



Characterization of Tahiti water samples with respect to carbonate dissolution, nutrient content and end-member modeling

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As part of the EuroMARC project CHECREEF this project investigates the influence of freshwater on the internal and external structure of coral reefs around Tahiti. In 2007 approximately 70 water samples, including surface water, groundwater, seawater and brackish water samples, were collected and analyzed for major elements, nutrients and stable isotopes.

The amount of total dissolved solids (TDS) in the freshwater samples is very low (conductivity ranged between 10-460 μS), which is due to the high amount of precipitation (up to 8500 mm a^{-1}) and the low residence times in the aquifer prior to discharge from onland springs or as submarine groundwater discharge (SGD). SGD is likely on Tahiti because of the high hydraulic gradient, which is a result of the islands internal structure and its steep relief. All freshwater samples were undersaturated with respect to aragonite/calcite and therefore could potentially dissolve the reef carbonates offshore Tahiti. Based on a simple water balance calculation, which employs climatic data of Tahiti and surface water runoff, we can estimate the potential amount of submarine groundwater discharge (SGD). Assuming chemical equilibrium, the maximum quantity of Ca-carbonates, which could be dissolved can be calculated with the geochemical program PHREEQC. This data in conjunction with an estimate of SGD allows us to estimate the potential amount of dissolved carbonate rocks due to SGD.

A second modeling approach is end-member water mixing along different freshwater pathways discharging into the ocean. We can track the pathways and the mixing amount using stable isotope data and conservative tracers like sodium and chloride. These findings shed light on, whether the dissolved compounds behave conservative according to mixing or if there are other processes that influence the dissolved content of the water sample.