



A case study on temporal and spatial scales of field aligned electron event in cusp region: Cluster observations

Jiankui Shi (1), Ziyang Zhang (1), Klaus Torkar (2), Malcolm Dunlop (3), Andrew Fazakerley (4), Zhengwei Cheng (1), and Zhenxing Liu (1)

(1) NSSC, Chinese Academy of Sciences, China (jkshi@nssc.ac.cn, +86-10-62534546), (2) Space Research Institute, AAS, Graz, Austria, (3) Space Science and Technology Department, RAL, UK, (4) Mullard Space Science Laboratory, UCL, UK

Using the Cluster multi-spacecraft observations, we analyze a long duration field aligned electron disturbance event in the cusp region on 30 September 2001. All four Cluster spacecraft observed the same event that the electron flux was one quantity order higher than usual in the cusp. The temporal scale of the field aligned electron event was 36 minutes. The spatial scale was about 540 km in the direction along the orbit and 1800 km in the direction perpendicular to the orbit in the mid-altitude cusp region. It was the longest duration and the largest spatial scale of any field aligned electron event observed in the polar region up to date, and could not be observed with a single satellite. Both upward and downward electrons are the main contributors to the field aligned currents in the event. During this event, the solar wind dynamic pressure increased and the IMF kept southward. It is likely that the field aligned electron event with long temporal and large spatial scales was caused by high solar wind dynamic pressure during permanent southward IMF. It is important to understand the physics mechanism, especially to study on the solar wind- magnetosphere- ionosphere coupling.