



The Role of Spatially Extended Supercooled Stratiform Clouds in the Southern Ocean Radiation Bias Question

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The extensive cloudiness and resulting high albedo of the Southern Oceans (SO) are predominantly due to the occurrence of widespread marine boundary layer (MBL) clouds. Recent work finds correlations between biogenically enhanced cloud condensation nuclei concentrations and cloud droplet number concentrations derived from passive satellite data. Recently, ship based remote sensing data collected during a 5-week voyage in the Southern Ocean by the Australian RV Investigator documented the occurrence, properties, and predominance of clouds in the region of the Antarctic Circumpolar Current south of Hobart, Tasmania. The data show that shallow mixed phase cumulus and apparently associated supercooled extended stratiform clouds dominate the cloud occurrence frequency. We examine this unique data record using simple algorithms to infer the properties of the supercooled liquid phase clouds. We find that these clouds tend to have low water paths, typical particle sizes but low number concentrations. The cloud properties over the Southern Ocean will be compared with similar clouds observed using surface based measurements collected over the remote Azores in the Southeast Atlantic.