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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 Dalgleish (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.

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