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Structural architecture and nature of the continent-ocean transition at the Camamu and Almada basins, northeastern Brazil

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In this study of the Camamu and Almada basins in the northeastern Brazilian margin we analyse an available grid of regional multichannel seismic (MCS) reflection profiles integrated with analysis of potential field data and conducted 2D gravity modelling, in order to reveal the structural architecture and nature of the continent-ocean transition along the Camamu and Almada basins. Our analysis indicates the existence of a high density "transitional crust" along the northeastern Brazilian margin, where seafloor spreading does not necessarily succeed rifting straightaway. Furthermore, a high amplitude and undulated seismic reflector observed at a depth of 7-9 s (twt) along the northeastern Brazilian margin shows remarkable resemblances to the strong and undulated S-reflector observed along the Galicia Bank continental margin. Results from gravity modelling indicate, however, that unlike the S-reflector the undulated reflector described in this study does not seem to characterize a continental crust/serpentinized mantle boundary, but rather the boundary between an extremely thinned, high density crust and normal lithospheric mantle. On the conjugate West Africa margin, a similar analysis shows good evidence for a lower crustal body, with intermediary densities between continental crust and mantle densities, underlying all the modelled profiles. We believe that the observed lower crustal body is not exclusively magmatic in origin, but is rather an inherited high-grade metamorphic product from the Transamazonian and Pan-African collision belts. The results obtained in this study favour a model in which the high amplitude and undulated reflector at the continent-ocean transition zone characterize the Moho discontinuity. In this setting, it seems that the hypothesis of the existence of a detachment that exhumes lower crust from beneath the continental margin, exposing it in the deep basin at the continent-ocean transition zone, is a good candidate to explain the nature and structural configuration of the crust at the trasitional domain along the northeastern Brazilian margin. Furthermore, the study clearly shows that integration of regional deep seismic reflection profiles, potential field data and gravity modelling provides a powerful resource for testing and validating both alternative seismic profile structural interpretations and geodynamic models for lithospheric breakup and early drift.