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Can rifting evolution and passive margins architecture be driven by relative rheological heterogeneities? Insight from analogue modelling focused on South Atlantic margins.

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Crustal transect joined with lithospherical-scale analogue experiments are used to unreveal the evolution of the Central Segment of the South Atlantic margin. Specifically we analized the Santos and Campos basins along the Brazilian margin, where crustal inhomogeneities affects both rifting evolution and structural architecture of the conjugate margins. The results show that heterogeneities located within the lower crust can have a remarkable impact on the along-margin segmentation promoting focused and deeper basins related to a relatively "weak" rheology, and articulated basins with horsts and grabens in response to a relative "strong" rheology on the equivalent parts of the conjugate pairs.
At the early-stage of rift evolution the deformation is concentrated at the proximal margin. At this stage, if a weak lower crust rheology heterogeneity exists, a main deep listric half-graben fault and associated thick and wedge shaped syn-rift basin sequences are developed; on the contrary, a strong lower crust rheology produce a more planar, rotated, domino-type faulted basins with thinner sequences directly controlled by the individual fault-blocks. At the late-stage rift evolution, once the effects of the initial crustal rheology inhomogeneities are reduced due to the lithosperic thinning process, the outer margin records a late syn-rift sequence which shows comparable thicknesses for both cases of lower crust rheologies. This tectono-stratigraphic evolution of the rifting process gives rise to along-margin alterations in symmetry versus asymmetry of the width and structural architecture.
The presented models show that the tectono-stratigraphic evolution of rifting process can produces along margin switching of width and structural architecture. The change in architecture is due to the relative rheological contrast with respect to the surrounding in the lower crust. This produces a different, "relative", behavior for the lower crust if next to "weak" or to "strong" heterogeneities.