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Interactive comment on "Assessing accuracy of gas-driven permeability measurements: a comparative study of diverse Hassler-cell and probe permeameter devices" *by* C. M. Filomena et al.

Anonymous Referee #2

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General comments:

A study of comparing permeability measurements using two Hassler cell systems and two mini permeameters was documented. Permeabilities of 51 sandstone samples from various locations and with permeability range over six orders of magnitude were measured and device-specific aberrations were observed, mostly in low permeability range. The document was well-written and the author provided a data set with quality for better understanding the discrepancies existing among different permeability measurements.

Specific comments:

1. Page 1167 line 7. It may be helpful to provide more information about clay contents and degree of cementation of the selective samples so readers have better idea of what the permeability data corresponds to, whether there were formation-specific aberrations observed in this study and why.

2. The author compared permeability measurements from four different devices and observed aberrations. However, these aberrations are all device-specific and the correlations/transform equations only apply to the particular devices/procedure examined in this document. Empirical correlations are of less importance since no systematic deviation of a particular method was observed in the data set provided. The comparison of this kind is useful to research facilities which conduct measurements with different devices but it does not provide suggestions of how data obtained from different entities can be compared. Other than technical specifications, the author may discuss more the discrepancies of fundamental methodologies, such as the impact of applying confining pressure to samples and the scale of heterogeneity on which each of the method integrates.

3. Page 1170 line 8. In mini permeameter measurements, a geometric factor needs to be determined beforehand empirically. How sensitive are the results to the determination of geometric factor and how was this done for the permeameter measurements reported in this document? Were the test sets included in the 51 samples? If the permeameter measurements were calibrated with results from Hassler cell devices, there should have been no systematic aberration between the two.

4. It may be of great value if the author can comment on permeability measurements conducted with other approaches, such as water injection. Excluding the cases that the permeability is extremely low, the sample is clay-bearing or water may swell a sample, is measurement with water consistent with gas driven measurements using both Hassler cells and probe permeameters?

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5, C552–C554, 2013

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5. Although it is important to obtain as accurate permeability values as possible, given the fact that four measurements of the majority of samples are within one order of magnitude and the fundamental difference of devices, it is acceptable to have a certain degree of uncertainty in measurements and a one-to-one correlation does not exist. Errors in sparsely measured permeabilities do not have large impact on reservoir heterogeneity characterization or reservoir simulation.

Interactive comment on Solid Earth Discuss., 5, 1163, 2013.