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Comparison of sea level reconstructions with glacial isostatic adjustment model predictions for Southeast Asia

Peter Parham (1,3), Keven Roy (2), Benjamin Horton (1,2), Aron Meltzner (1,2), Jedrzej Majewski (1), Adam Switzer (1,2), and Timothy Shaw (2)

(1) Earth Observatory of Singapore, Nanyang Technological University, Singapore, (2) Asian School of the Environment, Nanyang Technological University, Singapore, (3) Centre of Tropical Geoengineering, Universiti Teknologi Malaysia, Malaysia

Glacial isostatic adjustment (GIA) is considered the principal mechanism influencing variability in Holocene relative sea-level (RSL) in far-field tectonically stable regions such as the Sundaland of Southeast Asia. The RSL record of Sundaland is characterized by a mid-Holocene RSL highstand coincident with decrease in meltwater input from large ice sheets. Predictions of RSL evolution from GIA models can be tested against field-based RSL reconstructions, and potentially be used to provide further constraints on the parameters controlling post-glacial recovery.

Here, we compare state-of-the-art GIA predictions with RSL reconstructions from Southeast Asia, focusing on Peninsular Malaysia, Borneo and select Indonesian islands in the South China Sea. We use the ICE-7G_NA (VM7) model of Roy & Peltier (GJI, 2017), which is a global GIA model that was constrained using both high-quality RSL records from the Atlantic coast of the United States and space-geodetic constraints on crustal motion over the North American continent. The model was further tested against a wide range of GIA-related observables from North America and from the Mediterranean basin. Our Holocene RSL records are based mainly on coral microatoll and rock-encrusting oyster proxies with vertical uncertainties from ca. 0.3 to 1.5 m. Comparisons of eight sites on the relatively stable Sundaland enabled us to test the performance of this GIA model. For sites from more tectonically active northern Borneo, we used our GIA model predictions as an aid in isolating a potential tectonic contribution to the RSL record.