The ionospheric scintillation study with GNSS and IRNSS signal from regions near Kolkata-Burdwan during 2017-2022 period

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The radio frequency signal transmission from satellites of GNSS (L-band) and IRNSS (L&S band), traversing through the ionosphere containing ionized particles undergoes refraction and diffraction. The diffraction causes mutual interference of the electromagnetic waves, giving rise to random fluctuations in the amplitude and phase of the signal referred to as ionosphere scintillation. It has high variability with respect to time, seasons, months and solar activity.

It is well known that the equatorial anomaly region where the scintillation activity dominates, extends up to ±30° of geomagnetic equator. The area around Kolkata in West Bengal is situated under the northern crest of the equatorial anomaly [1,2] and is an ideal place to observe scintillation activity with GNSS as well as with IRNSS satellite system [3,4,5].

This paper is based on the analysis of data from GNSS and IRNSS L and S band signal done with the available data of Kolkata-Burdwan area, West Bengal, India to show the existence of scintillations on equinoctial months during the period 2017 to 2022. These scintillations are more intense in case of L band than in the case of S band signal as it is expected. The observed values of scintillation index have been compared with some theoretical computational program done. These values tally more or less when we compare the cases. The field aligned effects during the scintillations observed with the satellite links are prominent in those days. We can also observe that propagation geometry plays an important role in determining amount of scintillation occurring near Kolkata on the above cases.