



Tracking multidecadal trends in sea level using coral microatolls

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Coral microatolls can be used to study relative sea-level change at multidecadal timescales associated with vertical land movements, climate induced sea-level rise and other oceanographic phenomena such as the El Niño/Southern Oscillation (ENSO) or Indian Ocean Dipole (IOD) with the assumption that the highest level of survival (HLS) of coral microatolls track sea level over the course of their lifetimes. In this study we compare microatoll records covering from as early as 1883 through 2013, from two sites in Indonesia, with long records (>20 years) from proximal tide gauges, satellite altimetry, and other sea-level reconstructions. We compared the HLS time series derived from open-ocean and moated (or ponded) microatolls on tectonically stable Belitung Island and a potentially tectonically active setting in Mapur Island, with sea-level reconstructions for 1950-2011. The sea-level reconstructions are based on ground and satellite measurements, combining a tide model with the Estimating the Circulation and Climate of the Ocean (ECCO) model. Our results confirm that open-ocean microatolls do track low water levels at multi decadal time scales and can be used as a proxy for relative sea level (RSL) over time. However, microatolls that are even partially moated are unsuitable and do not track RSL; rather, their growth patterns likely reflect changes in the elevation of the sill of the local pond, as reported by earlier authors. Our ongoing efforts will include an attempt to recognize similarities in moated microatolls that may be helpful in identifying fossil microatolls that grew in moated settings. We will also attempt to build guidelines for recognizing and excluding living ponded microatolls in the field.