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Microbialite-dominated coral reefs as response to abrupt environmental changes during the last deglacial sea-level rise. IODP Expedition #310, Tahiti

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The rapid last deglacial sea-level rise is recorded by coral reef systems occurring on the modern reef slopes off Tahiti. The identification of short-term paleoclimatic and paleoceanographic changes associated with the last deglacial sea-level rise is among the main objectives of IODP Expedition # 310 “Tahiti sea-level”. For this task, the taxonomy of corals and geochemical tracers in their skeleton are currently studied by Science Party members. For reliable reconstructions, however, the signatures of sea-level change and sea-surface temperature in the sediment have to be distinguished from other parameters including water energy, nutrient levels, light intensity, wave base levels, and erosion of the hinterland. To gain this broader information, components other than corals need to be studied.

The deglacial reefs of Tahiti contain large volumetric portions of microbial crusts by far are not reached in their modern counterparts (Camoin & Montaggioni, 1994; Camoin *et al*., 1999, Camoin et al., 2006). These microbialites appear promising as archives for a wide range of environmental parameters. However, their paleoenvironmental significance is not sufficiently understood so far; i.e. neither have the microbialite communities forming those crusts been clearly identified, nor have the microbialites been calibrated as proxies for specific environmental parameters. Our study aims at better constraining the paleoenvironmental significance of the microbialites. We here present first results on the structure and (bio-) geochemical signatures of the microbialites occurring in the last deglacial reef sequences recovered during the IODP Expedition 310. Lipid biomarkers imply that carbonate precipitation processes were

related to the activity of heterotrophic bacteria. This is also supported by stable isotope data. This, along with microbioerosion in the encrusted corals and microbialites themselves, it appears that increased nutrient levels have played a significant role in microbial blooms initiating microbialite development. Further analyses will help to further pin down the conditions and the timing of microbialite formation in order to interpret the environmental changes that occurred during the transition from the last glacial maximum to the present interglacial.

References :

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