



SACRED
HEART
COLLEGE
Autonomous



Thevara, Kochi 682 013, Kerala, India, Tel: 0484-2663380, 2870500
Email: office@shcollege.ac.in; www.shcollege.ac.in

Paper Serial No: 116

Serial Number	116
Title of paper	Effects of the intense geomagnetic storm of September–October 2012 on the equatorial, low-and mid-latitude F region in the American and African sector during the unusual 24th solar cycle
Name of the author/s	de Jesus R, P.R. Fagundes, A. Coster, O.S. Bolaji, J.H.A. Sobral, I.S. Batista, A.J.de Abreu, K.Venkatesh, M. Gende, J.R .Abalde, S.G.Sumod
Department of the teacher	Physics
Name of journal	Journal of Atmospheric Solar Terrestrial Physics
Year of publication	2016
ISSN number	1364-6826

Dr. Jose John
Principal in Charge
Sacred Heart College (Autonomous)
Thevara, Kochi-682 013



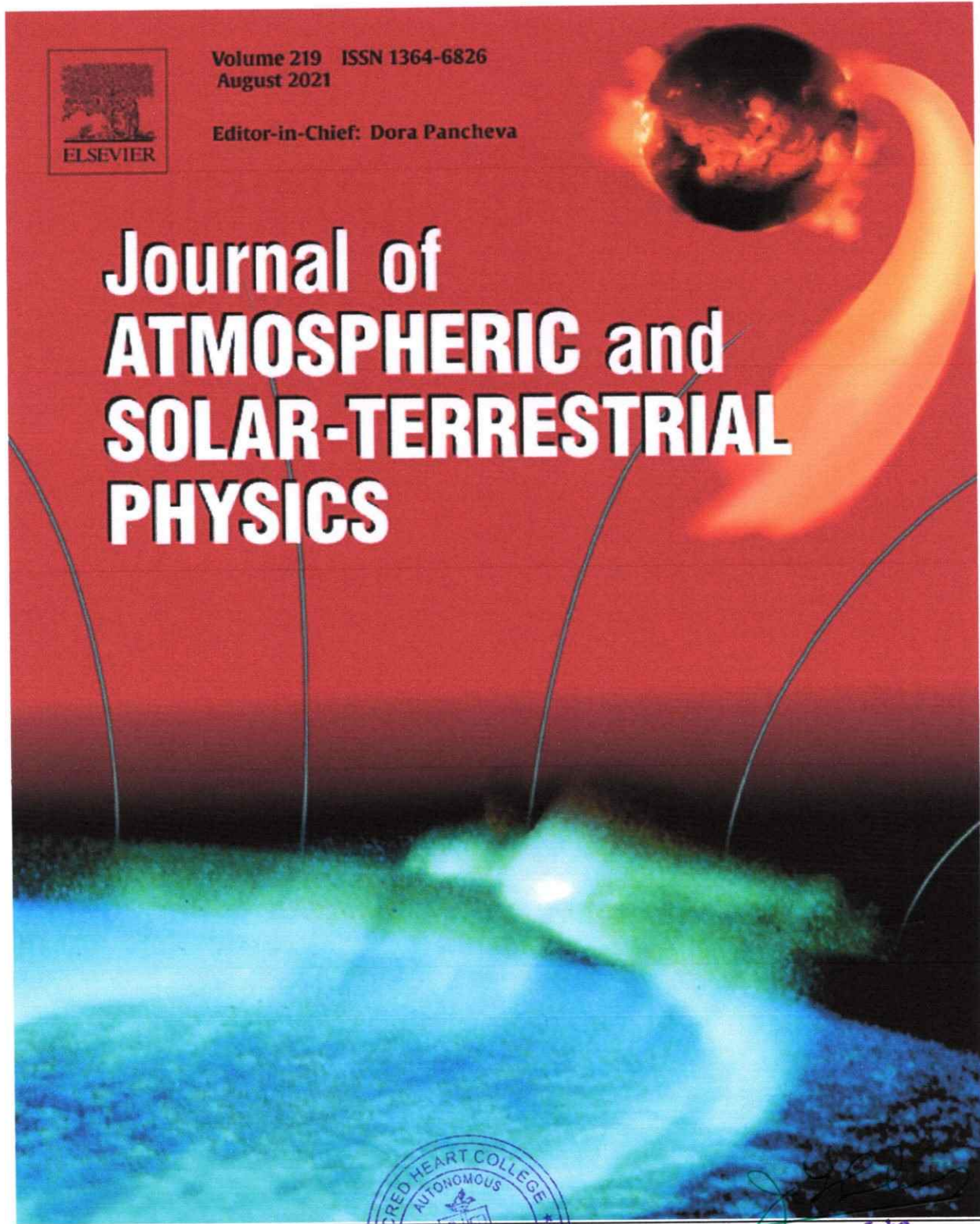


**SACRED
HEART
COLLEGE**
Autonomous



Thevara, Kochi 682 013, Kerala, India, Tel: 0484-2663380, 2870500
Email: office@shcollege.ac.in; www.shcollege.ac.in

Cover Page of the Paper (Serial Number: 116)



Volume 219 ISSN 1364-6826
August 2021

Editor-in-Chief: Dora Pancheva

**Journal of
ATMOSPHERIC and
SOLAR-TERRESTRIAL
PHYSICS**



Dr. Jose John
Principal in Charge
Sacred Heart College (Autonomous)
Thevara, Kochi-682 013

College with Potential for Excellence (CPE) & Accredited at A level by NAAC, Thevara, Kochi-682 013

First Page of the Paper (Serial Number: 116)

