

ROSA - THE ITALIAN RADIO OCCULTATION MISSION ON-BOARD THE INDIAN OCEANSAT-2 SATELLITE

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At the beginning of 2008 the Indian satellite OCEANSAT-2 will be launched. This satellite will carry on-board two payloads for ocean studies and the Italian Radio Occultation GPS receiver (ROSA) devoted to atmospheric studies. In the framework of this mission, the ROSA instrument will only be able to observe rising occultations collecting data both in Open-Loop and in Close-Loop modes. These data will be downloaded both to the Indian and the Italian receiving stations where they will be processed by the ROSA ground segment, completely developed by Italian universities and research centres. In particular, this ground segment will be implemented at a first level in an integrated computing infrastructure installed in Matera and mirrored at Hyderabad in India and, at a second level, on a distributed software and hardware infrastructure. This second infrastructure will perform the rapid and precise Orbit Determination and Prediction, the unambiguous bending and impact parameters profiles extraction, the ionospheric correction and the stratospheric initialization, the refractivity, pressure, temperature and humidity profile retrieval, the value added services for meteorology, climate and space weather applications. This will identify a prototype of distributed and Multimission Ground Processing Centre distributed through the various research centres and universities involved, connected through a Web-based GRID computing infrastructure. After a description of these two different implementations of the ROSA Ground Segment, this contribution will focus on the scientific activities carried on by the Italian institution involved in the project: - Physics Dept. of Università di ROMA: development of climatological indexes. These activity is based on the utilization of RO data for climatic study. The main work will be focused on tropopause temperature and height determination, large scale water vapour analysis, geopotential field retrieving for dynamic indexes, evaluation and comparison of RO data with LIDAR profiles in stratosphere. - Physics Dept. of CAMERINO: assimilation of Radio occultation data into Numerical Weather Prediction models both for real time prediction and for climatological studies. This section includes: sensitivity study on different vertical and horizontal resolution; evaluation of possible modification of forecasts by Numerical Weather Prediction Models; comparison between different vertical coordinates for assimilating RO data; study of observed and modelled gravity waves. - CNR - Istituto dei Sistemi Complessi di FIRENZE: use of Radio Occultation data for ionospheric studies and space weather applications. Three aspects will be focused. The first one deals with the identification of new techniques which allow ionospheric compensation in the propagation delay of a single frequency signal. The second consists of monitoring the plasmaspheric total electron content as a space weather tool. The third deals with a statistical study of ionospheric scintillations introduced in the LEO-GPS links, in order to detect and model the influences of

some solar/geophysical parameter on radio communications and space weather monitoring. - Electronics Dept. of Politecnico di TORINO: The identification of reflection induced patterns on the received signal for both altimetric applications (measure of the sea level and the various oceanographic features associated to it) and scatterometric applications (measure of the near surface wind field). Moreover, an intercomparison activity of Radio Occultation products derived by different GPS payloads placed on-board various operative satellite missions (the German CHAMP satellite, the NASA-Taiwan COSMIC constellation and the ESA-EUMETSAT Gras instrument placed on-board MetOP satellite) is also planned. - ASI Space Geodesy Center di MATERA: Radio Occultation data exploitation for space geodesy. In this contest many activities have been identified: the estimation of new mapping functions for ground-based GPS meteorology, the development of new radio occultation inversion algorithms, the Ionospheric tomography, the evaluation of atmospheric pressure fields.