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 #2

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This research paper deals with the uCT imaging of transport of Bentonite suspension in glass beads packing of two different sizes (2mm and 600um diameters). The topic is of importance to many applications such as civil engineering and slope stabilization, well clogging, etc. Sodium-Bentonite and Calcium-Bentonite as the two major suspensions have been injected the methodology and objectives are valid and very relevant to porous media applications.

Authors have used uCT imaging to visualize the penetration/filtration of bentonite suspension in glass bead packing. uCT imaging has been used extensively in the

past decade for diverse porous media applications such as particle deposition, flow, transport, multiphase flow. e.g.: uCT imaging of particle deposition in porous media (GRL,34,2007, L18404), MRI imaging of particle deposition (Environ. Sci. Technol. 2005, 39, 7208-7216). Although this approach has been used in these disciplines, the authors introduce the technology for other applications such as tunnel engineering.

Conclusions made are valid within the very limited parameterization space. There are two major drawbacks in this study.

a. In practice, for creating bentonite suspension, water with a given composition and pH is used. Since the swelling behaviour of bentonite and its agglomeration are highly controlled by pH and salinity of the suspension, the authors should have presented a sensitivity analysis of the penetration/filtration process as a function of water ionic strength/pH or at least report their own experimental conditions. Surprisingly, there is no information about the water and the resulted suspension specifications.

b. The porous media is spherical glass beads while natural granular porous media are made of irregular grains which are covered by some impurities such as clays. It is known that movement of particles including bentonite suspension is highly influences by the shape of grains, roughness, and surface properties. Roughness and grain shapes control the pore scale hydrodynamics while surface properties control the surface forces and interaction between the particles and porous media. None of these factors are present in the current study. As the most simple approach, at least crushed glass beads or a simple sand packing could be used to investigate the penetration/filtration processes.

1. Does the paper address relevant scientific questions within the scope of SE? This research paper deals with the uCT imaging of transport of Bentonite suspension in glass beads packing of two different sizes (2mm and 600um diameters). The topic is of importance to many applications such as civil engineering and slope stabilization, well clogging, etc. Sodium-Bentonite and Calcium-Bentonite as the two major suspen-

sions have been injected the methodology and objectives are valid and very relevant to porous media applications.

2. Does the paper present novel concepts, ideas, tools, or data? Authors have used uCT imaging to visualize the penetration/filtration of bentonite suspension in glass bead packing. uCT imaging has been used extensively in the past decade for diverse porous media applications such as particle deposition, flow, transport, multiphase flow. e.g.: uCT imaging of particle deposition in porous media (GRL,34,2007, L18404), MRI imaging of particle deposition (Environ. Sci. Technol. 2005, 39, 7208-7216). Although this approach has been used in these disciplines, the authors introduce the technology for other applications such as tunnel engineering.

3. Are substantial conclusions reached? Since the system of porous media is very simple and the parametric space adopted is very limited (no analysis on the effect of water composition, pH, grain size distribution of the porous media, roughness, natural porous media) the conclusions made dot not provide a substantial contribution to the current understanding.

4. Are the scientific methods and assumptions valid and clearly outlined? uCT imaging technique used in valid and appropriate for this study. However the image processing is very brief. It is needed to mention how the different steps are done. Maybe presenting the image processing in an appendix would be better.

5. Are the results sufficient to support the interpretations and conclusions? Conclusions made are valid within the very limited parameterization space. There are two major drawbacks in this study.

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6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? Yes.

7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution? Important papers on particle imaging (examples given in item 2) are missing

8. Does the title clearly reflect the contents of the paper? Yes.

9. Does the abstract provide a concise and complete summary? Summary of the paper seems as an introduction. It needs to be rewritten to explain the summary of the work rather than the importance / introduction of the work.

10. Is the overall presentation well structured and clear? The paper is well structured and well presented.

11. Is the language fluent and precise? The language is clear and fluent.

12. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? Symbols are fine. No equation is provided.

13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced,

combined, or eliminated? Figures 9, 10 and 11 can be shown in a single figure with three subfigures.

14. Are the number and quality of references appropriate? Fine.

15. Is the amount and quality of supplementary material appropriate? Some more information on image processing and experimental analysis should be provided in the SI.