Journal of Atmospheric and Solar-Terrestrial Physics 138-139 (2016) 93-105



Contents lists available at ScienceDirect

Journal of Atmospheric and Solar-Terrestrial Physics

journal homepage: www.elsevier.com/locate/jastp



Research paper

Effects of the intense geomagnetic storm of September–October 2012 on the equatorial, low- and mid-latitude F region in the American and African sector during the unusual 24th solar cycle



R. de Jesus^{a,d,*}, P.R. Fagundes^a, A. Coster^b, O.S. Bolaji^c, J.H.A. Sobral^d, I.S. Batista^d,
A.J. de Abreu^{a,e}, K. Venkatesh^a, M. Gende^f, J.R. Abalde^a, S.G. Sumod^g

^a Universidade do Vale do Paraíba /IP & D, São José dos Campos, SP, Brazil

^b Haystack Observatory, Massachusetts Institute of Technology (MIT), Westford, Massachusetts, USA

^c Department of Physics, University of Lagos, Akoka, Lagos, Nigeria

^d Instituto Nacional de Pesquisas Espaciais (INPE), São José dos Campos, SP, Brazil

^e Instituto Tecnológico de Aeronáutica (ITA), Divisão de Ciências Fundamentais, São José dos Campos, SP, Brazil

^f Facultad de Ciencias Exactas e Ingeniería, Universidad Nacional de La Plata, La Plata, Argentina

^g S.H. College Thevara, Kochi-13, Mahatma Gandhi University, India

ARTICLE INFO

Article history:

Received 8 May 2015

Received in revised form

7 December 2015

Accepted 29 December 2015

Available online 30 December 2015

Keywords:

