Improving active sensor capability with melting layer simulations within the RTTOV-SCATT radiative transfer model

Rohit Mangla[1], Philippe Chambon[1,], Mary Borderies[1] and Alan Geer[2]

[1]CNRM, Université de Toulouse, Météo-France & CNRS, Toulouse, France
[2]ECMWF, Reading, United Kingdom

Abstract

The bright band is characterized by a sudden enhancement of radar reflectivities in the melting layer. The modeling of melting layer effects onto the simulation of spaceborne radar instruments is difficult to achieve because it involves mixing the radiative effects of both liquid and solid water to properly simulate the backscatter from melting hydrometeors. In order to accurately estimate rainfall from space-borne radars, knowledge of attenuation by the melting layer will be essential and is regarded as a source of uncertainty in the forward simulations. The EUMETSAT NWP SAF recently released a first version of the active sensor module within Version 13 of the RTTOV software, with the goal of simulating both active and passive microwave instruments within a single framework using the same radiative transfer assumptions into a widely-used tool in the NWP community. This initial version supports the simulation of both the GPM/Dual frequency Precipitation Radar and the Cloudsat/Cloud Precipitation Radar. In this presentation, simulations will be shown for GPM/DPR, with RTTOV V13 and the ARPEGE global NWP model running operationally at Météo-France. The simulations will be performed with and without the melting layer, using the Bauer (2001) parametrization. A statistical comparison between observations and simulations for a one-month period will be detailed to assess the realism of this parametrization.