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Weilin W. Hou
Robert A. Arnone
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Contents

ix	Conference Committee
xi	Introduction

SESSION 1 UNDERWATER IMAGING AND SENSING I

- 8724 02 **State-of-the-art tools for next-generation underwater optical imaging systems** [8724-1]
L. Mullen, S. O'Connor, B. Cochenour, Naval Air Systems Command (United States);
F. Dalglish, Harbor Branch Oceanographic Institute (United States)
- 8724 03 **Polarimetric imaging of underwater targets** [8724-5]
A. Gilerson, C. Carrizo, A. Tonizzo, A. Ibrahim, A. El-Habashi, R. Foster, S. Ahmed, The City
College of the City Univ. of New York (United States)
- 8724 04 **Experimental validation of an undersea free space laser network simulator in turbid coastal
conditions** [8724-7]
D. Rashkin, Florida Atlantic Univ. (United States); F. Dalglish, Harbor Branch
Oceanographic Institute (United States); I. Cardei, Florida Atlantic Univ. (United States);
B. Ouyang, A. Vuorenkoski, Harbor Branch Oceanographic Institute (United States);
M. Cardei, Florida Atlantic Univ. (United States)

SESSION 2 UNDERWATER IMAGING AND SENSING II

- 8724 05 **Measurements of turbulent dissipation during the Bahamas optical turbulence experiment**
[8724-9]
S. Matt, National Research Council Postdoctoral Research Associate (United States) and
U.S. Naval Research Lab. (United States); W. Hou, S. Woods, E. Jarosz, W. Goode,
A. Weidemann, U.S. Naval Research Lab. (United States)
- 8724 06 **Characterization of optical communication in a leader-follower unmanned underwater
vehicle formation** [8724-8]
F. Eren, S. Pe'eri, M.-W. Thein, The Univ. of New Hampshire (United States)
- 8724 07 **Using computer vision to analyze the images obtained from ocean mapping** [8724-11]
I. Fernandez Florez, Univ. EAFIT (Colombia)
- 8724 08 **Multiuser sonar watermarking and detection in an underwater acoustic channel** [8724-10]
B. G. Mobasser, Villanova Univ. (United States); R. S. Lynch, Signal & Information Processing
Systems Consultant (United States); D. Andiaro, Villanova Univ. (United States)

SESSION 3 LIDAR AND OCEAN PROCESSES

- 8724 09 **Effect of surface roughness on lidar overlap function** [8724-12]
J. H. Churnside, National Oceanic and Atmospheric Administration (United States)

- 8724 0A **CZMIL (coastal zone mapping and imaging lidar): from first flights to first mission through system validation** [8724-13]
V. I. Feygels, J. Y. Park, Optech, Inc. (United States); J. Wozencraft, Joint Airborne Lidar Bathymetry Technical Ctr. of Expertise (United States); J. Aitken, Optech, Inc. (United States); C. Macon, Joint Airborne Lidar Bathymetry Technical Ctr. of Expertise (United States); A. Mathur, A. Payment, V. Ramnath, Optech, Inc. (United States)
- 8724 0B **Sea floor classification with satellite data and airborne lidar bathymetry** [8724-14]
H. M. Tulldahl, Swedish Defence Research Agency (Sweden); P. Philipson, Brockmann Geomatics Sweden AB (Sweden); H. Kautsky, Stockholm Univ. (Sweden); S. A. Wikström, AquaBiota Water Research (Sweden)
- 8724 0C **Circulation on the continental shelf within the Mississippi Bight** [8724-16]
S. D. Howden, A. Kern, The Univ. of Southern Mississippi (United States)
- 8724 0D **In situ laser sensing of mixed layer turbulence** [8724-15]
F. Dalglish, Florida Atlantic Univ. (United States); W. Hou, U.S. Naval Research Lab. (United States); A. Vuorenkoski, G. Nootz, B. Ouyang, Florida Atlantic Univ. (United States)
- 8724 0E **Assimilation of bio-optical properties into coupled physical, bio-optical coastal model** [8724-17]
I. Shulman, S. Frolov, S. Anderson, B. Penta, R. Gould, P. Sakalaukus, S. Ladner, U.S. Naval Research Lab. (United States)

