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Influence of Eunice norvegica on feeding and calcification in the coral Lophelia pertusa

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Lophelia pertusa is the main framework building cold-water coral in the North Atlantic. It forms complex reef structures, extending up to several km in length and several meters in hight. Many species are attracted by the coral frame work, forming a highly diverse community within the reef. Although most work has focused on the corals, the functioning of the system also depends on interactions between corals and associated species. A particular example is the Polychaete Eunice norvegica that lives in close association with the coral host. The Polychaete builds a thin texture-tube between living coral branches and stimulates the coral to calcify the tube. This process strengthens the reef framwork by thickening and connecting coral brances and thereby acts as a positive feedback on the development of large reef structures. This comes however at an metabolic cost for the coral due to the enhanced calcificationrates. Another negative feedback for cold-water coral may be food related, since aquaria observations have shown that Eunice occasionally steels food from its host coral.
In this study we investigated the interactions between the coral and polychaete related to calcification and food partitioning for two food types (algae and Artemia). The uptake of 13C and 15N labeled food sources by the worm and the coral was studied in chambers with only corals, only the polychaete and both species present. After 7 days, corals and worms were analyzed for isotope incorporation in bulk tissue and skeleton samples and specific fatty acids (13C) using GC-c-IRMS (gas-chromatography-combustion-isotope ratio mass spectrometry). Corals that were kept in the presence of Eunice indeed showed a higher calcification rates of 7.4 ug C (day* g dw coral)-1, evidencing the stimulation of calcification by Eunice. Interestingly, food uptake of algae and Artemia was higher in the coral-worm treatment for both species as compared to the single species treatments. These results shed new light on trophic and non-trophic interactions in cold-water coral reefs.