First, we would like to thank Anonymous Referee #1 (hereafter AR1) for taking the time to read and assess our manuscript. Here below, we have reproduced all AR1's comments in normal font, followed by **our responses in bold**.

General comment

One feels always embarassed to comment a well written and extended paper, but dealing with non-original subject and conclusions. As it the paper looks like more a master dissertation than a research paper.

While the main conclusion is that when the use of small Electrode Separation (ES) in ERT may give long acquisiton time and limited investigation depth, you can improved the ERT results when added some selected levels with ERT acquisition with larger ES. However this solution is presented on a particular 3-layer model (conductive solum- resistive subsolum- conductive bedrock), is threfore ground dependant, and the authors do not conclude with a general improvement procedure.

The paper is therefore justified by a particular case study on some hydrogeological catchment, but the study could be more efficient (especially on a plainly tabular ground) when simply dealing with the influence of the minimum electrode spacing in vertical electrical sounding for instance, on the model resolution, especially when there is some issues with first thin layers. The particular result about the maximum optimal ES linked to first layer thickness can be quickly demonstrated without ERT and Nash-Sutcliffe stuff !

Since the paper insists on the definite influence of a priori information (the so-called "adapted vertical resolution", p.21) from the field, not only for geophysical inversion and interpretation, but also for the geophysical acquisition parameters (a criterion often forgoten for instance, in ERT acquisitions with large to very large ES) the paper seems therefore worth on-line publication.

In his review, AR1 qualifies our work as well written and documented and recommends it for publication in conclusion. We would like to thank her/him for that appreciation. Nevertheless, AR1 expresses some concerns about our work which we will try to answer below.

AR1 expresses concerns related to a certain lack of originality of our work - both in terms of subject and subsequent conclusions. We would agree with this statement if our contribution was only about showing the influence of the electrode spacing (ES) on ERT results accuracy. However, to the best of our knowledge, no study has investigated and documented in detail from which ES threshold (as well as why and how) the accuracy of inverted ERT images is significantly affected for a given regolith structure. Eventually this aspect, which is first documented in our work, serves to introduce the problem equally dealt with in our contribution: "How to compensate for the use of an oversized ES?"

This issue can be particularly important for large scale ERT surveys, such as catchment scale studies, that could be really cost and time-consuming if a too small ES is to be used (e.g., due to logistical or budgetary constraints). We actually go further than showing that ERT images based on large ES can be improved by adding some selected surficial apparent resistivity levels. We believe our approach to be an innovative contribution for overcoming the bias caused by the presence of a top thin layer in a subsurface structure (e.g., a soil layer within a typical solum-to-bedrock regolith continuum).

In case of an ERT survey carried out with a large ES – and for which the first acquisition level does not directly give information on the resistivity of the subsurface structure's top layer – we propose to take advantage of the potential relationship between this first acquisition level and additional surficial apparent resistivity acquisition levels obtained from a reduced number of measurements with a smaller ES. We demonstrate through our work that these relationships (which are linear regressions in our study) can be strong enough if the top layer has a rather constant thickness and resistivity (such as for the solum of the Weierbach catchment). They can then be transposed to areas where solely the larger ES have been used

and where data gaps prevail in the shallow subsurface. Our study proposes an innovative solution for improving the accuracy of ERT profiles based on large ES.

As discussed in our manuscript, and as stated by AR1, we agree that the proposed upgrading approach is not a general improvement procedure at this stage (we focused on a specific conductive-resistive-conductive 3-layer structure) and it depends on site specificities (i.e., the top layer has to be rather homogeneous, compared to the underlying layers). Note that in our manuscript we actually invite the reader to confirm/infirm the proposed methodology for the reverse case "resistive solum / conductive subsolum / resistive bedrock" in other study sites. We believe that our methodology is not "Weierbach catchment – specific". As discussed in our contribution, the regolith of the Weierbach catchment is representative of the slate regolith which covers a large part of the Rhenish Massif. Hence, we anticipate that the proposed protocol could be used across many regions of this large central European geological area (extending from Luxembourg, through Belgium, France and Germany) and might thus be of interest for the hydrological sciences community working in this region. Moreover, as written in our manuscript, we further expect that our novel approach may also be transferable beyond this area to other regions/catchments with similar characteristics, like forested catchments with similar bedrock geology.

AR1 suggests also that our study would have been more efficient if a Vertical Electrical Sounding (VES) logic and a 1D forward/inverse modelling approach had been used for the synthetic case study. We disagree with AR1 on this point as the use of a 1D modelling approach is less informative. It is worth recalling that we have opted for the use of a 1D synthetic model structure, but that the subsequent forward modelling and inversion processes have then been done in 2D in order to evaluate not only the accuracy, but also the precision of ERT inversion results. This would not have been possible using a 1D inversion scheme. We therefore think that our choice to use a 2D modelling approach for the synthetic case in order to deal with a 2D ERT specific issue is fully justified.

Misprints and comments

P.1 - L.17: in Abstract: "larger ES" (instead of "smaller ES")

We thank AR1 for pointing out this mistake. If our work is accepted for publication in HESS, this will be obviously corrected in the revised version of the manuscript.

P.19: I suggest that time domain EM soundings may be very efficient for conductive bedrock recognition.

We agree with AR1 that ground-based TDEM soundings could be suitable for detecting the bedrock of the Weierbach catchment (or in a similar context). However, although this technique might potentially provide results as precise as those derived from ERT, to the best of our knowledge there is no fast-moving device allowing quick measurements. We thus believe that TDEM is not more time efficient than ERT to explore accurately the regolith over large areas for a comparable horizontal sampling resolution. This statement is also strengthened by Figure 5 in Binley et al. (2015), who compare the horizontal and vertical survey scales typically achievable in 1 day by a two person field crew for ERT, FDEM, and TDEM.

References

Binley, A., Hubbard, S. S., Huisman, J. A., Revil, A., Robinson, D. A., Singha, K., and Slater, L. D.: The emergence of hydrogeophysics for improved understanding of subsurface processes over multiple scales, Water Resources Research, 51, 3837-3866, 2015.