SESSION 4 FUTURE SENSING CAPABILITIES

- 8724 0G **On the eigenvalue analysis using HH-VV dual-polarization SAR data and its applications to monitoring of coastal oceans** [8724-20]
M. Sugimoto, National Defense Academy (Japan); K. Ouchi, National Defense Academy (Japan) and Korea Institute of Ocean Science and Technology (Korea, Republic of); C.-S. Yang, Korea Institute of Ocean Science and Technology (Korea, Republic of)
- 8724 0H **Estimating oil layer thickness: a vibrational spectroscopic approach** [8724-21]
L. E. Besaw, G. F. S. Hewitt, J. W. Haas, N. E. Van Wyck, R. A. Langlois, D. W. Sweeten, Applied Research Associates, Inc. (United States)
- 8724 0I **Colombian ocean waves and coasts modeled by special functions** [8724-22]
S. Duque Tisnés, Univ. EAFIT (Colombia)

SESSION 5 VISIBLE REMOTE SENSING I

- 8724 0J **Evaluating VIIRS ocean color products for west coast and Hawaiian waters** [8724-24]
C. O. Davis, N. Tufillaro, J. Nahorniak, Oregon State Univ. (United States); B. Jones, The Univ. of Southern California (United States) and King Abdullah Univ. of Science and Technology (Saudi Arabia); R. Arnone, The Univ. of Southern Mississippi (United States)

- 8724 OK **Analyzing radiometric requirements for diurnal observations of coastal/oceanic waters from geostationary orbits** [8724-25]
N. Pahlevan, Z. Lee, Univ. of Massachusetts Boston (United States); C. Hu, Univ. of South Florida (United States); J. R. Schott, Rochester Institute of Technology (United States)
- 8724 OL **Evaluation of VIIRS ocean color data using measurements from the AERONET-OC sites** [8724-26]
S. Ahmed, A. Gilerson, S. Hlaing, I. Ioannou, The City College of New York (United States); M. Wang, National Oceanic and Atmospheric Administration (United States); A. Weidemann, U.S. Naval Research Lab. (United States); R. A. Arnone, The Univ. of Southern Mississippi (United States)
- 8724 ON **Bathymetry estimations using vicariously calibrated HICO data** [8724-27]
D. Lewis, R. W. Gould Jr., A. Weidemann, S. Ladner, U.S. Naval Research Lab. (United States); Z. Lee, Univ. of Massachusetts Boston (United States)

SESSION 6 VISIBLE REMOTE SENSING II

- 8724 OO **Improved monitoring of bio-optical processes in coastal and inland waters using high spatial resolution channels on SNPP-VIIRS sensor** [8724-29]
R. A. Vandermeulen, R. Arnone, The Univ. of Southern Mississippi (United States); S. Ladner, U.S. Naval Research Lab. (United States); P. Martinolich, QinetiQ North America (United States)
- 8724 OP **Neural network approach for the derivation of chlorophyll concentration from ocean color** [8724-30]
I. Ioannou, R. Foster, A. Gilerson, B. Gross, F. Moshary, S. Ahmed, The City College of New York (United States)
- 8724 OQ **Monitoring bio-optical processes using NPP-VIIRS and MODIS-Aqua ocean color products** [8724-32]
R. Arnone, The Univ. of Southern Mississippi (United States); S. Ladner, U.S. Naval Research Lab. (United States); G. Fargion, San Diego State Univ. (United States); P. Martinolich, QinetiQ North America (United States); R. Vandermeulen, The Univ. of Southern Mississippi (United States); J. Bowers, QinetiQ North America (United States); A. Lawson, U.S. Naval Research Lab. (United States)

