



GNSS-Reflectometry for Earth Observation: History, Results and Prospects

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The usage of Earth reflected signals from Global Navigation Satellite Systems (GNSS) for remote sensing of water, ice/snow and land surfaces is a recent hot topic of geoscientific and GNSS research (GNSS-Reflectometry, GNSS-R) with numerous intense international scientific activities.

Standard geodetic receivers of global and regional ground networks are used to operationally derive information on soil moisture, vegetation, snow properties, and water levels near the GNSS antennas of existing or dedicated ground networks. Specific receivers on the Earth's surface and aboard flight platforms including satellites are applied to monitor, e.g., sea surface heights or wind speed/directions of water surfaces, key applications with respect to climate change characterization and natural hazard monitoring. Several GNSS-R satellite missions were recently launched, or are in preparation (e.g., TechDemoSat-1, CYGNSS, GEROS-ISS, G-TERN), which provide observations on a global scale.

The history of GNSS-Reflectometry for Earth Observation is briefly reviewed and selected results for various geoscientific applications are given to illustrate the versatility of the GNSS-R method. Ground as well as satellite based GNSS-R results are presented. One focus is the usage of the existing global network of the International GNSS Service (IGS). More than 500 ground stations are investigated on their potential use to provide GNSS-R based geophysical information in addition to the high precision station positions and velocities. Investigated parameters are soil moisture, snow height and altimetric heights of larger water surfaces in the vicinity of the stations. Future prospects of the GNSS-Reflectometry method are discussed with focus on current and potential future links to meteorological applications.