



SAPHIR aboard Megha-Tropiques satellite to study free tropospheric humidity and deep convective clouds

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Megha-Tropiques (MT) satellite was launched with the aim to study convective systems, water cycle and energy budget and to improve the understanding on tropical weather events and the climate. SAPHIR is a millimeter wave payload aboard MT with six channels on the water vapor absorption band centered around 183.31 GHz. In contrast to earlier microwave humidity sounders SAPHIR has three additional channels and has improved vertical and horizontal resolutions. The low inclination orbit of MT ensures unprecedented coverage over global tropical region with revisits at different local times, which help to capture the weather related atmospheric variability.

The brightness temperature (TB) measurements of four channels (183.31 ± 0.2 GHz, 183.31 ± 1.1 GHz, 183.31 ± 2.8 GHz and 183.31 ± 4.2 GHz) of SAPHIR have been used to derive Jacobian weighted mean free/upper tropospheric humidity for four layers. Unlike its predecessors such as SSM/T2 or AMSU-B, SAPHIR sounder is able to give humidity information above up to ~ 200 hPa using its 183.31 ± 0.2 GHz channel.

Using the TB measurements at different channels of SAPHIR, a methodology has been developed to study deep convective clouds with different vertical extents and examined the seasonality over the global tropical region. The methodology has been validated by comparing SAPHIR derived cloud information with the concurrent and collocated CloudSat radar and Kalpana-1/VHRR measurements of deep convective and overshooting cloud systems.

1. N. Mathew, V. O. John, C. S. Raju, and K. K. Moorthy, "Upper tropospheric humidity from SAPHIR on-board Megha-Tropiques," *Current Science*, vol. 108, no. 10, pp. 1915–1921, May 2015.

2. N. Mathew and Suresh Raju C., "Distribution of Tropical Deep Convective Clouds from MeghaTropiques SAPHIR Data", *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 54, No. 11, November 2016.