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## Segmentation and structural style evolution during continental breakup: observations from the Northern Bay of Biscay passive margin (offshore France)

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The extension and thinning of the continental lithosphere during rifting may eventually lead to continental breakup. Related mechanisms are recorded within the Continent-Ocean Transitions (COT) of distal passive margins, showing different, often complex, tectono-magmatic interactions as revealed by the variability of basement architectures imaged by seismic data. Different extensional structures are interpreted in the COT, including high-angle or low-angle extensional faults dipping either oceanward or continentward. This variability appears mainly controlled by the initial rheological stratification of the lithosphere and its evolution during rifting. As a result, the relative influence between lower crustal ductility, crustal embrittlement, and serpentinization of the underlying mantle are the main parameters considered to explain the structural variability observed in the COT.

In this contribution, we document the tectonic evolution of the northern Bay of Biscay passive margin and show the impact of passive margin segmentation in controlling along strike changes in structural style during rifting and continental breakup. The Bay of Biscay is a V-shaped oceanic basin, which opened during the northward propagation of the North Atlantic Ocean. Its bordering magma-poor passive margins formed subsequently to a Late Jurassic to Early Cretaceous oblique rifting and Aptian-Albian oceanic spreading onset. A large number of studies already focused on this margin revealing a first-order along strike segmentation, but the structures accommodating the passage from one to the other segment remained poorly constrained.

We used a series of reflection seismic sections and complementary marine data sets such as dredges and drilling results from the Deep Sea Drilling Project to map the structural pattern and stratigraphic evolution related to this segment transition. Our seismic interpretations and mapping of the main rift structures define a relatively loose segment transition marked by a progressive change in structural style expressed differently between the COT and the rest of the passive margin. The differences observed between the proximal and distal parts of the margin can be explained by an evolution of the nature and depth of the main fault décollement level; crustal embrittlement and serpentinization becoming important controlling parameters oceanward. However, the progressive change in structural style observed in the distal margin from west to

east from oceanward dipping to mainly continentward dipping faults is more likely to be related a different accommodation of extensional deformation across the transfer zone. This segmentation occurs near major pre-existing structures identified further continentward, suggesting a key role of inheritance.

Results of this work reveal the impact of margin segmentation in controlling changes in structural style at the end of rifting. If this soft transfer zones do not seem to be observed as far as the first oceanic crust, further work is required to determine how far it can control different interplay between tectonic and magmatic processes further oceanward in the COT.