

GRAS ON METOP: INSTRUMENT CHARACTERISTICS AND PERFORMANCE EVALUATION

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The GRAS (GNSS Receiver for Atmospheric Sounding) on board the MetOp-A satellite is producing high accuracy measurements since end of 2006. In order to analyse and further improve the capabilities to handle difficult measurement conditions, ESA launched a study where EUMETSAT, DMI (Danish Metrological Institute), DLR (Deutsches Zentrum für Luft- und Raumfahrt), Wegener Center at University of Graz, and DFZ (Deutsches Geoforschungszentrum), cooperate in a team led by RUAG Space. Its wide antenna coverage enables GRAS to measure 650 radio occultations per day. The accurate on-board time reference allows measurements to be processed without differencing, and this fact together with high antenna gain and low system noise gives very accurate measurements even above 30 km. A performance model is used to predict bending angle errors at high altitudes and relate performance to instrument performance such as noise and clock errors. The major error sources are identified and the potential for improvements is investigated. The dual frequency GRAS receiver is at low altitudes and under dynamic conditions also using open loop tracking. The low instrument noise in combination with 1 kHz open loop sampling rate provides an unprecedented opportunity to investigate the RF environment including strong pulsed radars, co-channel interference and surface reflection. The instrument tracking behaviour in the presence of RF interference or high atmospheric dynamics has been investigated. Potential changes to improve the performance of the GRAS instrument by tuning software parameters are discussed as well as more advanced tracking methods that will be considered for the next generation of occultation receivers.