

Relation between the local equatorial electrojet and global Sq current calculated from different longitude sectors

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The equatorial electrojet (EEJ) is a strong eastward current flowing in a narrow band along the magnetic dip equator. This current interacts with the global Sq current before decreases to zero near 3 degree dip latitude at both hemispheres. In this study, we examined the relation between the local EEJ component and global Sq current component obtained using two stations method. Analysis was carried using the new equatorial electrojet index, EUEL, calculated from geomagnetic northward, H, component from different longitude sectors. The magnetic EEJ strength is calculated as the difference between the EUEL index of the magnetic dip equator station and the EUEL index of the off magnetic dip equator station located beyond EEJ band. The global Sq component is then obtained by subtracting the EEJ component from the EUEL index. Long term data from 2005-2011 are used in this study. The relation between these currents component are then examined from four particular aspects. The first aspect is the daily and seasonal variations of both currents components. The result shows that the amplitude of local EEJ component is always higher than the global Sq component. The second aspect is the day to day variation of these currents obtained from auto-correlation function. The third aspect is the dependence on solar activity represented by the 10.7cm solar radio flux (F10.7). The F10.7-EEJ correlation is found to be slightly higher in 2011 compare to other years. The last aspect is the longitudinal dependence where a comparison is made between the mean of daily amplitude of both currents from different longitude sectors. The correlation between these daily currents component is then quantified using calculated correlation coefficient.

Keywords: equatorial electrojet, Sq current, EUEL index, F10.7, correlation analysis