Author's response to reviewer comments – Long term monitoring of the geoelectric field in the UK 2012-2024

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Reviewer comments noted in *italics*, response in normal text.

Reviewer RC1 - István Lemperger

Minor suggestion: Figures 6–11 are crucial, but the narrative could benefit from grouping the spectral analysis figures (Figures 7–8, 10–11) into composite panels for compactness. Just a recommendation.

We agree with this assessment and have condensed these down to composite figures 7 and 9.

Modified individual panels to the combined panels on lines 245 and 315

There is no mention of separate supplementary materials. However, the description of data availability (e.g., via ESA space weather portal) is sufficient for transparency. Providing links to design schematics or PCB layouts in supplemental material might further enhance reproducibility.

It is our intention to upload these schematics as open hardware, however we are in discussion with BGS' intellectual property team on the proper way of making these schematics available in line with institute policy. We currently plan to host the schematics on an open-access BGS or NERC platform and link to them from the electric field product website.

1.1. Cross-Talk Due to Misalignment at ESK

Issue: The paper mentions a ~12° misalignment at ESK leading to ~20% cross-coupling (Section 5), but stops short of quantifying its impact on the long-term dataset.

Suggestion: Include a rough estimate or preliminary analysis of how much this misalignment might bias tidal studies or storm response data.

We agree that a small amount of initial analysis would be useful, although prior to more detailed investigations we don't want to publish anything that may not be substantiated in the future.

Lines 476-481: We have included some additional, preliminary analysis on how we think this might affect the data and why. This helped clarify to us that magnetic vector direction of the storm would affect how severe the distortion of the data would be.

1.2. Filter Design Parameters

Issue: The filtering is critical in dealing with anthropogenic noise, but only the type (low-pass, 5 Hz) is mentioned.

Suggestion: Please add the filter order (e.g., Butterworth, Bessel?) and analog vs digital implementation details. This improves reproducibility and transparency for others aiming to replicate the design.

Agreed, this adds to the reproducibility of the design.

Line 229-231: We have added the requested information around the filter response, order and analogue electronics implementation.

2. Small Technical or Editorial Corrections Typographical / Stylistic Issues

"In areas where one electrode becomes waterlogged this can cause..." → insert a comma after "waterlogged".

Line 398: Comma added

A few places use "this required mitigation" repeatedly. Vary phrasing or tighten wording (e.g., "mitigated by…").

Line 365, Line 466: Agreed. We have replaced several instances of mitigated (or similar) with suitable synonyms or more precise terminology.

In line 428, you mention O1 — could this be a typo? Should it perhaps be M1?

This is the correct notation. O_1 is used to define the Lunar diurnal tide caused by the Moon's gravitational pull, with a period of 25.82 hours.

In line 472: Locationthat

Space added

3.1. Instrument Calibration and Inter-site Consistency

- *Missing: The paper does not state how consistency between sites was validated after each hardware upgrade.*
- *Suggestion: Add a sentence about whether cross-calibration or inter-site comparison (e.g., response to shared storms) was done to ensure uniformity in measurements.*

We agree this would be useful. Our inter-site comparison process isn't complicated but does confirm the site is working and responding to space weather so we should include it.

Line 153: Added a short description of our process of comparing upgraded sites to working existing sites.

3.2. Power Backup or Data Gaps

Missing: No mention of backup power, data loss handling, or system uptime statistics.

Suggestion: One sentence on whether power outages caused downtime or how data continuity is ensured (e.g., battery backup, local buffering) would close this small gap.

Agreed, this is an easily missed step in ensuring data continuity so should be included.

Line 260-264: Added additional information about the power and data backup systems.

Reviewer RC3 – Anonymous

In the Introduction: please, use either "GIC" or "GICs". You first use "GIC" abbreviation: "Geomagnetically Induced Currents (GIC)". You can continue using "GIC" hereinafter.

Line 31-50: Agreed, amended GICs to GIC for consistency

Instead of the "ESA Space Weather portal", you can use the official name "ESA Space Weather Service Network" and provide the link: https://swe.ssa.esa.int

Thank you for the correction. The link to the ESA service is also worth including.

Line 447: Corrected name of ESA Space Weather Service Network and added the link to the service in the text body.