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Problems and possibilities of Sr/Ca as a temperature proxy in cold-water coral *Lophelia pertusa*

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One of the basic data to understand the climate system and past global changes is the measurement and the reconstruction of seawater temperature. In combination with salinity, the temperature of the ocean controls the density of the water masses, which is the major driving force for the oceans thermohaline circulation system. Geochemical investigations on the cold-water corals *Lophelia pertusa* and *Desmophyllum cristagalli* indicated the potential of these organisms as high-resolution archives of environmental parameters from intermediate and deeper water masses. Other studies tried to use cold-water corals as a high-resolution archive of temperature. However, the fractionation of stable isotopes and elemental ratios are strongly influenced by vital effects, and hence difficult to interpret. Nevertheless, ongoing studies indicate the potential of a predominant temperature dependent fractionation of distinct isotopes and elements (e.g. Li/Mg, Montagna et al. 2009; U/Ca, Mg/Ca, delta18O, López Correa et al. 2008; delta88/86Sr, Rüggeberg et al. 2008).
We investigated live-collected specimens of the cold-water coral *L. pertusa* from all along the European continental margin. These coral samples grew in waters characterized by temperatures between 6°C and 14°C. Electron Microprobe and mass spectrometer investigations along the growth direction of individual coral polyps were applied to determine the relationship between the incorporation of distinct elements (Sr, Ca, Mg, S). Cohen et al. (2006) showed for L. pertusa from the Kosterfjord, Skagerrak, that 25% of the coral's Sr/Ca ratio is related to temperature, while 75% are influenced by the calcification rate of the organism. However, the Sr/Ca-temperature relation of our *L. pertusa* specimens suggests, that mean Sr/Ca-values of adult specimens are more reliable for temperature reconstructions along a larger temperature range than local high-resolution investigations. Additionally, our results plot along the same line of Sr/Ca-temperature relationship as tropical corals indicating a similar behaviour of element incorporation during calcification.

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