



The Study of the Geomagnetic Variation for Sq current System

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The solar quiet variation (Sq) with a period of 24 hrs is a typical one of the quiet variations. Sq is generally caused by atmospheric tide-dynamo in ionosphere and it is controlled by the electric field, electric conductivity in ionosphere and neutral wind in middle-high altitude atmosphere. In our work, the geomagnetic field data observed by 90 ground-based observatories is used to analyze the local time variation of Sq. Sq is derived from five quiet-day geomagnetic data in every month by the FFT method. According to the pattern of geomagnetic X component in Sq, there is a prenoon-postnoon (before noon and after noon) asymmetry. This asymmetry is obvious in spring, summer and winter. The X component at 12:00-13:00 LT is about 5 nT larger than it at 11:00-12:00 LT. The ratio between the X component of daily variable amplitude and Y component of daily variable amplitude in middle and low (high) latitude regions in summer is greater (smaller) than that in winter. Used the sphere harmonic analysis method, the Sq equivalent current system is obtained. From the pattern of Sq current system, the prenoon-postnoon asymmetry may be caused by the electric field in the high latitude region. This electric field has two effects: the one is that the electric field from high latitude maps to the low latitude region; the other is this electric field penetrate to the middle latitude region directly. The combined action of these two effects makes the prenoon-postnoon asymmetry of Sq. The asymmetry also has an obvious seasonal effect. It may relate to the polar Sq and DP2 in the high latitude region.