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Evaluating the crustal architectures of the Eastern Seaboard of the United States: Insights from seismic reflection and potential field data

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Passive margins are commonly categorised into two end-member models based on the amount of magma produced during continental rifting and breakup, resulting in 'magma-rich margins', or 'magma-poor margins' as a generic classification. However, in recent years, substantial variability within these models, due to parameters such as rheology, structural inheritance, variations in magmatic budget, has been identified. Similarly, attempting to confidently interpret crustal architectures, particularly within the ocean-continent transition zone, is challenging and much uncertainty in geometries and crustal type exists across many rifted margins across the globe which require careful and robust interpretation to attempt to reduce this uncertainty.

This contribution focuses on the Eastern Seaboard of the United States; in which we show a suite of seismic interpretations (from seismic reflection data), together with validations from potential field data to produce a comprehensive map of the crustal types along the margin. Much recent work on the margin has investigated the segmentation along strike, indicating that the architecture of the Eastern Seaboard does not conform to any of the end-member models. Here we provide evidence of the segmentation and non-conforming nature of the margin, consistent with recent work on the US Eastern Seaboard which is at odds with typical models of rifted margin architectures. Furthermore, to accompany the new crustal architectures map, we propose a conceptual structural model of the development of the margin, constrained by our observations and accounting for the three-dimensional nature of the margin evolution.