

# MATLAB-BASED VHF AND UHF AMPLITUDE SCINTILLATION CHARACTERIZATION USING THE NEW LOW-LATITUDE IONOSPHERIC TOMOGRAPHY NETWORK (LITN)

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**Abstract :** The new LITN network was established in 2006 to study equatorial anomaly dynamics (Hsiao et al., 2009). It has ten Ionospheric Tomography Stations (ITS) placed along the 120°E longitude with stations in Japan, Taiwan, Philippines and Indonesia. These stations independently receive mutually coherent signals at VHF (150 MHz) and UHF (400 MHz) bands which come from NNSS-like satellites and FORMOSAT-3/COSMIC satellites. Local ionospheric irregularities, that cause rapid fluctuations in radio signals or scintillation, can be studied using the total electron content (TEC) values acquired from the ITS receiver. In this study, a MATLAB-based application was developed to process these data for automatic identification and characterization of amplitude scintillation where six criteria are set to characterize an event as scintillation including the S4 index, elevation angle, transmitting satellite, confirmation from other data recording and ground stations, and location difference of the recordings. LITN data was obtained from August 2008 to February 2011. Scintillation varied with operating frequency, local time, geographical location, solar activity and magnetic activity. Strong scintillation occurred more in VHF than in UHF. Moreover, nighttime scintillations occurred predominantly around local midnight (2000~0200 LT), while most of the daytime scintillation occurred at 0800~1000 LT. Scintillation mostly occurred between 15°-25° of geomagnetic latitude and almost none below 10° and above 30° geomagnetic latitude. Generally, the scintillation occurred under quiet magnetic condition and the occurrence increases as the solar activity increases.

Keywords: equatorial anomaly, tomography, scintillation, ionospheric irregularity, MATLAB.