

Raindrop size distribution: still a challenge!

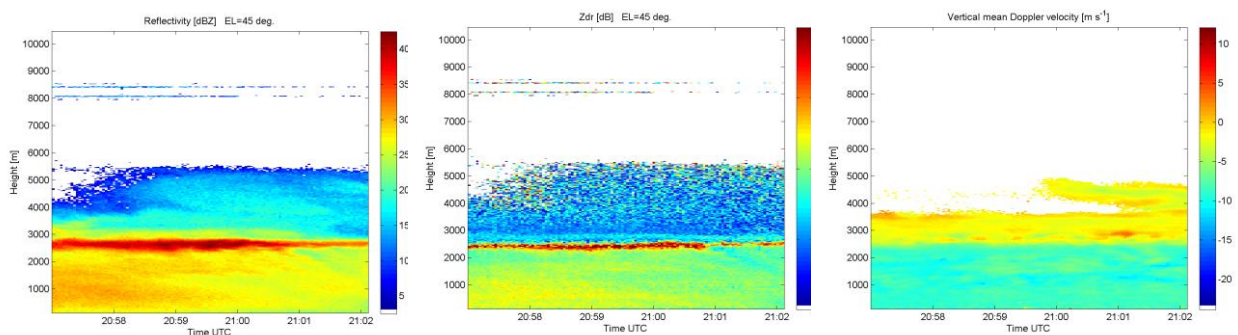
One of the most successful sensors to measure precipitation is the radar. Its main advantage is its ability to measure at different ranges through precipitation without encountering severe attenuation problems. The weather/atmospheric radar measures the reflectivity, polarimetric and Doppler parameters. However the weather/atmospheric radar must also deliver the rainfall rate for weather and climate monitoring. How much does it rain? Does the rain type and intensity change with the climate?

To answer these questions, the rainfall rate should be accurately estimated. However it is not straightforward to relate the weather/atmospheric radar measurements to the rainfall rate. Different techniques exist in the literature and some of them have been developed at the Delft University of Technology. Among their assumptions, the raindrop size distribution is a key one. If the raindrop size distribution can be retrieved, the rainfall rate can be directly estimated.

The research work planned in the master project is to assess different techniques which retrieve the raindrop size distribution (from simple to sophisticated). Some variants of these techniques can be proposed by the student. A serious analysis of these methods can be carried out for a full measurement campaign, using the radars TARA and IDRA, and in-situ raindrop size distribution data. In-situ data are provided by a disdrometer (optical sensor) in the vicinity of the TARA radar. The considered campaign, ACCEPT, took place in October-November 2014 at Cabauw.

Understanding the techniques, coding some of the techniques, applying them on the radar measurements, comparing their results, comparing their outcome with the disdrometer data and write a relevant report of this important investigation are the main tasks of this master topic. However the student may propose his/her own technique.

The programming language for this master assignment is Matlab.



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