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TITLE: The cold?water coral community as hotspot of carbon cycling on continental margins: A food?web analysis from Rockall Bank (northeast Atlantic)

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ABSTRACT:

We present a quantitative food?web analysis of the cold?water coral community, i.e., the assembly of living corals, dead coral branches and sediment beneath, associated with the reef?building Lophelia pertusa on the giant carbonate mounds at ~800?m depth at Rockall Bank. Carbon flows, 140 flows among 20 biotic and abiotic compartments, were reconstructed using linear inverse modeling by merging data on biomass, on?board respiration, ? 15 N values, and literature constraints on assimilation and growth efficiencies. The carbon flux to the coral community was 75.1 mmol C m ?2 d ?1 and was partitioned among (phyto)detritus (81%) and zooplankton (19%). Carbon ingestion by the living coral was only 9% of the carbon ingestion by the whole community and was portioned among (phyto)detritus (72%) and zooplankton (28%). Carbon cycling in the community was dominated by suspension? and filter?feeding macrofauna associated with dead coral branches. Sediment traps mounted on a bottom lander trapped 0.77 mmol C m ?2 d ?1 (annual average), which is almost two orders of magnitude lower than total carbon ingestion (75.1) and respiration (57.3 mmol C m ?2 d ?1 ) by the coral community. This discrepancy is explained in two ways: the coral community intercepts organic matter that would otherwise not settle on the seafloor, and through their action as ecosystem engineers, the increased turbulence generated by the coral framework and organic?matter depletion in the boundary layer augment the influx to the coral community. A comparison of macrofaunal biomass and respiration data with soft sediments reveals that coral communities are hot spots of biomass and carbon cycling along continental margins.

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