

Interactive comment on “Lithospheric and sub-lithospheric deformation under the Borborema Province of NE Brazil from receiver function harmonic stripping” by Gaele Lamarque and Jordi Julià

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On lines 13 to 31 of p. 4, the authors acknowledge uplift in NE Brazil: “During the Mesozoic, opening of the south Atlantic separated the Borborema Province from its African conjugate (de Matos, 1992). Continental rifting resulted in significant crustal thinning in the region (Santos et al., 2014; Lima Neto et al., 2013; Luz et al., 2015b), forming both marginal (e.g. Ceará, Potiguar, Pernambuco-Paraíba, Sergipe-Alagoas) and intra-continental (e.g. Araripe, Tucano) sedimentary basins (Figure 1). The post Gondwana breakup evolution of the Borborema Province is characterized by recurrent

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magmatism (Knesel et al., 2011) and postulated episodes of uplift in the Borborema Plateau (Morais Neto et al., 2009; de Oliveira and Medeiros, 2012) and the Araripe basin (Assine, 2007; Marques et al., 2014) . . . Cenozoic uplift was inferred from both relative dating of elevated sediments of the Serra dos Martins formation in the northern Borborema Province and absolute dating from apatite fission-track analysis of granitic-gneissic samples (Morais Neto et al., 2009; de Oliveira and Medeiros, 2012). Although some sort of tectonic uplift and/or inversion of the Araripe basin seems to be widely accepted (Marques et al., 2014; Peulvast and Bétard, 2015; Garcia et al., 2019), uplift in the Borborema Plateau is more debated.” Besides the evidence of inversion in the Araripe Basin, there is more evidence of inversion and uplift in NE Brazil. Coblenz and Richardson (1996) showed that the South American continent is under approximate E-W compression, which can lead to the inversion of previous structures favourably oriented. Current seismicity (Assumpção, 1998; Bezerra and Vita-Finzi, 2000; Bezerra et al., 2007, 2011, 2014; Ferreira et al., 1987, 1998, 2008; Lopes et al., 2010; Neto et al., 2013; Takeya et al., 1989) and deformation of Pleistocene or later sediments in the Taubaté Basin (Riccomini et al., 1989) provide evidence for ongoing compression in NE Brazil. Riccomini et al. (1989) and Cobbold et al. (2001) concluded that inversion(?) uplift(?) of the Brazilian Plateau (tectonic uplift of the eastern Brazilian margin, with greater expression at Serra do Mar close to the coast) is likely due to neotectonic activity. Morais Neto et al. (2009), Cogné et al. (2011, 2012, 2013) and Japsen et al. (2012) used AFTA to analyse episodic burial and exhumation in NE Brazil after the opening of the South Atlantic. Cogné et al. (2012), in particular, concluded that there has been synchronicity of the cooling phases in NE Brazil with the Steinman’s Andean phases of tectonic uplift, and assumed a plate-wide compressional stress that reactivated inherited structures. Hegarty et al. (2002) used AFTA for a more local study, i.e. to analyse episodic burial and exhumation in the Araripe Basin. The reported results show two cooling events: (1) one at ca. 100–90 Ma, and (2) another from 30 to 0 Ma. The above evidence means that the latest stage of inversion is Quaternary, consistent with the works of Nóbrega et al. (2005), Morais Neto et al. (2009), Cogné

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et al. (2011, 2012, 2013), Japsen et al. (2012), Gurgel et al. (2013) and Nogueira et al. (2015).

All this evidence of the stress state in South America and the inversion of inherited structures should be given in the Introduction of the ms. to adequately write the rationale of the paper.

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