

ROSA INSTRUMENT COMMISSIONING ASPECTS AND RESULTS ON-BOARD OCEANSAT-2

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ROSA is a dual-frequency GPS receiver developed for space applications and tailored for GPS radio occultation studies. It is developed and manufactured by Thales Alenia Space Italia under a contract with the Italian Space Agency (ASI) and is designed to establish accurate global profiles of temperature and water vapour in the lower atmosphere. Moreover, ROSA antenna extended coverage allows the retrieval of total electron count (TEC) profiles in the ionosphere for space weather applications.

ROSA first flight mission is on-board the Indian Space Research Organization (ISRO) Oceansat-2 satellite, launched on Sep 23, 2009 from SHAR, Sriharikota by Indian PSLV launcher. Oceansat-2 is a mission developed by ISRO for applications dedicated to ocean studies and meteorology. OCS-2 carries three payload instruments: Ocean Colour Monitor (OCM), Ku-band Scatterometer (SCAT) from ISRO and the Radio Occultation Sounder for Atmospheric studies (ROSA) from Italian Space Agency (ASI). The accommodation of the ROSA instrument on board the Oceansat-2 spacecraft has been driven by the satellite configuration that allowed the possibility to install only one Radio Occultation antenna in the direction of the spacecraft velocity. In fact the anti-velocity side is used to interface the satellite with the launcher. This means that only rising occultation events can be detected by the ROSA instrument in this mission.

Regarding ROSA, the goal of the OCEANSAT-2 mission is to validate the instrument concept and performance and possibly improve it during the commissioning phase through tailoring of parameters specifically devoted to occultation functioning. The ROSA commissioning step is particularly important because the instrument validation has been done in laboratory environment and no on-field validation (mountain or airborne tests) was carried out prior to flight.

The aim of this paper is to provide an overview of the ROSA Instrument Commissioning status, results and lessons learnt, both on instrument itself and on satellite accommodation issues. In particular, the commissioning strategy followed will be overviewed, the evaluation of the instrument flight results and the activities carried out in the commissioning phase will be covered. The focus will be on instrumental aspects like the analysis of GPS raw data, quantity and quality of signal acquisitions in occultation channels, raw data quality check. Interaction of the instrument with the satellite environment (accommodation constraints and impact on instrument performance) will be covered. Last, but not least, an evaluation of the on-board atmospheric model will be provided by comparing the predicted Doppler excess with true signal Doppler when the combined presence of open-loop and closed loop tracking makes it possible.