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REVIEWER'S REPORT

Manuscript No.: IJAR-55502

Title: Variability of Total Electron Content (TEC) during Four Major Geomagnetic Storms of 2012Â–2014: A Multisite Analysis at Fixed Longitudes

Recommendation:

Accept as it is .....

Accept after minor revision.....

Accept after major revision .....

Do not accept (*Reasons below*) .....

Rating	Excel.	Good	Fair	Poor
Originality		Good		
Techn. Quality		Good		
Clarity		Good		
Significance		Good		

Reviewer Name: Dr Thirunahari Ugandhar

Detailed Reviewer's Report

The manuscript entitled **"Variability of Total Electron Content (TEC) during Four Major Geomagnetic Storms of 2012–2014: A Multisite Analysis at Fixed Longitudes"** presents a thorough and well-structured investigation of ionospheric responses to major geomagnetic storms during solar cycle 24. Overall, the study is scientifically sound, clearly written, and makes a valuable contribution to space weather and ionospheric research. I strongly recommend it for publication after minor editorial polishing.

Strengths of the Manuscript

1. **Originality and Relevance**

   The focus on the **Europe–Africa–Antarctic longitudinal sector (20°E–40°E)** fills an important geographical gap in storm-time TEC studies, which are often biased toward American and Asian sectors.

   The multisite, fixed-longitude approach provides new insights into **interhemispheric and latitudinal variability** of VTEC during geomagnetic storms.

2. **Robust Data and Methodology**

   The use of **13 well-distributed GNSS stations** covering low, mid, and high latitudes ensures strong spatial coverage.

   The adoption of the **five quietest days of each month** as a reference is appropriate and consistent with established literature.

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Integration of **solar wind parameters, geomagnetic indices (Dst, SYM/H, AE, Kp), GNSS-derived VTEC, and GUVI O/N_2 data** significantly strengthens the physical interpretation.

3. **Comprehensive Analysis**

   The combined use of **station-based time series, spatio-temporal VTEC maps, and relative ΔVTEC (%) maps** offers both local and regional perspectives.

   The event-by-event discussion is detailed and logically organized, clearly distinguishing between positive and negative ionospheric storm phases.

4. **Physical Interpretation**

   The explanations based on **PPEF, DDEF, travelling atmospheric disturbances (TADs), neutral winds, and thermospheric composition changes (O/N_2)** are well justified and supported by previous studies.

   The discussion of **seasonal and interhemispheric asymmetries** is particularly strong and demonstrates a deep understanding of ionosphere–thermosphere coupling.

5. **Clarity and Structure**

   The manuscript is well organized, with a clear flow from introduction to data, methods, results, and interpretation.

   Figures and tables are appropriately referenced and effectively support the text.

Minor Suggestions (Optional Improvements)

A **summary table** comparing the key ionospheric features (positive/negative phase, latitude of maximum response, dominant mechanisms) across the four storms could further enhance readability.

Minor **language polishing** (e.g., consistency in tense and small grammatical refinements) may be done during final proofreading, but this does not detract from the scientific quality.

Overall Recommendation

This is a **high-quality and well-executed study** that significantly advances understanding of storm-time TEC variability over the Europe–Africa sector. The methodology is rigorous, the analysis is comprehensive, and the interpretations are physically meaningful.

I recommend this manuscript for publication with minor editorial revisions.