

Interactive comment on “Time-stamp correction of magnetic observatory data acquired during unavailability of time-synchronization services” by Pierdavide Coisson et al.

Anonymous Referee #2

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GENERAL COMMENTS:

This study is very useful and interesting for geomagnetic observatories and data users. The authors propose the method which correct time-stamp using time-series of other observatories or the second acquisition system with GPS synchronization. This might be good method to ensure or correct the time-stamp of data from observatories with un-manned acquisition system or those without the second acquisition system.

However, I think that quantitative discussion about accuracy and precision of time correction value is insufficient. It is necessary to show accuracy and precision of the time correction value using time-series which have GPS synchronization at both of the LZH and the reference stations. The accuracy and precision may depend on position of

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reference observatories or time of analysis.

I would recommend the article for acceptance after dealing with the issue of accuracy and precision.

SPECIFIC COMMENTS:

1) I have a concern about cross-correlation using local signals. In my understanding, when the time series at LZH and LZ2 are cross-correlated, signals from road traffic are also computed. I guess that there might be a time lag if the sensors of LZH and LZ2 is not on the line perpendicular to the road.

For example:

- Sensor of LZH is 50 m away from that of LZ2 to North.
- There is a road going north and south.
- A car go to north with 10 m/s.

In above case, there will be the computed time lag of 5 s, even though LZH and LZ2 have GPS synchronization.

In addition, what does the oscillation of Z component mean in Figure 2? Do each narrow peaks represent car signals?

2) It is better to write magnetic coordinates of each observatory in Table 1, since the Sq currents are discussed in line 22 of page 3.

3) Please include enough information about making "A single daily correction value" in the section 2.2.1. Which data did you use, LZ2 or KAK? In the case of LZ2, there are 24 time lags per day. In the case of KAK, there is one time lag per day which have large dispersion. How did you calculate "A single daily correction value"?

4) Please describe the required time accuracy for making 1-minute definitive data, citing the INTERMAGNET Technical Reference Manual.

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TECHNICAL CORRECTIONS:

Page 2, line 21: PSS -> PPS

Page 3, lines 12, 13: Is "longitude distance" a difference between longitude of LZH and that of other observatory? According to Table 1, the longitude distance of KAK is 36 degrees and the time difference of KAK is two hours.

Page 4, Figure 2: To make it easier to discriminate the different lines in Figure 2, I recommend that you use some type of lines, e.g. dashed lines. It is difficult for me to distinguish some lines in Figure 2.

Page 8, Figure 5: To make it easier to recognize these lines in Figure 5, I recommend that you change the markers of legend bigger or longer.

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