

Space weather monitoring and data analysis

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Space weather is a branch of near-Earth space physics that studies the impact of the solar wind on the Earth and its various layers (magnetosphere, ionosphere, thermosphere, and exosphere), as well as on biological systems and humans. Furthermore, investigating this subject is crucial for the safety of satellite technologies, as well as for communication and electrical power systems on Earth.

In this work, strong geomagnetic storms of 2024 (March 3, March 24, and May 11) are analyzed. The study is based on the investigation of the interaction between the horizontal component of the Earth's magnetic field, B_H , obtained from the Dusheti Geomagnetic Observatory, and solar wind parameters such as dynamic pressure, P , plasma beta coefficient, β_p , the interplanetary magnetic field B_{imf} , and its components - B_x , B_y , B_z . Particular attention is given to the storm of May 11, 2024, which was the most powerful in the last two decades.

Correlation, wavelet-coherence, and multifractal analysis methods are employed for the study. This research confirms the reliability of local geomagnetic data for studying local responses during global space weather events in Georgia. The results obtained will contribute to the improvement of geomagnetic storm prediction models.

References

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