Quantification Of Type-Specific Sub- And Super-Micron Aerosol Fluxes Over The Ocean Using CALIPSO Retrievals

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Accurate representation of aerosols in the marine environment is crucial, as clouds in the marine boundary layer (MBL) are particularly sensitive to the concentration of cloud condensation nuclei (CCN) and ice nucleating particles (INP). Studies show that terrestrial aerosols can be transported at extraordinary distances and can dominate boundary layer CCN budgets in remote marine regions. Measurements of aerosol vertical distribution over oceans remain limited, and the relative contribution of different sources (sea spray, long-range transported anthropogenic pollution, new particle formation) to the aerosol and CCN number budget in the MBL is poorly quantified.

In this presentation, a new algorithm capable of the retrieval of aerosol mode- (sub- and super-micron) and type- (clean marine, dust, polluted dust, polluted continental, and smoke) specific curtains of vertical turbulent flux profiles using Cloud-Aerosol Lidar with Orthogonal Polarization (CALIOP) lidar-retrieved aerosol extinction and backscatter at 532 and 1064 nm wavelengths using *K*-theory with the help of type-specific normalized aerosol size distribution from the CALIPSO aerosol model and the Modern-Era Retrospective analysis for Research and Applications, Version 2 (MERRA-2)-provided meteorological data will be shown. The data were acquired from CALIPSO overpasses close to ARM sites at Bear Islands, north of Norway, the Eastern North Atlantic (ENA) observatory located on Graciosa Island in the Azores archipelago, and Ascension Islands, in the Southern Atlantic Ocean. Preliminary results from the CALIPSO overpass from the Azores on 31 October 2018 suggested clean marine aerosols for the entire curtain with a maximum aerosol number concentration of less than 200 cm^{-3} inside the MBL. The aerosol number fluxes were positive (upward) in the range of 200-400 cm^2s^{-1} till the first 400 m indicating that marine aerosols are being emitted from the ocean surface. This presentation will discuss how aerosol number fluxes can be retrieved using CALIPSO data which will be an asset to the Atmospheric Observing System (AOS) mission which will carry a lidar like CALIOP.