Space weather

Geomagnetic storm

Ionosphere

Ionospheric irregularities

ABSTRACT

The main purpose of this paper is to investigate the response of the ionospheric F layer in the American and African sectors during the intense geomagnetic storm which occurred on 30 September–01 October 2012. In this work, we used observations from a chain of 20 GPS stations in the equatorial, low- and mid-latitude regions in the American and African sectors. Also, in this study ionospheric sounding data obtained during 29th September to 2nd October, 2012 at Jicamarca (JIC), Peru, São Luis (SL), Fortaleza (FZ), Brazil, and Port Stanley (PST), are presented. On the night of 30 September–01 October, in the main and recovery phase, the h'F variations showed an unusual uplifting of the F region at equatorial (JIC, SL and FZ) and mid- (PST) latitude stations related with the propagations of traveling ionospheric disturbances (TIDs) generated by joule heating at auroral regions. On 30 September, the VTEC variations and foF2 observations at mid-latitude stations (American sector) showed a long-duration positive ionospheric storm (over 6 h of enhancement) associated with large-scale wind circulations and equatorward neutral winds. Also, on 01 October, a long-duration positive ionospheric storm was observed at equatorial, low- and mid-latitude stations in the African sector, related with the large-scale wind circulations and equatorward neutral winds. On 01 and 02 October, positive ionospheric storms were observed at equatorial, low- and mid-latitude stations in the American sector, possibly associated with the TIDs and an equatorward neutral wind. Also, on 01 October negative ionospheric storms were observed at equatorial, low- and mid-latitude regions in the American sector, probably associated with the changes in the O/N₂ ratio. On the night of 30 September–01 October, ionospheric plasma bubbles were observed at equatorial, low- and mid-latitude stations in the South American sector, possibly associated with the occurrence of geomagnetic storm.

© 2015 Elsevier Ltd. All rights reserved.

1. Introduction

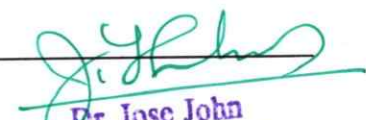
A geomagnetic storm is the result of the energy transfer from the solar wind to the magnetosphere (Gonzalez and Tsurutani, 1987; Tsurutani et al., 1997). There is a strong relationship between the occurrence of geomagnetic storms and ionospheric disturbances. The responses of ionosphere–thermosphere system

in the mid-latitude region during geomagnetic storms have been extensively documented, during solar cycles 21, 22 and 23 (e.g., Proiss and Jung, 1978; Yeh et al., 1991; Pavlov, 1994; Richards and Wilkinson, 1998; Foster and Rich, 1998; Huang et al., 2003; Keskinen et al., 2004; Foster and Rideout, 2005; Basu et al., 2005; Annakuliev et al., 2005; Foster et al., 2007; Basu et al., 2008; Borries et al., 2009; Heelis et al., 2009 and references therein). Other investigators have studied the ionospheric response of equatorial and low-latitude F region during geomagnetic storms in solar cycles 21, 22 and 23 (e.g., Batista et al., 1991; Fejer and Scherliess, 1997; Abdu, 1997; Sobral et al., 1997; Abdu et al., 1998; Reddy and Mayr, 1998; Sobral et al., 2001; Batista et al., 2006; de

