

## 亚暴期间电离层场向电流的分布特征——CHAMP卫星观测

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## Substorm time ionospheric field-aligned currents as observed by CHAMP

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摘要

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### 摘要

场向电流在不同的等离子体区之间传递能量、动量和质量,是磁层与电离层之间的关键耦合过程.本文利用CHAMP卫星高精度的空间磁场测量数据,研究亚暴期间极区电离层场向电流的统计学分布特征.研究表明场向电流的大小与所在位置呈现明显的日夜和晨昏不对称性,具体为:(1)场向电流的大小与亚暴极光电流指数(AL)密切相连,AL愈大,电流愈强,亚暴期间电流强度相对平静期来说可增加约5倍,昏侧和夜侧电流强度与AL指数的相关性较好,晨侧和白天侧两者相关性较差;(2)电流的峰值密度所在位置与AL指数的相关性不高,昏侧电流所处纬度低于晨侧,而夜晚电流所处纬度低于白天侧.

关键词: 亚暴 极区电离层 场向电流 CHAMP卫星

### Abstract:

Field-aligned currents (FACs) play an important role in the energy, momentum, and mass coupling between magnetosphere and ionosphere. This study investigates the statistical characteristics of polar ionospheric FACs during substorms by using high resolution magnetic field measurements on board CHAMP. Obvious day-night and dusk-dawn asymmetries emerge in both FACs density and location. It shows: (1) FACs densities are related to AL index, with larger AL the larger current density. FACs densities during substorm are 5 times of that during quiet period. The duskside and nightside FACs densities correlate well with AL, while the dawnside and dayside FACs densities correlate not well with AL; (2) the locations of peak FACs densities do not correlate with AL. The dusk FACs locate equatorward of the dawn, and the nightside FACs locate equatorward of the dayside.

Keywords: Substorm Polar ionosphere Field-aligned current CHAMP

Received 2010-01-26;

Fund:

国家自然科学基金项目(40604017, 40974096)、空间天气学国家重点实验室专项基金和教育部留学归国人员基金资助.

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### 引用本文:

王慧,毛丹丹,马淑英, H. Luehr.亚暴期间电离层场向电流的分布特征——CHAMP卫星观测[J] 地球物理学报, 2010, V53(6): 1256-1262

WANG Hui, MAO Dan-Dan, MA Shu-Ying, H. Luehr. Substorm time ionospheric field-aligned currents as observed by CHAMP[J] Chinese Journal Geophysics, 2010, V53(6): 1256-1262

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http://www.geophy.cn/CN/10.3969/j.issn.0001-5733.2010.06.002 或 http://www.geophy.cn/CN/Y2010/V53/I6/1256

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