

CHAMP OBSERVATIONS OF MULTIPLE FIELD-ALIGNED CURRENT (FAC) UNDER QUIET GEOMAGNETIC CONDITIONS

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We analyse Field-Aligned Current (FAC) measurements on board the CHAMP satellite, conducted on days 30.06-02.07.2008. In general, there are 91 crossings over polar regions (46 in the Northern hemisphere and 45 – in the Southern hemisphere). The data are gathered under quiet geomagnetic conditions ($K_p < 1$, $V_{sw} < 450$ km/s, and IMF B_z is within ± 3.5 nT). On these days most of the FAC measurements fall in the noon (MLT =10-14, Mlat = 55-85) and midnight (MLT =16-12, Mlat = 55-85) sectors.

Our preliminary analysis reveals a multitude of alternating medium-scale (at least 1-2 degrees) FAC sheets of reverse sign and with increasing amplitude. Determination of FAC by single satellite measurement however is accompanied with the following uncertainties: i) underestimation of the FAC density and ii) appearance of false FAC structures. Consecutively we apply several procedures to reduce the occurrence of such errors. First, FAC structures of density less than $0.1 \mu\text{A}/\text{m}^2$ were neglected; secondly, all FAC obtained at attack angles (the angle between the satellite trajectory and polar oval) considerably different from 90 degrees (e.g. for angle less than 65 degrees) were discarded. Despite these methodological constraints, the existence of multiple FAC close to the noon-midnight meridian under quiet geomagnetic conditions remains. The multiple FAC structure is more frequent in the night sector, with as much as 7 sheets of alternate sign for IMF $B_z > 0$. This issue is verified for both Northern (summer) and Southern (winter) hemispheres. The number of all FAC sheets observed in the Southern hemisphere, however, is less than in the Northern one. FAC sheets poleward of FAC Region 1 were also detected.

Possible mechanisms of multiple FAC structures under quiet geomagnetic conditions are considered.

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