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Interactive comment on "Simulating stress-dependent fluid flow in a fractured core sample using real-time X-ray CT data" *by* Tobias Kling et al.

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Dear reviewer,

fluid flow simulations were re-simulated with adjusted fluid properties. As expected, new experimental and simulated results are lower than before, however do not affect their relative behavior and, hence, do not affect the general conclusions of the paper.

As we stated mistakenly, the experiments were not performed with water but with nitrogen. Indeed, nitrogen is not an incompressible fluid, however experimental conditions were chosen so that fluid flow simulations can be represented by a laminar, incompressible approach. The experiment was conducted at 2.1 MPa pore pressure so that

the slippage effect is highly suppressed and negligible. For analysis, common Darcy's law and a corrected one for gas showed identical results. Furthermore, repeated measurements with three different flow rates clearly showed Darcy flow behavior. There are several reasons for that such as the very small pressure drops due to the fracture, the low flow rates and the high pore pressure. So the compressibility in this experiment can be assumed as negligible and the simulation approach is also applicable for the actual fluid.

We attached a new (preliminary) revised manuscript in the supplements. Following changes were performed:

Page 33, 35, 36, 37 and 38: Adjustment of Figures 2, 5, 6, 7 and 8.

Page 6, lines 4-9; Page 9, lines 17-19; Page 10, lines 9-10: Adjusting information about experimental conditions and simulation input parameters for nitrogen.

Page 16, lines 24ff: Fracture permeabilities derived from cubic law approaches were corrected for matrix permeability to correctly reproduce the entire core permeability. Actually, the resulting range of permeabilities is significantly lower (cf. Figure 8) than mentioned in the initial revisions (Response 1). Hence, the cubic law approaches represent a valuable method to predict quantitative fluid flow, however are physically limited and cannot be used for qualitative flow analyses. This aspect is re-discussed in the new manuscript and is also adjusted in the summarizing sentence in the conclusion part (Page 19, lines 27-29).

The new simulation results do not affect the comparison with the comparative CT-based fluid flow simulations discussed on Page 15, lines 20ff or the error analysis.

We deeply apologize for the former mistake and think that the changes to the manuscript will improve the consistency of the manuscript and will meet the journal publication requirements.

With kind regards T. Kling

Please also note the supplement to this comment:
http://www.solid-earth-discuss.net/se-2016-41/se-2016-41-AC6-supplement.pdf

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