

CANCELLED RADIO OCCULTATION WITH ROSA ON-BOARD OCEANSAT-2: MISSION OVERVIEW AND FIRST RESULTS

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On 23th September 2009 the Indian Remote Sensing OCEANSAT-2 satellite was launched. Together with the Ocean Colour Monitor (OCM) and a Ku-band Pencil Beam Scatterometer, OCEANSAT-2 carries on-board a third payload, the Italian Space Agency ROSA receiver (Radio Occultation Sounder for Atmospheric studies) developed by Thales Alenia Space. This instrument will give accurate information about the vertical structure of the atmosphere through the exploitation of the GPS Radio Occultation technique. The Radio Occultation data processing for the ROSA receiver (which is called ROSA-ROSSA - ROSA-Research and Operational Satellite and Software Activities) has been supported by Italian Space Agency and has been developed by a pool of Italian Universities and Research Centers. In May 2010 the first ROSA-ROSSA release was installed into the Italian operative ROSA Ground Segment (the same processing chain will be also installed into the Indian ground segment). ROSA-ROSSA scientific validation was performed using observations collected by other Radio Occultation mission (ROSA commissioned data were not yet available) and it was carried out following two procedures. The input dataset was defined considering one day of real observations carried out in the framework of the operative COSMIC, CHAMP and GRAS on-board METOP-1 Radio Occultation missions. Firstly, ROSA-ROSSA products at each level were statistically compared with the corresponding products generated by the other processing software, giving in input the raw data observed by the other occultation mission. On the other hand, ROSA-ROSSA and COSMIC original refractivity and temperature profiles (obtained giving in input to ROSA-ROSSA the corresponding COSMIC raw observations) were individually compared on a statistical base with co-located ECMWF 91 level analysis. Despite some limitations (the validation scheme applied considering as true RO products derived by other software will surely identify some misalignment due to different algorithms implementation; different and not completely known preprocessing details applied by the other Radio Occultation packages to their own input data, etc.), results were good and promising. The first ROSA-ROSSA release is actually characterized by inversion algorithms which are based on Geometric Optics approximation. This was the main weakness of ROSA-ROSSA processing software, since it causes some misalignments with respect to products obtained by other RO processing software implementing Radio Holographic algorithms in the characterization of tropical tropospheres. A second ROSA-ROSSA release, that is able to overcome such limits, has been actually developed and results will be presented

in the framework of the OPAC-2010 workshop. Moreover, and most important, at the end of July the ROSA commissioning phase is expected to end. Several problems affected ROSA in flight data from the first hours of observation: raw data format not compliances identified after the de-format procedure from OCEANSAT-2 telemetry, OCEANSAT-2 on-board mass storage limits, a -20° yaw bias introduced on the OCEANSAT-2 platform because of pointing error of scatterometer antenna, corresponding unexpected behavior of local multipath induced in the ROSA occultation antenna (which drastically impacts the performance of ROSA receiver). Several of these problems were solved by Indian Space Research Organization during the OCEANSAT-2 commissioning phase. Other solutions were (and are actually) undertaken thanks to several tele-commands sent (and that will be sent) to the ROSA receiver, which was conceived to be completely controlled by ground procedures. Starting from the end of ROSA commissioning phase, first ROSA-ROSSA processing stages will be tuned to operatively process ROSA data, and results will be hopefully presented in the framework of OPAC-2010. The authors are grateful to ASI for supporting the development of the ROSA Ground Segment.