High resolution topography and modeling of the Huon coral reef terrace sequence (Papua New Guinea)

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Coral reef terraces (CRT) are amongst the most important indicators of Quaternary sea level fluctuations, and are therefore relevant to a wide spectrum of climatic and tectonic studies. The Huon Peninsula in Papua New Guinea accommodates one of the first CRT sequences to be mapped, measured and dated in detail through pioneering studies several decades ago. Those studies were limited by the available techniques to assess the large scale terrace sequence morphology, and thus to constrain spatiotemporal uplift rate variations that are key to determine past relative sea-level (RSL). We re-visit the Huon CRTs with the aim of refining tectonic uplift rates and RSL, using digital surface models calculated from 0.5m Pleiades satellite imagery. This allows us to constrain variations in CRT elevation, and assess tectonic deformation wavelengths in detail. We then use a numerical code for coral reef modeling to reconstruct the sequence morphology and constrain the possible range of RSL over the past few glacial-interglacial cycles. We find that large-scale tilting of the terrace sequence is generally N- instead of NW-directed, which is more compatible with the regional tectonic setting. It also implies changes of several meters for RSL highstand estimates compared to previous studies. We compare our results to other terrace sequences, and discuss the potential of combining high-resolution topography with landscape evolution modeling to constrain RSL.