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The behavior of the F3 layer over Jicamarca during geomagnetic storm in September 2011

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This contribution presents the investigation results of the behavior of equatorial ionosphere during geomagnetic storm on September 26–30, 2011. This investigations were performed using the Global Self-consistent Model of the Thermosphere, Ionosphere and Protonsphere (GSM TIP) developed in WD IZMIRAN. The simulation results are compared with observation data of some ionospheric stations located on the different latitudes and longitudes. The aim of our research is to identify the main features of the F3 layer behavior in the equatorial ionosphere at different LT epochs before and during a geomagnetic storm on the different phases of its development. In order to solve this problem we have developed the program for selection of the F3 layer characteristics in the equatorial ionosphere from the simulation results. This program enables a thorough analysis of the additional layers behavior over Jicamarca, Peru. The most important aspect of our study was the determination of the F3 layer appearance and disappearance. Therefore it was necessary to create and realize the algorithm of allocation the F3 layer existence periods with certain sensitivity. Such an approach provided to get graphics options of the regular F2 layer and the additional F3 layer (critical frequency, height, and electron density in their peaks). Our results clearly illustrate the process of the near-equatorial F2 layer stratification during geomagnetic storm. In this study we discuss the influence of geomagnetic storm on the F3 layer formation, existence and disappearance. In addition we compare the peak parameters of the regular F2 layer and the additional F3 layer.
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