

Interactive comment on “Electrical Formation Factor of Clean Sand from Laboratory Measurements and Digital Rock Physics” by Mohammed Ali Garba et al.

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Referee Comment #1 besides experiments, there also are some theoretical and modeling works on electrical properties of rocks/porous media, these should be well summarized and reviewed.

Authors Reply Yes indeed some modelling work has been done too: we have summarized them from L.64 to L.81. We have though just focused on the computation of electrical properties from microstructural models, as this is the main object of this paper (and not on the actual theory related to electrical properties of porous medium). Besides, the paper is already quite substantial and we did not want to add too much

C1

information that would unnecessarily lengthen it.

Referee Comment #2 Writing should be improved and concised. Many basic descriptions are not necessary.

Authors Reply We think it is important to describe with enough details the methods, techniques and computation steps, as it allows readers to see how the various results have been obtained. It is also necessary to have these information for comparing the results obtained by the various techniques or experimental devices, as some differences between them could be inherent to the methods used. Hence this is why we have preferred to have a shorter and more focused introduction and then allow for a more detailed methodology part.

Referee Comment #3 Please discuss the limitation of your work/method, such as for tight or low permeability rocks

Authors Reply. Indeed our work has been developed for non-conductive, unconsolidated materials and would require further development for other types of rocks or materials. However, tight or low permeability rocks are only a subset (and in that case the most challenging part may be the imaging itself as a classical micro-CT may not resolve the small pore and pore throats sizes). We thus added the following in the conclusion part.

Changes in the text L470 “This work was focused on establishing a robust methodology and workflow and we thus started with one of the most simple materials, though still highly relevant for many applications in oil & gas or water management environments. For more complex geological materials, such as low-permeability rocks, multi-mineralitic rocks, materials with conductive minerals, etc., further developments are obviously needed. However these developments are mostly related to the employed techniques (e.g. a higher-resolution imaging technique would be need for low-permeability rocks, a more complex laboratory set-up and techniques for measurements of rocks with conductive minerals or minerals with a non-negligible surface conductivity, etc.)

C2

rather to the overall workflow established here (comparison between laboratory and computed data through trends between properties) that remain valid.”

Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2018-133>, 2019.