



The impact of freshwater geochemistry on reef growth and reef alteration

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As part of the EuroMARC project CHECREEF this project focuses on the influence of freshwater on the internal and external structure of reefs. We will initially work on freshwater samples from the hinterland of the IODP 310 drill sites offshore Tahiti. On Tahiti, precipitation rates up to 8500 mma^{-1} have been recorded, causing major runoff of freshwater by rivers as well as groundwater percolation through the porous volcanic rocks. The steep relief produces a high hydraulic gradient which is likely to force groundwater to percolate through the reef bodies below sea level. Submarine groundwater discharge in the reef has been found in several places around Tahiti. Carbonate undersaturated groundwater might contribute to internal cavities inside the reef bodies. Additionally nutrients and iron are assumed to be transported to the reefs with the groundwater and fuel reef growth, which was shown by previous studies on other reef systems. Due to the high precipitation rates and short flow paths, Tahiti freshwaters show a low mineralization and low alkalinities. Most of the freshwaters are undersaturated with respect to Ca-carbonates and they will alterate carbonates along their pathways.

The questions addressed within CHECREEF are the possible effects of carbonate-undersaturated groundwater on reef alteration and the change of reef development and coralgal record due to submarine groundwater discharge during sea level lowstands and sea levels rise. For the IODP drill sites, existing freshwater and offshore data are compiled and complemented by field sampling focussing on freshwater sources in the reef and their onshore surface water or groundwater sources. This datasets will be evaluated with the geochemical equilibrium model PHREEQC to assess the dissolution of

carbonates and the geochemistry of the mixing between freshwater and seawater.