Geophysical Research Abstracts
Vol. 16, EGU2014-1264, 2014
EGU General Assembly 2014

Controlling of merging electric field and IMF magnitude on storm-time changes in thermospheric mass density

Yunliang Zhou (1), Shuying Ma (1), Ruosi Liu (1), and Hermann Lühr (2)

(1) Inst. of Ionosphere and Magnetosphere, College of Electronic Information, Wuhan University, Wuhan 430072, P. R. China, (2) Deutsches GeoForschungsZentrum, GFZ, Telegrafenberg, 14473 Potsdam, Germany

The controls of merging electrical field, Em, and IMF magnitude, B, on the storm-time changes in upper thermospheric mass density are statistically investigated using GRACE accelerometer observations and the OMNI data of solar wind and IMF for 35 great storms during 2002-2006 years. It reveals that: (1) The correlation coefficients between the air mass density changes and the parameters of Em and B are larger at lower latitudes than at higher latitudes generally, and larger in noon and midnight sectors than in dawn and dusk. (2) The most likely delay time (MLDT) of mass density changes in respect to Em is about 1.5h (4.5h) at high (low) latitudes, having no distinct local time dependence. While it is 6h at middle latitudes in all the local time sectors except for noon, which is longer than at low latitudes. A similar fact of longer delay time at mid- latitude is also seen for B. The MLDTs for B at various latitudes are all local time dependent distinctly with shorter delay time in noon/midnight sector and larger in dawn/dusk. Despite of widely spread of the delay time, IMF B exhibits still larger correlation coefficients with mass density changes among the interplanetary parameters. (3) The linear control factor of B on the density changes increases for large B, in contrast to somewhat saturation trend for larger Em. (4) The influence of B and Em on the mass densities shows different behaviour for different type storm. The influence intensity of Em is much stronger for CIR-driven than for CME-deiven storm, while it is not so distinct for B. On the local time asymetry of the influence, both Em and B has largest influence at noon sector for CME-driven storms; while an obviously larger intensification of the influence is found in dawn/dusk sector during CIR storms, especially for parameter Em.