Geophysical Research Abstracts
Vol. 18, EGU2016-16206, 2016
EGU General Assembly 2016

Effect of volcano ash additions on nutrient concentrations, bloom dynamics and community metabolism in a short-term experiment in the NW Mediterranean Sea

Markus Weinbauer
Laboratoire d'Océanologie de Villefranche, Station Zoologique, Villefranche-sur-mer, France (wein@obs-vlfr.fr)

Volcano ash deposition is now considered as an important source of inorganic bioavailable iron which can relieve Fe-limitation in the ocean. As volcano ash also releases PO4, a experiment was performed in the NW Mediterranean Sea to test whether volcano ash deposition can affect nutrient dynamics and bloom development in a P-limited system. In a 54h experiment, it was shown that the development of a phytoplankton bloom was not enhanced or even repressed by ash additions of 2 and 20 mg l-1, whereas higher ash concentrations (200 mg l-1) induced a phytoplankton bloom as indicated by elevated Chlorophyll-a levels. Concurrently, net community production (NCP) and gross primary production (GPP) were enhanced at T24h at the highest ash additions. The metabolic balance was roughly neutral at low or no ash additions, but shifted towards phototrophy at the highest ash additions. The data on inorganic nutrient development and release estimates from ash material assays suggest relieving of P-limitation concomitant with NO_3 and silicate use from ash. The concentration of TEP increased with increasing ash levels. The abundances of the heterotrophic compartment (bacteria, viruses and ciliates) also indicated dose-dependent responses. Our data suggest that heterotrophs won the competition for inorganic nutrients at ash levels of 2 and 20 mg l-1, whereas phytoplankton won at levels of 200 mg l-1. Overall, our experiments point to a strong potential of volcano ash deposition as forcing factor for nutrient dynamics and the activity of microbial plankton in a P-limited system.