Investigation of Arctic mixed-phase clouds as seen with remote sensing equipment from polar research aircraft

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The contribution of Arctic mixed-phase clouds to the Arctic Amplification is still not clear as there are major deficits in their representation in regional and climate models. The Transregional Collaborative Research Center (TR 172) "Arctic Amplification: Climate Relevant Atmospheric and Surface Processes, and Feedback Mechanisms (AC)³" tries to increase the understanding of these clouds in the climate system. A major contribution to the aims of (AC)³ will be made by the field campaign "Arctic Cloud Observations Using airborne measurements during polar Day" (ACLOUD) conducted in summer 2017, where the Polar research aircraft Polar 5 & 6 from the Alfred-Wegener-Institute equiped with remote sensing and in-situ instrumentation are operated from Longyearbyen, Svalbard. The general goal of ACLOUD is to obtain a comprehensive data set of a diversity of atmospheric parameters that will be used to understand and quantify specific physical processes in, above, and below Arctic mixed-phase clouds and thereby to asses their contribution to the amplified warming observed in the Arctic.

Within this presentation we will introduce the ACLOUD campaign, the instrumentation employed on the aircraft, and a first analyses of the measurements taken by the remote sensing instrumentation on Polar 5. ACLOUD included satellite underflights, i.e. the A-Train and polar orbiters carrying microwave radiometers (AMSU-B/MHS) and infrared spectrometers (IASI) as well as overfilghts of vertical profiling sites from the research vessel Polarstern and Ny-Ålesund, Spitsbergen. The synergy of the instrumentation in the microwave, infrared, and visible spectral region, together with the dropsondes, and the in-situ observations on the Polar 6 aircraft supplemented by satellite data will be used to gain more insights into Arctic mixed-phase clouds ant the feedback processes related to these clouds and further to evaluate their representation in regional climate models.