Interactive comment on "Wireless monitoring system for a high-power borehole-ground electromagnetic transmitter" *by* Shuangshuang Cheng et al.

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Thank you very much for your attention and comments on our manuscript. Your comments impress us a lot. We really appreciate your attention and comments for our manuscript. Our replies are listed as follows, and the revised version of the manuscript in the supplement.

1. Describe in more detail how the corrections are made in the data to avoid the loss

or disorder of the same.

Thank you for your suggestion. We have made some efforts to avoid the loss or disorder of data. We added the row number and fixed the output data format. Each row of the storage data has its own unique row number and fixed format and length. An example of the output string is, N1_20170528090438#1.250000Hz$D:925.8,25.9,26.7,22.6,34.4,E where N1 is the row number, 20170528090438 is the date-time, 1.250000Hz is the frequency, 925.8,25.9,26.7,22.6,34.4 are the transmitter status information, and the rest are the identifiers. In the transmission process, the transmitter system determines the format and length of each row of data. If the format or length is incorrect, the row data will be resent.

The modified sentences at line 111 are as follows. Thus, in order to avoid problems associated with data loss or format disorder in wireless transmission, a data check function is incorporated into the software. Each row of the stored data has a row number and a fixed format and length. An example of the output string is, N1_20170528090438#1.250000Hz$D:925.8,25.9,26.7,22.6,34.4,E, where N1 is the row number, 20170528090438 is the date-time, 1.250000Hz is the frequency, 925.8,25.9,26.7,22.6,34.4 are the transmitter status information, and the rest are the identifiers. In the transmission process, the system evaluates whether the format and length of each row of data is correct or not. If the format or length is incorrect, the software will send a re-transmission instruction to the transmitter, and the transmitter will subsequently transmit the corresponding correct data, thereby improving the accuracy of the wireless transmission.

2. Describe and explain the replication facility.

Thank you for your comment. Our reply is as follows. The file stored in the SD memory card must be copied to the computer via wireless technology after completing the transmission. First, the software retrieves all names of the files in the SD memory card

by clicking the corresponding button, and we select the file we want. The hardware control unit will then send the file via wireless transmission technology, and finally, the software will receive and store the file on the computer.

The corresponding is at line 107: After the transmission is completed, the software retrieves all names of the files in the SD memory card by clicking the corresponding button, and we select the file we want. The hardware control unit will then send the file via wireless transmission technology, and finally, the software will receive and store the file on the computer.

3. Emphasize the benefits and improvements of the proposed wireless monitoring system.

Thank you for your comment. Our reply is as follows. 1) At line 98 in the revised manuscript, we have added a sentence as follows: This function avoids the burden and errors of manual recording and provides convenience for researchers. 2) In section 3.4 SD memory card mode, we have described the data check function, which can improve the accuracy of data. 3) In the conclusion section, we have listed the advantages, the first of which is high security. The software is able to perform the function of real-time monitoring of the EM transmitter via wireless technology, and eliminates the risk of the tester possibly being exposed to the transmitter during the testing process. The second advantage is simple operation. The software simplifies a series of configuration operations and enables transmitter control via clicking on a function in the software program.

4. Explanation and detailed description of the manipulation possibilities of the proposed interface.

Thank you for your comment. Our reply is as follows. In order to improve the performance of the software, we have added several convenient functions. 1) The one touch trigger mode avoids the tedious setting of parameters and improves the convenience. The corresponding sentence is at line 70: In addition, we provide the one

