

Geosci. Instrum. Method. Data Syst. Discuss., author comment AC2
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Reply on RC2

Antenor Oliveira Cruz Júnior et al.

Author comment on "Design and construction of an automated and programmable resistivity meter for shallow subsurface investigation" by Antenor Oliveira Cruz Júnior et al., Geosci. Instrum. Method. Data Syst. Discuss.,
<https://doi.org/10.5194/gi-2022-2-AC2>, 2022

Dear Anonymous Arbitrator

Thank you in advance for the opportunity and the contributions sent. I appreciated the constructive criticism and addressed each of your concerns as described in the discussion contributions. I am sending attached a pdf version of the manuscript GI-2022-2, with the corrections made, in colored highlights for easy checking. The corrections made and arguments follow below, item by item, as suggested.

Text revisions

Section 1 (Introduction) (lines 24-29) describes the use of resistivity meters in geological exploration. Here, I suggest adding literature references on recent advances in testing time-lapse resistivity tomography to monitor shallow subsurface saturation changes.

Answer = At first, we chose to focus on the development of electronics and measurement accuracy in simple geophysical surveys, to test and evaluate the conceptual idea to prove its feasibility. Following your suggestion, we added some references on time-lapse resistivity. We agree that it is a relevant topic and we intend to address this issue in more depth in the field test that the equipment will soon undergo.

Most importantly, at the end of the introduction, the manuscript would greatly benefit from a concise description of the concrete goals in terms of cost, power consumption and component availability that they aim to achieve and a discussion of how these instruments can complement existing instruments in terms of performance.

Answer = It is in our interest that this equipment be made available to other researches, a subject that is already a consensus among the creators of the project, however, the availability of information about the process inherent to the logistics of construction, as well as cost, consumption and availability of components of the equipment have not yet been raised, since, the main object was to validate the feasibility of a concept.

Section 3.1 "Computational unit" states that the flexibility of the instrument would allow testing new methods of data inversion (lines 93 - 95). I strongly encourage supporting this with literature references and discussing advantages and disadvantages of conventional instruments. This comment is related to my comment on the introduction and could possibly be addressed together.

Answer = The project is intended to contribute to the development of open instrumentation and programming Geophysics, which will enable the implementation of new investigation techniques or arrangements for the geoelectric method. Unlike commercial equipment, this platform will allow a greater number of configurations in its software and the use of algorithms (developed by the researcher himself or by other collaborators), in the treatment of the data obtained. It is worth noting that there are already works that address the same theme that were cited in the text of the article, for low-cost, robust and flexible investigations, for small-scale experiments using state-of-the-art electronic equipment.

I encourage a clearer distinction between methods, results, and discussion. I read section 4 ("Testing") as an extension of methods. The sentences in line 142-144, however, begin with an interpretation and are redundant with what follows in section 5.

I understand that the focus of this paper is on hardware and software engineering. However, the interpretation of the field test seems a bit short. The subsurface characteristics of the study site at the National Observatory are mentioned in line 149. I suggest that additional information from previous resistivity surveys at this site be provided and discussed along with the results obtained with this prototype.

Answer = The entire section has been redrawn. In fact, confusion occurred when drafting the text. This adjustment is marked in yellow background (lines 142 to 151).

Later, in line 167, the environmental effects (rainy season) are discussed, which should also be related to Figure 9, which is not referred to here. I recommend outlining how a second test during a different soil saturation situation could be performed. Also, the sentence in line 167 is long and should be rephrased in a more understandable way.

Answer = New tests are scheduled plus that will not be able to happen in time to be able to be incorporated into the original article.

Other technical corrections:

Section 2 (Numerical methods): The sentence (line 55) is very difficult to understand. The sentence should be clarified and possibly split in two. The sentence (line 59 onwards) should also be simplified and split, as it is difficult to understand.

Answer = answered. Modified, as directed. This adjustment is marked on a yellow background (lines 58 to 65).

All the analysis and plotting functions that the human-computer interface provides, of which some, are shown in Figure 3, mentioned in this manuscript? They can also be shown in a diagram.

Answer = A diagram for the HMI is now included. The online repository for this project to be published soon will also contain all source codes, diagrams and function descriptions.

The order of the figures should be improved to match the text. Figure 9 showing the arrangements should be shown together with Figure 6.

Answer = complied with. Figure 9 demonstrates the prototype's ability to run modeling algorithms in the Python language that made it possible to produce the data treatment. This adjustment is marked on a yellow background (lines 188 to 191).

Figure 6 would benefit from a more detailed legend description, providing more information on how to read the schema.

Answer = We have modified as directed. This adjustment is marked on a yellow background (lines 150 to 151).

Figure 7 requires adjustments regarding the readability of the y-axis, as well as a spell check.

Answer = complied with. We have modified as directed.

Figure 9: Some units are not displayed correctly in the legend. Should it really be "4k7â"|"?"

Answer = understood. We would like to apologize for the misunderstanding and will now review this unit of measure information. This setting is marked on a yellow background (line 197).

Please also note the supplement to this comment:

<https://gi.copernicus.org/preprints/gi-2022-2/gi-2022-2-AC2-supplement.pdf>