Geophysical Research Abstracts
Vol. 20, EGU2018-9082, 2018
EGU General Assembly 2018

Lower Crustal Strength Controls on the Nature of the Continent-Ocean Transition at Magma-Poor Margins: Potential Implications for the South Atlantic

Marta Pérez-Gussinyé (1,2), Elena Ros (3), Mario Araújo (4), Marco Thoaldo Romeiro (4), Miguel Andres-Martınez (1,2), and Jason P. Morgan (3)

(1) MARUM – Center for Marine Environmental Sciences, University of Bremen, Bremen, Germany, (2) Faculty of Geosciences, University of Bremen, Bremen, Germany, (3) COMPASS, Department of Earth Sciences, Royal Holloway University of London, Egham, United Kingdom, (4) Petrobras R&D Center, Horácio Macedo Avenue, 950, Rio de Janeiro, Brazil

Rifted continental margins may present a predominantly magmatic continent-ocean transition (COT), or one characterized by large exposures of serpentinized mantle. In this study we use numerical modeling to show the importance of the lower crustal strength in controlling the amount and onset of melting and serpentinization during rifting. We propose that the relative timing between both events controls the nature of the COT. Numerical experiments for half-extension velocities <=10 mm/yr suggest there is a genetic link between margin tectonic style and COT nature that strongly depends on the lower crustal strength. Our results imply that very slow extension velocities (< 5 mm/yr) and a strong lower crust lead to margins characterized by large oceanward dipping faults, strong syn-rift subsidence and abrupt crustal tapering beneath the continental shelf. These margins can be either narrow symmetric or asymmetric and present a COT with exhumed serpentinized mantle underlain by some magmatic products. In contrast, a weak lower crust promotes margins with a gentle crustal tapering, small faults dipping both ocean- and landward and small syn-rift subsidence. Their COT is predominantly magmatic at any ultra-slow extension velocity and perhaps underlain by some serpentinized mantle. These margins can also be either symmetric or asymmetric. Our models predict that magmatic underplating mostly underlies the wide margin at weak asymmetric conjugates, whereas the wide margin is mainly underlain by serpentinized mantle at strong asymmetric margins. Based on this conceptual template, we propose different natures for the COTs in the South Atlantic.