# Plasmaspheric electron content variation in the magnetic equatorial region during space weather events:

# Results from the CRABEX (Coherent Radio Beacon Experiment) using the beacon onboard the Indian geostationary satellite (GSAT – 2)

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CRABEX is a national scientific program for the investigation of the unique features associated with the equatorial and low latitude ionosphere in the Indian zone using the technique of ionospheric tomography. It consists of a beacon transmitter onboard the Indian geostationary satellite GSAT-2 which transmits four coherently generated frequencies - 150.012MHz, 400.032MHz along with 1 MHz modulation of these frequencies (i.e., 149.01192 MHz and 399.03192 MHz) and a unique ground receiver system designed and set up at Trivandrum (dip 0.3 $^{\circ}$N) to receive these beacon transmissions. The data obtained from the measurement of the differential phase between 400 MHz and 150 MHz gives the relative Total Electron Content (TEC) along the line of sight between the satellite and the ground receiver and the measurement of modulation phase delay of 1 MHz on the above frequencies provides a coarse estimate of TEC. These two measurements together give an accurate estimate of TEC along the line of sight, from the satellite to the ground receiver and the Faraday rotation measurements give a reliable estimate of electron content upto $\sim$2000 km (i.e., the ionospheric content IEC). The simultaneous measurements of IEC and TEC (upto the geo-stationary altitude of 36000 km) is used to determine the plasmaspheric electron content (PEC).

The CRABEX program with its another segment consisting of a network of 6 receiver stations over the Indian subcontinent established along 77-78 $^{\circ}$ E meridian, also makes use of the data obtained by receiving the 150 and 400 MHz beacon signals from some of the existing Low Earth Orbitting Satellites (LEOS), from which the relative TEC upto $\sim$1000 km altitude(the LEOS's orbit) is obtained. Using the two station method, (Leitinger, 1994), absolute vertical TEC at these stations are estimated. Simultaneous measurements of TEC from GPS (upto $\sim$20,000 km) and LEOS (upto $\sim$1000km) are

used to estimate PEC.

PEC estimated by these two methods is compared under different geophysical conditions. Preliminary results show that PEC varies over the magnetic equatorial location from $\sim$10% during quiet periods to $\sim$30 % of TEC during magnetic storm periods. A quantitative estimate of the temporal variation of PEC is an important parameter for studying the effects of space weather events in the low latitude ionosphere. Some of the observed features brought out using a case study of a few events under different geomagnetic conditions will be presented and discussed.