

Dear Reviewer

Thank you very much for your invaluable time.

Manuscript Title: Empirical Evidence of Spurious Correlations Among Space Weather Variables

Recommendation: Major Revision

We are quite willing to take a comprehensive review of the manuscript. Many thanks for giving us the opportunity to do that.

Major Comments

- The methodology for removing solar-cycle oscillations is insufficiently described. A clear mathematical description of the filtering procedure is required for reproducibility.

You are right. We will pay adequate attention to it when revising the manuscript.

- Autocorrelation and non-stationarity in time-series data are not adequately addressed. This may itself produce spurious regression results.

We shall also take care of this during the revision.

- The dramatic change in FD counts before and after filtering requires deeper justification and sensitivity analysis.

Detailed attention will be given to this before submitting the revised manuscript.

- The manuscript relies heavily on p-values without sufficient discussion of effect sizes and physical interpretation.

Thanks for the observation. We will take this into account in the revision.

- The claim of identifying spurious correlations should be moderated unless robustness tests (e.g., bootstrapping, cross-validation) are provided.

We will review the manuscript in view of the above comments.

- Only Solar Cycle 23 is analyzed. Extending to additional cycles would strengthen generalizability.

Thank you. The result of this will be presented in the revised manuscript.

- There is an inconsistency between the discussion of advanced methods (e.g., mutual information, AI) and the actual application of linear regression only.

We shall correct this in the revision.

Minor Comments

- Several grammatical and typographical errors require correction.

We will correct the grammar and typos.

- Table numbering should be carefully checked for consistency. Some references appear duplicated, and formatting should be standardized.

We have noted this and will take care of it in the revision.

Definitions of acronyms (e.g., SI, SSN) should be standardized at first use. Figures would benefit from additional quantitative statistical descriptors.

We agree to address the comments above in the revision.

Overall Assessment

The manuscript addresses an important problem in space weather analysis, namely, the potential inflation of correlations due to long-term solar-cycle modulation. The study presents interesting findings and may have a substantial impact after methodological strengthening. However, significant revisions are required to improve statistical rigor, reproducibility, and clarity of interpretation before the work can be considered for publication.

We are indebted to you for your pointers. We will do a comprehensive revision of the manuscript.

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