Solid Earth
Discussions

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Interactive comment on "Development of a numerical workflow based on μ-CT-imaging for the determination of capillary pressure-saturation-specific interfacial area relationship in two-phase flow pore-scale porous media systems: A case study on Heletz sandstone" *by* Aaron Peche et al.

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We want to show our gratitude to anonymous referee number 2 for his valuable and reasonable comments. Answers to the comments are listed as given by referee 2 in the following section. This document is also added as a .pdf with colors and fonts indicating our answers and modified or newly added sections in order to make changes

more obvious.

I suggest to avoid the multiple abbreviations (PPF, PSD, etc.) explained in the list of abbreviations in the end of manuscript and to leave only the commonly-accepted ones (REV, FEM, etc.).

We agree and used full terms instead of abbreviations for digital sample approximation, phase field method, plane Poiseuille flow and Rayleigh-Taylor instability.

p.4 bottom: pls change a reference to Comsol (2014) manual to the reference to some handbook or to some other theoretical source.

We agree and changed this reference to another source.

p.6, Model validation: I suggest specifying in the first paragraph that three kinds of the model validations were conducted. Then to specify that first validation addresses single-phase Poiseuille flow, why two others deal with two-phase flow.

We agree that adding such sub-section makes this section more understandable. We added: The model described in this study was validated by reproduction of three analytical solutions. First validation refers to single-phase flow and second and third validation at two-phase flow and fluid-fluid interface tracking.

p.6, Fig.2: Colorbar addressing the depicted modeled velocities is missing.

We understand the point of referee number 2. However, this figure only aims at clarifying the model setup for plane Poiseuille flow (where we only used a subgeometry for the validation). Since only the value at the channel center is important we give this value and only qualitative information about isolines of velocities in the figure description (. . .blue and red colors define lower and higher velocities respectively.). We believe this is sufficient and a legend specifying velocities is not necessary.

p.9 & p.11: Pls insert a sentence with more detailed explanation of REV.

It is true, a general description of the REV-concept might be very helpful. We added:

Generally, a REV-analysis identifies the minimum porous media volume with similar (e.g.) hydraulic properties of the total porous media volume (Singhal and Gupta, 2010). Further information about the REV can be found in Bear (1988).

p.15: I suggest changing the title of subsection 6.5 to "Final model setup"

We agree and changed the subsection title.

Miscellaneous: p.5, line 10 "equation is implemented according to equations 3 and 4 " : pls change the wording.

This sentence and wording has been changed

p.12, line 14: Pls consider the following substitution: "Model domains are called -> PRESENT? an idealized pore, idealized pore network, micro-CT-based pore and micro-CT-based pore network.", following the increasing level of complexity.

We agree with the referee and changed the sentence to past tense.

p.15, line 6: a_wn is specified for the first time in this section, so that I suggest calling it by its name.

We agree with the referee and substituted awn with interfacial area (awn).

Please also note the supplement to this comment:
http://www.solid-earth-discuss.net/se-2016-39/se-2016-39-AC2-supplement.pdf

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