Interactive comment on "2-D finite displacements and finite strain from PIV analysis of plane-strain tectonic analogue models" *by* David Boutelier et al.

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Received and published: 18 June 2019

We thank the reviewer for the constructive comments on the manuscript. We have taken these comments into account to produce a significantly clearer manuscript.

Below are the specific comments and how they have been addressed in the revision.

COMMENT: "PIV": "PIV" is an essential acronym which should be defined earlier (title or abstract) than it is currently done (where you define it in the third paragraph of the intro). You may also quickly clarify the use of the term "PIV" in parallel to the emerging preference of the term "DIC" (digital image correlation) for applications outside the fluid

dynamic context. In understand you stick to "PIV" because the software has this name and you may not want to change it. Even if this would be the only reason, it should be spoken out frankly.

RESPONSE: We have now included the term PIV and what it means in the title as suggested by the reviewer.

COMMENT: "TecPIV" first (and only) appears in the conclusions although it is what the paper is about. It should be introduced in the introduction and abstract (if not in the title). Page 2 Line 3ff:

RESPONSE: We now mention TecPIV earlier and multiple times throughout the manuscript.

COMMENT: The reasoning for not using PIV cameras is (my perception) nowadays mainly the costs, not the resolution. I therefore suggest to update the sentence on "relatively low-resolution". You say that PIV cameras have low resolution (<10 MPx), which is strictly valid only for imaging frequencies beyond what is typically used in analogue modelling of tectonic processes and for cameras with a color depth beyond 14 bit. There now exist also higher resolution (up to 29 MPx, 14 bit) PIV cameras which run at frequencies up to a few Hz and I assume with a time lag of a few years they will keep pace with DSLR camera developments in term of spatial resolution. The sensitivity of PIV cameras might indeed be of minor importance for the tectonic analogue modelling community, unless you work with pulsed light or under low light conditions. A short sentence clarifying the role of a proper dynamic range (preferentially at least 12 bit) for image correlation accuracy could be helpful in this context. Lastly, analogue "seismo-tectonic" models, where high rates are an issue, requires imaging frequencies beyond what is possible with consumer-grade cameras at a decent level of image quality.

RESPONSE: We expanded this section to include the valid point made by the reviewer.

COMMENT: Figures: A) Increase font size in all panels showing the velocity fields (numbers on axes and color bars).

RESPONSE: We have increased the font size of all panels and most figures. The labels are all font 7 or larger.

COMMENT: Figures B) Figure 3 & 5: The grey background is not well suited to appreciate the velocity field, especially the low levels. A white zero-level (as actually the color bar indicates) is better. The undeformed areas of the masks are not really visible, maybe add some space outside the frame, make the lines thicker etc.

RESPONSE: This is because the derivative of the velocity, which is plotted in colour, is overlaying the view of the model from which it derives. This may not be relevant for the synthetic images employed in this study but is rather important in multiple models. To blend the colour image of the derivative and the view of the model surface, the derivative is made semi-transparent. This is why the white colour does not appear so white when plotted on top of black. We believe this small compromise brings significant value.

COMMENT: Title: In the title you constrict the use to applications for plane strain. I probably understand your motivation to do so because the method is 2D but in contrast to the synthetic benchmarks (which are truly 2D) any real analogue model (free) surface will deviate at least locally from plane strain. Also because in the main text you never recall the issue of plane strain (not before the conclusions), so I suggest to delete "plane strain" from the title and instead discuss the limitations of 2D analysis shortly elsewhere.

RESPONSE: We changed the title following the reviewer's advice.