地球物理学报 » 2009, Vol. 52 » Issue (7) :1685-1692 doi:10.3969/j.issn.0001-5733.2009.07.002

引用本文(Citation):
蔡红涛;马淑英;I.W. McCrea;J. A. Davis;M. Lockwood;S.E. Milan.极区电离层对IMF B_z 4次快速转向的响应——EISCAT/ESR雷达观测. 地球物理学报, 2009, (7): 1685-1692,doi: 10.3969/j.issn.0001-5733.2009.07.002

CAI Hong-Tao;MA Shu-Ying;I.W. McCrea;J. A. Davis;M. Lockwood;S.E. Milan.Polar ionospheric responses to 4-times rapid turnings of the IMF B_z component—EISCAT/ESR radar observations.Chinese J.Geophys. (in Chinese),2009,52(7): 1685-1692,doi: 10.3969/j.issn.0001-5733.2009.07.002

极区电离层对IMF B_z 4次快速转向的响应——EISCAT/ESR雷达观测

蔡红涛[1, 2];马淑英[1, 2];I.W. McCrea[3];J. A. Davis[3];M. Lockwood[3]; S.E. Milan[4]*

1 武汉大学电子信息学院，武汉 430079
2 武汉大学空间环境与大地测量教育部重点实验室，武汉 430079
3 Space Science and Technique Department, Rutherford Appleton Laboratory, Chilton, Oxfordshire, OX11 0QX, UK
4 Department Physics and Astronomy, University of Leicester, UK

Polar ionospheric responses to 4-times rapid turnings of the IMF B_z component—EISCAT/ESR radar observations

CAI Hong-Tao[1, 2]; MA Shu-Ying[1, 2]; I.W. McCrea[3]; J. A. Davis[3]; M. Lockwood[3]; S.E. Milan[4]*

1 School of Electronic Information, Wuhan University, Wuhan 430079, China
2 Key Laboratory of Geospace Environment and Geodesy, CNEM, Wuhan University, Wuhan 430079, China
3 Space Science and Technique Department, Rutherford Appleton Laboratory, Chilton, Oxfordshire, OX11 0QX, UK
4 Department Physics and Astronomy, University of Leicester, UK

摘要 利用EISCAT VHF和EISCAT Svalbard（ESR）雷达观测数据，对2003年2月12日IMF B_z分量4次快速方向转换期间，极区电离层，尤其是极尖/极隙区的响应特征进行了分析研究.随着IMF B_z方向的多次快速变化，地面雷达观测到极尖/极隙区所在位置随着开放-闭合磁力线边界在纬度方向上来回移动.在此期间，极区电离层等离子体水平对流多次反向，表现出与IMF B_z分量强的负相关性.进一步分析表明：极区磁层-电离层系统在日侧对IMF极性变化的平均响应时间约为3 min.

关键词 极尖/极隙区， 行星际磁场， EISCAT/ESR 雷达， 磁重联

Abstract: With the observations from EISCAT/ESR radar on Feb.12 2003, the responses of polar ionosphere, especially those of the cusp/cleft region to the 4-times rapid turnings of IMF B_z component are investigated in this paper. During this event, latitudinal location of the cusp/cleft region was found moving back and forth, likely resulted from the variations of the reconnection sites at the magnetopause which are widely accepted to be ruled by the IMF polarity. Meanwhile, polar ionospheric plasma convection reversed several times, exhibiting strong correlation with the signs of the IMF B_z component. Correlative and timing analysis suggest that the dayside magnetosphere-ionosphere system seems to need an average reconfiguration time of approximate 3 minutes in response to the variations of the IMF polarity in polar region.

Keywords Cusp/cleft region, Interplanetary magnetic field, EISCAT/ESR radar, Magnetic reconnection