Geophysical Research Abstracts, Vol. 8, 00560, 2006
SRef-ID: 1607-7962/gra/EGU06-A-00560

Microzooplankton response to mesoscale iron enrichment: Case study and global synthesis.

R. B. Rivkin (1), M. S. Hale (1), W.K.W. Li (2), H. Bussey (1)

(1) Ocean Sciences Centre, Memorial University of Newfoundland, St. John's, NL, Canada (rrivkin@mun.ca), (2) Bedford Institute of Oceanography, Fisheries and Oceans Canada, Dartmouth, NS, Canada

Microzooplankton consume a large fraction of the autotrophic and microheterotrophic production in the upper ocean and thus directly mediate the biogeochemical cycling carbon and nitrogen. Although catalogues of microzooplankton impact on phytoplankton have been compiled, our understanding of their role in structuring the plankton community is very limited. Biodiversity is an important driver of ecosystem function, hence conceptual and prognostic models are incomplete in the absence understanding the role of microzooplankton in modifying community structure. Mesoscale Fe enrichment experiments have been carried out in High Nutrient, Low Chlorophyll regions for over a decade, yet there are few studies of microzooplankton-mediated grazing mortality of eucaryotic and prokaryotic autotrophs and heterotrophs. As part of the Canadian Surface Ocean Lower Atmosphere Study, we carried out mesoscale a Fe enrichment study in the sub-Arctic Pacific during July-August 2002. We measured the time-dependent change in the rates of growth and grazing mortality of Synechococcus, picoeucaryotes, small and large nanophytoplankton, small and large phytoplankton, and heterotrophic bacteria. For all prey types, growth and grazing mortality were higher within than outside the Fe-enriched patch. Within the patch, temporal patterns of growth, grazing mortality, net growth rate and biomass accumulation differed among the autotrophic groupings and between autotrophic and heterotrophic prey. Based upon these patterns, we propose that microzooplankton grazing controlled the observed prey dynamics, and that they switched from bacterivorous to herbivorous feeding modes during the course of the bloom. We compared our results to a synthesis other mesoscale Fe enrichment experiments in the Equatorial Pacific and Southern Oceanto identify common ecosystem responses and consequence to Fe fertilization.