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Inter-comparison of GNSS-Reflectometry measurements from CYGNSS and Spire's satellites with SMAP soil moisture product

Vahid Freeman, Philip Jales, Stephan Esterhuizen, Vladimir Irisov, Jessica Cartwright, and Dallas Masters

Spire Global, Space Program, Luxembourg (vahid.freeman@spire.com)

The potential of space-borne GNSS-Reflectometry (GNSS-R) technique for soil moisture retrieval has been demonstrated in recent studies using observations from the NASA's Cyclone Global Navigation Satellite System (CYGNSS) and the UK's Technology Demonstration Satellite, TechDemoSat (TDS-1).

Spire Global operates a constellation of CubeSats performing GNSS based science and Earth observation. In December 2019, Spire launched two new satellites with GNSS-R payloads with plans to launch two more follow-on GNSS-R missions in January 2021. In this study, we highlight the capabilities of the Spire's current and future GNSS-R missions compared to CYGNSS for global soil moisture monitoring and present the results of an inter-comparison between CYGNSS and Spire GNSS-R observables over land with NASA's Soil Moisture Active Passive (SMAP) observations. The comparison of level-1 data and various statistical parameters was performed after data collocation both trackwise and also within a 6km regular grid. The results of the study were used for intercalibration of CYGNSS and Spire's GNSS-R measurements for developing a combined GNSS-R soil moisture product.