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PHYTOPLANKTON AND HETEROTROPHIC BACTERIA RESPONSE TO ATMOSPHERIC DUST DEPOSITION IN THE MAURITANIAN-SENEGALESE UPWELLING REGION

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Abstract: The eastern North Atlantic region is among the highest receivers of dust deposition in the world oceans, which is an important source of nutrients, trace metals and organic matter to the surface ocean. In this study, we assessed the response of phytoplankton and heterotrophic bacteria to intense dust deposition in the Mauritanian-Senegalese upwelling system. Four bioassays were performed, each lasting three days, along a trophic gradient extending from the eutrophic coastal upwelling to the oligotrophic open sea . On each occasion, dust concentrations above 4 mg l-1 were added to triplicate microcosms, increasing nitrate, phosphate and, to a lesser extent, silicate seawater concentrations. Even though dust deposition enhanced heterotrophic and photosynthetic activity concurrently, bacterial production rates responded faster and stronger than primary production especially as oligotrophic conditions increased. Although not always reflected in total microbial cell abundances, dust enrichment also stimulated the growth of certain planktonic groups over others according to their nutrient requirements. High silica content phytoplankton groups (such as Dinophyceae, Chrysophyceae and Filosa-Thecofilosea) thrived in dust-treated microcosms, as well as Hyphomonas type of Alphaproteobacteria and several Gammaproteobacteria orders (including Alteromonadales, OM182_clade and Ectothiorhodospirales). Yet, microbial community structure and composition were primarily shaped by the unique characteristics of each experiment (intrinsic local productivity and nutrient availability), as well as by trophic interactions across autotrophic and heterotrophic microbial communities.

Key words: Dust bioassay, primary production, bacterial production, plankton community structure, molecular diversity, subtropical Northeast Atlantic.