Reply on RC1

Suqin Zhang et al.

Author comment on "Rescue and quality control of historical geomagnetic measurement at SheShan Observatory, China" by Suqin Zhang et al., Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2022-203-AC9, 2022

Referee #2:

This paper details the rescue and quality control of historical data at SSH observatory. As an application of the data set, the phenomenon of geomagnetic jerk is analyzed. This work has important reference significance for the processing and quality evaluation of observation data, and the rescued data is important in the study of geomagnetic field and its secular variation.

Thank you very much for your affirmation and valuable suggestions on our work.

Here are some suggestions for revisions of the manuscript:

Comment: It is suggested to give the specific algorithms for some calculations in the manuscript, such as FTD.

Response: Thank you for your useful advice. We have give the specific algorithms for some calculations in the manuscript.

For all data series, the FTD is calculated as

$$ t \text{(hour)} = \frac{(X \text{(hour)} - X \text{(hour-1)})}{1} \tag{2} $$

Where $X$ is geomagnetic field components D, H and Z.

Comment: The manuscript said that the homogeneity of corrected data has been greatly improved. Can you quantify it?

Response: Inter-comparison of geomagnetic elements time series from adjacent observatories is an important method to test accuracy and stability of data (Curto and Marsal, 2007). We compared the data of SSH before and after correction with those data from COM which is the nearest observatory from SSH. The differences of the three components before correction are: $\Delta D$ varies between -1.0 min and 2.4 min, $\Delta H$ varies between -2 nT and 14 nT, and $\Delta Z$ varies between -46 nT and 19 nT. The differences of the three components after correction are: $\Delta D$ varies between -0.3 min and 1.3 min, $\Delta H$ varies between -7 nT and 24 nT, and $\Delta Z$ varies between -20 nT and 4 nT. The standard deviations of the differences of the three components before correction are: 1.1 min, 3 nT
and 20 nT. The standard deviations of the differences of the three components after correction are: 0.3 min, 3 nT and 3.3 nT.


**Comment:** Using the COV-OBS model for comparative analysis, can you explain the reasons for choosing this model?

**Response:** The geomagnetic field model COV-OBS.x2 covers the period 1840–2020. The data produce the model was from observatory series, satellite data, plus older surveys. The model can give the field contributions from the sources internal and external to Earth. We explained it in the revised manuscript.

**Comment:** It is recommended that the Chinese characters on the pictures in the manuscript can be translated into English.

**Response:** We have translated all Chinese in Figure 2 and Figure 3 into English in the revised manuscript.

**Comment:** There are 5 gaps in Figure 4, it is recommended that these gaps should be marked in the figure.

**Response:** Thank for your advice. We have marked the gaps in the figure.

The gaps 1: 19450401-19461231; The gaps 2: 20070101-20081231; The gaps 3: 20100101-20101231; The gaps 4: 20110801-20111231; The gaps 5: 20190701-20191031.