



A case study on subduction erosion with extra-slow convergence rate: the northern Yap subduction zone, western Pacific

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The Yap subduction zone is a unique erosive margin with an extremely slow convergence rate. The roughness of the subducting plate, generated by horst and graben structures and seamounts, leads to the attenuation of the arc crust. In this study, we present the latest geophysical data, collected by the Chinese research vessel “Kexue”, to investigate subduction erosion at the Yap subduction zone and to develop subduction models for Yap subduction zone structures. We reveal an anomalous distance between the Yap Trench and adjacent volcanic arc, the steep slope of the trench arc-ward, a frontal prism and rare sediment in the trench, all typical features of erosive margins. We propose that the rough subducting plate has led to the erosion of the overlying plate and that different subduction processes, controlled locally by topography of subducting plate, have modified the Yap subduction zone. Numerous normal faults increase the roughness of the seafloor entering the trench, and an anomalously large slope angle along the trench reflects the uplift of the forearc high by seamount subduction. In addition, the thin crust of the subducted horst and graben structures, along with the normal faults might have eroded the forearc crust, and subsequently eroded the Yap arc crust during subduction. These subduction erosion processes at the Yap Trench provide one of the best cases of an erosive margin in the world, especially for a subduction zone with an extremely slow convergence rate.

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