1.37 PAIRED DISTROMETRIC MEASUREMENTS IN SOUTH BRAZIL: WIND EFFECTS AND SAMPLING UNCERTAINTIES

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Drop size distribution (DSD) is basic for the analysis of the microstructure of rainfall, which is of primary importance for the remote sensing of precipitation. As well, DSD plays an important role e.g. in precipitation physics, numerical weather and hydrological modeling, telecommunications, and agricultural and soil sciences. Reliable measurements of DSD are of primary importance for the understanding of the microstructure of rainfall at a more advanced level of analysis. Measurements of DSD are usually performed at ground level using distrometers; the OTT Parsivel instrument is one of the distrometers most widely used in validation and comparisons of weather radars. Inherent to the measurement of a physical process uncertainties affect the DSD measurements, and results from both the natural variability of rainfall and sampling fluctuations. At a more advanced level of analysis, these uncertainties must be considered quantitatively. This paper is directed to weather radar remote sensing, following the approach of Jaffrain and Berne (2011) to characterize and quantify the sampling uncertainty in rain due to the the limited sampling area of the Parsivel. OTT Parsivel distrometers were installed in the state of Paran, southern Brazil, in association with two long-range S-band radars (TXS: -25.5053, -50.3613, and CAS: -25.5053, -53.5293) covering regions of high socio-economical relevance with outstanding agro-industrial activities and energy production. These radars survey a region where more than 33% of the hydro-power energy in the country is generated. In a previous work, distrometer based R and Z were compared with those from gages and radars. In the present work, approximately 6 months of data from paired OTT Parsivel at CAS, disposed in the N-S and E-W directions and wind data from a collocated anemometer are used to: a) correlate corresponding measurements from both distrometers, b) correlate the differences between corresponding measurements from the distrometers with wind speed and direction, c) generate the DSDs, d) generate the time evolution of rainfall accumulation along the 6-month period, e) generate the time evolution of the difference between measurements f) compute the relative sampling uncertainty of rainfall measurements, for different classes of rainfall throughout the full range of values, as a function of time resolution. The negligible correlation coefficients obtained in b) (0.01 for speed; 0.03 for direction) indicates that, in general, wind effects are not significant. Notwithstanding, events with significant differences between the distrometers, in special one case of extreme rain rate with a large value of the difference and the presence of associated wind shift and gusts, were identified and will be investigated. First uncertainty results in f) show values in the 0.17 to 0.34 range. So far, results are compatible with the findings of Jafrain and Berne (2011), before mentioned. Their work was based in a data set comprising only light-to-moderate rainfall, in a region of temperate climate while the work in this paper uses data from a different climate

with typical occurrence of heavy rainfall. Continuing work includes computation of the sampling uncertainty for reflectivity and polarimetric variables.