The hidden flows within species: Phytoplankton population dynamics in Arctic assemblages

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Progressing climate change and concurrent alterations of environmental conditions pose challenges of adaptation on organisms and ecosystems, especially in rapidly changing places like the Arctic. While more diverse systems are usually considered to be more resilient, biodiversity does not only describe the number of species, but can also consist of diverse individuals within a species. Especially in protists, with large census sizes and fast proliferation, intraspecific lineage sorting can be an important mechanism of plasticity and trait adjustment. For phytoplankton communities at the base of the foodweb, physiological acclimation and species shifts are frequently described, but intraspecific composition and diversity are methodologically still difficult to resolve, especially in diverse natural contexts and at temporal resolution. Therefore, our knowledge on the functioning and importance of intraspecific selection dynamics in phytoplankton is still limited. In recent years, we have developed and applied a new, high throughput methodology for phytoplankton population composition, which can make temporal and spatial population dynamics visible that were before extremely difficult to resolve. Next to experiments with natural phytoplankton communities and artificial populations under controlled settings, a time-series of Arctic spring blooms has been investigated towards the year-to year composition of species but also of intraspecific populations of a dominant diatom. Datasets emerging now thanks to such novel technologies can offer new, more comprehensive perspectives on our understanding of the mechanisms and results of microevolution and local adaptation, and can reveal formerly hidden patterns of species' strategies of persistence and development.