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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 #2

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The main goal of this paper is to analyze the nature and origin of the high-velocity lower crust (HVLC) observed along the rifted margins of the South Atlantic and its relationship with the seaward dipping reflectors (SDR) and magmatism. The authors present two new seismic refraction lines off South America which are interpreted together with 5 existing seismic profiles across the conjugate South Atlantic margins. The presented analysis is relevant, reaching sounding conclusions. The paper is clearly written with good quality figures. My main comments/suggestions are: General comments: (1) The authors should describe in more detail how the crustal structures used in gravity

modelling (Figs. 5 and 6) have been obtained. Note that the seismic data presented in Figs. 2 and 3 are far to reproduce the fine structure of the upper-middle crust depicted in gravity modelling. This is an important aspect since according to the authors, the size of the HVLC lies on the combined gravity and seismic modelling. (2)The northern part of the study region is clearly affected by the Tristan plume (Parana-Etendeka margins), which is responsible for anomalously high potential mantle temperature and magma generation (flood basalts and anomalously thick oceanic crust). The effects of Tristan plume superpose to those related to passive extension and rifting. These aspects should be discussed by the authors when analyzing the along strike variations of HVLC in the margins. (3)One of the main conclusions raised is that the South Atlantic margins obey to a simple shear mode of deformation. However, this mechanism implies also a very different upper crustal structure between the footwall, characterized by highly rotated blocks, and the hanging-wall, characterized by deep and wide basins. Perhaps the authors can add some discussion about. Definitely, a scheme or cartoon showing a lithospheric cross-section with the polarity of the simple-shear mechanism would help very much in understanding the proposed model. Specific comments Page 1339, line 2 (P1339/2): Feliciano instead of Feliciono; P-1339/26: This is the first time that the North Atlantic margin is mentioned in the text, so it would be better if the authors can give some more details on the context of this region; P-1348/3: strictu instead of strict; P-1348/5: HVLC instead of HVLV; Section 3.2.3: Density must be expressed in SI units; i.e. in kg m-3 instead of g cm-3.

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