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Interactive comment on "Control of pre-existing fabric in fracture formation, reactivation and vein emplacement under variable fluid pressure conditions: An example from Archean Greenstone belt, India" *by* Sreyashi Bhowmick and Tridib Kumar Mondal

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Dear Dr Soliva, dear authors,

Please find my comments on the paper "Control of pre-existing fabric in fracture formation, reactivation and vein emplacement under variable fluid pressure conditions: An example from Archean Greenstone belt, India."

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Discussion paper

The paper presents a study on the formation of quartz veins in the Chitradurga Schist Belt in southern India. The study involves combination of different approaches (AMS, tensile strength measurements in the lab, structural measurements and ultimately paleostress inversions) in order to determine the stress and the pore fluid pressure(s) pertaining to the formation of the veins. Although the approach is very interesting and innovative, I have serious reservations concerning methodological aspects and opine that some of the main conclusions are not firmly supported by the analyses. These aspects that look to me essential and therefore I will restrict my discussion on them.

1) In page 14 (lines 273-274), it is mentioned: "Tensile strength of metabasalt ($\sim$12 MPa; obtained from BTS studies) indicates that the minimum principal stress (sigma3) has to be sigma3 $\geq$ 12 MPa." Thereafter, this value is selected as magnitude for the minimum principal stress for the stress reconstructions (e.g. Fig. 7). I am particularly puzzled by the reasoning. The condition for tensile fracturing is sigma3 – pore pressure less or equal to the negative value of tensile strength. That is if sigma3 = 12 MPa then Pf has to be equal or higher than 24 MPa... Starting from there could the authors explain how they constrain sigma3?

2) It is proposed that the veins formed in response to various fluid pressure pulses (see pages 13 and 14, and Fig. 7), which is reasonable and supported by numerous studies (e.g. discussion in Yamaji et al. 2010, p. 1139). The analysis suggests two extreme values for the fluid pressure: a maximum Pf derived from the Bingham distribution of all the measured veins and a minimum Pf, corresponding to the Bingham distribution of a selected subset of veins forming an elliptical cluster around sigma3 (see Fig. 7). It is totally unclear how the authors have selected the subset indicating, presumably, the actual minimum pore pressure. For example if one decides to select another subset of poles forming a tighter cluster around sigma3, Pf will be further reduced. It is just a mathematical consequence (see Jolly and Sanderson 1997)... In addition, stress anisotropy is theoretically insensitive to pore pressure variations. Surprisingly, the two inversions shown in Fig. 7 indicate rather different shape values, though pore pressure

is the only quantity that is expected to change. In conclusion, the results themselves suggest that the selection of the subset of poles is merely subjective and the advanced minimum pore pressure value badly supported by the analysis.

Nevertheless, I would like to remain constructive and opine that other aspects addressed in the paper are worth to be published. I recommend major revision and re-submission after having considered my two above “worries”.

Kind regards C. Pascal

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