



Latitudinal variations of radar derived rain dropsize distributions in the Southern Hemisphere

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Australia's RV Investigator has routinely provided C-band dual polarization radar data on all its voyages since 2016 [1]. The data collected covers a wide range of latitudes and climate regimes from the tropics to the deep Southern Ocean and includes climatically important cloud and precipitation regimes. This paper applies the methodology of Bringi et al [2] to derive rain dropsize distributions across these precipitating systems

The data has gone extensive quality control in order to remove artefacts and the impact of sea clutter. To ensure high quality data, a minimum range of 15 km is used ensuring no residual sea clutter contamination and a maximum range of 50 km is selected to maintain high spatial resolution and minimize beam filling issues. This is particularly important in the Southern Ocean where many of the precipitating clouds are very shallow. This analysis will include latitudinal variations and analysis of shallow, and deep convection as well as stratiform rain.

Improved understanding of the precipitation and cloud characteristics over the Southern Ocean is essential to understand the uncertainties in climate simulations and climate sensitivity as well as understanding the global water budget. Preliminary work has shown large discrepancies between radar, satellite and reanalysis rainfall rates [3], so this is a major science issue.

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2. Bringi, V.N., C.R. Williams, M. Thurai and P.T. May, "Using Dual-Polarized Radar and Dual-Frequency Profiler for DSD Characterization : A Case Study from Darwin, Australia", J. Atmos. Oceanic Tech, **26**, 209, 2107-2122.

3. Montoya Duque, E., Y. Huang, P. T., May and S.T. Siems, "An evaluation of IMERG and ERA5 quantitative precipitation estimates over the Southern Ocean using shipborne observations", J. Appl. Meteor. Clim., **62**, 2023, 1479–149. DOI: [10.1175/JAMC-D-23-0039.1](https://doi.org/10.1175/JAMC-D-23-0039.1)