

22nd August 2023

Dear Editors and reviewers,

Please find enclosed a revised copy of the manuscript 'water-2524662 Groundwater Investigation through Electrical Resistivity Tomography in the Galhareri District, Galgadud Region, Somalia: Insights into Hydrogeological Properties'

The following is a detailed response to all the points raised during the review process. In this revision, we have addressed the comments and suggestions of the reviewers, and we have carefully revised the manuscript. Moreover, we have expanded the manuscript. It is now more than 4000 words.

Please note that all changes to the manuscript can be readily seen in the marked-up version that accompanies the updated submission. Below, the reviewers' comments are in black colour and our responses are in blue colour.

Reviewer #2:

the manuscript entitled "Groundwater Investigation through Electrical Resistivity Tomography in the Galhareri District, Galgadud Region, Somalia: Insights into Hydrogeological Properties" presents and discusses the results of DEEP 2D Geoelectrical resistivity tomography survey finalized to identify aquifer geometry and to through more insight on the quality of the groundwater.

The manuscripts describes the results of a conventional ERT survey that is being used, perhaps, for the first time as a tool to explore the subsurface for possible groundwater exploitation.

I include annotated copy of the manuscript. The reported annotations regard the elimination of repeated sentences and the correction of some technical terms (Lines: 192-193; 194).

Response: Thank you for pointing this out. We have eliminated the repeated sentences and corrected the technical terms.

other issues to address:

Q1: authors do not mention the apparent resistivity data quality? no resistivity pseudosections are included in the manuscript? why?

Response: Thank you for raising this. We have added the data quality of the apparent resistivity (refer to Lines 251-252). We have also included pseudosections (Refer to Figs. 4-7).

Q2: the RMS of the inverted resistivity models is not mentioned? pl. add

Response: Thank you for pointing this out. We have now stated the RMS of each inverted model (refer to Figures 4-7)

Q3: no map is included, in the text, to show the location of the ERT profiles!

Response: Thank you for pointing this out. We have included Figure 3 to show the locations of the ERT profiles.

Q4: the ERT profiles were acquired on flat topography? according to Fig. 1 it seems no; if topography is not flat, authors have to run the inversion with the correct topography. If flat, add the elevation instead of depth.

Response: Thank you for the comment. Although the topography is changing, we have acquired the ERT profiles along contour lines (see Figure 3). This is to reduce the effect of topography on the ERT. We have changed the depth to the actual elevation above sea level.

2.2. section

Lines 151-

the aquifers with their EC values should be indicated on the geological section (Fig. 2).

Response: Thank you for the suggestions. We have included the EC values in Table 1.

3 Methodology:

what was the maximum current dipole distance (i.e. report the number?

of electrodes for each segment acquired along the profile),

Response: Thank you for the suggestion. We have included the maximum current electrode distances (refer to Lines 232-233).

4. Results and Discussion

in the survey area do you have shallow wells?

Response: No, there are two water boreholes (Bida Ciise 02 and Ceel Jiqow) outside of the survey area (refer to Table 1).

what are the EC values of the groundwater?

Response: We have added EC values of the sandstone and limestone aquifers in Table 1 for the two boreholes drilled outside of the survey area.

you should add some labels and lines on the ERT sections to help readers better understand the significance of these models

Response: Thank you. We have made the lines and labels on the ERT section clearer (refer to Figs 4-7).

Lines: 225-227

the resistivity values of 30-40 Ohm.m are interpreted as sand dunes;

these values, according to my experience, can easily be attributed to Silty Sand

sediments or to lime. pl. comment and explain and if possible add hard data such as

grain size distribution or so. If know data are available, the word 'confidently' cannot be used.

Response: Thank you for the comment. The surface geology of the survey area is dominated by sand dunes. However, silty sand sediments could occur below the surface as recorded by nearby boreholes. We, therefore, revised the text (refer to Lines 305-306)

Line 234: when referring to a figure add (a, b,...)

Response: Thank you. We added 'a, b, and c, when referring to the figures (see Lines 312-313).

Line: 240-241

'weathered limestone...'

these words should be considered as conservative interpretation as

no direct information are presented in the manuscript. Pl. modify this sentence.

In case no subsurface information are available, data calibration can be achieved by conducting few ERT profiles in areas where

subsurface information is known (my suggestion). However, if authors are sure about the subsurface geology (provided section) they should compare the ERT section with the geologic section (Fig. 2).

Response: Thank you for the suggestion. We revised the text (refer to Lines 323-324). The Bida Ciise 02 borehole (Table 1) supports our interpretation.

Lines: 237-241

resistivity values are also compatible with marl or marly limestone. pl. comment

Response: Thank you for the suggestion. We revised the text (refer to Lines XX-XX).

Lines: 243-247

the resistivity values are also compatible with sediments saturated with brackish water? pl. comment

In Fig. 2 no information about fresh-salt water interface are shown, why?

Response: Thank you for the suggestion. We revised the text (refer to Lines 330-331).

We do not have information about the fresh-salt water interface

4. Conclusion

Line 274:

..... exhibited very low apparent resistivity,...

change to real resistivity as authors are describing inverted

resistivity sections and not experimental apparent resistivity data.

pl. pay attention and check for this issue the manuscript.

Response: Thank you for the comment. Changed 'apparent' to 'real'. See Lines XX

Line 274 and Line 79

two interpretations are given for the fourth geoelectric layer; are

both interpretations correct? if yes provide more insights.

Response: Thank you for the comment. Yes, both interpretations could be correct. The Bida Ciise 02 borehole indicates the quality of the aquifer.

Why not suggesting the use of Time Domain EM methods which can increase the depth of investigation to at least 500/600 meters.

Response: Thank you for the comment. The text is revised (see Line 392)

Minor issues:

use ERT acronym instead of repeating the meaning in the text.

Response: Thank you for the comment. We agree and revised the text accordingly.

The manuscript needs to be deeply restuctured in order to be published. I encourage authors to follow the suggested recommendations and submit a new revised version.

Response: Thank you. We extensively revise the manuscript and followed your suggestions and recommendations.
