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Editorial: Lidar and ocean color remote sensing for marine ecology

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Editorial on the Research Topic
Lidar and ocean color remote sensing for marine ecology

The advent of the Coastal Zone Color Scanner (CZCS) in 1978 heralded a transformative era in ocean color remote sensing, paving the way for a deeper understanding of upper-ocean biogeochemistry. Over the past decades, the field has evolved significantly, with the recent inclusion of light detection and ranging (lidar) technology offering unprecedented insights into the marine environment. This Research Topic aims to encapsulate the collective knowledge and advancements presented in the Research Topic, highlighting the innovative applications of lidar and ocean color remote sensing in marine ecology. It is our intent to provide a comprehensive overview that not only summarizes the articles but also contextualizes their contributions within the broader scope of marine and atmospheric research. Four papers have been published, featuring contributions from a wide array of academic and industrial entities spanning 15 organizations, including the University of Iowa, Science Systems and Applications, Inc., NASA Goddard Space Flight Center, Université Laval (Canada), ArcticNet, QuébecOcéan, Département de biologie, University of Toronto Scarborough, Département de Physique, BeamSea Associates, Ministry of Natural Resources, South China Sea Institute of Oceanology (CAS), Nanchang Hangkong University, Université de Lille.

Within the scope of this Research Topic, significant advancements have been presented by esteemed researchers. McGill et al., demonstrates the utility of machine learning algorithms for real-time detection of cloud and aerosol layers using airborne lidar data. This advancement in atmospheric data acquisition, particularly those related to cloud and aerosol layers, is critical for marine ecology as it enhances our understanding of the interactions between the atmosphere and the marine environment, which are essential for modeling and predicting changes in marine ecosystems.

Palm et al., presents a study on the estimation of planetary boundary layer height from ICESat-2 and CATS backscatter measurements. Utilizing both traditional techniques and machine learning, the insights gained from this study on atmospheric boundary layer structure are integral to understanding the air-sea interactions that influence marine ecosystems, thereby providing a foundation for more accurate ecological assessments and predictions.

Huot et al., explores the application of machine learning for underwater laser detection and differentiation between macroalgae and coral. Their work highlights the potential of multispectral laser imaging for enhancing the detection and classification of these essential marine organisms, contributing to the monitoring of marine habitats and the assessment of climate change impacts.

Vadakke Chanat and Jamet propose a validation protocol for space-borne lidar measurements of the particulate back-scattering coefficient in the ocean. Their research is instrumental in ensuring the accuracy and reliability of space-borne lidar data, which is vital for ocean color remote sensing and the study of marine ecosystems.

In conclusion, the Research Topic “Lidar and Ocean Color Remote Sensing for Marine Ecology” showcases the innovative applications of remote sensing technologies including lidar and passive ocean color remote sensing in understanding complex marine environments. The articles presented in this Research Topic not only reflect the current state-of-the-art in this field but also point toward future directions for research and application, emphasizing the importance of interdisciplinary approaches in advancing marine ecological studies.

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Conflict of interest

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