



The trajectory of India towards Eurasia recorded by subducted slabs: evidence for southward subduction of the Tethys Ocean under India after 130 Ma

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At the ~ 130 Ma breakup of India from Australia-Antarctica, published paleomagnetic data estimate that India was located south of 30°S . As India began its northward journey that continues today, the 5000 km of Tethys Ocean that stood in the expanse between India and Eurasia gradually disappeared, leaving only traces of its existence in ophiolite sutures and accreted terranes at the Himalayas, the largest orogeny on Earth today.

Here we present newly mapped, sub-horizontal slabs under the Indian Ocean at depths of 1600 to 2100 km and at latitudes between 35°S to 15°N . These slabs are further south than any published paleolatitudinal estimates of initial India-Asia collision and thus, the existence of these slabs cannot be explained by the popular idea of northward Tethys subduction under Eurasia. Instead, our slab constraints show for the first time that the majority of the Tethys Ocean was subducted southward after 130 Ma, overrun by a northward-moving India.

When restored to the surface of a spherical model Earth, the slabs closely correspond to the well-known track of India from Eastern Gondwanaland to Eurasia that began at ~ 130 Ma, viewed in a mantle reference. We present a plate reconstruction that includes other restored slabs from the India-Eurasia collision zone, which are at shallower depths and ubiquitously located north of the equator. The reconstruction implies that the Tethys Ocean was subducted under Greater India, India and the post-breakup ocean at the eastern margin of the Indian plate – now identified as the enigmatic ‘Burma slab’.

Slab geometries were mapped from global P- and S-wave models and restored to the surface of a spherical Earth model. Gplates software was used to reconstruct the mapped slabs.