IGS ROTI Maps extension toward Southern Hemisphere and low latitudes

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The International GNSS Service (IGS) has accepted for official release a new ionospheric product to characterize ionospheric irregularity and intensity as derived from multi-site ground-based GPS observations. This product routinely generated by multi-step processing of carrier phase delays in dual-frequency GPS signals and transferred to the IGS CDDIS database. These ROTI maps allow regular monitoring of ionospheric irregularities over the Northern Hemisphere where there is the highest concentration of the GNSS users. This product represents changes of the GPS-based index ROTI (Rate of TEC Index) and has a polar projection within a range of 50˚-90˚N in geomagnetic latitude and 00-24 magnetic local time and based on measurements with 30 s sampling rate from about 700 GPS representative stations located at high and middle latitudes of the Northern Hemisphere.As the highest concentration of the GNSS users is within the American, European and Asian sectors, initially it focused on the Northern Hemisphere auroral, and midlatitude regions. But plasma irregularities that occurred at high, middle, and low latitudes have different physical mechanisms of their origin and development. For investigation of the ionospheric irregularities climatology, study of the ionospheric responses for Space Weather events, processes derived from below, this actual ROTI Map product is required to be extended to low latitudes and the Southern hemisphere polar and midlatitudes.

Recently, a number of the ground-based receivers within the global and regional networks grew significantly. It offers an excellent opportunity to extend the current IGS ROTI maps product toward global coverage. We present initial results of improved ROTI maps product performance to characterize ionospheric irregularities exited by different types of geophysical processes and space weather events. The new ROTI maps product can be a valuable tool for retrospective analysis of plasma irregularities impact on the GNSS positioning in the “worst case” examination domain.

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