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India-Eurasia collision triggers formation of an oceanic microplate

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Detailed mapping of seafloor tectonic fabric in the Indian Ocean, using high-resolution satellite-derived vertical gravity gradient data, reveals an extinct Pacific-style oceanic microplate — the Mammerickx Microplate — west of the Ninetyeast Ridge. It is one of the first Pacific-style microplates to be mapped outside the Pacific basin, suggesting that geophysical conditions during formation probably resembled those that have dominated at eastern Pacific ridges. The microplate formed at the Indian-Antarctic ridge and is bordered by an extinct ridge in the north and pseudofault in the south, whose conjugate is located north of the Kerguelen Plateau. Independent microplate rotation is indicated by asymmetric pseudofaults and rotated abyssal hill fabric, also identified in multibeam data. Magnetic anomaly picks and age estimates calculated from published spreading rates suggest formation during chron 21o ($\sim$47.3 Ma). Plate reorganizations can trigger ridge propagation and microplate development, and we propose that formation of the Mammerickx Microplate is linked with the initial 'soft' stage of the India-Eurasia collision. The collision altered the stress regime at the Indian-Antarctic ridge, leading to a change in segmentation and ridge propagation from an establishing transform fault. Fast Indian-Antarctic spreading that preceded microplate formation, and Kerguelen Plume activity may have facilitated ridge propagation via the production of thin and weak lithosphere. However, both factors had been present for tens of millions of years and are therefore unlikely to have triggered the event. Prior to the collision, this combination of fast spreading and plume activity was responsible for the production of a wide region of undulate seafloor to the north of the extinct ridge and 'W' shaped lineations that record back and forth ridge propagation. Microplate formation provides a means of dating the onset of the India-Eurasia collision, and is completely independent of and complementary to timing constraints derived from continental geology or convergence histories.