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Microcontinent cleaving and enigmatic proto subduction events (?): The role of transpressional transforms in plate tectonics of the Indian and North Atlantic Oceans

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Recent advances in knowledge have led to the recognition of continental crust beneath the Comoros islands offshore East Africa and conflicting fracture zone patterns in isolated regions of the Indian ocean. Furthermore, whilst the presence of continental crust within the Davis Straight has been known for some time, its origin remains debated.

Here, using gravity lineament analysis, plate kinematic modelling, seismic reflection interpretations, and 3D crustal thickness inversions (constrained by a new composite sedimentary thickness dataset), we investigate the origin of microcontinents and proto-subduction events in the Western Somali Basin, Indian Ocean, and the Labrador Sea. We find the role of plate motion changes, which induce transpression along active transform faults, play a critical role in the cleaving of the Comoros microcontinent and inducing previously poorly understood plate convergence and missing crustal sections along the Chain and Owen ridges. Furthermore, the temporal and spatial patterns of thrust and normal faulting in the Davis Straight indicates an analogous mechanism emplaced continental crust in this region, suggesting a generic and predictable mechanism may be applicable to the production of this type of microcontinent around the globe. The Davis Straight proto microcontinent (i.e., incompletely rifted microcontinent) began development during the 53 Ma spreading axis reorientation and ceased separation at 33 Ma, when the basin became extinct. We postulate that the extinction of ocean spreading in the Labrador Sea, and possibly also the Western Somali Basin, may have been influenced by increasing transpression across long-offset fracture zones and suggest further study of this phenomenon.