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# Auroral Kilometric Radiation and Magnetosphere-Ionosphere Coupling Process During Magnetic Storms

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Auroral kilometric radiation (AKR) has been believed to be a manifestation of field-aligned acceleration above the auroral ionosphere during substorms because electrons beamed down from the field-aligned acceleration region emanate the free-space mode radio waves of AKR as well as excite discrete auroral emissions. The remote observation of AKR from space thus has been utilized to diagnose the structure and dynamics of not only the AKR source region but also the acceleration region. In this paper, we presents an investigation of a magnetosphere-ionosphere (M-I) coupling process during magnetic storms, using observations of AKR in the field-aligned acceleration region and plasma density variation in the plasma sheet. The main phase electron precipitation, which AKR does not accompany, was confirmed as not characterized by inverted-V type precipitation but rather by precipitation with Maxwellian type distribution. This indicates the absence of the field-aligned potential in the M-I coupling region during the early phase of the magnetic storm. We found that the superdense plasma in the plasma sheet is closely concerned with the AKR activity; that is, the appearance of the superdense plasma sheet seems to suppress the AKR activity. From the statistical study, it is found that AKR tends to disappear in larger storms and the occurrence of the superdense plasma sheet accompanied with the AKR disappearance was caused by coronal mass ejection (CME) with magnetic cloud. On the basis of these observations, we discuss the Knight's current-voltage relation between the magnetosphere and ionosphere and role of field-aligned potential drop in the M-I coupling process.