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Reef accretion during the post-glacial sea-level rise at Tahiti (French Polynesia): I.O.D.P. #310 expedition « Tahiti sea level »

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The study of coral reef systems that developed during the last deglaciation (23,000-6,000 cal. yr BP) is of pivotal interest both for the reconstruction of climatic and environmental changes associated with the sea-level rise and the evaluation of the impact of those combined changes on reef accretion (growth modes and reef geometry) and biological composition.

Tahiti is a volcanic island characterized by slow and regular subsidence rates and located at a considerable distance from the major former ice sheets and corresponds, therefore, to an ideal site to obtain an unbiased continuous record of reef accretion and anatomy covering most of the last deglaciation. The 600 m of reef cores with an exceptional recovery ($>$ 90 % of the carbonate rocks) that were retrieved from 37 holes along transects ranging from 40 to 117 m water depth by drilling the successive reef terraces from a dynamically positioned vessel (*DV/DP Hunter* ; IODP Expedition #310 “Tahiti Sea Level” [1 to 3]) in three regions distributed around the island (Faaa, Tiarei and Maraa) therefore represent an unique opportunity to investigate the impact of sea-level and environmental changes on reef development during the last deglaciation.

The last deglacial sequence in Tahiti is mostly composed of coralgal frameworks heavily encrusted with microbialites, locally associated or interlayered with skeletal limestone and/or loose skeletal sediments (rubble, sand and silt) rich in fragments of corals, coralline and green (*Halimeda*) algae, and, to a lesser extent, bryozoans, echinoids, mollusks, and foraminifers (mostly *Amphistegina* and *Heterostegina*).

At each individual drill site, the cored reef sequences are continuous implying that there was no major break in reef development during the 16,000-8,000 yrs B.P. time span when reef accretion rates decreased from 16.2 mm.yr^{-1} to 9.1 mm.yr^{-1}, thus questioning the occurrence of reef drowning events as described in the Barbados record. This suggests that environmental conditions in Tahiti were optimal for reef development and no long term environmental changes occurred during that period, although changes in coralgal assemblages may reflect variations in environmental parameters (e.g. water depth and energy, light conditions, terrigenous fluxes, nutrient concentrations etc.). The deeper-water facies that form the top of the last deglacial sequence occur gradually shallower towards the modern reefs along the drilled transects, thus indicating a general backstepping of the reef complex as a response to sea-level rise during the last deglaciation. At all sites, the last deglacial sequence displays similar trends although it displays specific characters in each area.

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