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Ionizing effects of magnetospheric electrons in the low-latitude ionosphere during recurrent magnetic storms

Ionizing effects of magnetospheric electrons in the low-latitude ionosphere during recurrent magnetic storms

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The general concept of the near-Earth radiation asserts that fluxes of energetic electrons in the equatorial ionosphere and outside the region of South Atlantic Anomaly are stably tenuous and negligible due to permanent effective scattering and losing energy in interaction with atmospheric neutrals. In literature, this region is called a forbidden zone because it locates below the inner allowed Störmer zone or inner radiation belt. Radiation monitoring by a fleet of the NOAA satellites in low-Earth orbit have revealed significant enhancements of energetic electrons in the forbidden zone during enhanced substorm activity and geomagnetic storms. A regular occurrence of the enhanced forbidden energetic electrons (FEE) in the solar cycles 23 and 24 relates closely to recurrent magnetic storms. Superposed epoch analysis shows high probability of the FEE enhancement occurrence during first three days of a recurrent storm. Due to ionizing effect, the FEE enhancements contribute significantly to ionospheric positive phase during recurrent geomagnetic storms.

キーワード: magnetosphere-ionosphere coupling, recurrent magnetic storms, forbidden electron enhancements, positive ionospheric storms
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