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Atmospheric Measurement Techniques

Preface

"Observing atmosphere and climate with occultation techniques – results from the OPAC 2010 Workshop"

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Since the early use of the occultation measurement principle for sounding planetary atmospheres and ionospheres, its exploitation in atmospheric remote sensing has seen tremendous advances. In this special issue we focus on radio occultation for observing the Earth's atmosphere and climate based on sensors aboard Low Earth Orbit (LEO) satellites, which exploit Global Navigation Satellite Systems (GNSS) radio signals. Next generation occultation concepts are presented as well.

The methods share the key properties of self-calibration, high accuracy and vertical resolution, global coverage, and (if using radio signals) all-weather capability. The atmospheric parameters obtained extend from the fundamental variables bending angle, refractivity, density, pressure, temperature, and water vapour via trace gases, aerosols and cloud liquid water to ionospheric electron density. Occultation data are therefore of high value in a wide range of fields including climate monitoring and research, atmospheric physics and chemistry, operational meteorology, and ionospheric physics.

OPAC 2010, the joint OPAC-4 & GRAS-SAF Climate & IROWG-1 Workshop, was held in September 2010 in Graz, Austria. It followed the objectives of previous workshops on "Occultations for Probing Atmosphere and Climate" (OPAC-3, OPAC-2, and OPAC-1) in providing a forum for scientific discourse, co-operation initiatives, and mutual learning and support amongst members of all the different sub-communities and users of occultation data. This time, the integrated GRAS SAF (GNSS Receiver for Atmospheric Sounding Satellite Application Facility) Climate workshop set a special focus on climate applications of occultation data. The 1st Workshop of the "International Radio Occultation Working Group" (IROWG) promoted the exchange of scientific and operational information between radio occultation data producers, the research community and the user community. The OPAC 2010 workshop was attended by about 80 participants from 19 different countries, who contributed to a scientific programme of high quality. The detailed programme and all further workshop information, including abstracts and most presentations will continue to be available on-line at the OPAC 2010 website: http://www.uni-graz.at/opac2010.

This AMT special issue contains 23 papers that cover a variety of different aspects of occultation science. The topics range from processing, error analysis, and validation of GNSS occultation data via their application in atmospheric physics, meteorology, numerical weather prediction, and climate research to new mission concepts and data products, which employ LEO-LEO crosslinks and reflected GNSS signals, respectively.

We would like to thank the AMT editorial team and all OPAC 2010 colleagues, who contributed to this special issue as authors and co-authors. We also very much thank the anonymous reviewers for their important service to coherently ensure scientific correctness and high quality of this special issue from the first to the last page.

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