Researchers develop dual-wavelength ocean lidar for ocean detection

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Ocean water column information profiles are essential for ocean research. Currently, water column profiles are typically obtained by ocean lidar instruments, including spaceborne, airborne and shipborne lidar.

Most lidar instruments are equipped with a 532 nm laser; however, blue wavelength penetrates more for open ocean detection.

A research team from the Shanghai Institute of Optics and Fine Mechanics (SIOFM) of the Chinese Academy of Sciences developed a novel airborne dual-wavelength ocean lidar (DWOL) equipped with a 53-nm and 486-nm lasers that can operate simultaneously. The study was published in *Remote Sensing*.

This instrument was designed to compare the performance of 486 and 532 nm lasers in a single detection area and to provide a reference for future spaceborne oceanic lidar (SBOL) design.

The researchers optimized the laser wavelengths of the DWOL system to make it compatible with coastal water and open ocean water. The vertical profiles of returning signals from a depth of approximately 100 m were obtained with the newly designed 486 nm channel.

They conducted a shipborne experiment in the South China Sea. Results showed that for a 500-frame accumulation, the 486 nm channel obtained volume profiles from a depth of approximately 100 m. In contrast, the vertical profiles obtained by the 532 nm channel only reached a depth of 75 m, which was approximately 25% less than that of the 486 nm channel in the same detection area.

In the data processing, they inversed the lidar attenuation coefficient $\alpha(z)$ from the DWOL data; results showed that the maximum value of $\alpha(z)$ ranged from 40 to 80 m, which was consistent with the chlorophyll-scattering layer (CSL) distribution measured by the shipborne instrument. Additionally, $\alpha 486(z)$ decreased for depth beyond 80 m, indicating that the 486 nm laser could potentially penetrate the entire CSL.

More information: Kaipeng Li et al. A Dual-Wavelength Ocean Lidar for Vertical Profiling of Oceanic Backscatter and Attenuation, *Remote Sensing* (2020). DOI: 10.3390/rs12172844

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