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Solid Earth Discussions

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

Anonymous Referee #4

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This paper reports on a study aimed at comparing the values of the electrical formation factor of natural sands, determined by classical measurements on the one hand, and determined by numerical computations on micro CT images on the other hand. This is an interesting approach: indeed, image-based computation requires less time that experiments. The paper is well-organized and well-written. I think that this study can deserve publication, after some moderate revisions.

Line 123: why do you choose to study natural sands made of quartz and carbonates? Why not pure quartz sands or pure carbonate sands first?

Line 126: what is the carbonate/quartz content (in %) of the two sands? Have the

quartz and carbonate grains the same grain size distributions?

Line 130: how are you sure that after compaction the sandpack is homogeneous?

Line 158: you should add some words about the "non-conventional" rectangular cell. Why did you use such a geometry? What was the objective of using this configuration?

Figures 1 and 2: add the scale

Line 195, equation 3: use sigma_w instead of C. C is generally used to denote the concentration, not the electrical conductivity.

Line 201: maybe show an example of sigma_rock vs sigma_water with the fitting straight line.

Table 1: maybe provide the adjustment coefficient to provide an estimation of the quality of the value of FF

Figure 7: add th unit for the electrical field.

Figure 8: if I am right, this figure is not referenced in the text. Colorbar and unit are missing.

Figure 9: could you add the error bars, for both porosity and formation factor? Also add the value of the cementation exponent for the dashed lines corresponding to the fit of the experimental data.

Line 380: to validate your approach, a figure is missing, showing the comparison of the measured and compared value. I suggest you to plot measured FF/porosity and computed FF/porosity, as well as the 1:1 line.

Discussion: again, a comment on the interest of the unconventional cell is required. A comment about the deviating trend of the measured data for the Cottesloe sand with unconventional cell is missing.

Figure 13: informations are missing in the caption. Which data are from experimentally

measured values, from image-computation? The dots corresponding to this study are missing (for comparison). Moreover, the references of the data should be provide (for instance, "from Smith et al.").

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