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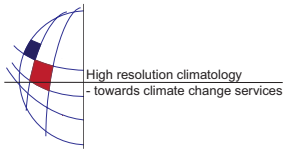

Statistical study of radar and aircraft turbulence strengths

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While radar has the possibility to measure the strengths of turbulence on a continuous basis, and over a good range of altitudes, radar methods are also still not fully proven, and are known to have biases towards regions of stronger Cn2. Therefore, a series of studies with instrumented aircraft have been undertaken to allow comparison with radar data. High-resolution aircraft turbulence measurements have been compared with Doppler radar measurements in Southwestern Ontario, Canada. From aircraft measurements, turbulence has been estimated using the structure function. The spectral width method has been used to determine turbulence from radar backscatter. Rather than try and compare the data on a point-by-point basis, which is notoriously difficult for turbulence, due to its inherent variability, we collect a large number of data sets and compare the two techniques in a statistical sense. It appears that measured energy dissipation rate by radar is overestimated compared to aircraft measurements. The turbulent energy dissipation rate measured with radar covers an order of magnitude between 10-4 and 10-3 m2s-3, while in-situ measurements can be considerably weaker. The main objective of this study is to compare the absolute values and variations of turbulence measurements by radar and aircraft.