SESSION 7 THERMAL REMOTE AND IN-SITU SENSING I

- 8724 OR **Improvements of satellite SST retrievals at full swath** [8724-36]
W. McBride, U.S. Naval Research Lab. (United States); R. Arnone, The Univ. of Southern Mississippi (United States); J.-F. Cayula, QinetiQ North America (United States)
- 8724 OS **VIIRS-derived SST at the Naval Oceanographic Office: from evaluation to operation** [8724-35]
J.-F. P. Cayula, QinetiQ North America (United States); D. A. May, B. D. McKenzie, K. D. Willis, Naval Oceanographic Office (United States)

- 8724 OT **OSI-SAF operational NPP/VIIRS sea surface temperature chain** [8724-37]
P. Le Borgne, G. Legendre, A. Marsouin, S. Péré, H. Roquet, Meteo-France (France)

SESSION 8 THERMAL REMOTE AND IN-SITU SENSING II

- 8724 OV **Evaluation and selection of SST regression algorithms for S-NPP VIIRS** [8724-38]
B. Petrenko, National Oceanic and Atmospheric Administration (United States) and Global Science and Technology, Inc. (United States); A. Ignatov, National Oceanic and Atmospheric Administration (United States); Y. Kihai, National Oceanic and Atmospheric Administration (United States) and Global Science and Technology, Inc. (United States)
- 8724 OW **Reduction of stripe noise in ACSPO clear-sky radiances and SST** [8724-39]
M. Bouali, National Oceanic and Atmospheric Administration (United States) and Cooperative Institute for Research in the Atmosphere (United States); A. Ignatov, National Oceanic and Atmospheric Administration (United States)
- 8724 OX **Evaluating calibration of MODIS thermal emissive bands using infrared atmospheric sounding interferometer measurements** [8724-40]
Y. Li, A. Wu, Sigma Space Corp. (United States); X. Xiong, NASA Goddard Space Flight Ctr. (United States)
- 8724 OY **Terra and Aqua MODIS on-orbit spectral characterization for reflective solar bands** [8724-41]
T. Choi, Sigma Space Corp. (United States); X. Xiong, NASA Goddard Space Flight Ctr. (United States); Z. Wang, D. Link, Sigma Space Corp. (United States)
- 8724 OZ **Simultaneous measurement of temperature and pressure sensor for oceanography using Bragg gratings** [8724-42]
I. V. A. K. Reddy, P. S. Reddy, G. R. C. Reddy, National Institute of Technology, Goa (India); R. L. N. S. Prasad, National Institute of Technology, Warangal (India); A. V. Narasimha Dhan, K. Sandeepkumar, National Institute of Technology, Goa (India); S. Afzulpurkar, National Institute of Oceanography (India)

POSTER SESSION

- 8724 10 **Spectral stability of the Libya 4 site using EO-1 Hyperion** [8724-43]
T. Choi, Sigma Space Corp. (United States); X. Xiong, NASA Goddard Space Flight Ctr. (United States); A. Angal, Science Systems and Applications, Inc. (United States); G. Chander, SGT, Inc. (United States)
- 8724 11 **Design of integrated ship monitoring system using SAR, RADAR, and AIS** [8724-45]
C.-S. Yang, T.-H. Kim, D. Hong, Korea Institute of Ocean Science & Technology (Korea, Republic of) and Univ. of Science & Technology (Korea, Republic of); H.-W. Ahn, Korea Institute of Ocean Science & Technology (Korea, Republic of)
- 8724 12 **Long-term band-to-band calibration stability of MODIS thermal emissive bands** [8724-44]
B. N. Wenny, Sigma Space Corp. (United States); X. Xiong, NASA Goddard Space Flight Ctr. (United States); S. Madhavan, Science Systems and Applications, Inc. (United States); A. Wu, Y. Li, Sigma Space Corp. (United States)

