Comment on “Assessment of ROSA onboard Megha Tropiques”
version 2.0 doc. no. 002/NARL/MT-ROSA/October 2015

By

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1. Yes, two directive Velocity and Anti-Velocity antennas are mounted on the MEGHATROPIQUES (MT) spacecraft. These antennas are oriented in such a way to be able to track signal from GPS satellites in Earth occultation (rising and setting); whereas ROSA onboard OCEANSAT-2 provides only rising occultations. Rising occultations do not suffice to provide climate data below 10 KM altitude. This is a major drawback with the products of ROSA onboard OCEANSAT-2. Figure 1 depicts nicely the number of occultations.

2. ROSA onboard MT provides about 390 occultations per day (see ISSDC monthly reports). As per the Figure 2, the number of profiles got reduced compared to original data sets due to rigorous quality checks. This is due to the GPS observables recorded as a function of time for L2 frequency (1227.60 MHz leading to erratic carrier phases at low altitudes). Flags are generated based on the quality of these observables in the DP software and that is how many setting profiles are facing rejections for generating Products.

3. In the article entitled “ROSA OVERVIEW” appeared in Signatures, Newsletter of the ISRS–AC, Vol. 24, No.3, July-Dec. 2012 by Subbarao et al, it was reported as follows:

   By taking the comparison between the ROSA refractivity profile with that of COSMIC co-located & co-temporal profile, for an event and also computing the mean refractivity difference and standard deviation of refractivity difference for January 2012 season data, it is seen that maximum variation in mean refractivity difference value is about 2 units, while standard deviation is of 2 units till 10 km and thereafter it goes up to 11 units at 5 km.

Later on, DP software included a module of radio-holographic methods. So version 1.5 is able to provide better Products.
4. Livio Marradi, Manager, Navigation Product Line, Thales Alenia Space Italia – Italy (vendor of ROSA!) mentioned via email that C. J. Johny and V. S. Prasad of National Centre for Medium Range Weather Forecasting, Noida, India, declared that ROSA MT data are poor and not usable for assimilation into the model, in their paper entitled “Impact of assimilation of Megha-Tropiques ROSA radio occultation refractivity by observing system simulation experiment; CURRENT SCIENCE, VOL. 106, 2014”.

5. Sometime ago, a PhD student at Tirupathi, AP, India was pursuing Full spectrum inversion (FSI) topic for research, I heard. If FSI is incorporated (to my knowledge, it is yet to be included) in DP software at Space Applications Centre (SAC) of ISRO, then the next version would give better Products even at low altitudes, I personally feel; This is because, in the implementation of the Full spectrum inversion (FSI), the excess phase path related to the neutral atmosphere is determined through ionospheric calibration using the L1 and L2 excess phase paths. Frequency variations caused by radial variations in the radius vectors of the GPS and the LEO satellite are accounted for. While the bending angle as a function of the impact parameter follows from the derivative of the FSI phase, the valid impact parameter range is determined from the FSI amplitude.

6. References


