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4D geomorphological evolution of intertropical islands

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Coral reef terraces record joint variations of sea level and surface elevation. U/Th ratings on corals along with topographic/bathymetric profiles and eustatic reconstitutions allow to locally determine the vertical rate of ground motion, while numerical modelling of reef sequences allows to unravel the processes controlling the architecture of sequences, and high-resolution DEMs facilitates the detailed mapping of the sequences of reef terraces. Alltogether, these methods allow to extrapolate the local vertical rates towards an unprecedented resolution for 4D kinematics. We applied our method to uplifting islands of the tectonically active Buton Archipelago, SE Sulawesi, Indonesia. The area undergoes a general uplift revealed by the ubiquitous occurrence of uplifted and folded reef sequences. We dated some 40 samples using U/Th, acquired sonar and dGPS profiles, and constructed high-res DEMs (Pleiades). Local vertical rates (from 0.2 to 0.28 mm/yr) were determined. Detailed geomorphological mapping of the lateral variations of the terraces are converted into time and space variations of uplift rates. Extrapolating the higher, undated terraces permits to reconstruct the overall 4D geomorphology history over the last Ma. In turns, these results give a unique view on the structural kinematics.