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Interactive comment on “Asymmetry of high-velocity lower crust on the South Atlantic rifted margins and implications for the interplay of magmatism and tectonics in continental break-up” by K. Becker et al.

Anonymous Referee #1

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Review of paper se-2014-41: Asymmetry of high-velocity lower crust on the South Atlantic rifted margins and implications for the interplay of magmatism and tectonics in continental break-up, by Becker et al. This is a significant paper on the conjugate tectono-magmatic break-up processes in the South Atlantic. The modelling and interpretations are for the most part sound, and the paper is relatively clearly written. Below I have indicated some comments. Major comments: The authors should more clearly try to relate their observations to the continent-ocean-transition. Along line 1 the HVLC is an integrated part of the oceanic crust, i.e. this is anomalously thick oceanic crust

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related to higher than normal mantle temperatures, whereas on line 3 the HVLC is beneath continental crust (with normal crustal accretion after break-up). Paragraph 5.2 could be simplified. SDR may form on continental crust, and on oceanic crust, and they are as such not necessarily related to continent-ocean transitions. See e.g.: Mjelde, R., Raum, R., Murai, Y. and Takanami, T. 2007. Continent-ocean transitions: review and a new tectono-magmatic model of the Vøring Plateau, NE Atlantic. *Journal of Geodynamics*, 43, 374-392. A SDR sequence must have a ponding system in the lower crust, i.e. a corresponding HVLC, but a ponding system in the lower crust may not necessarily lead to extrusions. The authors should more clearly distinguish between rifting processes and processes related to the Tristan Plume. Minor comments: Lines 79-89: Refer to fig. 1 here. Add all names to the figure. Line 105: You should briefly mention that the Walvis Ridge is related to a hot-spot (plume). Line 126: Add reference to magnetic chron scale. Fig. 2, d: Your modelling seemed to have missed two significant arrivals; a strong middle/lower crustal refraction (10-25 km), and Pn (30-40 km). Could you please try to include these phases? Fig. 3, caption: What do you mean by 'basement' (white line)? In the oceanic domain I assume this would be top of the magmatic oceanic crust? But in the continental domain the 4.8 km/s isoline would be intra sedimentary? Line 212: The chi-squared should be around 1, please check. Line 213: constrained Fig. 8b: Could the black bodies be interpreted as something else than intrusions? Line 332: You should mention that velocities above 7.2 km/s usually are related to anomalously high temperature in the melt, leading to higher Mg content (as described by White etc). Line 343-352: This paragraph is a bit jumpy, please tighten.

Interactive comment on Solid Earth Discuss., 6, 1335, 2014.

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