

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 paper presents models of subduction focused on illustrating how the depths to the brittle-ductile transition (zBDT) and subducting-overriding plate decoupling (zdec) depend on the frictional properties of the weak “interplate” material, the activation energy contrast between the weak material and the surroundings, and the age of the plate. The work is motivated in some ways by earlier assumptions that these two depths would be equal, and the fact that these two depths are related to the seismogenic behaviour of real subduction zones. The main conclusions of the paper are that zBDT is usually less than zdec, because zdec is determined by the viscous properties of the man-

C371

tle and therefore controls the temperature of the mantle wedge corner, which in turn, controls zBDT. Interestingly, there is very little to know dependence on the shallower frictional properties of the interplate weak zone.

While the results of the paper are very interesting, I find that the main results are not communicated well in the figures... I think a figure of zBDT vs zdec and a better explanation of the point of figure 9 would be helpful. Also, the text is wordy in many areas and difficult to follow (I'll point a few specific point below). It would be helpful to have the results (zBDT, zdec, ??) in a table along side the simulation number, so its easier to keep track of the results.

Minor comments:

- It is confusing that you use γ_c in the yield strength equation, but then refer to γ_c and γ_m
- There are many typos in the text, and awkward grammar/English usage. I note only a few things here. I did not note all of these, but careful re-reading is needed.
- throughout the text the author uses the word ‘besides’, when the word ‘also’ should be used.
- Typos (for example):
 - o abstract: decoupling, anergy, instrinsically
- the reference to Billen and Gurnis 2005 is incorrect, I think you might mean Billen and Hirth, 2007 (GRL).

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

C372