Preface

New results from DORIS for science and society

Dettmering, D.; Schrama, E. J.O.

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Preface: New results from DORIS for science and society

DORIS (Doppler Orbit Determination and Radiopositioning Integrated by Satellite) is a radio tracking system mainly used for precise orbit determination of radar altimeter satellites. It is also one of the four geodetic observation techniques that contribute to the determination of the International Terrestrial Reference Frame ITRF. In addition to these main applications, there are a number of other use cases, including the derivation of atmospheric parameters such as water vapor content or electron density.

DORIS started to provide data more than three decades ago, but it is still improving and enabling new innovative applications, for instance through receiver clocks coupled with GNSS or by providing near real-time data. We present to readers the fourth special issue on DORIS (after 2006, 2010, and 2016) dedicated to new advances in terms of measurement techniques and applications. There are eight papers covering the DORIS ground network and equipment, precise orbit determination, DORIS contributions to references frames, in particular to ITRF2020, and the application to ionospheric modelling and validation.

Saunier (2003) reviews the status of the DORIS tracking network and shows the progress made over the last fifteen years in terms of geographical coverage, co-location with other techniques, data availability, station equipment, monument stability and system requirement compliance.

Štěpánek and Filler (2003) discuss the evaluation of the phase center of Alcatel beacon antennas. Their conclusion is that there are elevation dependent systematics in the residuals of 8.7 ± 2.5 mm for the Alcatel PCV model 1.0 and -7.2 ± 2.4 mm for model 2.0 and that these differences exceed those obtained with the STAREC antennas.

Zhou et al. (2003) show how DORIS RINEX data can be used for precise orbit determination during orbit maneuvers. Based on their approach the root mean square of the radial orbit differences for HY2C/D reaches about 1.7 cm, compared to about 1.6 cm in maneuver-free periods.

Schreiner et al. (2003) generate precise orbits for Sentinel-3 and Sentinel-6 based on DORIS data and evaluate their performance. Based on these solutions, weekly local reference frames are computed for each of the three satellites as well as a combined solution. The standard deviations of the station coordinate residuals are in the range of 2–9 mm.

Moreaux et al. (2003) present the contribution of the International DORIS Service (IDS) to ITRF2020. The paper describes the combination process to generate the IDS solution based on the individual solutions of the four analysis centers and assesses its performance. The authors show that the new DORIS reference frame has an internal position consistency in North-East-Up better than 7.5 mm after 2008.

The GOP analysis center results and the contribution of DORIS to ITRF2020 are discussed in a paper by Štěpánek et al. (2003). They find significant improvements, in particular between mid-2002 and mid-2008 of about 1 mm in the station position residuals and more than 3 mm since mid-2008.

Herscovici-Schiller et al. (2003) discuss a simple ionospheric correction method for radar-based space surveillance systems, with performance evaluation on GRAVES data. They use a method based on GPS data, while their evaluation relies on GRAVES and DORIS data.

A validation of real-time GNSS ionospheric maps with near real-time DORIS data is presented by Liu et al. (2003) who conclude that the large frequency difference on the DORIS signal is helpful in analyzing the differential slant total electron content.

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D. Dettmering
Guest Editor
Deutsches Geodätisches Forschungsinstitut (DGFI-TUM), Technical University of Munich, Arcisstrasse 21, 80333 Munich, Germany
E-mail address: denise.dettmering@tum.de

E.J.O. Schrama
Guest Editor
Faculty of Aerospace Engineering, Delft University of Technology, Kluyverweg 1, 2629HS Delft, the Netherlands
E-mail addresses: e.j.o.schrama@tudelft.nl

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