We are grateful Dr. Boaga for his valuable comments, corrections and suggestions. His review significantly helped us to improve the quality of our manuscript.

General Comments The paper concerns an interesting and innovative procedure of coupled inversion for hydrological and geophysical parameters. In particular Authors present double phases air-water-heat inversion coupled with ERT data. Tran et al. show the results for both synthetic test and real data, with a relevant sensitivity analysis of the parameter estimation which highlights state variables resolution capabilities. The topic is of interest for HESS readers and the manuscript is concise and well written. Despite this, I suggest minor revision before the acceptance for publication: some points need to be better clarified, some figures should be revised cause they are not at the level of the paper, some captions need improvement. Here below a list of detailed comments.

Specific Comments

The Manuscript comes without a continuing lines numbering, restarting in every pages. This usually does not help the revision work. I will refer to page number and relative line numbering.

Reply: We are sorry for the inconvenience of manuscript. We have to follow the format of HESS Discussion. We do hope this format will be modified in the near future to help reviewers to easily review manuscripts.

Pg3 Ln 20-25 Sentences not clear to me. You cannot assert that difficulties in hydrogeophysics are linked to temporal/spatial resolution variables problems, and then refer to the high resolution of autonomous acquisitions (?). As in the paper of Binley et al. you cited, several methods are applied second their proper potentials. On the other hand I agree with you we are still far in properties characterization, and your paper represents a relevant step forward.

Reply: After reviewing, we found that this paragraph is not much relevant to our study so we deleted it.

Pg4 Ln 8. I suggest suspension points after properties affecting resistivity description, cause it is not (and cannot be) exhaustive. Ln 24. I’m always prudent when reading there are no similar attempts in the previous literature. Some different works partially fronted the topic (e.g. Jardani et al 2013; Irving et . 2010), but this does not affect the quality of yours work. Probably the differences stay in the design of coupled hydro-geophysical inversion, and the level of results obtained.

Reply: We restated these sentences (line 28 page 3 and line 16 page 4)

Pg6 There is probably an error in the symbol of porosity in Eq2 or in the text.

Reply: The error was corrected (line 1 page 6)

Pg9 ln3. There's no need to introduce the relation between resistivity and conductivity here. Ln 10-15. (fig1). The flowchart is unclear and the caption confusing. I understand it is ambitious describe graphically all the inversion scheme, but I suggest to redrawn the flowchart and explain better this crucial part of your relevant work.

Reply: A sentence that describes the relationship between conductivity and resistivity was removed. A new hydrogeophysical inversion flowchart and caption were added to the revised version (page 31) and presented as below:

