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Invited Talk
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GNSS reflectometry (GNSS-R) is in focus of recent GNSS and remote sensing research to exploit its complete and versatile potential for Earth Observation. The application of GNSS-R from space is the precondition for monitoring of key geophysical parameters for several applications on a global scale. In our contribution we review two recent European activities to apply GNSS-R in combination with GNSS Radio Occultation (RO) from space to further advance both GNSS based remote sensing techniques.
GEROS-ISS is an innovative ISS experiment of the European Space Agency (ESA) primarily focused on exploiting reflected GNSS to measure key parameters of ocean surfaces. The primary mission objectives are: (1) to measure the altimetric sea surface height of the ocean using reflected GNSS signals and (2) to retrieve scalar ocean surface mean square slope (MSS), which is related to sea roughness, wind speed and direction. Secondary mission objectives are related to further explore the potential of GNSS radio occultation data for global atmospheric sounding and to assess the potential of GNSS scatterometry for land applications. Two competitive industrial phase A studies were completed in 2016, complemented by the international scientific study GARCA (GNSS-R – Assessment of Requirements and Consolidation of Retrieval Algorithms) to develop an End2End Simulator for the preparation of the GEROS-Mission and to perform Observing-System Simulation Experiments (OSSE) to assess the oceanographic significance of the expected GEROS-ISS measurements. In parallel to these studies dedicated flight campaigns were carried out to monitor the sea surface height of the Baltic Sea around Helsinki, Finland utilizing the interferometric GNSS-Reflectometry approach, which is planned to be implemented for GEROS. GEROS was originally foreseen to be launched in 2019. Following the Phase A industrial contracts and the parallel scientific study, ESA is now leading a mission reduction exercise aimed at bringing its cost significantly down while keeping the most essential scientific objectives. We review the activities related to the GEROS-ISS experiment and inform on the recent mission status.
The second initiative to exploit GNSS-R signals from space is G-TERN (GNSS – Transpolar Earth Reflectometry exploriNg system). It is a GNSS-R mission with focus to Polar climate research, which was recently proposed within the revised call for Earth Explorer 9 missions from ESA. G-TERN will measure key parameters of the sea ice, the oceans and the atmosphere with frequent and dense coverage over polar areas, becoming a 'dynamic mapper' of the ice conditions, ice production and loss in multiple time and space scales, and surrounding environment. Frequent mapping is very important for better observing and understanding multi-scale interaction processes. Global interactions and their impacts will also be explored through generating global datasets of ocean and atmospheric observations suitable for assimilation in numerical models. The key scientific products of G-TERN are sea-ice surface elevation and roughness in the polar regions, and ocean surface elevation and roughness on a global scale, which shall be provided with 10 cm and 10% accuracy, respectively. In polar areas the spatial resolution is of the order of 30 km with full polar coverage within 3 days; the mesoscale ocean features will be resolved globally, with spatial resolutions of 0.5 degree and full coverage within 10 days. We introduce and review the G-TERN mission idea.
OSTS session

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