Storm-time variations of D- and lower E-region ionosphere measured as tweek reflection heights at Kagoshima, Japan

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Variations of the D- and lower E-region ionosphere at middle and low latitudes associated with magnetic storms have been investigated using satellites and ground VLF signals. Kikuchi and Evans (1989) reported unusual enhancements of energetic electron fluxes over Japan at L = 1.3 during a large magnetic storm based on NOAA-6 satellite data. Araki (1974) reported that the phase of trans-equatorial VLF signals from a transmitter changed anomalously at night during the main phase of two large magnetic storms. Peter and Inan (2004) reported that the occurrence rates of lightning-induced electron precipitation (LEP) events depend on geomagnetic activities. Ohya et al. (2006) reported responses of the nighttime D-region ionosphere to the great magnetic storm of 2–12 October 2000, showing that the tweek reflection height significantly decreased by approximately 10 km twice in the beginning of the storm. However, the response of the D-region during magnetic storms has not been sufficiently studied. In this study, we investigate variations of D- and lower-E-region ionospheric height through the tweek reflection height during 4 storms observed at Kagoshima (31.5N, 130.7E, L=1.2), Japan, from 1978 to 1982. The descent (rise) of the reflection height corresponds to increase (decrease) in electron density in the ionospheric D- and lower E-regions. The trends of the increase/decrease in the tweek reflection height were different depending on magnetic storms. In the presentation, we also compare the tweek reflection height with high-energy electron fluxes observed by the NOAA-6 satellite.