Developing Status of Guanlan Spaceborne LIDAR for Oceanography

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Traditional passive oceanic color remote sensing has revolutionized our ability to quantify horizontal patterns of phytoplankton and other suspended particles distributions across the ocean surface. Among the various challenges in spaceborne remote sensing of the upper ocean, the following two issues are probably of a higher priority: continuous observation day and night, and high spatial resolution vertical penetration. Lidar technology, which has already proven its ability to produce high resolution models of bathymetry/ topography, offers to provide critical insights into vertical distribution of optical properties and suspended particles, significantly improving our ability to model biogeochemical processes in the upper ocean. "Guanlan" science mission is a constellation associating the ocean lidar and radar altimeter technology to make a substantial contribution to a sub-mesoscale resolving and depth-resolving observation of the ocean. The "Guanlan-1" satellite including a multi-wavelength oceanic lidar and a imaging spectroradiometer is planned to launch at the end of 2024. The spaceborne active lidar (*wavelength: 532nm and 486nm*) will ensure a deeper penetration depth in different sea region and an all-time detection which leads to a layered characterization of the optical properties of the subsurface ocean. The simultaneous functioning of the ocean lidar, a compact imaging spectroradiometer will allow an enhanced understanding of contributions of the atmosphere and the air-sea interface which in turn considerably reduce the error budgets of the two sensors. The oceanic lidar is expected to partially reveal the marine food chain and ecosystem with fine vertical interval in the euphotic layer, moving a significant step down to the oceanic mixed layer both dynamically and bio-optically.