The next generation of IGS ROTI Maps: an extension toward global coverage

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The International GNSS Service (IGS) has accepted for official release a new ionospheric product for specification of ionospheric irregularities occurrence and intensity over the Northern Hemisphere as derived from multi-site ground-based GPS observations. Initially, we focused on the Northern Hemisphere auroral and midlatitude regions because of the highest concentration of the GNSS users and user supporting permanent networks located within the American, European, and Asian sectors. The IGS ROTI maps product is routinely generated by multi-step processing of carrier phase delays in dual-frequency GPS signals and transferred to the IGS CDDIS database. Now, ROTI maps allow regular monitoring of ionospheric irregularities over the Northern Hemisphere and provide information about past events when strong ionospheric irregularities developed here.

Obviously, the plasma irregularities that occur at high, middle, and low latitudes have different physical mechanisms of their origin and development. For study of the climatological features of ionospheric irregularities occurrence, investigation of the ionospheric responses for Space Weather drivers, processes derived from below, this actual ROTI Map product is required to cover low latitudes and the Southern hemisphere polar and midlatitudes.

During last decade, numerous ground-based permanent receivers were deployed within the global and regional networks and these observations are publicly available. These data can support our activity toward extending the current IGS ROTI maps product for a global coverage. In this paper, we present initial results of ROTI maps product performance to characterize ionospheric irregularities exited by different types of geophysical processes and space weather events. The next generation of the IGS ROTI maps product can be a valuable tool for global ionospheric irregularities monitoring and retrospective analysis of plasma irregularities impact on the GNSS positioning in the “worst case scenario” domain.

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