THE CORRECTION OF FSSP-DERIVED CLOUD DROPLET SPECTRA USING SIMULTANEOUS AND INDEPENDENT OBSERVATIONS OF THE LIQUID WATER CONTENT

O. A. Krasnov and H. W. J. Russchenberg

International Research Centre for Telecommunications-transmission and Radar (IRCTR),
Faculty of Information Technology and Systems,
Delft University of Technology,
Mekelweg 4, 2628 CD Delft, The Netherlands.
o.krasnov@irctr.tudelft.nl

The analysis and validation of the remote sensing data of clouds and the development of adequate radiative transfer models requires detailed knowledge of the microphysical parameters of clouds. These parameters are obtained in situ with airborne instruments like an FSSP (laser single particle counter for the estimation of the drop size distribution) and different types of hot-wire instruments for measurement of the liquid water content. It is known that the FSSP usually underestimates liquid water content in comparison with the hot-wire probe (Johnson-Williams (J/W), for example). For the CLARE'98 campaign (around Chilbolton, UK, October 1998) we found a clear dependence of the ratio between the measured J/W liquid water content and the one derived from the FSSP data as function of the mean (and/or effective) FSSP radius. This can be approximated with a power function, where the exponential parameter was estimated around -1. Using this dependence we analyzed some algorithms of FSSP spectrum correction (size-dependent correction of *sample volume* or size-dependent correction of FSSP *bin sizes*) and show that for the CLARE'98 data the correction of FSSP sample volumes gives unreasonable results for droplet concentrations in stratocumulus clouds. An alternative method for size-dependent correction of the FSSP bin sizes had more better and physically feasible results. All used methods for the FSSP spectrum correction are validated using simultaneous radar and lidar remote sensing data.