How to Predict Thermal Stress in Hyper Extended Rifted Margins Illustration of a New Lithospheric Model on the Iberia Margin

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ABSTRACT

Although passive margins have been actively explored for decades, they remain frontier zones with most of the time no or very few data available for calibration of basin models. The thermal history modeling of these margins, critical for maturity assessment, thus strongly relies on the rifting models available in basin modeling tools.

Classic approaches based on stretching factors work well for mildly extended sedimentary basins formed by largely uniform thinning of continental lithosphere. They are however limited in the case of hyper extended rifted margins where more complex models are required to account for the different basement domains (proximal margin, necking zone, distal margin, ocean continent transition and oceanic crust), their complexity and evolution through time.

In this regard, a new and flexible lithospheric model is tested on the well-studied magma-poor Iberia rifted margin. Coupled with sedimentation in a basin simulator, this model digresses from McKenzie concepts with a totally customizable basement, allowing describing precisely crustal and mantle structure and nature at present day and through time. The rise of the 1330°C isotherm and relaxation are thus automatically controlled by the model as it is defined.

As often in margins exploration, calibration is made using surface heat flow measurements only. Well data available in the area are used to assess the prediction quality of the methodology.

A comparison with other usual approaches highlights the added value of such models.