

Interactive
Comment

Interactive comment on “Dynamics of interplate domain in subduction zones: influence of rheological parameters and subducting plate age” by D. Arcay

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This study is about the influence of subducting plate age and visco-plastic rheological parameters such as activation energy, activation volume and friction coefficient of the oceanic crust and asthenospheric mantle on the depth of the brittle-ductile transition (zBDT) and of the kinematic decoupling (zdec). zBDT depends strongly on interplate channel friction coefficient and on the viscosity at the lithosphere-asthenosphere boundary, and to a minor extent on the interplate channel activation energy and activation volume. Older and colder plates deepen the depth at which the brittle-ductile transition occurs. zdec depends on the mantle viscosity at the mantle wedge tip, activa-

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tion energy contrast between the mantle and the interplate rocks and on the activation volume. Younger plates deepen zdec. The results are well presented with minor text typos (some of them are reported below). I recommend publication after minor revision.

Main comment: In the final discussion, there is an attempt to relate zBDT and zdec estimated in other studies with those found numerically in this work. However, no direct comparison is made with any of the mentioned subduction zones. Indeed, the author could discuss more carefully which numerical model parameters fit at best a given subduction system considered in the discussion in terms of subducting plate age, zBDT and zdec, and what are the eventual differences. The best option I think would be to make a plot of the thermal parameter (plate age at the time of subduction multiplied by the subduction velocity) vs. zBDT and zdec by using the estimates from previous studies and the range of estimates for the 2 models presented in this paper as a function of the different rheological parameters. The plot could be enriched with few more runs characterized by a subducting plate with different ages and/or subducting velocities and will serve in the future as a reference for the global variation of zBDT and zdec and for the range of plausible rheological parameters explaining the observations.

Minor comments: Abstract: line 16: decoupling, not deocoupling Page 952: line 16-17: I think it would be better to use the common definition of harmonic average rather than inverse average. Title of section 3.4: zBDT = zdec rather than zdec = zdec Title of section 4.1: Parameters rather than Paraters Page 972: line 26: at rather than a Caption of Fig. 1: second line: strain is written twice

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Interactive comment on Solid Earth Discuss., 4, 943, 2012.

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4, C333–C334, 2012

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