Tuesday, October 9
Poster Session 2
10:30–12:30

Poster 102

OCEAN PROFILING LIDAR MEASUREMENTS: LINKING FAST ATMOSPHERIC PROCESSES AND LONG TERM CLIMATE

Clouds and aerosols can change the amount of solar radiation that are absorbed by the Earth system. However, the atmosphere and land surfaces both have very limited heat capacity, and thus radiative heating/cooling associated with atmospheric and land processes is of short duration (a month or less), unless those processes impact the ocean, which has a huge heat capacity and thus longer "climate memory". The deeper the radiative impact reaches within the ocean, the longer it remains stored in the system (e.g., decades for heating below the mixed layer). Net absorption of solar radiation by the ocean mixed-layer is the driver of inter-annual changes in radiative heating of the ocean and cooling of the atmosphere, which in turn also drives the global water cycle. The degree of absorption in the mixed layer determines the amount of solar radiation reaching beyond the mixed-layer. Thus, the vertical distribution of phytoplankton may have a huge impact on the inter-annual variations of energy/water cycle and global ocean temperature at multi-decadal or longer time scales by impacting the vertical distribution of solar radiation within the ocean. Ocean profiling lidar can be a first step in studying vertical distribution of absorption of solar radiation within and possibly beyond the ocean mixed-layer in tropical and subtropical waters. For this study, we examine the relevant processes governing absorption in the mixed layer and beyond using a simplified coupled ocean-atmospheric model and assess the potential for ocean profiling lidar to provide global data to better quantify climate-relevant ocean heating.

Yongxiang Hu, NASA LaRC, yongxiang.hu-1@nasa.gov
John Hair, NASA LaRC, johnathan.w.hair@nasa.gov
Chris Hostetler, NASA LaRC, chris.a.hostetler@nasa.gov