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Dynamic foundering of the Sunda shelf during the Quaternary revealed by coral reef geomorphology: impact on the external spheres of the Earth.

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Transient dynamic topography associated with the Indo-Australian subduction zone has been responsible for large-scale topographic changes that result in emergence or submergence of wide areas in SE Asia. The analysis of coastal landforms attests for recent subsidence of the Sunda shelf, while uplift occurs in Wallacea (Central Indonesia). Yet, the classic scenario considered that the shelf is vertically stable and its Plio-Pleistocene physiography closely associated with sea-level oscillations. The shelf is thus usually shown as an intermittent terrestrial landbrige, only inundated during periods of sea level highstand.

Here, we combined geomorphological field observations with numerical simulations of coral reef growth to show that the Sunda shelf is subsiding at a rate of 0.2 to 0.3 mm/yr-1 and was thus permanently emerged prior to 500,000 years BP. This modification of the paleogeography profoundly affected the external spheres of the Earth: Further results from climate modeling suggest that the exposure of the shelf during interglacials has modified atmospheric and oceanic circulation in the region, while this revised paleogeography also calls for a reappraisal of early hominins dispersal and speciation dynamics in SE Asia.