



On the long-lasting sequences of coral reef terraces from SE Sulawesi (Indonesia): Distribution, formation, and global significance

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ABSTRACT

Many islands of the eastern Indonesian Archipelago exhibit Late Cenozoic sequences of coral reef terraces. In SE Sulawesi, on the Tukang Besi and Buton archipelagos, we identified 23 islands bearing such sequences. Remote sensing imagery and field mapping combined to U/Th and ¹⁴C dating enable to establish a chronologic framework of the reef terrace sequences from Wangi-Wangi, Buton as well as on the neighbouring, smaller islands of Ular, Siumpu and Kadatua. We identified the terraces from the last interglacial maximum (MIS 5e) at elevations lower than 20 m except on W Kadatua where it is raised at 34 ± 5 m. Such elevations yield low to moderate Upper Pleistocene uplift rates (<0.3 mm yr⁻¹). On SE Buton Island, a sequence culminates at 650 m and includes at least 40 undated strandlines. Next to this exceptional sequence, on the Sampolawa Peninsula, 18 strandlines culminate at 430 m. Dated samples at the base of this sequence (<40 m) yield mean Middle Pleistocene uplift rates of 0.14 ± 0.09 mm yr⁻¹. Extrapolation of these uplift rates compared to the geological setting suggests that the sequences of the Sampolawa Peninsula provide a record of sea-level high-stands for the last 3.8 ± 0.6 Ma. The sequences on SE Buton Island therefore constitute the best preserved long-lasting geomorphic record of Plio-Quaternary sea-level stands worldwide.

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1. Introduction

Morphologic evidence of late Cenozoic sea-level changes mostly documents Middle and Upper Pleistocene times (Guilcher, 1969; Johnson and Libbey, 1997; Siddal et al., 2006; Bowen, 2010; Pedoja

et al., 2011, 2014; Murray-Wallace and Woodroffe, 2014; Rovere et al., 2016). In fact, little is known about interglacials older than Marine Isotopic Stage 11 (MIS 11, 360–420 ka); their timing, duration and number of high-stands would have remained unknown if isotope records were not partly alleviating our lack of knowledge (Emiliani, 1955; Shackleton, 1987; Waelbroeck et al., 2002; Lisiecki and Raymo, 2005; Bintanja and Van de Wal, 2008; Zachos et al., 2008; Rohling et al., 2009). Sequences of coral reef terraces are widespread tropical indicators of ancient sea levels

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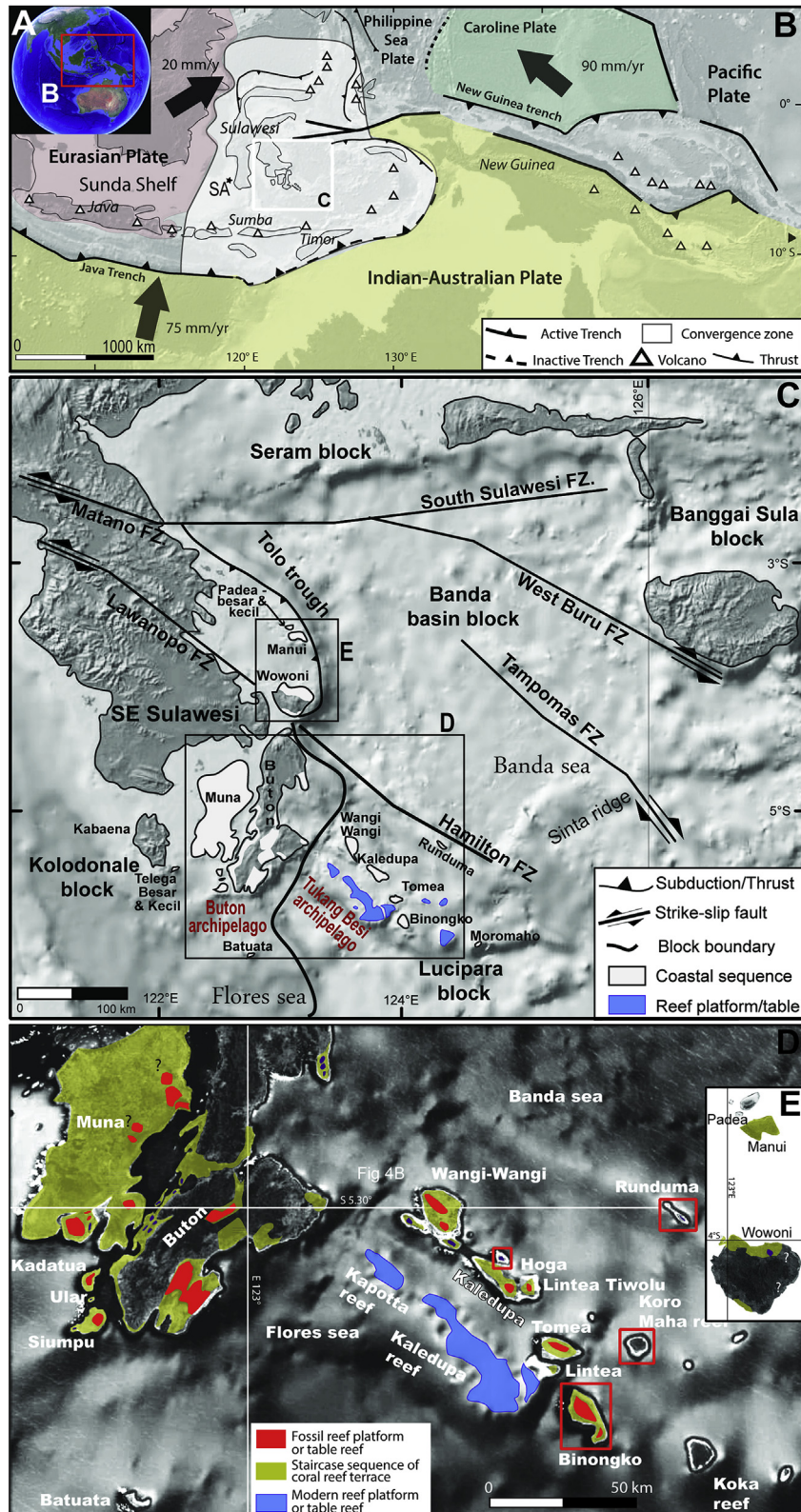


Fig. 1. A) Location of the Indonesian Archipelago B) Geodynamic setting of SE Sulawesi in the Eastern Indonesian Archipelago. Data compiled from Ali et al. (1996); Hall (2002); Hirschberger et al. (2005); Pigram and Supandjono (1985). Black star SA: Spermonde Archipelago. C) Tectonic setting of the coastal sequences from the Tukang Besi and Buton archipelagos, SE Sulawesi. FZ: fault zone. D) Main coastal modern and fossil landforms observed on the Buton and Tukang Besi archipelagos. Red insets refer to Fig. 13. E) Main coastal modern and fossil landforms observed on Wowoni, Manui, and Padea islands. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

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