

Ocean and Snow Studies from CALIPSO and ICESat-2

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This paper presents the ocean and snow optical properties obtained from two space-based lidars: CALIOP/CALIPSO and ATLAS/ICESat-2. The CALIPSO mission has 16 years of very successful operation, providing the first decadal datasets of high-resolution atmospheric profiles of aerosols and clouds globally, which are critical to studying the climate impacts of clouds and aerosols in the atmosphere. ICESat-2, a follow-on mission to ICESat, launched in September 2018 and now provides global altimetry and atmospheric measurements with particular emphasis on surface elevation changes in the polar regions.

Fortunately, additional and previously unexploited information from the penetration of laser light below ocean and snow surfaces offers a new and exciting opportunity to study ocean biology and snow properties. Our collaborative team onsite at NASA's Langley Research Center (LaRC) and Goddard Space Flight Center (GSFC) has proposed novel algorithms to determine ocean subsurface optical properties such as water diffuse attenuation coefficient and particulate backscattering coefficient, and as well as snow optical properties such as snow albedo, snow depth, and grain size from space lidar measurements. We will present and discuss the ocean and snow results from two space lidars – CALIOP and ATLAS – and welcome future collaborations with the global lidar research community.