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Geoscientific Instrumentation Methods and Data Systems Discussions

Interactive comment on "The baseline wander correction based on improved EEMD algorithm for grounded electrical source airborne transient electromagnetic signals" *by* Yuan Li et al.

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Thank you very much for your comments. The comments will be very useful for this paper. According to comments, we will revise some sections of the paper. 1.We have revised the contrast of difference on EEMD, STFT and wavelet transform methods. This part of the description is modified as: For non-stationary signal processing, it is necessary to propose the short time Fourier transform (STFT) and wavelet transform generally. The main method of STFT is to divide the signal into short time intervals where the signal is approximately stationary, and then perform Fourier transform with signal on each time interval to get the frequency distribution. The main method of the

wavelet transform is to utilize a variable-scale sliding window where the specific data is approximately stationary on signal. The width of window is variable for time and frequency domain. At the same time, because it is difficult to choose optimal wavelet basis function and the layer levels of wavelet decomposition by the signal itself, this method has poor adaptability. Therefore, the requirement of signal characteristic above method is stationary in a specific window as same as the Fourier transform. Different from previous methods, the major advantage of the EEMD is that the decomposition is derived from the signal itself. Therefore, the EEMD analysis is adaptive in contrast to the traditional methods where the decomposition functions are fixed in a specific window. Finally, the characteristics of the signal itself are not affected in the sifting process. 2. We will revise the 'conclusions' section and update references section. Some discussion will be added to the 'Field data analysis' section for anomaly curves profile image generated from different methods. 3. The receiver instruments will be showed on Fig 5 (c) and (d). Please refer to the figure behind comments. 4. We have updated description of figure 1, 3, 5, 7 in accordance with manuscript. The interpretation of figure contains more details. 5. The grammatical and term errors in the paper will be corrected carefully. 6. Section 3.2 describe the other method for subsequent analysis. Section 3.2.1 and 3.2.2 statement will be combined and added to specific referenced papers on Section Introduction.

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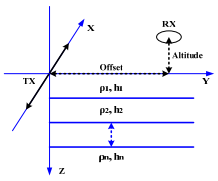

Figure 1: GREATEM model based on three-layer earth model. The TX is length of the transmitter line on the ground and the line length is 1000 m, the current is 10 A, the frequency is 25 Hz. The RX is receiving coil and the equivalent area is 1000 m², the offset is 50 m, the flight altitude is 35 m, the sample rate of receiver is 32 kHz. The other model parameters are shown in Table 1.

Fig. 1. fig1

C3

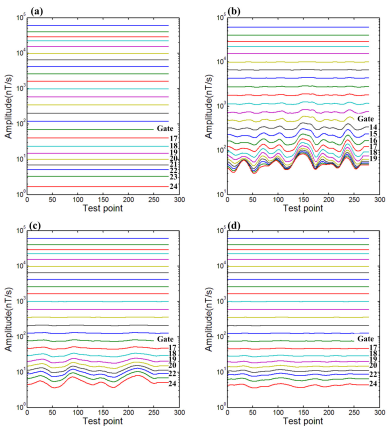

Figure 3: Anomaly curves profile image generated from different datasets. The simulation time of raw data is 60 s, and the stacking interval is 0.2 s therefore the number of the Test points is 300. In figure 3, (a) The clean signal from the theoretical model; (b) the noisy signal containing baseline wander; (c) the correctional data using wavelet-based method; (d) the correctional data using EEMD-AF method. The label 'Gate' marked in sub-figures represents the time gates from 1 to 24. Every time gate means different time width which increased logarithmically.

Fig. 2. fig3

C4

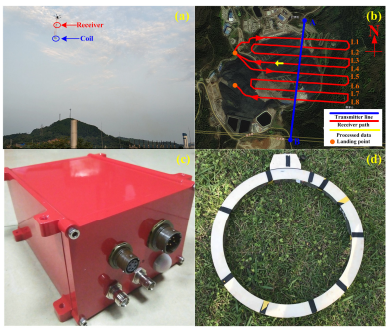

Figure 5: The survey area and flight paths of the GREATEM system. (a) The receiver system is mounted on UAV along the paths; (b) The blue line was the transmitter source and the red line was the survey path of the receiver; (c) the receiver instruments; (d) the receiving coil with diameter of 50 cm. The flight heading was from east to west on the L4 path. The data of part of L4 (yellow solid line) was processed and the length of time was 60 seconds. The sub-figure (b) embedded the satellite images came from https://map.tianditu.gov.cn/ built by the National Geomatics Center of China.

Fig. 3. fig5

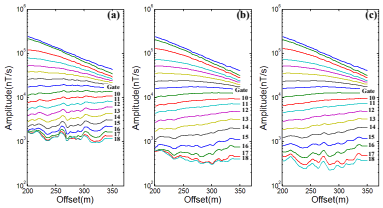

Figure 7: Anomaly curves profile image generated from field data: (a) Profile of raw data.; (b) profile of data using wavelet-based method; (c) profile of data using EEMD-AF method. The length of time for raw data was 60 s and the flight speed of the UAV was 2.5 m/s therefore the offset distance was 150 m.

Fig. 4. fig7