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Rift models for the central segment of the Northern Red Sea

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The timing and maturity of rifting and continental breakup in the northern Red Sea is highly contested with diverging interpretations. The Red Sea, for example, has been interpreted as either a pure-shear or simple-shear rifted margin. Existing interpretations also debate whether mantle exhumation or a magmatic transition to oceanic crust has occurred. Recently, different interpretations have proposed the initiation of rifting to be either ∼33 Ma or 23 Ma. The onset of seafloor spreading for the northern Red Sea sector is similarly uncertain, with estimates ranging from ∼15 Ma to 0 Ma.

Focusing on the central segment of the northern Red Sea, three crustal-scale profiles have been constructed across the conjugate margins of Saudi Arabia and Egypt. Plausible geological interpretations are established, which integrate field, well, 2D and 3D reflection data (PSDM and PSTM) and refraction data (reversed, unreversed, earthquake tomography, and receiver function). Interpretations are investigated and constrained through 2D gravity and magnetic modelling. The uncertainties behind the end-member interpretations will be highlighted. The key question that will be addressed will be how the spatial and temporal evolution of rifting and magma evolves within the central segment of the northern Red Sea.