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Ionospheric storm due to solar Coronal mass ejection in September 2017 over the Brazilian and African longitudes

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Abstract

Coronal mass ejection (CME) occurs when there is an abrupt release of a large amount of solar plasma, and this cloud of plasma released by the Sun has an intrinsic magnetic field. In addition, CMEs often follow solar flares (SF). The CME cloud travels outward from the Sun to the interplanetary medium and eventually hits the Earth's system. One of the most significant aspects of space weather is the ionospheric response due to SF or CME. The direction of the interplanetary magnetic field, solar wind speed, and the number of particles are relevant parameters of the CME when it hits the Earth's system. A geomagnetic storm is most geo-efficient when the plasma cloud has an interplanetary magnetic field southward and it is accompanied by an increase in the solar wind speed and particle number density. We investigated the ionospheric response (F-region) in the Brazilian and African sectors during a geomagnetic storm event on September 07–10, 2017, using magnetometer and GPS-TEC networks data. Positive ionospheric disturbances are observed in the VTEC during the disturbed period (September 07–08, 2017) over the Brazilian and African sectors. Also, two latitudinal chains of GPS-TEC stations from the equatorial region to low latitudes in the East and West Brazilian sectors and another chain in the East African sector are used to investigate the storm time behavior of the equatorial ionization anomaly (EIA). We noted that the EIA was disturbed in the American and African sectors during the main phase of the geomagnetic storm. Also, the Brazilian sector was more disturbed than the African sector.

Keywords: Space weather; Geomagnetic storm; Ionospheric storm; Geomagnetic field; TEC

1. 1Introduction

The complexity of the ionospheric electrodynamics over the equatorial and low latitudes regions is due to several phenomena that drive its space–time variation, such as

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