

Global distribution of magnetic fluctuations in middle and low latitudes as observed by CHAMP satellite and their origin

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An preliminary analysis of the magnetic field observed by the CHAMP satellite shows the ubiquitous existence of small scale (1 nT - 5 nT) magnetic oscillations with period shorter than a few tens seconds along the satellites path. Followings are their characteristics.

1. The amplitude of magnetic fluctuations observed on the dayside is much larger than that on the nightside.
2. The amplitude in the East - West component is largest.
3. The magnetic variation on the magnetic dip equator is very small.
4. The period tends to become longer with the decrease of latitude.
5. The dependence on geomagnetic activity is weak.
6. The dependence on the solar winds parameters is weak.
7. The global distribution of the amplitude depends on the season and suggests the effect of continent and ocean.

These characteristics cannot be explained by the known phenomena having solar winds and magnetospheric origin including Pc 3 micro-pulsations. It is interpreted as the spatial structure of small scale field-aligned currents with both edges on the ionosphere. The structure of the current system and its generation mechanism will be discussed.

Keywords: CHAMP satellite, magnetic variation with periods shorter than 30 seconds, the above layer of the ionosphere, field-aligned current, neutral oscillation in the ionosphere, the origin in the lower atmosphere