Possible marine picoplankton response to future warming

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Climatic models predict surface water temperatures increase by 2-4oC over the next few decades. Global warming is assumed to alter the trophic interactions and carbon flow patterns of aquatic food webs, especially in the areas that are highly reactive to external forces, such as the Adriatic Sea. A major role in the global carbon cycle and regulation of the world's climate is played by marine microorganisms. Temperature is an extremely influencing factor on microbial processes such as production, growth rate and growth efficiency, as well as on bacterial grazing and viral lysis. To address the importance of microbial processes in global climate change, we performed laboratory grazing dilution experiments on the growth and mortality rates of the picoplankton community of the Adriatic Sea in four different seasons under *in situ* and 3°C above *in situ* temperature. Experimental temperature increase had different impact on the growth and mortality rates of different picoplankton groups in different seasons. The highest growth and mortality rates for heterotrophic bacteria were recorded in February, for *Prochlorococcus* and *Synechococcus* in July and November, and for picoeukaryotes in April. Mortality of all picoplankton groups was mainly caused by protistan grazing. 89-91% of total picoplankton biomass was channelled to grazers in the cold months compared to 75-84% in the warm months. The experimental temperature increase also resulted in greater enhancement of bacterial respiration than bacterial production. Consequently, bacterial growth efficiency was negatively related to temperature in all months. These results point to important changes in the future carbon cycle related to the role of microorganisms in the Adriatic Sea further increasing the importance of microbial food web in biomass transfer towards higher trophic levels.

Keywords: Adriatic Sea; picoplankton community; grazing dilution experiments; global warming