

Interactive comment on “The influence of sample geometry on the permeability of a porous sandstone” by Michael J. Heap

Ougier-Simonin (Referee)

audreyo@bgs.ac.uk

Received and published: 18 December 2018

I have reviewed the submitted paper titled ‘The influence of sample geometry on the permeability of a porous sandstone’ that reports systematic permeability data measured in samples of a homogeneous, fine grain sandstone as a function of the cylinder’s aspect ratio.

The article reads very well. However, one has to be cautious regarding the suggested larger impact of the study compared to its actual content. If the data presented are well supporting the discussion and concluding remarks written in section 5, the abstract and introduction invite the readers to expect a much larger demonstration.

The method and data presented are for benchmarking the usage of a benchtop gas

C1

permeameter although there is a need, as well pointed by the author, for a standard description on how to perform high quality permeability test in laboratory in the best reproducible manner. Indeed, accessing to permeability value in triaxial test rigs for instance can be done using different sample geometry (cylinders, cubes), of various sizes and aspect ratios, and with different type of fluids (liquid, gas) and methods (flow, pulse-decay, oscillations).

I would therefore recommend to be a bit more precise in stating clearly that this paper deals with rock matrix permeability first, and also on benchtop measurements of this parameter. The sample geometry mentioned could also be simplify to aspect ratio for immediate clarity.

On a personal note, as I fully support the broader scope wished with that study, I would recommend the author to discuss with Prof. Christian David (Uni. Cergy-Pontoise, France) and Prof. Patrick Selvadurai (McGill University, Canada), who both trialled large permeability measurement benchmarking few years ago. It is my hope that the results they may have gathered could help the author to pursue this study.

Few other points: - Page 3, line 5: why only 1 sample once was tested 5 times and not other? - Page 3, line 13: “for 1 h prior to measurement to ensure microstructural equilibrium” How does the author know/control that this time was sufficient for the mentioned purpose? - The author presents both the Forchheimer and the Klinkenberg corrections. In Table 1, one can see that the Forchheimer correction has been applied to most of the measurements. Yet it is not stated clearly anywhere why the Klinkenberg correction was not needed. An additional figure demonstrating for 1 test at least why the Forchheimer correction was needed and how it was calculated would be of great value as well.