

## **Marine Stratocumulus Clouds Detection Using Satellite Borne Radars: Performance of Different Radar Configurations**

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Boundary layer (BL) clouds are a critical component of the Earth's climate system by their affect on the Earth's hydrological cycle, the vertical transport of heat, moisture and momentum and Earth's radiation budget. The detection of shallow clouds and associated precipitation using satellite borne radars is inherently challenging due to their shallow nature and proximity to the Earth's surface and the frequent masking of the cloud radar return by the drizzle return. Here, the dataset of marine stratocumulus collected during the Atmospheric Radiation Measurements (ARM) program Mobile Facility deployment in the Azores is compared against CloudSat observations collected over the same area and period. The comparison between the ground-based and space-based radar observations is used to illustrate certain challenges related to marine stratocumulus cloud detection from space using radars. An assessment of the expected performance of the Earth CARE Cloud Profiling Radar (CPR) is performed using a best and worst-case scenario for the point target response function of the CPR receiver and CPR simulator. Finally, the analysis is expanded to include assessment of other transmitted waveforms including the use of short (e.g., 100 m) and long (e.g., 500 m) pulse and the use of pulse compression.