Virus and bacteria dynamics of a coastal sediment: Implication for benthic carbon cycling

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ABSTRACT: We measured microbial heterotrophic activity, bacteria, and virus-like particle (VLP) abundance in homogenized, undiluted, and anoxic enclosures of sediment collected at a coastal station. The bacterial growth rate and VLP net production increased along with the respiratory activity in response to temperature. This suggests that VLPs represent a dynamic component of benthic microbial communities and that the net production of viriobenthos is regulated by the metabolic activity of bacteria. The abundance, net production, and decay rate of VLPs were significantly higher than those encountered in most pelagic systems. However, the rates were lower than the very few available potential rates (three studies) of viriobenthic activity, which all were obtained applying different slurry approaches. Our measurements support the general observation that virus abundance and production correlate with the trophic status of the environment and show that microbial activity can regulate the viriobenthic production in undiluted, homogenized marine sediments. The virus-induced bacterial mortality corresponded to ~20% of bacterial net production and ~2% h^{-1} of the total bacterial population. This is moderate compared with the results of most pelagic studies, and the associated leakage of lysates (dissolved organic carbon) only amounted to 4-8% of the produced dissolved inorganic carbon. Despite high standing stocks and relatively high turnover rates, VLP-induced bacterial lysis represented only a minor shunt in the benthic carbon cycle at the investigated site.