

## **1.5 RAINDROP SIZE DISTRIBUTION IN COASTAL RAINFALL SYSTEMS IN SOUTH EAST AUSTRALIA: EFFECT ON Z-R RELATIONSHIPS AND ATTENUATION**

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This study presents for the first time an analysis of raindrop size distributions (DSD) for a coastal environment in southeast Australia, an area prone to maritime and continental rainfall influences. DSD were collected using collocated laser optical disdrometers (2 OTT Parsivel and 3 Clima Thies) over three years (2014-2017) in Melbourne, Australia. Quality checks were performed based on particle velocities and a collocated pluviometer, and discrepancies between collocated instruments were analysed. Characteristics of the DSD for a range of rain rates, rainfall types (stratiform, convective) and rainfall origin (continental, maritime) were studied. Gamma distributions were fitted to the different rainfall types and DSD parameters ( $N_0$  and shape  $\mu$ , slope  $\Lambda$  and  $\mu$ , and  $N_W$  and  $D_m$ ) were derived. Reflectivity rainfall rate (Z-RR) relationships were estimated from regression of scatter plots both using T-matrix and moment approaches for deriving radar moments. Attenuation is modelled for a range of weather radar and Commercial Microwave Links (CML) frequencies. Finally, 3D reflectivity data collected by operational C- and S-Band radars were observed concomitantly and compared to the DSD-derived reflectivities.

This study fills an important gap of knowledge for this region and will help improve operational weather radar-derived quantitative precipitation estimates. A better characterization of rainfall-attenuation relationships will also provide a baseline for leveraging the development of rainfall rates retrievals at improved temporal and spatial resolutions using CML.

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