Observation of intraseasonal oscillation of 64 day in the ionospheric sporadic E layers using Indian MST Radar, SABER / TIMED instrument and Ionosonde present at Gadanki(13.5 N,79.2 E)

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Numerous researches have been carried out in the past to study the link between the lower atmospheric waves with ionospheric E region (95 – 150 km) and F region (150 - 500 km) based on tides and sporadic E layers (Es). The main objective of this study is to find the link between the ionospheric variabilities with the lower atmosphere using MST radar, GPS radiosonde, ionosonde present at Gadanki along with the satellite data obtained from SABER / TIMED and NOAA. The Morlet wavelet analysis of equatorial electro jet (Δ H), E - region (f_oE_s) and F – region (f_oF_{peak}) peak frequency in 2009 are performed which show statistically significant oscillations with periodicities of 4 – 8 day, 16 day, 21 day, 32 day and 64 day. High frequency oscillations of 4 – 8 day are observed in the winter months of February 2009 and summer months of April-September 2009 in both Δ H and f_oE_s and transiently present in the f_oF_{peak}.In the winter months of January-February 2009, 16 day oscillation is dominant in the wavelet plot of Δ H and f_oF_{peak} which is also present in the summer months of April-September 2009 in Δ H and f_oE_s but its signal strength is much lower in the f_oF_{peak}. Dominant signals for 21 day, 32 day and 64 day oscillations are observed from April-September 2009 in Δ H and f_oE_s showing strong correlation between those two parameters whereas comparatively no significant signals are observed in f_oF_{peak} except 64 day oscillation from August-October 2009. The Morlet wavelet analysis of temperature from SABER / TIMED instrument shows 64 day and 32 day oscillation in almost all the months of 2009 with enhancement in their value from March – November 2009. An interesting feature is that 32 and 64 day oscillations suddenly disappear at the height of 35 km in the summer months of April – June 2009. Since the stratospheric ozone over Gadanki peaks around 30 - 35 km so this sudden disappearance of these two oscillations can be influenced by ozone which shows maximum peak in the summer months of June – September and minimum from December – February over tropics. The variation of OLR over Gadanki from January to December 2009 shows a gradual decrease in value from April – September which corresponds to the summer months with the lowest value in July. Since OLR serves as the main signature of lower atmospheric convective activity so it clearly shows the link between the observed oscillations in the lower atmosphere with stratosphere and mesosphere.