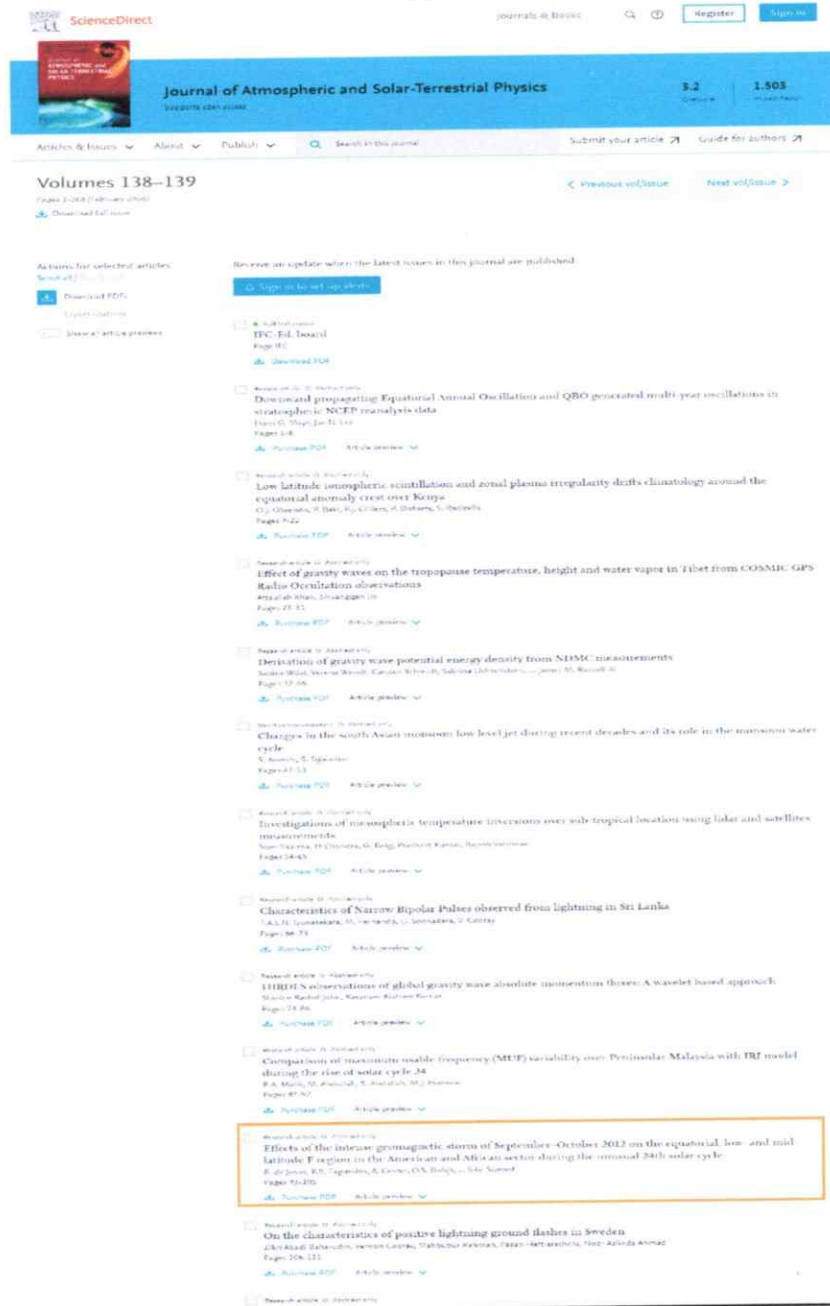
* Correspondence to: Av. Shishima Hifumi, 2911, Urbanova, 12244-000 São José dos Campos, SP, Brazil.
E-mail address: jesus.rodolfo@hotmail.com (R. de Jesus).

<http://dx.doi.org/10.1016/j.jastp.2015.12.015>
1364-6826/© 2015 Elsevier Ltd. All rights reserved.




Dr. Jose John
Principal in Charge
Sacred Heart College (Autonomous)
Thevara, Kochi-682 013

Page 2 (Contents Page) of the Journal (Serial Number: 116)



The screenshot shows the ScienceDirect website for the Journal of Atmospheric and Solar-Terrestrial Physics. The page displays the journal's title, volume information (Volumes 138-139), and a list of articles. The article titled "Effects of the intense geomagnetic storm of September-October 2012 on the equatorial low- and mid-latitude F region in the American and African sector during the unusual 24th solar cycle" is highlighted with a red box. The article is authored by R. de Jesus, R.S. Aguiar, A. Gouveia, D.S. Batista, and S.R. Siqueira, and spans pages 91-106.

Certified that the above scanned images of cover page, first page of the paper and page 2 of the journal pertain to the paper submitted as Sl. No: 116 in the uploaded document of key indicator 3.4.3.



Dr. Jose John
Dr. Jose John
Principal in Charge
Sacred Heart College (Autonomous)
Thevara, Kochi-682 013