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Response of a coastal cold-water plankton community to extreme levels of ocean acidification

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The emissions of anthropogenic CO_2 cause a drop in seawater pH and shift the inorganic carbon speciation. Collectively, these changes are summarized in the term ocean acidification (OA). Productive coastal regions already experience episodic extreme events where pH exceeds end of the century predictions of the global mean. The ongoing decrease of pH may further enhance the frequency of these coastal extreme events. To evaluate the influence of such episodic extreme OA events in coastal regions, we enclosed coastal plankton communities (Raunefjord, Norway) in 8 pelagic mesocosms (60 m^3) for 55 days, exposing 4 of them to $\approx$2200 μatm while the other 4 served as control treatments. In the present paper, we report on the OA-induced changes in the plankton community structure (phytoplankton, micro- mesozooplankton) by means of multivariate statistics. We found significant and relatively strong treatment differences in the plankton community emerging quickly after CO_2 manipulation. The main contributors to this restructuring of the community were cyanobacteria, ciliates, and a variety of mesozooplanktonic organisms like copepods, appendicularia, hydrozoa, and calcifiers. The restructuring of the community was further reflected in significant changes of the concentrations and elemental stoichiometry of particulate matter. Results imply that extreme events of CO_2-induced acidification have pronounced effects on coastal plankton communities and biogeochemical element cycling.