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The role of gravitational collapse in controlling the evolution of crestal fault systems (Espirito Santo Basin, SE Brazil) – Discussion

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Ze and Alves (2016) use 3D seismic reflection data to describe the geometry and throw characteristics of a salt-related normal fault population in the Espirito Santo Basin, offshore SE Brazil. As part of their analysis they test two competing fault growth models; (i) the *isolated model*, which states that faults grow via a sympathetic increase in their displacement and length, an inference seemingly consistent with displacement–length (D–L) scaling relationships (e.g. Watterson 1986; Walsh & Watterson 1988; Dawers et al. 1993; Cartwright et al. 1995; Dawers & Anders 1995); and (ii) the *constant-length* model, which states that faults grow via establishment of their near-final length relatively early in their slip history, prior to the accumulation of significant displacement (Fig. 1) (e.g. Morley 2002; Walsh et al., 2002, 2003; Childs et al. 2003; Nicol et al., 2005; Schlagenhauf et al. 2008; Giba et al. 2012; Jackson & Rotevatn 2013; Nicol et al. 2016; Tvedt et al. 2016). Because they make very different predictions regarding the tectono-stratigraphic evolution and earthquake hazard potential of rifts, critically testing these models is important for structural geologists, geomorphologists and stratigraphers, amongst many others. However, in our view, such critical testing has rarely been undertaken, thus the study of Ze and Alves (2016) is most welcome.

Two of the key conclusions of Ze and Alves (2016) are: (i) that most faults grew via a sympathetic increase in their displacement and length, a style of growth consistent with the isolated model; and (ii) that some of the large, segmented faults, which display multiple along-strike displacement minima, grew via the physical (hard) linkage of previously isolated segments. Furthermore, Ze and Alves (2016) explicitly state, “the propagation history of the