

Viruses within the ocean floor comprise the greatest fraction of the deep biosphere

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In the current issue of the *Journal of the International Society for Microbial Ecology (ISME Journal, 20.1.2014)* scientists from the University of Oldenburg and from the GFZ German Centre for Geosciences show that in deep, old and nutrient-poor marine sediments there are up to 225 times more viruses than microbes. In such extreme habitats viruses make up the largest fraction of living biomass and take over the role as predators in this bizarre ecosystem.

The scientists found that with decreasing nutrient levels the ratio between viruses and cells shifts more toward viruses. "For several years it has been known that the biomass of all microbes within the sea floor equals that of all life in the oceans above" reports Jens Kallmeyer from the GFZ. "Viruses, however, have been neglected previously".

In these extreme environments viruses take over the role of predatory organisms: They control size and composition of the microbial community. The surprisingly high number of viruses can be explained by the fact that the small but active microbial community permanently produces new viruses that remain in the sediment for longer times because the few microbes produce fewer enzymes that can destroy viruses.

Previous measurements in seawater and surficial sediments showed that [viruses](#) are about ten times more abundant than [microbes](#), but because of their much smaller biomass they did not play a major role in estimates of the total living biomass. Moreover, it was assumed that predators such as

unicellular organisms, but also worms and snails control the size of the microbial population. The new results show that these simple assumptions are no longer valid.

More information: Engelhardt, T., Kallmeyer, J., Cypionka, H., & Engelen, B. (2014): "High virus-to-cell ratios indicate ongoing production of viruses in deep subsurface sediments", *ISME Journal*. DOI: [10.1038/ismej.2013.245](https://doi.org/10.1038/ismej.2013.245); 20.01.2014

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