

Variability of Equatorial Counter Electrojet signatures in the Indian region

The limited longitudinal extent of equatorial counter electrojet (CEJ) has been inferred by several workers based on the analysis of ground data. However the scale length of CEJ characteristics at 2 h or less has not been estimated so far. The present study seeks to characterize the longitudinal variability of CEJ phenomena at a longitudinal separation of $\sim 15^\circ$ using hourly averaged variations at two equatorial electrojet (EEJ) pairs of stations: Hyderabad & Vencode at 77°E and Port Blair & Campbell Bay at 93°E . The nature of CEJ events are classified by time of occurrence and studied using 12 months of concurrent data at the two longitudes. From examination of 323 CEJ events at VEN and 239 at CBY over 346 days, the observations are: i) the occurrence of CEJ is not simultaneous at VEN and CBY for about 40% of events; ii) amplitude of CEJ events and their occurrence frequency are higher at VEN compared to CBY; iii) the variability in occurrence frequency of CEJ events at VEN and CBY is more significant during $K_p < 2$ than $K_p \geq 2$; iv) the influence of westward currents on the EEJ peak was evidenced by early or late peak occurrences comprising about 175 days at VEN and 89 days at CBY. It is established here that considerable variability of CEJ signatures is observed between two EEJ sites at 15° separation that reveal the significant impact of local electrodynamic processes on the characteristics of EEJ.

From the study of 323 CEJ events at VEN and 239 events at CBY for 346 days we characterized the counter electrojet by time and frequency of occurrence over the period of study. This has established the degree of variability between CEJ events at this short spatial separation. It is noted that over 40% of CEJ events occur only at one of the longitude indicates the influence of local ionospheric effects that are not accounted for in global models of ionospheric processes. The concurrent CEJ events at both the longitudes (Figure 01) also demonstrate the variability in strength at this close spatial separation. The persistent influence of CEJ (weak, moderate and strong), in quiet and disturbed periods, on EEJ peak amplitude and time of occurrence has been illustrated in details, which places new constraints on models of equatorial electrodynamic processes.

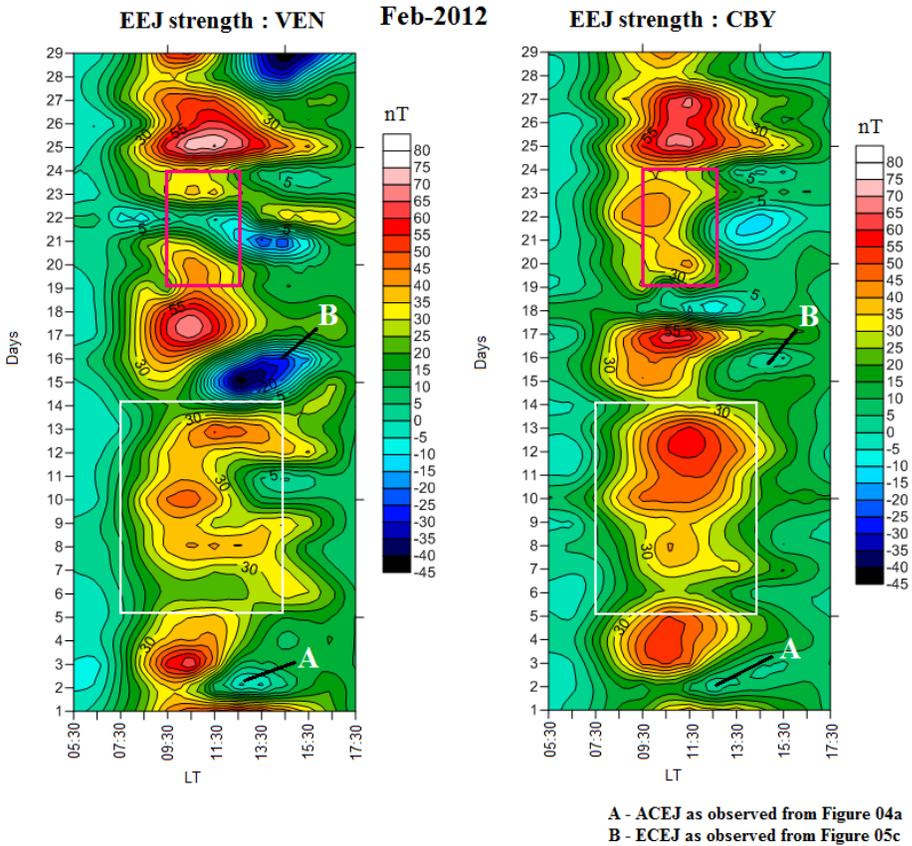


Figure 01 Contour plot of daytime hourly values of EEJ strength for all days of February 2012 at VEN (left panel) and CBY (right panel). The negative values contoured in light green to blue, indicate the presence of CEJ events and the strong daily EEJ peak values contoured in the colors yellow to red. 'A' and 'B' denotes the observed CEJ features from Figure 04a and Figure 05c.

Further Details: Phani Chandrasekhar, N., Archana, R.K., Nandini Nagarajan and Kusumita Arora, Journal of Geophysical Research-Space Physics, <http://onlinelibrary.wiley.com/doi/10.1002/2016JA022904/full>