Study of a relationship between the electric field and electron precipitation for the midnight sector in the polar ionosphere

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We have investigated how the relationships between the ionospheric electric field and electron precipitation varied with MLT and altitude using EISCAT Common Program data. The observed statistical anticorrelation between hard precipitation and the ionospheric electric field indicates de-coupling the ionosphere from the magnetosphere caused by field-aligned potential drop.

Around midnight, however, this de-coupling is not complete even under strong westward ionospheric current, which seems to be related to substorm activities. Even during hard precipitation, non-zero southwest ionospheric electric fields are observed.

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Around midnight, however, this de-coupling is not complete even under strong westward ionospheric current, which seems to be related to substorm activities. Even during hard precipitation, non-zero southwest ionospheric electric fields are observed. These electric fields can be explained by the polarization effect in the high conductivity region in addition to the convection electric field.