

OPAC 2022 RADIO OCCULTATION PROCESSING AT THE WEGENER CENTER: VALIDATION AND UNCERTAINTY EVALUATION OF ROPS LONG-TERM DATA RECORDS

M. Schwärz(1,2), V. Proschek(1), J. Innerkofler(1), A. Leuprecht(1), E. Wappis(1), and
G. Kirchengast(1,2)

(1) Wegener Center for Climate and Global Change (WEGC), University of Graz, Graz, Austria

(2) Institute for Geophysics, Astrophysics, and Meteorology/Institute of Physics, University of Graz, Graz, Austria

Wegener Center's new reference occultation processing system (rOPS) aims to process raw global navigation satellite system (GNSS) radio occultation (RO) measurements along the complete RO retrieval chain into profiles of essential climate variables (ECVs). We base this solution on the SI-traceability of GNSS RO data, which are available from a range of RO mission since 2001 and scheduled long-term into the future.

rOPS is the core processing system of the Wegener Center Occultation and Climate Analysis System, supported in its development also by colleagues from EUMETSAT Darmstadt, UCAR Boulder, DMI Copenhagen, ECMWF Reading, AIUB Berne, NSSC/CAS Beijing, and others. It aims to rigorously implement traceability, and the related quantification of accuracy and precision, by processing along the full Level 1 and Level 2 chain from the SI-tied raw data to the ECVs (temperature, pressure, and tropospheric water vapor profiles) as well as integrating a complete uncertainty propagation, for both, estimated random and systematic uncertainties.

In this presentation we start with a brief introduction of the design of the rOPS. Subsequently, we show validation and verification results of rOPS long-term data records from different RO missions compared to other high-quality datasets (e.g., radiosondes, ERA-5, datasets from other RO-provider). The focus of this inter-comparison study lies in the evaluation of the consistency among the different datasets, using the capabilities of rOPS, in particular the integrated uncertainty propagation. This allows us to track the uncertainties throughout the processing chain and to inspect them for intermediate retrieved profiles as well as for the final ECV result profiles.