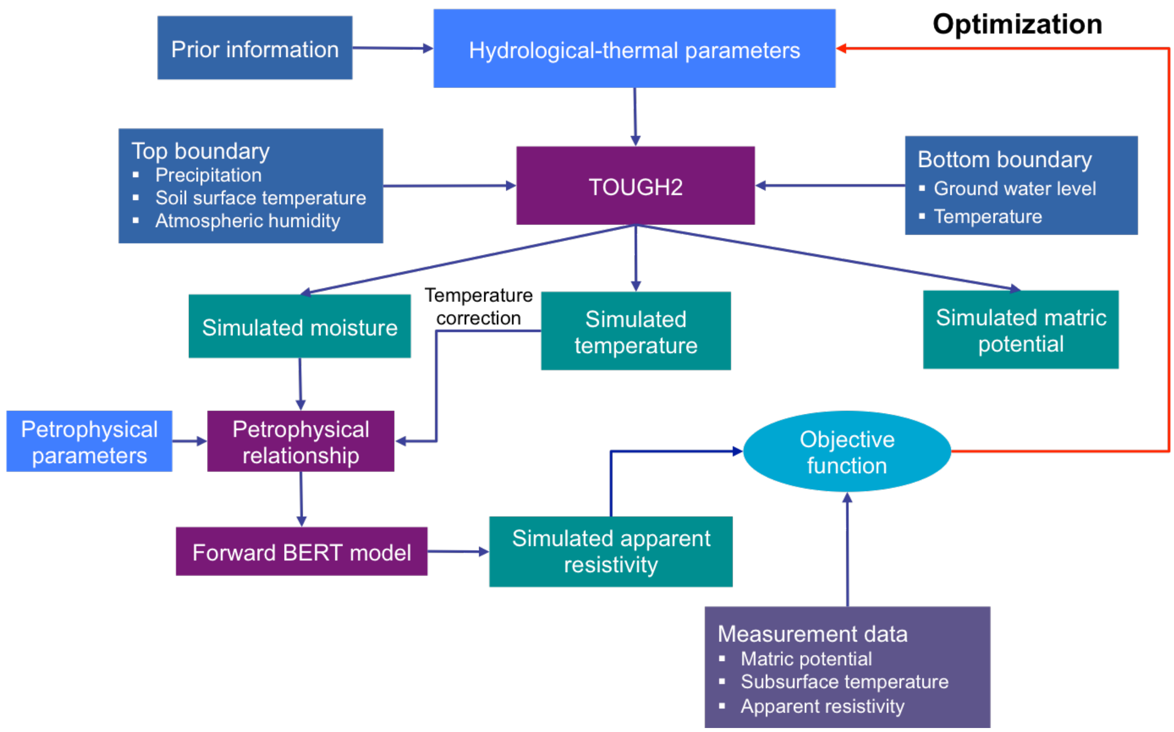

Figure 1: *Flowchart showing the steps involved in the coupled hydrological-thermal-geophysical inversion scheme. The objective function is represented by Equation (15). Estimated parameters consist of hydrological-thermal and petrophysical parameters (blue rectangles). The navy blue rectangles denote the model inputs, including prior information about estimated parameters, and the top and bottom boundary conditions. The purple rectangles denote the forward TOUGH2, geophysical and petrophysical models. The teal and indigo rectangles, respectively, denote the simulation and measurement. Data for inversion in this study include matric potential, subsurface temperature and apparent resistivity.*

Pg10.Ln20. I do not understand the sentence about initial guesses, it sounds unnecessary. Explain simply your (elegant) procedure.

Reply: This part is a practical procedure that I used in this study to step-by-step estimate different hydrological, thermal and petrophysical parameters. The optimization algorithm used in this study is a local optimization algorithm, while the inverse problem is nonlinear. As a result, the hydrological-thermal-geophysical inversion can be trapped into local optimal solution if the initial guesses of estimated parameters are not good. We tackled this problem by:

- Use matric potential data to estimate hydrological parameters
- Fix the hydrological parameters that were obtained in step 1, use temperature data to estimate thermal parameters
- Use hydrological and thermal parameters obtained in step 1 and 2 as initial guesses for hydrological-thermal-geophysical inversion that estimates hydrological-thermal and petrophysical parameters using matric potential, temperature and apparent resistivity data

Pg12Ln5 (fig2). Map figure should be re-drawn, it is not well readable, missing coordinates, label and fonts are too small

Reply: A new figure was added to replace the old one (page 32) as below

Figure 2: Plan view of the Rifle floodplain of the Colorado River, Colorado, and the location of the TT02 and TT03 wells and ERT line.

Pg13.Ln1 What is the relationship with yours work and Arora et al. one? Not clear why do you present extensively this biogeochemical topic here. Ln 18. Why the hydrological model contains simply two geological layers? This is not specified. Ln 19 Please insert citation introducing Wasatch layers resistivity, otherwise these seems reasonable but not supported considerations (and should be placed in the discussion section). Fig.3 should be revised. Please put unit over the scale and not with X label. It is unusual the starting with negative distance values.

Reply: We presented these studies to show that quantification of hydrological and thermal dynamics in this study are crucial for other biochemical studies in our study site.

In our site study, the subsurface has two clear layers (fill and alluvium layers). Considering heterogeneity of soil properties inside each layer is possible but it also increases the number of estimated parameters, which may lead to non-uniqueness problem. As a result, we considered the subsurface include only two layers and estimate the average soil properties of each layer.

In this study the resistivity of Wasatch layer was obtained from ERT geophysical inversion, which is around 45 Ω. m. (line 5 page 14).

Figure 3 was modified in the revised version (page 33) and presented as below. In this study, we determined that the computational domain of the hydrological simulation centered at the TTO2 well with a length of 30 m (x_{TTO2}=0). As a result, the first x-coordinate was x=-15 m and the end x-coordinate x=15 m.

