

Influence of the liquid layer within mixed-phase clouds on radar observations.

Lukas Pfitzenmaier

Delft University of Technology, The Netherlands

Dufournet, Yann (Geoscience and remote sensing, TU Delft, the Netherlands)

Unal, Christine (Geoscience and remote sensing, TU Delft, the Netherlands)

Russchenberg, Herman (Geoscience and remote sensing, TU Delft, the Netherlands)

E-mail: l.pfitzenmaier@tudelft.nl

Mixed phase clouds are clouds containing ice particles and super-cooled liquid cloud droplets at the same time. One of the main challenges is to understand how ice particles grow by up-taking water from the liquid phase within mixed-phase clouds. In the middle latitudes this processes are one of the most efficient processes for precipitation formation. A first step is to be able to quantify the influence of liquid water on the ice phase within such clouds.

The method presented here is based on a multi-sensor technique. The Transportable Atmospheric RADar (TARA) from the Delft Technical University, a S-band precipitation radar profiler, is used to measure the ice phase. Information about the liquid phase are retrieved from collocated lidar measurements. This work shows how such a combination of instruments is used to:

- Detect the liquid layer within the ice clouds
- To study if the influence of the liquid phase can be observed on the radar bulk parameters (and therefore on the ice crystal properties).

TARA participated to the international measurement campaign HyMex (Hydrological cycle in Mediterranean Experiment), in South France, one of the aims being a better observation of such mixed-phase clouds using a multi-sensor strategy. Radar and lidar were present on the same site and measured simultaneously.

The data-set is analysed to study the change in the vertical profiles of radar bulk parameters due to the presence of liquid water for several case studies. This work aims at quantifying, understanding and explaining the influence of the liquid layer on the ice crystals. Furthermore it helps to improve the radar data processing for further studies and interpretation of the ice particle growth processes within mixed-phase clouds.