Thank you for your valuable comments. We fully acknowledge your suggestions and have revised the paper accordingly. On behalf of all the authors, I would like to respond to you as follows:

RC1

Question 1:

Figure 2. It is not clear if the figure represents a typical day of FW-AEF or a daily mean curve.

Reply:

The FW-AEF curve in Fig. 2 represents the AEF curve that can reflect the local natural state (i.e., fair weather), which is calculated from a large number of filtered historical data. The FW-AEF curve exhibits the characteristics of a cycle in cyclical change (i.e., 24 hours), instead of a typical day of FW-AEF or a daily mean curve. For the AEF sites, the frequency of actual data acquisition is relatively high, and we have made smooth operations (5-min-mean FW-AEF). In the main text, we have stated the period of the data used from each site in the process of screening the fair-weather conditions, and the AEF data that conform to FW-AEF conditions were selected to be summed and then averaged to get the diurnal variation of FW-AEF curve of the site.

Question 2:

Lines 172-175. Among magnetic indices, only Dst is used. However, some penetrating field currents can appear in middle latitudes on occasion of some aurora activity. It would be more conservative to consider also AE index. When it is lower than 100, it is practice to neglect the presence of that kind of currents. Could you please check if AE is lower than 100 in the period of interest?

Reply:

Thank you for your suggestions. Here we added the changes of AE index from 0:05 on 22 August, 2023 to 23:55 on 5 September, 2023, with the temporal resolution of 10 mins, which are derived from the Space Environment Prediction Center (SEPC) (Luo et al., 2013). It is suggested that the ring current is energized occasionally by the injection of particles from even the sub-auroral latitudes along the earth's magnetic field lines (Rastogi, 2005), and the AE index can characterize the strength of magnetic sub-bursts in the polar regions (Davis et al., 1966). In Fig. 3(a), the SSN is still the value of the daily change, and the Dst was changed to the value of the hourly variation. AE < 100 nT represents the calm activity of the polar area magnetic substorms, while AE=100-300 nT represents modest activity of the polar area magnetic substorms. When AE > 300 nT, the magnetic storm activity in the polar region is intense (Li et al., 2010).

The AE index remained essentially <100 nT from 12:00 on 22 August to 24:00 on 27 August, so the polar region magnetic storm activity was weak during that period and its effect on the AEF can be ignored. The AE was higher in other periods, some of which even reached >1000 nT, such as on 4 September. Two of the four identified anomalies in the manuscript occurred in the quiet period of polar magnetic storm activity (8/22 20:00-23:00 at LES, 8/24 13:00-15:00 at GAR), while the other two appeared within 4 hours before the EQ and disappeared after the EQ. Since the AE showed a higher value after 27 August, the AEF anomalies in the four hours before the EQ did not match with the high AE value in time. Therefore, even if AE fluctuated, the effect on AEF near the epicenter was very limited, being unable to cause the AEF anomalies. All the information will be added in the

revised version.

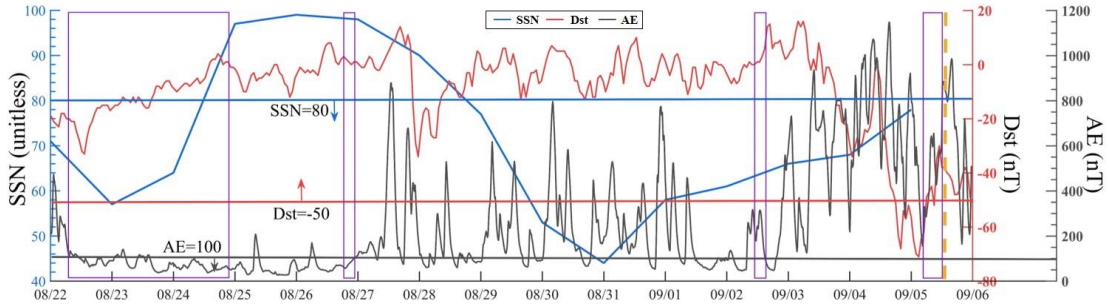

Figure.3(a) Changes in SSN (blue), Dst (red) and AE (grey) from 22 August to 5 September. Horizontal thick lines of different colors indicate the thresholds of geomagnetic and solar activity for quiet periods represented by the corresponding indices, where the direction of the arrows represents a weakening of activity intensity. The orange dashed line represents the moment of the EQ's onset, and the purple solid box represents the periods of the AEF anomalies.

