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The topside ionization over Indian region: An analysis using tomograms from Radio Beacon for Ionospheric Tomography (RaBIT) onboard YOUTHSAT.

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Understanding the electron density distribution of ionosphere is very important for the estimation of propagation delays involved in the satellite to ground communication systems and their corrections.The vertical electron density profiles of ionosphere have been extensively studied using the ionosonde in the early days. By nature of the principle of operation, Ionosonde can give profiles only up to F region peak altitudes. Hence the region beyond the F- peak referred to as topside ionosphere was not extensively profiled.

Later, Topside ionosphere was probed and their altitude profiles were obtained with Incoherent Scatter Radars (ISR) and were complimented by the topside sounders [Lockwood and Nelms, 1964; King et al., [1964] . Later on several satellite observations have provided an understanding of various aspects of topside ionosphere. Based on these observations, it is now realised that the behavior of ionization in the topside ionosphere above F region peak is quite different from the lower ionosphere owing to the diverse processes operational there.

Nevertheless the relative roles of different contributing factors to topside ionization and their altitudinal variability's have not been addressed so far. This paper presents a comprehensive study on the topside ionosphere and brings out the role of F3 layers (Balan et al., 2008; Mridula and Pant, 2015) as well as increases in solar flux in modulating the topside ionization. Further in this study, an altitude of influence of each factor has been identified.

Data used comprises of the electron density obtained from COSMIC satellite for the period 2007 to 2012 as well as RaBIT tomograms for the period May to December 2011. This study clearly shows that the ionization in the height region of 300 km to 400 km is affected by the presence of F3 layer while above 450 km ionization is not significantly altered by the formation of F3 layer during the solar minimum period. The important factor which affects topside ionization above this altitude is the solar flux. The present study has generated an empirical relationship between the topside electron density and F10.7 cm solar flux during the rising phase of solar cycle 24. This empirical relationship is compared using tomographic observations obtained from RaBIT (Radio Beacon for Ionospheric Tomography) data (Pant et al., 2013) over Indian region.

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