



Mantle exhumation during magma-poor rifted margin formation: from asymmetric detachment faulting to symmetric mid ocean ridge spreading

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Narrow non-volcanic rifted margins such as the Iberia-Newfoundland conjugate margin system typically exhibit a wide area of exhumed serpentinized mantle. Extensive data sets demonstrate that this domain is distributed symmetrically on both conjugate margins. Recent, high-resolution seismic data demonstrate that the exhumed mantle domain is characterised by asymmetric detachment faulting with thin to absent magmatic crust, resulting in rough sea floor topography. We use high resolution 2D thermo-mechanical modelling of narrow non-volcanic rifted margin formation. Our model results show that frictional strain weakening results in the generation of multiple asymmetric detachments in the exhuming mantle domain, followed by a switch to symmetric spreading center. We explain the transition from detachment dominated exhumation to symmetric spreading the relative importance of frictional shear zone localisation and mantle melting leading to symmetric spreading and propose a new interpretation of distal part of the Newfoundland – Iberia conjugate margins.