Modeling strain localization in two-phases aggregates

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Strain localization involved in mylonites formation requires both dynamic recrystallization to reduce grain-size and stress weakening through diffusion accommodated grain-boundary sliding [1], which are not synchronous during deformation [2]. To address this problem in the case of polymineralic aggregates we have adapted a two phase model proposed by Bercovici and Ricard [3] that produces coeval rheological weakening and grain-size reduction through pinning of the interfaces between the two phases [4].

However we slightly discuss their interpretation of the pinning influence and propose to couple the pinning processes due to grain coarsening with deformation induced grain nucleation. Furthermore, taking into account Zener pinning implies a limited range for initial interface roughness to ensure that the initial aggregate is energetically balanced. These considerations implies important differences in the model evolution, particularly concerning the importance and brevity of the stress drop (see figure 1).

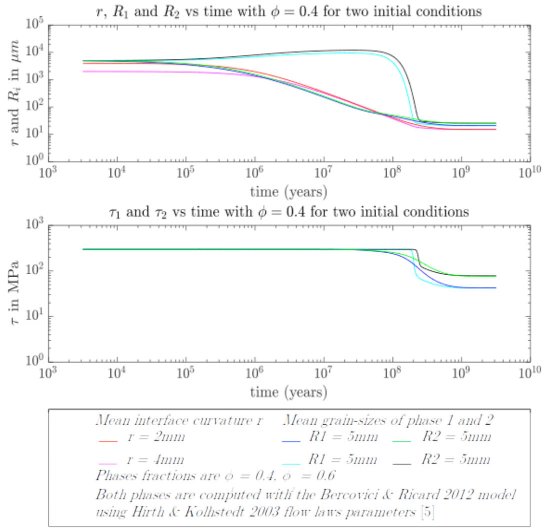

Figure 1: Grains sizes, interface roughness and stress evolution

[1] Poirier (1980) *J. Struct. Geol* **2 1/2**, 135-142. [2] De Bresser *et al* (2000) *Int. J. Earth Sci.* **90,** 28-45. [3] Bercovici & Ricard (2012) *Phys. Earth Planet. Int.* **202-203**, 27-55. [4] Smith (1948) *Trans A.I.M.E* **175**, 15-51. [5] Hirth & Kohlstedt (2003) *Inside the subduction factory AGU* **138**, 83-105.