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Interactive comment on "Fracturing of ductile anisotropic multilayers: influence of material strength" *by* E. Gomez-Rivas et al.

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The present paper is focusing on the experimental deformation of multilayers to demonstrate the transition from ductile to brittle behavior with changes in viscosity of the individual layers. The paper is well written and should be of interest for many structural geologists dealing with brittle to ductile deformation of crustal rocks. I think the paper could be published after minor revision. There are some weak points, which should be considered when revising the Ms.. I have listed these below and have indicated these in the paper (pdf).

Specific comments

The material used for the experiments is not sufficiently described concerning material

anisotropy. First of all I suggest to clearly define the meaning of 'ductile' and 'viscous' in the introduction section (see reference in the pdf). It is obvious that anisotropy is very important for the development of the deformation structures. However, there are not only two but at least three types of anisotropy in your experiments, which are important for the results: (i) anisotropy of the plasticine itself because of possible plate-shaped filler components, which might rotate during progressive strain resulting in strain hardening and different viscosity in different directions with respect to the principal strain axes; note that an anisotropy would also be produced in cases of isometric filler components because of their change in site (with progressive strain you have a denser distribution parallel to the Z-direction and a less denser distribution parallel to X direction; the quality of the present paper would probably increase if the type of fillers and their behavior during progressive strain is known; (ii) anisotropy caused by the paper flakes, which rotate during progressive strain; it is of interest if these paper flakes collide during rotation/translation or if these are rotating passive markers during the entire run; (iii) anisotropy because of the different layers, which have different viscosity. The viscosity ratio of the individual layers should be listed in a table and also in the figure where the deformed models are depicted. This viscosity ratio is important for the nucleation of pinches. The pinches and necks are weak zones where shear fracture could nucleate. Thus, the formation of macroscopic shear fractures and boudinage is probably intimately related. Pinch-and-swell structures are particularly well developed in Model B, but some are also present in Model A, where deformation is almost entirely homogeneous. May be that these few pinches in Model A result from heterogeneities in the material (artefacts, such as air bubbles). I suggest to describe the sequence of structures (pinch-and-swell, tension gashes, shear fractures), which develop with progressive strain during the individual experimental runs, in order to check, which structure is influencing the other.

Another weak point is the lack of confining pressure. I know that most of these types of analogue experiments are working without confining pressure, but this should be mentioned at least in the Discussion section. Note that confining pressure would suppress the formation of open fractures, which are present in your models. These open fractures, particularly tension gashes, are not common in rocks, where the overall deformation is viscous, at least when the rocks are dry. In nature, such fractures develop in the ductile (viscous) level because of elevated pore pressure, which, however, is not possible in your models.

There are some further points, which should be considered. They are marked in the pdf document.

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Please also note the supplement to this comment:
http://www.solid-earth-discuss.net/7/C124/2015/sed-7-C124-2015-supplement.pdf

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Interactive comment on Solid Earth Discuss., 7, 419, 2015.