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Interactive comment on "The rheological behavior of fracture-filling cherts: example of Barite Valley dikes, Barberton Greenstone Belt, South Africa" *by* M. Ledevin et al.

Anonymous Referee #1

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Ledevin et alii write a manuscript on the rheological aspects of fracture-filling cherts from South Africa. The authors well explain that the theme has been previously addressed by many scientists but remains controversial, and eventually propose an appealing model to explain the growth of chert-filled dikes. Although the manuscript by Ledevin et alii is surely interesting for many aspects, I think that the provided data are not sufficiently compelling to properly support the proposed model. The provided evidence is mostly qualitative and poorly quantitative.

(1) The conclusive section starts with this sentence: "Based on the geometry of Barite Valley dikes and on the petrology of the fracture filling cherts ...". Unfortunately, I see very few geometrical data. Concerning the dikes, I would have expected plots

with geometrical data and orientations, thicknesses, crosscutting relationships, fracture density, etc to explain various aspects including fracture growth, fluid circulation, and hydrofracturing that are mentioned in the conclusions by Ledevin et alii.

(2) Also the petrological data are very few. I would have expected geochemical-petrological quantitative (compositional) data to better understand the fluid circulation and rheology of the fracture filling that are the main focus of the paper.

(3) "Impact-induced hydrothermalism and hydraulic fracturing by overpressured fluids account for the intense in situ brecciation of the country rocks". I do not see compelling data supporting this conclusion and explaining hydrothermal circulation as well as the cause of hydrofracturing and overpressured fluids. On which basis (data) is hydrofracturing invoked?

(4) "The plumbing system probably developed at low temperature at the external edge of a large crater." Please, provide evidence to support this conclusion.

(5) "The fluid that caused the fracturing was thixotropic, having a very low viscosity as it was injected and becoming highly viscous after circulation stopped. The presence of abundant clay-sized particles within the Si-rich fluid, and the capacity of silica-rich colloidal fluid to form cohesive 3-D networks, accounts for the viscosity variations". The evidence that supports this conclusion are merely descriptive/qualitative and non-quantitative.

In synthesis, I suggest the Editor to reject the manuscript by Ledevin et alii. With the addition of new, quantitative, and compelling data this manuscript would be surely of interest for and publishable on Solid Earth.

Interactive comment on Solid Earth Discuss., 6, 1227, 2014.