

地球物理学报 » 2009, Vol. 52 » Issue (6) : 1419-1428 doi:10.3969/j.issn.0001-5733.2009.06.001

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引用本文(Citation):

王慧;马淑英;A. J. Ridley.磁暴期间亚极光区极化流(SAPS)的DMSP观测与RAM模拟的比较研究.地球物理学报,2009,52(6):1419-1428,doi:10.3969/j.issn.0001-5733.2009.06.001

WANG Hui;MA Shu-Ying*;RIDLEY A. J..Comparative study of subauroral polarization streams with DMSP observation and RAM simulation.Chinese J.Geophys. (In Chinese),2009,52(6):1419-1428,doi:10.3969/j.issn.0001-5733.2009.06.001

磁暴期间亚极光区极化流(SAPS)的DMSP观测与RAM模拟的比较研究

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Comparative study of subauroral polarization streams with DMSP observation and RAM simulation

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摘要

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摘要 亚极光区极化流(Subauroral Polarization Streams, SAPS)为快速流动的向西等离子体流,位于昏侧-子夜前亚极光区,是磁层-电离层-热层耦合的重要过程之一.本文利用密西根大学的RAM(Ring current-Atmosphere Interaction Model)模型对一次典型磁暴期间发生的SAPS事件进行了模拟,并与DMSP卫星观测值进行了比较.结果表明:模拟结果能大致反映观测现象;模拟得到的SAPS峰值速度所在纬度随磁暴时间的变化与观测值有较大差别;SAPS速度观测值在约18:00 UT和约20:00 UT左右出现两个峰值,而模拟值只有一个峰值,出现在约18:00 UT,主要原因是模型对亚暴过程的模拟存在不足.

关键词 亚极光区极化流, RAM模型, 磁暴, 亚暴

Abstract: Subauroral Polarization Streams (SAPS) are fast westward plasma flows, located mainly at dusk and premidnight subauroral region. They are one of the important magnetosphere-ionosphere-thermosphere coupling processes. This work has simulated one storm time SAPS event with the Ring current-Atmosphere Interaction Model (RAM) developed by University of Michigan. The model results are compared with the DMSP observations. It shows: the model results can be comparable with the observations in general; the latitude of the modeled SAPS peak velocity differed greatly from the observations; the observed SAPS velocities have two peaks around 18:00 UT and 20:00 UT, while the modeled have only one peak around 18:00 UT, which is due to the model's inability in the modeling of the substorm process.

Keywords Subauroral Polarization Streams, RAM model, Storm, Substorm

Received 2008-10-08;

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链接本文:

<http://118.145.16.227/geophy/CN/10.3969/j.issn.0001-5733.2009.06.001> 或 <http://118.145.16.227/geophy/CN/Y2009/V52/I6/1419>

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