Geophysical Research Abstracts
Vol. 19, EGU2017-9858, 2017
EGU General Assembly 2017

Reconstructing Mid- to Late Holocene sea-level change from coral microatolls, French Polynesia

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Coral microatolls are sensitive low-tide recorders, as their vertical accretion is limited by the mean low water springs level, and can be considered therefore as high-precision recorders of sea-level change. They are of pivotal importance to resolving the rates and amplitudes of millennial-to-century scale changes during periods of relative climate stability such as the Mid- to Late Holocene, which serves as an important baseline of natural variability prior to the industrial revolution. It provides therefore a unique opportunity to study coastal response to sea-level rise, even if the rates of sea-level rise during the Mid- to Late Holocene were lower than the current rates and those expected in the near future.

Mid- to Late Holocene relative sea-level change in French Polynesia was reconstructed based on the coupling between absolute U/Th dating of *in situ* coral microatolls and their precise positioning via GPS RTK (Real Time Kinematic) measurements. The twelve studied islands represent ideal settings for accurate sea-level studies because: 1) they can be regarded as tectonically stable during the relevant period (slow subsidence), 2) they are located far from former ice sheets (far-field), 3) they are characterized by a low tidal amplitude, and 4) they cover a wide range of latitudes which produces significantly improved constraints on GIA (Glacial Isostatic Adjustment) model parameters.

A step-like sea-level rise is evidenced between 6 and 3.9 ka leading to a short sea-level highstand of about a meter in amplitude between 3.9 and 3.6 ka. A sea-level fall, at an average rate of 0.3 $mm.yr^{-1}$, is recorded between 3.6 and 1.2 ka when sea level approached its present position. In addition, growth pattern analysis of coral microatolls allows the reconstruction of low-amplitude, high-frequency sea-level change on centennial to sub-decadal time scales. The reconstructed sea-level curve extends the Tahiti last deglacial sea-level curve [Deschamps et al., 2012, *Nature*, 483, 559-564], and is in good agreement with a geophysical model tuned to fit far-field deglacial records [Bassett et al., 2005, *Science*, 309, 925-928].