



Estimation of Droplet Size and Liquid Water Content Using Radar and Lidar: Marine Cumulus Clouds

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During the Cloud Systems Evolution in the Trades (CSET) field campaign airborne measurements from the High-Performance Instrumented Airborne Platform for Environmental Research (HIAPER) Cloud Radar (HCR) and the High Spectral Resolution Lidar (HSRL) were made in the North Pacific. In addition, in situ observations of cloud and aerosols size distributions and radiation were also collected. The HCR operated at a frequency of 94 GHz (3 mm wavelength) and collected observations at high temporal (0.5 sec) and range (30 m) resolution. The capability of HCR is enhanced by the coordination with the HSRL that made high temporal and range resolution observations of calibrated backscatter and extinction. The lidar, designed and built by the University of Wisconsin. The radar and lidar are designed to fly on the NCAR Gulfstream V HIAPER aircraft.

The remote and in situ measurements collected during CSET offer opportunities for evaluating the engineering performance of the instruments and developing cloud microphysical scientific products. The coincident HCR and HSRL measurements are analyzed for assess their utility to characterize cloud boundaries, estimate liquid water content (LWC) and mean particle size. Retrievals of LWC and mean particle sizes from remote radar and lidar measurements will be compared with those from the in situ instruments.