

P32

### **Rain retrieval using the SAPHIR water vapor sounder on Megha-Tropiques**

Audrey Martini, Nicolas Viltard and Ramsès Sivira

*LATMOS-IPSL, CNRS-UVSQ-UPMC*

Megha-Tropiques is an Indo-French satellite launched in 2011 to study the water and energy cycle in the tropical belt. The satellite carries on board three passive instruments: MADRAS, an microwave imager, SAPHIR a microwave water vapor sounder, and ScaraB a broadband VIRS to compute TOA radiative budget. Unfortunately, MADRAS worked nominally only for about 14 month before failing. This was a dramatic loss for the rain retrieval objectives of the Megha-Tropiques mission. As an alternative solution an algorithm was developed to retrieve rain from SAPHIR using a combination of the 183 GHz channels. The latter are nominally designed to retrieve water vapor profiles but are also sensitive to scattering by ice. Bennartz and Bauer (2005) showed some preliminary results on the scattering regimes of such sounding instruments. We pushed further on and showed that the sounding properties remain true even in the scattering regime. By co-locating SAPHIR and three space-borne radars: CPR on CloudSat, PR on TRMM and DPR on GPM, we were able to test extensively the information content of the microwave brightness temperatures in scattering regime using the RTTOV-scatt radiative transfer model. This allows us to gather information on the vertical structure of the precipitating ice on the upper part of the cloud. The vertical structure of ice is in turn related to the properties of the convection: deep or shallow and intense or weak. Using these last properties, a rain retrieval algorithm was designed. The presentation will detail how the algorithm works, evaluate its performances and compare the results with the retrieval from MADRAS over the fourteen-month when the two instruments were functioning together.