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Use of S-PolKa Particles IDentification and TMI and MADRAS brightness temperatures to characterize the ice microphysics in rain systems as a function of their life cycle.

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In the framework of the French-Indian Megha-Tropiques Mission, a specific campaign was dedicated to ice microphysics studies during the CYNDIE-DYNAMO experiment. This contribution consisted in deploying the French Falcon 20 from mid-November to mid-December in Gan and perform about 40 hours of microphysics flights.
The Falcon was equipped with a up- and downward looking W-Band Doppler Radar (RASTA) and a series of microphysics probes in order to characterize the ice particles in terms of density. This information is of dramatic importance to the microwave-based rain retrieval algorithms and more specifically the operational algorithm used in Megha-Tropiques known as BRAIN (Viltard et al 2006, Viltard et al 2012).
This algorithm uses a retrieval database to reduce the number of possible solutions to those actually physical. This requires the computation of microwave brightness temperatures through a radiative transfer model in which the ice microphysics properties are parameterized. This parametrization is key for all brightness temperature simulation above roughly 30 GHz and strongly affects the quality of the rain retrieval.
For the limited number of cases when the Falcon flew, we have a rather detailed description of the ice microphysics properties but this happens to be insufficient to build a robust statistics of the ice as a function of rain system life cycle. Hence the use of particles identification (PID) obtained from the ground-based polarimetric data from NCAR SPol-Ka. This dataset covers almost 5 month within a 200 km radius centered on Gan.
We will briefly present our contribution in the CYNDIE-DYNAMO campaign and interpret in terms of microphysical properties the comparisons between these PIDs and the brightness temperatures measured by two passive microwave radiometers: TMI on TRMM and MADRAS on Megha-Tropiques.