AE data was also added to Table 2 (Multi-source data for anomaly discrimination).

Table 2. Multi-source data for anomaly discrimination.

Data name	Data source	Temporal Resolution	Spatial Resolution	Unit
Low cloud cover	ERA5	1 h	0.25° ×0.25°	/
Cloud base height				km
Total Precipitation				mm
10m/100m Wind speed				m/s
Dst	WDC	1 h	/	nT
AE	SEPC	10 mins	/	nT
Sunspot number	ESA	1 d	/	/
Microwave brightness temperature	AMSR-2	1 d	50 km×50 km	K
Surface soil moisture	GLDA V.2.1	3 h	0.25°×0.25°	kg/m2

Rastogi, R. G.: Magnetic storm effects in H and D components of the geomagnetic field at low and middle latitudes, J. Atmos. Sol.-Terr. Phys., 67, 665-675, https://DOI10.1016/j.jastp.2004.11.002, 2005.

Davis, T. N., and Sugiura, M.: Auroral electrojet activity index AE and its universal time variations, J. Geophys. Res., 71, 785-801, https://agupubs.onlinelibrary.wiley.com/doi/epdf/10.1029/JZ071i003p00785?saml_referrer, 1966.

Luo, B. X., Li, X. L., Temerin, M., and Liu, S. Q.: Prediction of the AU, AL, and AE indices using solar wind parameters, J. Geophys. Res.: Space Phys., 118, 7683-7694, https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2013JA019188, 2013.

Li, W., Thorne, R. M., Bortnik, J., Nishimura, Y., Angelopoulos, V., Chen, L., McFadden, J. P., and Bonnell, J. W.: Global distributions of suprathermal electrons observed on THEMIS and potential mechanisms for access into the plasmasphere, J. Geophys. Res.: Space Phys., 155, A00J10, https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2010JA015687, 2010.

Question 3:

It shows at its top panel the daily mean values of Dst and SSN. However, this value for Dst is not appropriate and cannot well characterize the level of magnetic activity. It would be more appropriate its hourly value.

Reply:

This issue was corrected accordingly in Fig.3(a) in response to Question 2 by converting Dst daily averages to hourly variations. The Dst > -50 nT and < -30 nT represents weak magnetic storm activity, Dst > -100 nT and < -50 nT represents moderate magnetic storm activity (Loewe et al., 1997). Compared with the daily mean Dst, the hourly values are more representative of the magnitude of the intensity of magnetic storm activity at low latitudes. Except for the period from 18:00 on 4 September to 06:00 on 5 September, all other time periods have Dst greater than -50 nT, which represents that the magnetic storm activity in the low-latitude region is weaker in these time periods, and the effect of this type of activity on the AEF can be ignored.

Loewe, C. A., and Prölss, G. W.: Classification and mean behavior of magnetic storms, J. Geophys. Res.: Space Phys., 102, 14209-14213, https://agupubs.onlinelibrary.wiley.com/doi/pdf/10.1029/96JA04020, 1997.

Question 4:

How did you define the 0 value of AEF?

Reply:

First of all, AEF is a vector, the AEF values measured at the site are the vector superposition of all the AEFs in the detection range. A value of zero does not mean that the electric field no longer exists, it represents that the electric field strength at a certain location at a certain time is zero. Secondly, the zero value may be caused by the presence of an additional electric field of equal magnitude but opposite direction, thus counteract the original AEF. The AEF zero value line in Fig.3 is able to better identify negative AEF anomalies. This information will be explained in the revised version.