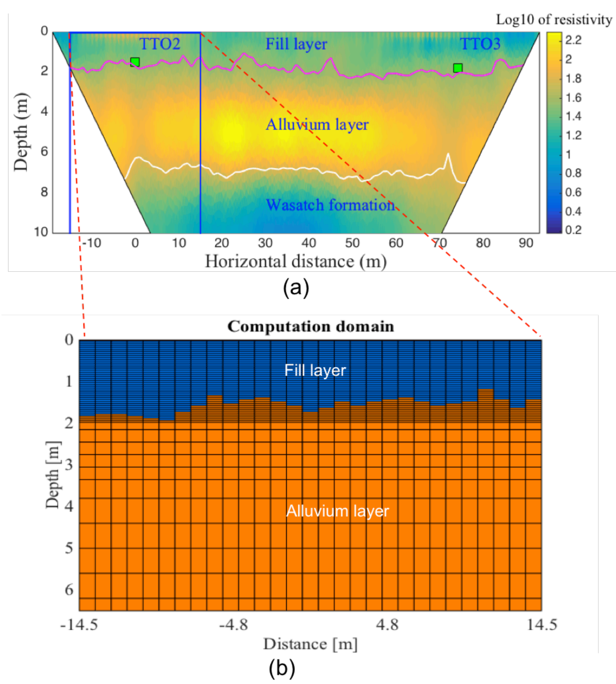

Figure 3: *(a) The 2-D image of the soil electrical resistivity obtained by inverting ERT data collected on May 20, 2013. The magenta and white lines delineate the inferred fill-alluvium and alluvium-Wasatch boundaries. Green square markers denote the fill-alluvium boundary determined from the well logs of TT02 and TT03 and adjacent wells, as recorded in the field during drilling. The blue rectangular box indicates the hydrological-thermal computational domain. (b) Computational domain for the hydrological-thermal inversion with associated grid mesh. Blue and orange regions represent the fill and alluvium layers, respectively. The domain is situated below an atmospheric layer (top boundary) and above the relatively impermeable Wasatch (bottom boundary).*

Ln 23. Please introduce before the characteristics (e.g. a stratigraphy description) of TT02 and TT03 boreholes.

Reply: We presented the procedure to determine the soil stratigraphy using ERT geophysical inversion and TTO2 and TTO3 boreholes in lines 8-15 page 13 as below:

To specify the locations of the fill-alluvium and alluvium-Wasatch interfaces from ERT geophysical inversion, we used the depths of these interfaces observed at the TTO2 and TTO3 well as the references to determine resistivity thresholds. Accordingly, a grid cell with a resistivity greater than 1.52 $Log_{10}(\Omega.m)$ and above 1.5 m depth belongs to the alluvium layer. The cells whose resistivity values are smaller than 1.83 $Log_{10}(\Omega.m)$ and below 5 m are assigned to the Wasatch layer. The remaining cells are in the fill layers. The magenta and white lines in Figure 3 represent the fill-alluvium and alluvium-Wasatch interfaces, respectively.

Pg14 Ln 11. How do you approximate bottom temperature from land surface temperature?

Reply: It was extrapolated from measured temperature at above depths (z=4.6 and 6 m)

Fig.4 Caption should be improved to explain better these relevant sensitivity graphs.

Reply: We modified the Figure 4 caption as below (page 34):

"The sensitivity coefficients |EE| of matric potential, subsurface temperature and apparent resistivity data with respect to different hydrological, thermal and petrophysical parameters. A parameter with a higher |EE| is more likely to be determined. (a) The sensitivity coefficient |EE| of the matric potential at depths of 0.5, 1, 1.5, 2, 2.5 and 3 m, with respect to the hydrological parameters of the fill and alluvium layers, and the gas diffusion coefficient standard conditions. (b) The |EE| of the temperature at depths of 0.75, 1, 1.5, 2.5, 4.63 and 6 m, with respect to the thermal conductivity of fill and alluvium layers. (c) The temporal variations of the |EE| of the resistivity data with respect to the soil hydrological-thermal and petrophysical parameters of both fill and alluvium layers."

Tab.1 Table is quite confusing to me and caption does not help. Explain better what's from hydrological inversion and what's from the coupled one. Note: 'To' miss the initial bracket?

Reply: We modified the table caption to provide more information about inversion as below (page 40):

Constraints and estimated values of the hydrological-thermal and petrophysical *parameters for different inversion cases. Hydrological inversion used matric potential data to estimate hydrological parameters (m (fill, alluvium), α (fill, alluvium), K (fill) and D). Thermal inversion used subsurface temperature data to estimate thermal conductivity of both fill and alluvium layers (λ (fill, alluvium)). Coupled inversion used all matric potential, temperature and apparent resistivity data to estimate parameters m (fill), α (fill), λ (fill), n (fill), n (alluvium) and σ (fill).*

Thanks for the reading of a very interesting and well written work, which in my opinion opens important further perspectives for hydrological characterization.