- 8724 13 **Sea surface signature of tropical cyclones using microwave remote sensing** [8724-46]
B. Kil, The Univ. of Southern Mississippi (United States); D. Burrage, J. Wesson, U.S. Naval
Research Lab. (United States); S. Howden, The Univ. of Southern Mississippi (United States)

Author Index

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Session Chairs

- 1 Underwater Imaging and Sensing I
Weilin W. Hou, U.S. Naval Research Laboratory (United States)
- 2 Underwater Imaging and Sensing II
Silvia Matt, U.S. Naval Research Laboratory (United States)

- 3 LIDAR and Ocean Processes
James H. Churnside, National Oceanic and Atmospheric Administration (United States)
- 4 Future Sensing Capabilities
Stephan D. Howden, The University of Southern Mississippi (United States)
- 5 Visible Remote Sensing I
Robert A. Arnone, U.S. Naval Research Laboratory (United States)
Samir Ahmed, The City College of New York (United States)
- 6 Visible Remote Sensing II
Robert A. Arnone, University of Southern Mississippi (United States)
Samir Ahmed, The City College of New York (United States)
- 7 Thermal Remote and In-Situ Sensing I
Alexander Ignatov, National Oceanic and Atmospheric Administration (United States)
- 8 Thermal Remote and In-Situ Sensing II
Alexander Ignatov, National Oceanic and Atmospheric Administration (United States)

Introduction

Technological sensor advances are enhancing the capability of ocean sensing and monitoring. The SPIE papers presented in 2013 are enabling improved understanding of the ocean by addressing the details of how ocean sensors respond to changing ocean processes. Through new sensor capability, details of ocean processes can be observed that never before have been seen, both spatially and temporally. These details are presenting ocean research with new problems to address on how the ocean can be monitored using new sensors, and modeled by refined parameters.

A major contribution in ocean sensing is the use and applications of LIDAR and underwater imaging techniques. Advances in these areas are providing new capability for examining ocean turbulence and identification of underwater targets, as discussed by the papers of Mullen (8724-1), and Dalglish (8724-15). Coupling these optical signatures with acoustical signatures can provide new methods to monitor ocean processes. The exploitation of LIDAR technology for ocean sensing is rapidly emerging. LIDAR optical systems and improved processing methods have improved significantly. Research has demonstrated our ability to define ocean processes through a better understanding of light propagation and polarization. This is an emerging technology in ocean monitoring that is rapidly growing and somewhat dependent on the availability of LIDAR sensors for ocean research. These papers (8724-12, 13, 14, 15) show new technological capability for ocean sensing.

Several presentations (8724-17, 19, 24, 25, 26, 27, 29, 30, 32, 43, 44, 46), discussed recent improvements in ocean remote sensing technology which are linked to enhanced calibration and validation of space sensors. Research demonstrates the capability to conduct spectroscopy from space through the use of improved sensor calibration and how this significantly enhances our ability to monitor ocean processes (8724-24, 25, 26, 27). Space sensor calibration is critical for enabling consistency of ocean products and generation of improved and advanced algorithms for ocean monitoring. These calibration and validation procedures for remote sensors are also shown to be dependent on accurate collection of insitu data, which are representative of the ocean state. This includes accurate ocean sensors used for measurement of optical properties, ocean currents, thermal properties and biological properties (8724-20, 22, 43, 44, 45, 46).

Thermal sensing of the ocean surface, ie, sea surface temperature (SST), provides much needed parameters in understanding the energy exchange between the atmosphere and the ocean, and forcings associated. Several presentations

(8724-34, 35, 36, 37, 38, 39, 40, 41) have focused in this area, with an emphasis on recently launched VIIRS sensors.

In summary, accurate sensing of the ocean processes is required to improve our monitoring ability. This requires new sensors which can define the space and time scales of the ocean processes. Future ocean monitoring capability will require experimenting with the response of emerging ocean sensors to the ocean processes. This volume of SPIE 2013 papers provides a pathway to the future in ocean monitoring by illustrating how emerging sensors can be applied for sensing ocean processes.

Weilin W. Hou
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