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Long term 2-D thermo-mechanical modelling of magma-poor passive margins formation: effects of deep mantle processes on vertical motions

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Here we use observations from the central South Atlantic conjugate margins to constrain the structural style of rifting and its relation with sedimentary basin evolution during the syn and early post-rift. Three synthetics transects from North (Gabon-Brazil) to South (Angola-Brazil) are used to constrain fault distribution, width, crustal thickness, distribution of magmatism, syn-rift sedimentary section thickness and paleo-environment from the start of rifting in the Berriasian (145 Ma) until the early post rift in the Aptian (113 Ma).
Recent paleo-geographic reconstructions show that rifting is the consequence of two phases of extension with different azimuths. The second phase exhibits a low obliquity and accounts for most of the extension. We use variations along strike in structural style, magmatic output and sedimentary basin evolution to assess the contribution of mantle processes on topography using on forward 2-D thermo-mechanical modelling.
The main and well known characteristic is the small topographic gradient and the shallow water environment between the proximal and distal domains over more than 200 km of the wide margin during most of the syn-rift. We consider different hypothesis to explain the extra-buoyancy of upper-mantle. We assess the influence of pressure and temperature dependency on thermal properties of mantle rocks and the conditions (rheology and density contrast with non-depleted mantle) that promote counterflow of deep lithospheric metasomatized depleted mantle. We use paleo-environment and post-rift subsidence curves to constrain these different contributions.