

Eco-evolutionary coupling in competing marine phytoplankton communities

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The overarching goal of the proposed project is to assess the relative importance, and functional interdependencies of ecological and evolutionary processes within communities under external pressure. We study species of marine phytoplankton that differ in terms of resource acquisition, productivity and environmental tolerances, and that are globally responsible for 50% of all primary productivity. We first address the components of response diversity of selected experimental plankton communities to enhanced CO₂ by direct experimental decomposition, and by a theoretical Price-equation decomposition into plasticity components, ecological species sorting, and adaptive evolution. Second, we study how rapid ecological and evolutionary processes inhibit or mutually enhance each other in artificially assembled coccolithophore communities. We manipulate different levels of genotypic and species level diversity to allow for different intensities of species competition (=ecology) and genotypic selection (= evolution). Rates of change of genotypes as component of evolutionary change will be followed using real-time QPCR assays. Trade-offs for example among calcification, photosynthesis and growth rates will be addressed and guide the interpretation of experimental results.

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