Geophysical Research Abstracts, Vol. 7, 09231, 2005 SRef-ID: 1607-7962/gra/EGU05-A-09231 © European Geosciences Union 2005



Statistical study of auroral substorm onset: its dependence on solar wind parameters and solar illumination

H. Wang (1,2),S. Y. Ma (1), H. Luehr (2), P. Ritter(2)

Dept. of Space Physics, College of Electrical Information, Wuhan University, P. R. China,
GeoForschungsZentrum, Potsdam, Germany (syma@whu.edu.cn/0086-27-87653923)

Based on 2400 well-defined substorm onsets in the northern hemisphere observed over a 2.5 years period by the FUV Imager on board the IMAGE spacecraft, a statistical study is performed. From the combination with the ACE solar wind parameters observations and magnetic field observations of the low altitude satellite CHAMP, the location of auroral breakups in response to solar illumination and solar coupling parameters are studied. Furthermore the correspondence of the onset location with the prominent field-aligned currents and electrojets are investigated. Solar illumination and with it the ionospheric conductivity has a significant effect on the substorm onset latitude and local time. In sunlight, substorm onset tend to occur at earlier local time and more poleward than in darkness. The solar wind input, represented by the merging electric field integrated over one hour prior to the substorm, correlates well with the latitude of the break up. Most poleward latitudes of the onset are found to range around 73 deg MLAT during very quiet times. Field-aligned and Hall currents observed concurrently with the onset are consistent with the signature of a westward travelling surge. The observation suggest that the ionospheric conductivity has an influence on the location of the precipitating energetic electron beams.