Effect of geomagnetic storm conditions on the equatorial ionization anomaly and equatorial temperature anomaly.

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The effect of the geomagnetic storm on the equatorial ionization anomaly (EIA) and equatorial temperature anomaly (ETA) has been studied using the atomic oxygen dayglow emissions at 577.7 nm (OI 557.7 nm) and 732.0 nm (OII 732.0 nm). For the purpose of this study, four intense geomagnetic storms during the ascending phase of solar cycle 24 have been considered. This study is primarily based on the results obtained using photochemical models with necessary inputs from theoretical studies and experimental observations. The latest reaction rate coefficients, quantum yields and the corresponding cross-sections have also been incorporated in these models. The volume emission rate of airglow emissions has been calculated using the neutral densities from NRLMSISE-00 and charged densities from IRI-2012 model. The modeled volume emission rate (VER) for OI 557.7 nm shows a positive correlation with the Dst index at 150 km and negative correlation with Dst at 250 and 280 km altitudes. Latitudinal profile of the greenline emission rate at different altitudes show a distinct behaviour similar to what has been observed in EIA with crests on either sides of the equator. The EIA crests are found to show poleward movement in the higher altitude regions. The volume emission rate of 732.0 nm emission shows a strong enhancement during the main phase of the storm. The changes observed in the airglow emission rates are explained with the help of variations induced in neutral densities and parameters related to EIA and ETA. The latitudinal variation of 732.0 nm emission rate is correlated to the variability in EIA during the storm period.

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