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Imaging exhumed lower continental crust in the distal Jequitinhonha basin, Brazil

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1 **Title:** Imaging exhumed lower continental crust in the distal Jequitinhonha basin, Brazil

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23

24 **Abstract**

25 Twelve combined wide-angle refraction and coincident multi-channel seismic profiles were
26 acquired in the Jequitinhonha-Camamu-Almada, Jacuípe, and Sergipe-Alagoas basins, NE Brazil,
27 during the SALSA experiment in 2014. Profiles SL11 and SL12 image the Jequitinhonha basin,
28 perpendicularly to the coast, with 15 and 11 four-channel ocean-bottom seismometers, respectively.
29 Profile SL10 runs parallel to the coast, crossing profiles SL11 and SL12, imaging the proximal
30 Jequitinhonha and Almada basins with 17 ocean-bottom seismometers. Forward modelling,
31 combined with pre-stack depth migration to increase the horizontal resolution of the velocity
32 models, indicates that sediment thickness varies between 3.3 km and 6.2 km in the distal basin.
33 Crustal thickness at the western edge of the profiles is of around 20 km, with velocity gradients
34 indicating a continental origin. It decreases to less than 5 km in the distal basin, with high seismic
35 velocities and gradients, not compatible with normal oceanic crust nor exhumed upper mantle.
36 Typical oceanic crust is never imaged along these about 200 km-long profiles and we propose that
37 the transitional crust in the Jequitinhonha basin is a made of exhumed lower continental crust.

38

39 **Keywords:** NE Brazil, South Atlantic Ocean, Passive margins, Wide-angle refraction seismic,
40 PSDM, Crustal structure, Cretaceous breakup, lower continental crust

41

42 **1 Introduction**

43 The processes that led to the breakup of West Gondwana and the opening of the South Atlantic
44 Ocean are still not fully understood. One of the main hindrances for an accurate reconstruction of
45 West Gondwana is the lack of magnetic anomalies to establish a time-line for the oceanic crust-
46 spreading rate, as the breakup occurred during the Cretaceous Normal Superchron, chiefly in the
47 Central Segment of the South Atlantic Ocean (Moulin et al., 2010). The lack of magnetic anomalies
48 is counterbalanced by the presence of well-marked fracture zones and lineaments that, with the
49 knowledge of the intra-plate deformation on both Africa and South America, tightly constrain the
50 plate movements (Moulin et al., 2010; Aslanian & Moulin, 2012).

51

52 The SALSA experiment is aimed at constraining the crustal structure, the segmentation and the

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