

The relative contributions of electric field and ionospheric conductance to the auroral electrojets

Eun-Ah Cho^{1,3}, Byung-Ho Ahn², Yong-Jae Moon³

¹ Department of Astronomy and Atmospheric Sciences, Kyungpook National University

² Department of Earth Science, Kyungpook National University

³ Bohyunsan Optical Astronomy Observatory, Korea Astronomy Observatory

Using magnetometer data from the International Magnetospheric Study (IMS) meridian chains of observations for March 17, 18, and 19, 1978, we examine the relative contributions of electric field and ionospheric conductance to the auroral electrojets. For this purpose the AU and AL indices were derived from the magnetic disturbance data obtained from the AE stations located only within limited magnetic local time (MLT) sectors; i.e., $15 < \text{MLT} < 18$ and $00 < \text{MLT} < 04$, respectively. Then we estimate the electric field contribution to the AU index under the assumption that the Hall conductance at the dusk sector is mainly caused by the solar EUV radiation. Assuming further that electric field distributions at dawn and dusk are comparable, it is possible to estimate the contribution of the Hall conductance associated with auroral particle precipitation to the AL index. From this study it is noted that electric fields and Hall conductances thus estimated are well correlated with the AU and AL indices, respectively, suggesting that the AU and AL indices are closely associated with the directly driven and unloading components of substorms.