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**TECTONIC and THERMAL EVOLUTION of the IBERIA-NEWFOUNDLAND
RIFTED MARGINS: IMPLICATIONS for HC EXPLORATION**

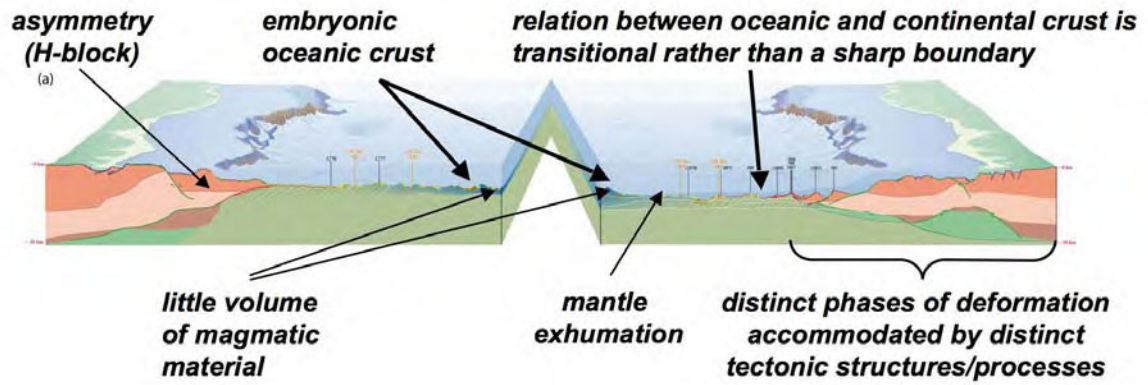
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Research into the formation of deep-water rifted margins is incontestably undergoing a paradigm shift. The discovery of exhumed continental mantle and hyper-extended crust devoid of significant normal faulting directly overlain by shallow marine sediments is proving fundamental in defining the controls and processes that thin continental lithosphere. However, the development of these new concepts critically depends on the access to pertinent geological and geophysical data sets, which remains a key problem. At present, little is known about the depositional environments, sedimentary facies, the kinematics and age of structures, or the subsidence and thermal history of pre-to syn-rift sediments of many distal deep-water rifted margins.

Mapping and drilling of rift structures along the Iberia-Newfoundland rifted margins showed that the transition from rifting to seafloor spreading does not represent a sharp spatial and temporal limit. As a consequence, the concepts of a sharp and well-defined ocean-continent boundary and of a breakup unconformity is at present scrutinized. Based on a mapping of the three-dimensional architecture of basement structures and dated sedimentary units and the examination of the drilling results from ODP Legs 149, 173 and 210 from the conjugate Iberia and Newfoundland margins we propose a new model for the final rifting and continental break-up history (see Péron-Pinvidic and Manatschal 2008). Our results show evidence for a complex overall migration and localization of deformation into the area of final breakup that is linked with a change in the mode of deformation. These observations strongly underline that classical indicators used to determining location and age of breakup such as breakup unconformity, magnetic anomalies, composition of rocks, occurrence of high-angle faults and sedimentary wedges can not be used as stand alone criteria. Recurrence of distributed tectonic extension and magmatic activity even after onset of localized seafloor spreading suggest that continental breakup is a poly-phase, transitional and complex process that can occur, in magma-poor environments over 10s of millions of years and result in hundreds of kilometres of crust that is neither oceanic nor continental. Although our study is limited to the Iberia-Newfoundland rift system, comparisons with other margins suggest that the described evolution is probably more common and applicable for a large number of rifted margins. These new results have major implications for plate kinematic reconstructions and ask to rethink the terminology, the processes, and the concepts that were (are) used to describe continental breakup. These crucial observations have major implications for the thermal evolution and therefore also of the survivability of syn-to post-rift petroleum systems in hyper-extended margins.



Reference

Péron-Pinvidic, G. and Manatschal, G., 2008, The final rifting evolution at deep magma-poor passive margins from Iberia-Newfoundland: a new point of view: *International Journal of Earth Sciences*, doi:10.1007/s00531-008-0337-9.