Authors comment

Simulating permeability reduction by clay mineral nanopores in a tight sandstone by combining µXCT and FIB-SEM imaging

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	Saeid Sadeghnejad:	Authors' reply:
1.	The paper's Appendix comparing micro-CT, BSE, and EDX should be merged into the main text. Fig A provides a clear insight into the "problem definition" of the paper. The readers should wait until reading this Appendix and see this figure to understand why Illites are not visible in micro-CT images.	As suggested by Mr. Sadeghnejad, we inserted the images into the manuscript text section (Figure 2,5). This improves the comprehensibility of the manuscript, clarifies the motivation, and illustrates why we had to model illites into µXCT structures to obtain the true rock permeability.
2.	Authors considered a 2-voxel pore layer next to solid surfaces as pore locations for illites in the primary simulation model. The reason for selecting this value was not discussed in the paper. Also, the methodology used in Eq. 7 requires more detailed explanations.	We updated the description of the decision why we chose a 2-voxel layer of illites and included it into the text. We updated the description of the method in line 213-216. Furthermore, we updated the text from line 221-224. We changed fig. 6 and the figure description to improve the comprehensibility of the method.
3.	However, the discussion of the same effect on the porosity of the system is missing.	With a focus on the permeability impact of clay minerals, this work shows that only a minor alteration of the pore throat morphology can be accompanied by a strong reduction of permeability in tight reservoir rocks. Assuming porous voxels, the porosity does not change significantly by applying the methodology. It is our intention to emphasize that the well-known relationship between porosity and permeability changes with a disconnection of the pore throats (e.g. Leu et al., 2014). The impact on permeability of this

		effect increases with decreasing permeability of the considered rock.

Appendix:

Leu, L., Berg, S., Enzmann, F. *et al.* Fast X-ray Micro-Tomography of Multiphase Flow in Berea Sandstone: A Sensitivity Study on Image Processing. *Transp Porous Med* **105,** 451–469 (2014). https://doi.org/10.1007/s11242-014-0378-4