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Interactive comment on "Visualization and Quantification of the Penetration Behavior of Bentonite Suspensions into the Pore Network of non-cohesive Media by using μ-CT Imaging" *by* Britta Schoesser et al.

Anonymous Referee #1

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The authors provide an overview of their experiments about bentonite infiltration into glass beads. The subject fits well to scope of the special issue, as it combines 3D imaging with a geotechnical application. However, I cannot recommend its publication for several reasons.

1. Objective: There seems to be no clear research question, which this study addresses. The three-dimensional visualization of a well studied process with μ-CT should not be the only motivation nowadays. The authors themselves state that from their observations no general rules can be derived about how properties of the sus-

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pension and the pore space affect penetration depth (l 472-476).

2. Design of the experiment: - A lot of results were presented that only distract from the central message of the paper without providing further insights. For instance, the material of the cylinder (acrylic vs. quartz glass) had no influence on penetration. This can be stated in one sentence without showing results for sample 5 (Fig. 4, etc.) - Various parameters were changed at the same time, which mixes up the causes for observed effects. I assume Ca and Na changes the flocculation behavior of bentonite (is this stated somewhere in the introduction?), which is why the particle sizes for Ca-Bentonite and Na-Bentonite were different. You state that the viscosity of the suspension was different. Is this due to the different particle sizes (Appendix 1) or due to the different densities (Ca-Bentonite 25%, Na-Bentonite 8-13%)? Which of these effects is governing penetration depth? - Parts of the analysis is of no obvious use for the conclusions. For instance, the contact angle measurements are only shown for single interfaces from three out of six samples (Ca - Bentonite only). There are several issues with that: 1. The authors don't state how the contact angles were measured. The plane in which the angle can be measured without bias, needs to be perpendicular to the three-phase contact line (Andrew et. al. 2014) and many angles need to be measured in order to get robust results. 2. Why would you expect different contact angles, when all material properties are the same (same suspension, beads of same material - only differ in size). 3. How exactly would a change in contact angle effect penetration depth anyway?

3. Style: - Abstract reads like an introduction and not like a concise summary. In fact, parts of the abstract are directly copied from the introduction. The abstract should tell what you did, why you did it and why this is important. - Some figures are in German (Appendix 1). Some are unnecessary, because they only show common knowledge (Fig. 16). Some show conceptional sketches that are not well explained (Fig. 1,2). Some show what seems to be colorful watershed partitioning of the pore space (e.g. Fig.6,14) without telling why this is necessary, because results are only analyzed with

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respect to depth profiles anyway. Some figures are of low quality so that observations made in the text are not really supported by the figures (e.g. water films in Fig. 12). - Some of the cited literature is in preparation (Zizka & Theiwes 2015), some is not even listed (Zizka & Theiwes 2016). - Many typos and bad wording. Maybe consider to consult a native speaker. - Some passages of the text are unimportant and should be omitted, e.g. l215-224 or l489-495.

4. Other: - Is the pore size distribution determined by the maximum inscribes sphere method, by the watershed partitioning in individual pores or another method? - a vertical test line through the image is called a profile and not a histogram (which is the frequency distribution of intensities for an entire image). - What does the "measurement" module in Avizo do exactly?

References: Andrew, M., Bijeljic, B., Blunt, M.J.: Pore-scale contact angle measurements at reservoir conditions using X-ray microtomography, Advances in Water Resources 68(0), 24–31, 2014

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