touch trigger mode, which avoids the tedious setting of parameters and improves convenience, where the current waveform can be easily transmitted by clicking on one of the functions in the default frequency table tab shown on the left in Fig. 4. 2) To prevent misoperation, we have added functional buttons to enable, disable, and confirm functions. The corresponding description is at line 74: Additionally, a function for preventing misoperation is included that is necessary to ensure stable operation of the transmitter. When a function button in the default frequency table tab is selected, the only other function button enabled is the cancel transmission function button shown on standby in Fig. 4. 3) The system uses Coordinated Universal Time (UTC) and our local time is eight hours ahead of UTC, therefore, if the start working time is before 8 a.m., the start work day is one day before the local time. Our design has addressed this problem. The corresponding is at line 80: Because the software system uses UTC and our local time is eight hours ahead of UTC, if the start working time is before 8 a.m., the start workday is one day before the local time. Given the time difference, our design has addressed this problem by setting the start workday as shown on the right in Fig. 4. 4) The system is equipped with functions for recording log and duty files, which avoid the burden and errors of manual recording. The corresponding place is at line 95: The proposed software also incorporates a data storage function. Two files, which are respectively referred to as the duty file and log file, are initiated in the background of the software after a successful connection between the software and transmitter is established. The two files record important information in real time in order to provide data for subsequent data processing. This function avoids the burden and errors of manual recording and provides convenience for researchers. 5) The system is equipped with a screenshot function to record the transmitter's work instantaneously. The corresponding sentence is at line 98: In addition, the software is equipped with a screenshot function to record the instantaneous working state of the transmitter. 6) The system is equipped with a data check function, which can improve the accuracy and reliability of data. The corresponding sentence is at line 111: Thus, in order to avoid problems associated with data loss or format disorder in wireless transmission,

a data check function is incorporated into the software. Each row of the stored data has a row number and a fixed format and length. An example of the output string is, N1_20170528090438#1.250000Hz$D:925.8,25.9,26.7,22.6,34.4,E, where N1 is the row number, 20170528090438 is the date-time, 1.250000Hz is the frequency, 925.8,25.9,26.7,22.6,34.4 are the transmitter status information, and the rest are the identifiers. In the transmission process, the system evaluates whether the format and length of each row of data is correct or not. If the format or length is incorrect, the software will send a re-transmission instruction to the transmitter, and the transmitter will subsequently transmit the corresponding correct data, thereby improving the accuracy of the wireless transmission.

5. List and describe in detail the main limitations of the system developed and described in this paper.

Thank you for your comment. We have described some main limitations of the system as follows. 1) Distance problem: Because the software control system is based on wireless transmission, the distance between the software control system and the transmitter can not be too long owing to the limitation of the wireless transmission mode. The distance is up to 50 m in the field. However, this problem has little effect on field exploration experiments. 2) Universality problem: This software control system is designed for self-developed electromagnetic transmitters, and can not be used in other electromagnetic transmitters, as we could not determine the communication protocol of other transmitters.

We have revised the manuscript by adding the following sentences at line 150. However, there exist problems of distance and universality. The software control system and the transmitter can not be too far apart owing to the limitation of the wireless transmission mode. The distance is up to 50 m in the field. Moreover, the software control system is designed for self-developed EM transmitters, and can not be used in other EM transmitters. The primary reason is that we could not determine the communication protocol of other transmitters.

6. Minor Comments, Please check both the references mentioned throughout the text and the listed ones, since there is no agreement between them.

Thank you for your helpful comment. We have proofread the references mentioned throughout the text and the listed ones, and deleted the following references that are not cited in the manuscript. Chen, K., Deng, M., Wei, W. B., Jin, S. and Ye, G. F.: New progress in the design and development of AMT instruments. Geophysical and Geochemical Exploration, 37(1):78-81, 2013. Cheng, D. F., Wang, J., Li, X. P., Duan, Q. M. and Lin, J.: Development in the research of HSSMT instrument. Progress in Geophysics (in Chinese), 19(4):778-781, doi:10.39969/j.issn. 1004-2903. 2004.04.012, 2004. Han, L.: Research and implementation of GPS time synchronization and data acquisition and processing system for SEP transmitter. Beijing: Beijing University of Technology, 2015.

Please also note the supplement to this comment:
https://www.geosci-instrum-method-data-syst-discuss.net/gi-2017-54/gi-2017-54-AC1-supplement.pdf

Interactive comment on Geosci. Instrum. Method. Data Syst. Discuss., https://doi.org/10.5194/gi-2017-54, 2018.