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# The impact of thermal blanketing of pre-rift basins on rifted margins subsidence and basement heat flow: Insights from 2D thermomechanical modeling.

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Recent studies have highlighted the impact of thermal blanketing on the evolution of rifted margins. This has been achieved by employing 2D geodynamics models in conjunction with models of superficial processes, specifically erosion and sedimentation. The findings of Andrés‐Martínez et al. (2019) and Pérez‐Gussinyé et al. (2020) demonstrate how the sediment transport can influence the architecture over geologic time and how pure ductile deformation can be caused due higher fluvial coefficients. Although this approach is more realistic and can simulate how the mass is distributed along the rifting, with the erosion of uplifted regions deposited in the local basins, it complicates parametric analysis. The deposition is highly sensitive to the input parameters of the superficial dynamics, making it difficult to establish a direct correlation between the input parameters and the outputs. For these reasons, this study aims to establish a link between the response of the margins width and architecture to the basin depths, enabling a clearer connection between the thermal blanketing, sediments thickness and the resulting architecture in a parametric approach. To reach it, a 2D thermomechanical geodynamic model was used, varying the basin thickness (2-7 km) for fixed Moho depths (35-45 km). The effects of heat flow, mechanical and thermal subsidence, and crustal thickness in the basement were analyzed, and each scenario was compared to a control model in which no varied diffusivity was assumed (there was no blanketing effect) and to a model in which no pre/syn rift basin was present. The findings are in accordance with the results of previous studies, which indicate that crustal deformation is affected by larger sediment packages, resulting in greater extension (approximately 100 km) and slower rifting (approximately 4.5 million years) compared to control scenarios. In the models with thicker sedimentary packages, the results suggest a higher thermal flux in the break-up point, with a lower heat flux in proximal domains, accompanied by an increased subsidence in the distal margin and a lower uplift in the proximal domain. The subsidence observed in the central ridge was particularly pronounced in these models with great basins, with a notable reduction in uplift along the rift shoulders.

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