented Architecture For Ocean Observing and Prediction

Philip Bogden, Gabrielle Allen, Greg Stone, Jon Maclaren, Gerald Creager, Larry Flournoy, Wei Zhao, Hans Graber, Sara Graves, Helen Conover, Rick Luetich, Will Perrie, Lavanya Ramakrishnan, Dan Reed, Harry Wang and Peter Sheng

## Assessing Performance Tradeoffs In Undersea Distributed Sensor Networks

Thomas A. Wettergren, Russell Costa, John G. Baylog, and Sandie P. Grage

## Broad-Band Time Domain Modeling Of Sonar Clutter In Range Dependent Waveguides

Kevin Lepage, P. Neumann and C. W. Holland

## Toward An Ocean Observing System Of Systems

Luis Bermudez, Philip Bogden, Eric Bridger, Gerry Creager, David Forrest and John Graybeal

## Terrlab - A Generic Simulation and Post-Processing Tool For Terrain Referenced Navigation

Ove Hagen

## Improving The Understanding Of Mooring Motion In Current Measurements Using High-Resolution Diagnostic Records

Vadim Polonichko and Vitalii A. Sheremet

## Mapping Clutter In Situ: Broadband Results From T-MAST 02 and Boundary 2004

R. C. Gauss and J. M. Fialkowski

## Control Of Autonomous Underwater Vehicles Using Neural Networks

Michael Santora, Joel Alberts, and Dean Edwards

## Pilot-Tone Based ZP-OFDM Demodulation For An Underwater Acoustic Channel

Baosheng Li, Shengli Zhou, Milica Stojanovic, and Lee Freitag

## MBARI's Midwater Ecology Low-Light Imaging System Development

Lance R. Mcbride, Kim R. Reisenbichler and Barbara L. Johnson
Table of Contents

Tools For Tomorrow's Science and Technology Workforce: MATE's 2006 ROV Competition Sets Students' Sights On Ocean Observing Systems ................................................................. 940
Jill Zande, Blanche Meeson, Susan Cook, and George Matsumoto

Path Planning Methods For Adaptive Sampling Of Environmental and Acoustical Ocean Fields ................................................................. 945

Integrated In-Situ Chemical Sensor System For Submersible Deployment At Deep-Sea Hydrothermal Vents ................................................................. 951
K. Ding, Z. Zhang, W. E. Seyfried, A. M. Bradley, Y. Zhou, C. J. Yang, Y. Chen

Martha's Vineyard Coastal Observatory - Real-Time Information Management For A Coastal Ocean Observing System ................................................................. 957
Janet Fredericks, Robert Groman, Edward Hobart, John Krauspe and Julie M. Allen

More Than One Way To Catch A Fish: Effective Translation Of Ocean Science For The Public ................................................................. 962
B. W. Meeson, J. McDonnell, J. Kohut, S. Litchenwahler, H. Helling

Satellite Ocean Color and Aerosol Data Validation At Martha's Vineyard Coastal Observatory ................................................................. 967
H. Feng, D. Vandemark, R. Morrison and H. Sosik

Applying Joint Network Enabled Operations (NEO) Project Lessons To IOOS/GOOS ................................................................. 972
David Sweet

Power Storage and Conversion From An Ocean Microbial Energy Source ................................................................. 977
Lance Mcbride, P. Girguis and C. E. Reimers

Integrated Guidance and Control Of Auvs Using Shrinking Horizon Model Predictive Control ................................................................. 982
Charmane V. Caldwell, Emmanuel G. Collins and Srinivas Falanki

A Software Framework For An Integrated Observing System ................................................................. 988
Jesse Kipp and Tom Hansen

Statistical Analysis Of Sound Transmission Results Obtained On The New Jersey Continental Slope ................................................................. 991
Simona M. Dediu, William M. Carey and William L. Siegmann

Integration Of Range, Bearing and Doppler Measurements From Transponders Into Underwater Vehicle Navigation Systems ................................................................. 994
Are B. Willumsen, Oddvar Hallingstad and Bjarn Jalving

Use Of The Invariance Principle For Target Tracking In Active Sonar Geometries ................................................................. 1000
Jorge E. Quijano and Lisa M. Zurk

Underwater Acoustic Navigation With The WHOI Micro-Modem ................................................................. 1005
Sandipa Singh, Matthew Grund, Brian Bingham, Ryan Eustice, Hamamani Singh, Lee Freitag

Cost-Benefit Analysis Of Alternative Ocean Observing Platforms For Coastal Water Quality Monitoring ................................................................. 1009
Paul Dragos, Michael Mickelson, Carl Albro, Matthew Fitzpatrick

Results From A Small Synthetic Aperture Sonar ................................................................. 1015
Daniel Brown, Daniel Cook, Jose Fernandez

Remote, Aerial, Trans-Layer, Linear and Non-Linear Downlink Underwater Acoustic Communication ................................................................. 1021
Fletcher Blackmon and Lynn Antonelli

Sea Surface Backscatter Distortions Of Scanning Radar Altimeter Ocean Wave Measurements ................................................................. 1028
Edward J. Walsh and C. Wayne Wright

Our Ocean - An Integrated Solution To Ocean Monitoring and Forecasting ................................................................. 1032
Peggy Li, Yi Chao, Quoc Vu, Zhijin Li, John Farrara, Hongchun Zhang, Xiaochun Wang

Advances In Undersea Power Distribution ................................................................. 1038
J. M. Yeager, D. T. Macchiarolo

Coastal Observing Systems: Addressing Science While Fulfilling The Needs Of Regulators, Managers and Stakeholders ................................................................. 1042
Temitope Ojo, James S. Bonner, Cheryl Page, Deidre Williams, and Nick Kraus

xi