

Assessing the potential of VLBI transmitters on next generation GNSS satellites for geodetic products

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Abstract. There is an ongoing global effort to improve the Space geodetic techniques contributing to the Global terrestrial reference frames, which do not yet fulfill the Global Geodetic Observing System (GGOS) scientific requirements.

Next-generation Global Navigation Satellite Systems (NextGNSS) satellites are planned to be equipped with optical inter-satellite links and ultra-stable clocks. The motivation of the study is to assess the improvement in the reference frames and Earth orientation parameters (EOP) achieved by the NextGNSS. In addition, transmitters on NextGNSS satellites for Very Long Baseline Interferometry observations (VLBI) are envisaged that will result in co-location in Space in addition to co-location on the ground between the Space geodetic techniques.

The VLBI will observe the satellites along with the radio sources realizing the ICRF (International Celestial Reference Frame). This will empower the NextGNSS to directly determine the Earth's Rotation angle, which is otherwise impossible. Furthermore, it would allow for independent validation of satellite orbits. For this study, we will investigate multiple scenarios, such as having a NextGNSS satellite constellation with and without VLBI transmitters, and determine the improvement in the station positions and EOP.