Interactive comment on “Mechanisms of destructing translational domains in passive margin salt basins: Insights from analogue modelling” by Zhiyuan Ge et al.

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This manuscript uses physical models to assess the formation, deformation and overprinting of translational domains on gravity-driven salt-cored passive margins. I like the models in general and they should be useful to people interested in salt tectonics. Tim Dooley

General comments:
These experiments follow on from several papers published since 2017 on the impact of base-salt relief on deformation on these types of margins and are thus quiet timely.

These other studies used physical models, numerical models and seismic-based studies. I think the authors should refer to these in the introduction and state the differences, and similarities, between those studies and their own, rather than just adding this in as a footnote at the end of the manuscript.

My main problem with the manuscript is the presentation of results. There are 3 experiments with essentially 2 basins in each experiment, and the authors present them in pairs. There is no need to do this. There are 6 distinct experiments as there was no connectivity between the "basins". Split these up so that you can present the parameters you tested in a logical fashion. See the comments on the manuscript for more details but you can work it like so:

1. Evaluating sediment thickness controls on size of translation zone
2. Evaluating sediment deposition rates on translation zones – but use strength
3. Evaluating discontinuous loads on translation zones

I also feel that some areas of the text need expanding on, and others are perhaps too wordy. See the comments on the PDFs.

Specific comments:
I refer you to the attached PDFs for specifics on the text and figures.

Please also note the supplement to this comment:
Mechanisms of destructing translational domains in passive margin salt basins: Insights from analogue modelling

Rob Gawthorpe, Zhiyuan Ge, Michael Warsitzka

Abstract Current petroleum industry models illustrating the structural style of passive margin salt basins typically have three domains of active extension and corresponding deformation controlled by a domain of thin undeformed salt layer. However, such a undeformed domain is rarely observed in natural systems where compressional and extensional structures may interact in the mid-slope area. In this study, we use sandbox analogue modelling to investigate how the pre-existing undeformed domain of passive margin salt basins respond to increasing compressional forces associated with constant (Holocene) loading. The results show that a translational domain preferentially nucleates in the basinal domain where pre-existing boundary layer is relatively thick compared to the undeformed boundary layer in the early stage, although it is thinner in the experiment. The pre-existing boundary layer overprints the domain of pre-existing thin-skinned domain. The results suggest that the architecture of pre-existing salt basins is closely linked to the pre-existing boundary layer's thickness and sedimentary cover thickness. The translational domain is an undeformed region in the undeformed central area of undeformed boundary layer, whereas the undeformed domain is a deformed one in the undeformed central area of the thin-skinned domain. Our study suggests that the architecture of passive margin salt basins is closely linked to the pre-existing boundary layer's thickness and sedimentary cover thickness. The results also indicate that the pre-existing boundary layer overprints the central area of the thin-skinned domain.

Keywords: translational domain, thinned-skinned, salt tectonics, passive margin, analogue modelling, digital image correlation (DIC)

Fig. 1. Comments on text TD

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