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Long-Lived "Superpropagators" on the Carlsberg Ridge between Chrons 26-20 (58-42 Ma)

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Recent reinterpretations of magnetic anomaly data in the Arabian Sea and Eastern Somali Basin (Chaubey et al., 1998; Dyment, 1998) have shown that, between C26-C20 (58-42 Ma; "C" stands for Chron), seafloor spreading along the Carlsberg Ridge was mainly accommodated by a series of en-echelon propagating ridge segments. Such a systematic ridge propagation resulted in a tremendous spreading asymmetry: ~65% of the oceanic crust generated between C26r-C24r (58-54 Ma; "r" means reversed magnetic polarity interval) lies on the African plate, and ~75% of the crust created between C24r-C20 (54-42 Ma) is on the Indian flank. The direction of propagation reversed from eastward to westward at C24r. These observations may reflect the position of the Carlsberg Ridge relative to the nearby Deccan-Reunion hotspot. Free air gravity anomaly maps derived from satellite altimetry confirm these interpretations. In the Arabian Sea, the inner pseudo-faults of the seven C24r-C20 westward propagators are marked by subtle ~N70°E linear anomalies. In the Eastern Somali Basin, the outer pseudo-faults of these propagators correspond to a single, narrow and quite prominent anomaly. This observation suggests that the same structure acted as a pseudo-fault for all the different propagators during their westward migration. The outer pseudo-fault represents the main discontinuity in the oceanic lithosphere formed near a propagator, as it directly juxtaposes lithospheres of different ages. We consider that the outer pseudo-fault of the westernmost propagator was a thermomechanical boundary which guided subsequent propagation of ridge segments located further east. The seven C24r-C20 westward propagators could then be regarded as the expression of a single, larger tectonic feature that we name "superpropagator". Interestingly, the three C26-C24r eastward propagators observed in the Eastern Somali Basin are associated with several N75°E oriented inner-faults matching a single outer pseudo-fault in the Arabian Sea; thus they can also be interpreted as an other superpropagator. It should be noted that the outer pseudofaults of the two superpropagators are both roughly parallel to the C27 lineations, which date the onset of seafloor spreading along the Carlsberg Ridge. We therefore define a superpropagator as a set of enechelon ridge segments propagating toward the same direction along the same outer pseudo-fault. The evolution of the two superpropagators resulted in a perfect - although slightly delayed - spreading asymmetry: between the propagating tips of the westernmost and easternmost segments of the C24r-C20 superpropagator, all the oceanic crust created at the Carlsberg Ridge was finally captured by the Indian plate. Depending on the duration of its activity, the outer pseudo-fault may evolve into a major lithospheric discontinuity which keeps focussing further ridge propagation. In such a context, the outer pseudo-faults can certainly be regarded as the major tectonic discontinuities between the two plates, since the ridge segments and transform zones - the true plate boundary - are transient and unstable features.

Chaubey AK et al., *Earth Planet. Sci. Lett.*, **154**, 41-52, (1998).
Dyment, J., *J. Geophys. Res.*, **103**, 24,067-24,084, (1998).