

## Comments to Editor and Reviewer:

**Editor Decision: Publish subject to minor revisions (review by editor)** (18 May 2019) by [Mario Parise](#)

Comments to the Author:

Even though the paper has improved throughout the revised versions, it still does not completely respond to the referees' observations. In particular, I totally agree with the request by the referee to include a **Discussion section**. Authors are kindly invited to revise their manuscript, trying to fulfill all the referees' request

If I understood, you are asking me to add a Discussion section attending the suggestion made by the reviewer.

The follow letter contains the reviewer suggestions.

Dear editor and authors,

I have reviewed manuscript nhess-2018-180 and the author response letter included in the submission.

I want to thank the tone and detailed explanation from the revision letter.

In my previous review I make some comments regarding the inversion method, not for the inversion from parallel profiles, moreover from the integration of profiles with non parallel strikes. This was mentioned in the manuscript as a new approach. When comparing parallel profiles at constant distances between the measurement points, we can make the inversion more easily than profiles with different strikes and where distance between survey points is not constant. In this sense, the inversion requires to evaluate the anisotropic pixel for the integration that produces a new complexity in the inversion, and requiring the iteration and heterogeneous raw data for the analysis. This was one of the subjects that I pointed out in relation to the methodological processing routines that were applied in the manuscript.

Due to the description of some geological subjects referenced in the text, I propose to include some more geological information from the area, in order to define the contour conditions for the later geophysical model. Inverse data model produce potential multiple solutions, and from them the local geology can improve the election of the most probable solution. I am not making reference to the own inversion data model, I making reference to the evaluation of ranges for a cavity or change in water content to be interpreted as preferential flow-paths in the underground.

The resolution of the model is in general low, that is related to the intrinsic resolution from the used geophysical method and the low contrast of the looked for changes in the underground in the study area (this is not a critic, I am just trying to describe the context). This produce that if we include information from other sources (geological, geomorphological, surficial data) we can improve the model and to validate it more easily than without this kind of data.

I understand the problem of accessibility, the vegetation in the area, the eventual irregular topography and other handicaps, which defines the survey context and makes the obtained results and applied methodology a challenge to decipher the hidrogeological pathway in the area. This should be benefited by the data discussion in terms of data representativeness. Due to the complex problem, and the interest to find water in contexts such as described, one in the future can think that the proposed approach can be used to get data and solve the complex hidrogeological context; however each context can differ and produce that the results cannot be generalized. In this sense, the data discussion can permit to evaluate this data, but also to permit that anyone in the future that can try to reproduce the results, and get from the manuscript a complete description of the ambiguities that can be present.

The manuscript is a case-study that can be benefited with a try of generalization that can be obtained from **a discussion** in terms of resolution and effectiveness. This was the idea to include more geological data from the area.

I was confused because reviewer suggestions are two or three but they could take months to test the model as he said. But at the end of the letter I understood that he wanted a discussion

about the topics he pointed out. Finally, I understood that you both want a Discussion section including the topics mentioned by the reviewer.

Here is the **Discussion section** we added to the manuscript.

#### **4. Discussion**

This was the best resistivity model after many trials moving the 3D mesh and the smoothing parameter. The data collected in the field, put us in a challenge, because the profiles azimuth was arbitrary, forcing us to adapt equations but also in terms of resolutions in areas without data. In case of parallel profiles there are short gaps without data, but with arbitrary azimuth profiles, some data gaps are larger. This 3D resistivity model is confident close to the profiles, that is why, we decided to show mainly the 3D model as cross-sections along the original profiles.

We did not add constraints in the inversion but our models matched with the information given by the scuba divers. In cases where geology is complex and data is sparse, any kind of constraint can improve the solution thanks to quadratic programming.

Our 3D resistivity model could be better if the resistivity contrast between water conduits and bedrock would be larger.