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Degradation and mineralization of coral mucus in reef environments

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Abstract:

With *in situ* and laboratory chamber incubations we demonstrate that coral mucus, an important component of particulate organic matter in reef ecosystems, is a valuable substrate for microbial communities in the water column and sandy sediments of coral reefs. The addition of coral mucus to the water of benthic chambers placed on lagoon sands in the coral cay Heron Island, Australia, resulted in a rapid and significant increase in both O_2 consumption and DIC production in the chambers. The permeable coral sands permitted the transport of mucus into the sediment with interfacial water flows, resulting in the mucus being mainly (>90%) degraded in the sediment and not in the water column of the chambers. A low ratio of 0.48 (*in situ*) to 0.64 (laboratory) for O_2 consumption/ DIC production after the addition of coral mucus, and high sulfate reduction rates (SRR) in natural sediments which were exposed to coral mucus, suggest a large contribution of anaerobic processes to the degradation of coral mucus. Oxygen penetrated less than 5 mm deep into these sediments. The microbial reaction to mucus addition was rapid, with a calculated *in situ* C turnover rate ranging from 7 to 18% h^{-1}. The degradation of coral mucus showed a dependency on the permeability of the carbonate sediments, with faster degradation and remineralization in coarse sands. This indicates the importance of permeable reef sediments for the trapping and degradation of organic matter. We suggest that coral mucus may have a function as a carrier of energy to the benthic microbial consumers.

Key-words: Coral mucus, POM, Degradation, Permeable carbonate sands, O_2 consumption, DIC production, C turnover