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# PREFACE

## Ocean remote sensing for sustainable resources

### 1. Introduction

This is a special issue featuring a selection of research papers presented at the 12th Biennial Pan Ocean Remote Sensing Conference (PORSEC) in November 2014. Since its establishment in 1990 as the Pacific Ocean Remote Sensing Conference, PORSEC has rapidly gained global status as one of the most prestigious oceanic remote-sensing conferences in the world, with a scope covering all world oceans. Primarily through volunteer efforts, with some support from the host countries and national and international agencies that share its principles, the PORSEC association has been holding biennial scientific meetings since 1992 in different locations around the Pacific Rim and Indian Ocean. The goal of the meetings and the associated training courses is to further the understanding of the Earth's environmental processes, and to assist in training, education and capacity building in the host country. Conferences take advantage of the unique perspective provided by satellite remote-sensing technology, while striving to protect the ocean and atmosphere and promote sustainable use and development of oceanic and coastal resources. PORSEC 2014 and the preceding tutorial course were held in Denpasar, Bali, Indonesia, hosted by the Indonesian National University of Udayana, together with the Indonesian National Institute of Aeronautics and Space, with in-kind and financial support from international space science and research agencies, and financial support from the US Office of Naval Research. The conference reviewed and discussed the state of ocean remote sensing with emphasis on topics and areas of interest to Indonesia in 98 oral and 18 poster presentations during 4–7 November 2014 (Tanaka et al. 2015). The 11 research papers in this issue cover a broad range of problems in satellite observations of the ocean, atmosphere and coastal and inland waters. They are broadly grouped in two main categories: Processing and Exploitation, and are briefly reviewed in the following subsections.

### 2. Processing: algorithm development, improvement and validation; data processing and new products

Among the three papers that discuss algorithm development, improvement and validation involving active microwave remote sensing, that by Troitskaya et al. (2016) investigates the X-band co-polarized and de-polarized radar return in a wide range of high wind speeds based on laboratory experiments. The major contribution of this article is providing a capability to evaluate the dependency of microwave backscatter returns and wind speed in a well-controlled environment. A combination of laboratory data and satellite retrievals will provide better description and understanding of the geophysical wind models for scatterometry and synthetic aperture radar (SAR) missions. Tings, Bentes da Silva, and Lehner (2016) deal with the challenging issue of estimating ship parameters from satellite imagery. The authors propose an improved algorithm based on cross-entropy and multiple linear regression applied to ship signatures in TerraSAR-X images that are validated with Automatic Identification System data flows. The third paper, He et al. (2016), presents a

novel approach to determine storm intensity. It is based on estimation of wind speeds around typhoon eyes from SAR and Moderate Resolution Imaging Spectroradiometer (MODIS) satellite observations. This study demonstrates that the local wind distribution of cyclonic winds around typhoon eyes at different radial distances from the typhoon centres may be derived from rainband feature tracking using quasi-concurrent multi-sensor images. This technique may offer useful wind information for typhoon simulations and forecasts.

Kameda and Kutsuwada (2016) evaluate the advantages of using multiple scatterometers to provide continuous wind measurements for investigating the long-term variation of ocean surface winds. They combine three scatterometer data sets (QSCAT/SeaWinds, MetOp-A/ASCAT and ERS-1,2) to build a gridded product and show the advantages of having more than one instrument in orbit at the same time. A fifth paper, Sambah and Miura (2016), makes use of middle-resolution ALOS satellite imagery to map tsunami-affected areas. The premise is that while it is almost impossible to reduce the occurrence of natural disasters, their impact can be minimized by an initial assessment related to tsunami vulnerability mapping and the observation of tsunami inundation areas. The inundated area information is extracted using spatial multi-criteria analysis of several parameters. A case study in the coastal area of Miyagi and Iwate Prefectures, Japan, is illustrated. The final two papers deal with ocean colour data in coastal areas. Nimit, Lotliker, and Srinivasa Kumar (2016) evaluate the Medium-Resolution Imaging Spectrometer sensor's CoastColour Algorithm for Waters off the West-Coast of India against *in-situ* observations made as a part of the Satellite Coastal and Oceanographic Research programme, and Gower (2016) considers the use of satellite-measured chlorophyll fluorescence for monitoring coastal productivity and plankton blooms. MODIS images from western Canada, Bali and the Yellow Sea are used to illustrate differences in sea surface chlorophyll as indicated by chlorophyll fluorescence and by the standard green/blue ratio.

## 3. Exploitation and applications

Four papers describe the use of satellite data for exploitation in different marine and coastal applications. Syamsuddin et al. (2016) assess inter-annual variability of Bigeye tuna hotspots in the eastern Indian Ocean off Java using data from different sources, including satellite remote sensing (altimetry and ocean colour), *in situ* data (Argo floats), Bigeye tuna catch statistics and climatic indices. Empirical orthogonal function analysis is performed to obtain a detailed structure of the spatio-temporal ocean variability in the region. In two papers, two different applications of SAR data in the Caspian Sea are investigated. Ivanov and Kucheiko (2016) present the results of routine satellite oil spill monitoring in the Eastern Black Sea (2011–2013) and the Northern and Middle Caspian Sea (2009–2013). The paper describes the methodology and presents analysis of oil spill monitoring results in the two regions. In another paper, Ivanov (2016) uses SAR observations and other supplementary data sources to describe physical generation and propagation mechanisms of atmospheric gravity waves in the Caspian Sea. The paper reveals a new hotspot at the western coast of the Caspian Sea that can lead to intense large-amplitude waves in the middle portion of the sea and on its eastern coast. The final paper by Cai et al. (2016) describes a novel application of Landsat data for monitoring the impacts of construction in coastal waters. They show evidence of the capability of high-spatial-resolution Landsat Thematic Mapper data to sense and document suspended

particulate matter concentration variability due to the influence of large structures in coastal waters, and provide an example from the Yangtze River Delta in China.

## 4. Conclusions

The conference reviewed and discussed the state of ocean remote sensing and will help scientists and students involved in ocean–atmosphere studies using remote-sensing techniques to benefit from interactions with the experts participating from all over the globe. The conference provided opportunities to showcase the research work carried out using remote-sensing techniques from various satellite missions, applying ocean remote sensing for societal benefits and fostering collaborations in advance of the major international field campaigns planned for the Years of Maritime Continent (YMC, 2017–18). The 'Maritime Continent' includes the Indonesian Island of Bali, where the meeting was held.

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