

Thank you very much for your valuable comments on our manuscript, and our responses are listed below.

Question 1:

On line 33, “atmospheric field” should be replaced by “atmospheric electric field”;

Reply:

We have corrected the problem you mentioned in the manuscript. In accordance with the principle that the first occurrence is indicated by ‘atmospheric electric field’ and the rest of the text by ‘AEF’, the problem is also searched and corrected in the full text.

Question 2:

On line 33, “non-thunderstorm or sunny areas” is not correct. Even in the absence of thunderstorms but the presence of charged clouds or haze, the atmospheric electric field may be negative. This statement could be considered to be changed to "undisturbed fair areas".

Reply:

We have corrected the problem you mentioned in the manuscript.

Original text: ‘In the background of GEC, a direct current (DC) atmospheric field with an amplitude of around 130 V/m is always present in global non-thunderstorm or sunny areas (Sun,1987).’

Revised version: ‘In the background of GEC, a direct current (DC) [atmospheric electric field](#) with an amplitude of around 130 V/m is always present in [undisturbed fair areas](#) (Sun,1987).’

Question 3:

On lines 101-103, the detailed differences between these two types of instruments should be elaborated in more detail.

Reply:

Original text: ‘The GAR, GUZ and SWG were deployed by National Space Science Centre of Chinese Academy of Sciences with instrument EMF-100 (Li, 2022), and the LES was deployed by China University of Geosciences (Wuhan) with instrument CS110 (Chen et al.,2021).’

Revised version: ‘The GAR, GUZ and SWG were deployed by National Space Science Centre of Chinese Academy of Sciences with instrument EMF-100 (Li, 2022), [this type of instrument is independently developed by the Chinese Academy of Sciences, with a range of \$\pm 50 \text{ kV m}^{-1}\$, relative accuracy of \$\pm 1 \%\$ and resolution of \$10 \text{ V m}^{-1}\$](#) . The LES was deployed by China University of Geosciences (Wuhan) with instrument CS110 (Chen et al.,2021), [which has a range of \$\pm 21.2 \text{ kV m}^{-1}\$, a relative accuracy of \$\pm 1 \%\$, and a resolution of \$3 \text{ V m}^{-1}\$](#) .