Annual and Semi-annual Variations of Equivalent Sq Current System along the 210 MM

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The equivalent *Sq* current pattern is estimated by using the CPMN data along the 210-degree Magnetic Meridian (MM) [see Yumoto and the CPMN group, 2001]. From these patterns we can see latitudinal and longitudinal (local time) distributions of the *Sq* current on day-to-day basis. The equivalent *Sq* current patterns thus can be regarded as a snapshot of the spatial structure of the *Sq* current system.

We analyzed the geomagnetic field data (*dH*, *dD*) obtained from the 19 CPMN stations during 1996-2007. 10 'International Quiet Days' are selected and hourly data (*dH*, *dD*) at each station (*Phi*, *LT*) are used; here, *Phi* and *LT* are magnetic latitude and local time of each station, respectively. Further, based on the daily *F10.7* solar flux data, the quiet days available are divided into two levels of the solar activity, "high" and "low". The data for 50˜*F10.7*˜150 is classified as the data for "low" solar activity period, on the other hand, the data for 150˜*F10.7*˜250 is classified as the data for "high" solar activity period.

The equivalent *Sq* current patterns of 210 MM sector are represented as the sum of three components: temporally constant component (*Sq0*), annual component (*Sq1*) and semi-annual component (*Sq2*). So that, *SqFr* = *Sq0*+*Sq1*+*Sq2*, here *SqFr* is an approximated *Sq* variation obtained by Fourier analysis. A mean error of the *SqFr* from the 30-day running average of the raw data is about 12%. In fact, the *SqFr* well represents some known features of the seasonal variation of the *Sq* current, e.g.: (1) The *SqFr* current is strong in summer and very weak in winter. (2) The vortex centre of the *SqFr* current in the winter hemisphere is located on the afternoon side of that in the summer hemisphere by a few hours local time. In the present paper, we will demonstrate the seasonal variations of equivalent current patterns of the each component (i.e., *Sq0*, *Sq1* and *Sq2*) for both "high" and "low" solar activity periods and discuss the generation mechanisms of them.