

Dear Referee #2:

Their comments were pertinent to improving our manuscript, for which we are very grateful. Below are the responses to each of their observations in blue and the text that will be added to the manuscript is in red.

The paper emphasizes important problem to studying long-term trends in the critical frequency foF2, which are the regional anomalies, specifically the region of the Weddell Sea Anomaly (WSA).

I have found the main conclusions well documented, but would suggest to reconsider some statements as indicated below:

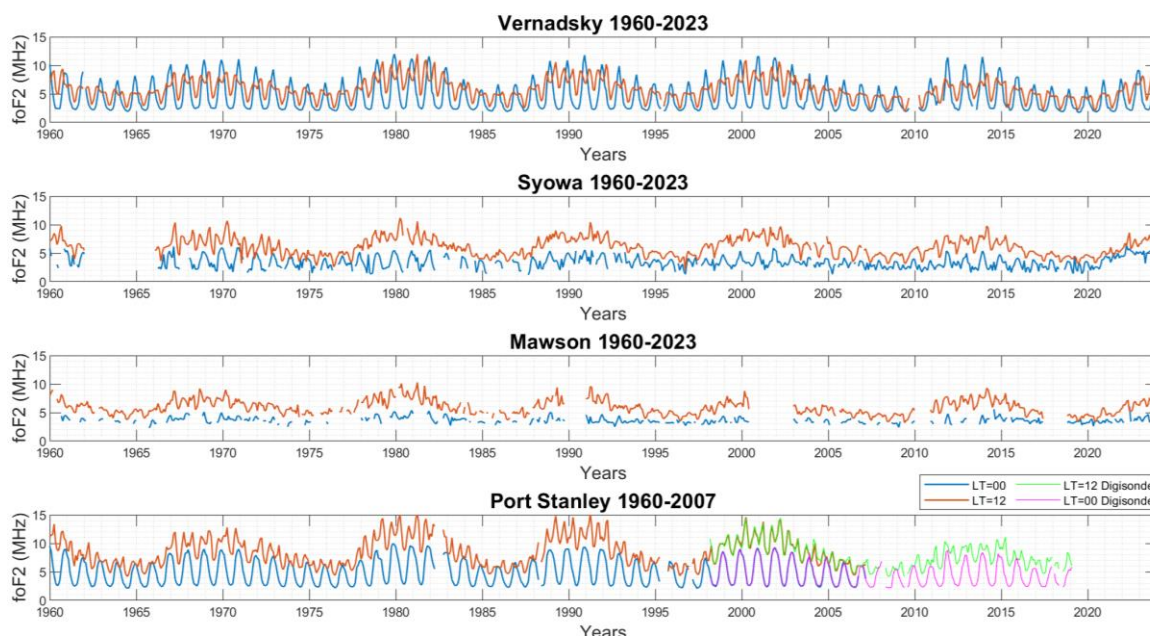
1. 31 We detected two ionosondes -> We used two ionosondes
Done.
2. 58 The extensive dataset of monthly median foF2 from the Vernadsky ionospheric station, covering the period from 1996 to 2023. -> add at the end "was built by including:"
It has to be noted in the manuscript that most of the data were not manually scaled or evaluated, which can introduce significant errors even when using foF2 parameter which is well known even for modern digisondes operated at mid-latitudes. For ionosondes operated at polar cap or auroral ionospheric regions, the foF2 parameter is even less reliable.

(it is not enough to be noted as per line 89: "Possible deficiencies and missing data from these stations are presumed to be due to their proximity to the auroral oval, a highly dynamic region where geomagnetic conditions can significantly interfere with ionospheric measurements." which is only explaining missing F-region data due to ionospheric absorption)

New text has been added after the table to clarify that most of the data is manually scaled except for some time intervals at Port Stanley and Mawson stations. "It should be noted that most of the data are manually scaled. In particular, the year intervals used for Vernadsky and Syowa are entirely manually scaled. While for Mawson and Port Stanley, they are a combination of manual and autoscaling, the latter method has only been used for a little over

a decade. Furthermore, the significant errors introduced by this combination should be reduced by using monthly medians.”

The figure below shows the consistency between the ionosonde and digisonde data for Port Stanley, even during a period where the two series intersect. The high variability of the auroral stations (Syowa and Mawson) can also be seen. Although Syowa is entirely manually scaled and Mawson only partially, both appear to behave similarly regardless of the scaling method.



3. random noise inherent in any real-time series -> random noise inherent in any physically measured series

Done.

4. 120> Figure 3 illustrates a strong solar and geomagnetic dependence at Vernadsky during all hours in the summer, but only during daylight hours (08:00-19:00 LT) for the rest of the year. This is likely due to the presence of the WSA in the summer months

I don't agree and have to suggest here that it could be simply due to polar-night effect (where there is long-term missing solar illumination of ionosphere around June at Vernadsky and other Antarctic stations, while Port Stanley is normal mid-lat station.)

You are right. The sentences was modified including the polar night effect.

“The Antarctic stations (Vernadsky, Syowa, and Mawson) show low to almost zero correlations during winter nights due to the polar night effect. This also occurs during summer nights, with the exception of Vernadsky, which shows a high correlation during these months, probably due to the presence of the WSA.”

5. Figure 4 - "Dashed black line is with 95% significance." As it is not very clear which areas are then significant and which not (which could be inferred only from the text), I'd suggest to make those not significant ones with lower hue/contrast (as those are not very relevant anyway).

Transparent white areas were added to Figure 4 and represent non-significant trends to make it easier for the reader.

6. 140: Such a pattern is not observed at the Syowa and Mawson stations, which, despite their proximity (140 23° longitude apart), show significantly different trends from each other

-> replace the part "despite their proximity (23° longitude apart)" by something like due to their differing prevailing placements within auroral and polar cap ionosphere, respectively,...

Done