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Characterization of the microphysics of ice using CHUVA X-band radar and TMI and MADRAS brightness temperatures

CHUVA campaign is aimed at deploying a series of instruments in various locations over Brazil in order to better characterize the various rain regimes. Among those instruments, the X-Band dual polarization Doppler radar has a polarimetric capability, allowing us to get information about the "local" microphysics of the precipitation. Indeed using the combination of the various polarimetric variables measured by the radar, it is possible to access to a certain extent the type of particles that were observed within a given radar bin. Simultaneously, the radar classically gives the surface rain associated with those particles and the various regions of the rain system.

Megha-Tropiques is a Franco-Indian satellite to study the water and energy cycle in the Tropics. The satellite is part of GPM and provides an exceptional sampling of the 23° S-23° N region because of the low inclination of the orbit (20°) combined with the large swath (1700 km) of its main instrument MADRAS. The latter is a 9-channel passive microwave radiometer dedicated mainly to precipitation retrieval. Bauer et al (2005) showed that the most critical source of uncertainties in the precipitation retrieval over land comes from the ice microphysics characteristics. In the framework of the Megha-Tropiques mission we tried to improve the parameterization of precipitating ice in the radiative transfer model used to performed the retrieval of rain from the measured brightness temperatures.

The aim of this study is not to get more into the details of particles classification but rather to test if the radar PID can be somewhat correlated to the 85 GHz brightness temperature in order to explain the effect of particles density and the ice content on the scattering. The knowledge of the properties of the ice precipitations is a very important information in order to retrieve accurately the rain from a vector of microwave brightness temperatures (Tb), particularly over land where the surface emissivity masks most of the rain/precipitation contribution for all frequencies below ~40 GHz.

The next step will be to build a database of cases in various situations: oceanic, continental, coastal using CHUVA data set over Brazil.