**Applications of Lidar Systems for Ocean Ecosystem Research**

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Global estimates of phytoplankton biomass (Cphyto) and particulate organic carbon (POC) have traditionally been made using passive ocean color measurements. Recently, data from the CALIOP sensor on the CALIPSO satellite have provided the first measurements of these two key carbon cycle stocks from a space-based lidar. CALIOP was not designed for subsurface ocean retrievals. Nevertheless, global distributions of surface layer Cphyto and POC retrieved with CALIOP compare well with independent assessments using MODIS passive ocean color data. This success suggests a potentially important future role for space lidar measurements in global ocean plankton research, particularly for a lidar system optimized for water column profiling. To this end, the NASA Langley airborne High Spectral Resolution Lidar (HSRL) was recently modified for ocean research to increase vertical resolution and to provide independent vertically-resolved retrievals of the diffuse attenuation coefficient (Kd) and particulate backscatter (bbp). The advanced airborne HSRL was deployed in July-August of 2014 on the Ship-Aircraft Bio-Optical Research (SABOR) experiment to overfly ship-based optical measurements. Correlations of lidar-derived bbp with in situ ship-based measurements and lidar-derived Kd with MODIS retrievals during SABOR were excellent. Our poster will provide results from the CALIOP and HSRL studies and ideas on the scalability of the HSRL technique to space for global ocean profiling.

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