



Scintillation studies on the Indian SBAS

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India's own satellite constellations GAGAN and IRNSS are implemented to enhance the integrity and accuracy in navigation capability. The Indian subcontinent extends from the magnetic equator near Trivandrum to the region beyond (Delhi) the equatorial ionization anomaly crest. The swath of the land encompasses the entire low latitude region and transition zone of electron density irregularity activities which is much susceptible to interruption of navigation signals. The present study is concentrated with ionospheric scintillation activities exhibited in the transionospheric signal paths from the said satellite constellation. The observation has been made from the most vulnerable region of the EIA crest in the Indian longitude sector (Raja Leary Mohan College centre, 22.66 N 88.58° E). The study pertains to moderate solar activity period of 2015-2018 when most of the satellites in IRNSS constellation are in operation. The study reveals that in spite of multi-satellite (GAGAN) and multi-frequency (IRNSS) provision of Indian SBAS program ionospheric scintillation, particularly at L5 and L1 bands, in the post sunset period of equinoctial months of high solar activity period may create disruption in navigation capability. It is observed that not only the satellite signals in GEO but in GSO are simultaneously affected by the scintillation activity leading to loss of lock of the receiver's channels. The cross over region of GSO figure of eight tracts is most susceptible to scintillation not only in L5 band but in S band also. The disruption capability of an event is dictated by scintillation features such as intensity, distribution of fade characteristics. The comparatively less weak scintillation features in S band may suggest its suitability for faithful navigation but the study on maximum solar activity period is yet to be initiated. The study reveals that the higher ambient ionization conditions along with its extreme variability (driven by various solar geophysical conditions) prevailing around the EIA region in post sunset period is one of the stimulating conditions to dictate scintillation over the foot print region of GAGAN and IRNSS.