1.13 INVESTIGATION OF ICE MICROPHYSICS USING SIMULTANEOUS MEASUREMENTS AT C- AND KA-BAND

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The synergy of radars with different wavelength provides additional information on the physics of clouds and precipitation. While C-band weather radars are not sensitive enough to detect small ice and water particles, almost no attenuation is observed for weak to medium precipitation. On the other hand, Ka-band cloud radars are sensitive to detect small ice and water particles. However, attenuation limits the ability to perform measurements in rain.

Synchronous RHI scans are being performed with DLRs dual-polarization C-band radar POLDIRAD and a Mira-36 Ka-band cloud radar operated at the University of Munich. The two radars are separated by a distance of about 23 km and have an overlapping measurement range of about 30 km. Both reflectivity measurements agree quite well in the reflectivity range between -10 to 10 dBz. For lower reflectivity values the measurements with the C-band radar are limited to short ranges. At reflectivity values above 15 dBz attenuation effects at Ka-band are visible. Interestingly in ice clouds the overlapping region of both radars is quite large and the C-band radar has a high detection efficiency in ice clouds. This gives evidence on the presence of larger ice particles were the backscatter is sufficient high enough due to the D^6 dependence.

The high sensitivity on ice particles in the combination of both frequencies allows for the investigation of the initiation of precipitation through the ice phase - the cold rain process. The dual-wavelength measurements will provide an enhanced hydrometeor classification and enable for the retrieval of ice microphysics parameters like effective radius and ice water content IWC. Other processes observable will be drizzle formation, cloud glaciation, distinction between depositional growth of small ice particles and onset of quicker ice particle growth into precipitation sized particles by aggregation, and initiation of first precipitation at the surface.