Geophysical Research Abstracts
Vol. 18, EGU2016-10048, 2016
EGU General Assembly 2016


# Observational Evidence that Magnetosheath Plasma Parameters are Prominent in Determining Cross Polar Cap Potential Saturation

Robert Clauer (1), Zhonghua Xu (1), Michael Hartinger (1), Michael Ruohoniemi (1), Wayne Scales (1), Maimaitirebike Maimaiti (1), Michael Nicolls (2), Rick Wilder (3), and Ramon Lopez (4)

(1) Virginia Tech, Center for Space Science and Engineering Research, Blacksburg, Virginia, United States (rclauer@vt.edu), (2) SRI International, Center for Geospace Studies, Menlo Park, California, United States, (3) University of Colorado, Laboratory for Atmospheric and Space Physics, Boulder, Colorado, United States, (4) University of Texas at Arlington, Department of Physics, Arlington, Texas, United States

A variety of statistical studies have shown that the ionospheric polar potential produced by solar wind - magnetosphere - ionosphere coupling is linear for weak to moderate solar wind driving, but becomes non-linear during periods of very strong driving. It has been shown that this applies to the two-cell convection potential that develops during southward interplanetary magnetic field (IMF) and also to the reverse convection cells that develop during northward IMF. This has been described as polar potential saturation and it appears to begin when the driving solar wind electric field becomes greater than 3 mV/m. It has also been shown that the summer ionospheric electric field saturates at about the same value (20 mV/m) for both northward or southward IMF. Recent measurements of the high latitude convection on September 12 - 13, 2014 using the Resolute Incoherent Scatter Radar during periods of large northward IMF show ionospheric electric fields varying between 56 mV/m and 156 mV/m within the dayside reverse convection cells. There is no indication of saturation during these periods of very strong driving. We believe that the extremely rare conditions in the solar wind that produce extreme driving while also producing a high plasma beta in the magnetosheath provide the best explanation for the lack of potential saturation of the reverse convection cells. That is to say, the conditions in the magnetosheath that contribute to enhancing or limiting reconnection are most important in determining cross polar cap potential saturation. This research was supported at Virginia Tech by National Science Foundation Grant AGS-1216373.