

## ***Interactive comment on “Petrophysical and mechanical rock property database of the Los Humeros and Acoculco geothermal fields (Mexico)” by Leandra M. Weydt et al.***

### **Anonymous Referee #1**

Received and published: 29 July 2020

This manuscript presents a rock physical property database for two geothermal fields in Mexico. The database contains a colossal volume of data. This contribution summarises the motivation for the project and the geological structure of the area, before explaining the workflow and methods used to compile the database. The manuscript is well written and logically ordered. My only major comment is that I think, as explained further below, the discussion section should include an additional paragraph that outlines the issues surrounding using laboratory-measured values in large-scale models (i.e. upscaling). I consider this manuscript suitable for publication after the following comments have been suitably addressed to the satisfaction of the editor.

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Line 68: Another relevant, and recent, paper that the authors could consider citing here is Heap et al. (2020, JVGR). Heap, M. J., Gravley, D. M., Kennedy, B. M., Gilg, H. A., Bertollett, E., & Barker, S. L. (2020). Quantifying the role of hydrothermal alteration in creating geothermal and epithermal mineral resources: The Ohakuri ignimbrite (Taupo Volcanic Zone, New Zealand). *Journal of Volcanology and Geothermal Research*, 390, 106703.

Lines 90, 107, and 254 (and elsewhere): Data is plural.

Line 146: “Samples. . .were collected several times. . .” suggests that the same block of rock was collected several times. Suggest to reword.

Line 265: I suspect the authors mean “too friable” rather than “too brittle”.

Line 329: You mean “Table 2”?

Line 350: A temperature of 105 °C might be high enough to encourage thermal microcracking or damage clays. Can the authors comment on the suitability of using this temperature? Are the authors sure the materials were not affected?

Lines 353 and 439: Can the authors comment on the effectiveness of saturating samples by leaving them submersed in water? For tight rocks, it seems doubtful that water would have penetrated thin pores/cracks. Errors resulting from incomplete saturation would influence, for example, the porosity measurements using the triple-weight method (Lines 365 and 370).

Line 360: For those unsure of the meaning of “effective porosity”, I would add “i.e. connected porosity” in parentheses here.

Line 373: What was the range of plug length? Measurements on “short” samples of a homogeneous sandstone were recently shown to provide reliable permeability values, see Heap (2019). These authors argued that permeability measurements on “short” samples are reliable as long as the pore/grain/crystal size is small compared to the length/diameter of the sample. Heap, M. J. (2019). The influence of sample geometry

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on the permeability of a porous sandstone. *Geoscientific Instrumentation, Methods and Data Systems*, 8(1), 55-61.

Line 377: Gas permeability measurements for high-permeability samples and/or when using high flow rates likely also require a Forchheimer correction. Did the authors check for this?

Line 381: “. . .at five pore fluid pressure levels. . .”

Line 407: Elastic wave velocities were measured parallel to the sample axis?

Line 425: Can the authors provide more information as to how the saturated velocities were measured? On samples submersed in water? Or were the samples wrapped in cling film and quickly measured to avoid desaturation?

Line 474: If the authors prefer to use “G-Modulus”, I would also put “shear modulus” in parentheses to avoid any confusion.

Line 479: This should be “load at failure/maximum load” and “cross-sectional area”.

Line 484: Do the authors mean here that they used a constant loading rate of 0.5 kN/s? It's not clear. Written as it is, it suggests that the loading rate was variable and that the maximum was 0.5 kN/s.

Line 485: Do the authors mean the loading rate?

Line 490: What type of sensor? Strain gauges?

Line 508: Can the authors elaborate on what they mean by “tension controlled”?

Line 519: They were loaded diametrically in compression?

Line 537: The triaxial experiments were performed on dry samples?

Line 607: See also the study by Eggertsson et al. (2020), who measured samples taken from the Krafla geothermal system in Iceland. Eggertsson, G. H., Lavallée, Y., Kendrick, J. E., & Markússon, S. H. (2020). Improving fluid flow in geothermal

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reservoirs by thermal and mechanical stimulation: The case of Krafla volcano, Iceland. *Journal of Volcanology and Geothermal Research*, 391, 106351.

Line 669: I think the authors should include an additional paragraph(s) that states that large-scale modelling, such as fluid circulation models, require upscaled values not those measured in the laboratory. I think it would be beneficial for the reader if the authors explain the issues surrounding using laboratory-measured values in large-scale models and discuss/present existing methods typically used to upscale such values.

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Interactive comment on Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2020-139>, 2020.

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