



Calcification and isotopic record (delta 18O, delta 13C) of corals (Faviidae) from the upwelling-zone of Oman

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The application of coral skeletons as paleoclimate archives is based on studies dealing with the response of recent living corals to modern environmental conditions. Due to the regional climate and oceanography, corals from Oman are exposed to a high level of environmental stress. In the Arabian Sea, upwelling during the Southwest Monsoon lowers summer SSTs and assumably drives the surface water towards more acidic conditions. The calcification response of corals exposed to these environmental stressors is as yet unknown. Here, we describe six corals from the Island of Masirah (Arabian Sea) with respect to sub-annually resolved oxygen and carbon stable isotope records in conjunction with seasonal density and extension rate. Results were compared to previously collected satellite derived SST-data (NOAA). This work demonstrates no negative impact on the vitality of corals living in the upwelling-zone. The skeletal density of the Masirah corals is negatively correlated with SST (-0,08 g/cm³ per 1°C) while extension rates seem to be influenced by nutrients, reproduction cycles and SST. The highest calcification rate occurs during the upwelling season of the Southwest Monsoon and the following Intermonsoon. As a preliminary result, we assume that the negative impact of a low pH is compensated by eutrophic conditions. Furthermore, the mitigating effect of upwelling on SSTs in summer seems to prevent coral bleaching events. The $\delta^{18}\text{O}_{\text{Coral}}$ results illustrate evidence, that next to a temperature controlled fractionation, intra-annual changes in the isotopic composition of the surrounding seawater occur. The results of this study seem to suggest a high potential in the seasonal resolution of coral climate archives and represent a major advance for the interpretation of coral skeletons from upwelling-zones prior to instrumental records.