

Abstract:

10nV/sqrt (Hz) is stated. This is a potential not a field strength, while the discussion is about electric fields. Please explain why this is chosen, or correct.

The expression “fluxgate” is a short form derived from “fluxgate magnetometer”. Please use the full form at least the first time this is used. (in the abstract and in the main text)

“Results of our experiments support the claim that high-quality CSEM signals can be obtained using this new borehole electromagnetic receiver, and that the electric field component exhibits sufficient advantages for measuring the vertical component of the electric field.” – This is not discussed, please describe what is sufficient and for what purpose. What is “high-quality CSEM signals”? What is “sufficient advantage”?

Last sentence in paragraph 1 states “The receiver realizes high-precision acquisition of the three-axis magnetic field components and the vertical electric field component in the borehole, with broad bandwidth and large dynamic ranges, and stores and transmits status data that contains the root mean squares (RMS) of the magnetic and electric field signals, attitude, orientation, depth, and temperature.” What is the difference between attitude and orientation?

Paragraph2: It is stated “ ... uses a global positioning system (GPS) and...”. Please explain how (if) the GPS unit will work underground (in the borehole).

Paragraph 2.2 “... four analog-to-digital converters(ADCs) are daisy-chained”. In Fig. 3 it appears that the ADCs are individually connected to the FPGA (in parallel) and not daisy-chained. Please correct either text or drawing.

Paragraph 2.4 “The current high-precision temperature-compensated crystal oscillator... “. This oscillator is not shown in the diagram. Before this only an OCXO has been discussed. Is this a second oscillator? Please explain. If there are two clocks, why is not the OCXO used as a master oscillator but only as a synchronisation device?

Paragraph 2.5 “In terrestrial studies...”. All studies discussed here are terrestrial studies. Supposedly you mean surface studies, or similar. Please correct.

Paragraph 3.1.3. Please explain why receiver nonlinearity was measured at DC while the real measurements will be made at AC.

Paragraph 3.2 and Fig 9. It is not clear how x, y, and z are oriented. Is Bz and Ez the vertical direction? If so, then it is clear that the Ez signal from the horizontally oriented transmitter is low. But the Bz should have a significant magnetic field component. Why is this not the case? Which direction in the receiver is parallel to the transmit dipole A-B (where the current is injected)? That B field measurement should be low, not the vertical B Field. Please explain.

Fig.9 At what depth were the BH1 and BH2 instruments located?

Fig.10. For all panels: What is time? mm:ss or hh:mm? Y-axis is labelled as Frequency,Hy or Frequency,Ez and similar. Better write Frequency, Hz The component is already given under each panel.

It is stated that 41 frequency steps are made. That many cannot be seen. It appears that the duration of the weak high frequency steps are very short, while the duration of the strong low frequency steps are much longer. Why is this? It seems that selecting the opposite would be more logical.

Fig 10. Panels are not well aligned, please organise such that corresponding panels come above each other (or next to each other), f. ex. :

Bx1 By1 Ez1

Bx2 By2 Ez2

or:

Bx1 Bx2

By1 By2

Ez1 Ez2

The caption states: "The scale in the figures is provided in dB; however, the data in the figure is calculated with the formula $10\log X$." Then the scale is not dB as dB always refers to a ratio of power. What is the unit of X? i.e. what is the reference in the $10\log X$? V/m for E and nT for B?

Paragraph 3 (end): It is stated: "We observed that our system has obvious advantages in bandwidth, where the highest frequency can reach 10 kHz". It is not clear why this is an advantage. In Fig 10 one can see that no signals exist above a few hundred Hz. Please explain. The following sentence has the word "sampling" repeated, making the sentence difficult to understand. (typo?)

Paragraph 4. It is stated: "According to the measurement requirements of the borehole surface electromagnetic method..." Such requirements have not been discussed or even mentioned in this paper. Thus, no conclusions can be drawn on that. Please add a discussion in the main text or remove this sentence. As in the abstract, here again the Electric field is given as a potential ($10\text{nV}/\sqrt{\text{Hz}}$). Please correct.