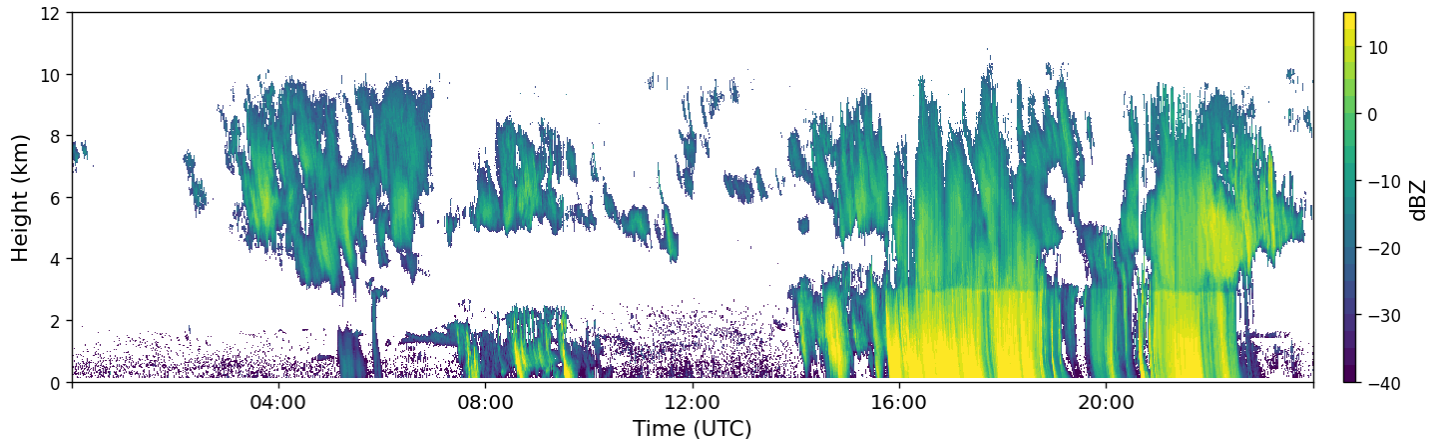
MSc Thesis in Remote Sensing of the Atmosphere

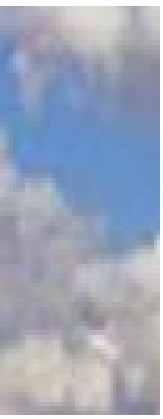
Raindrop Size Distribution: the next frontier

The knowledge of the raindrop size distribution is key for characterizing rain. However, it is still a challenge to retrieve it with radars. Several techniques have been proposed for cm-wavelength radars (weather radars). What about the mm-wavelength radars (cloud radars), which have a better spatial and time resolution and can still measure light and moderate rain? Knowing that 90% of the rain volume in Europe comes from rainfall rates between 0.1 mm/h and 10 mm/h, this is worthwhile to explore.

Most of the cloud radars in Europe profiles vertically clouds and precipitation. Within the Ruisdael Observatory project, in 2020, TU-Delft acquired 3 new scanning polarimetric cloud radars of which one is dual-frequency. This provides new perspectives to create new measurements, retrieve the raindrop size distribution and analyze the microphysics of rain in the context of a warming climate.

For this purpose, a large amount of data (reflectivity, Doppler, polarimetric, dual-frequency) are available. Assessment of the master thesis results can be done comparing the results obtained at two frequency bands and/or using disdrometers next to the cloud radars. Further, each cloud radar is equipped with a weather station, which supplies the rainfall rate.





For the interested student, this topic provides a great experience in data analysis, research and methodology development, which can be applicable to other instruments and media. The societal impact, creating measurements and retrievals of physical quantities for monitoring the possible changes of precipitation types in the context of a warming climate, is large.

Contact information

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