We find that both PhycoCyanin(PC)-rich and PhycoErythrin(PE)-rich phenotypes of Synechococcus sp., show a high potential to emerge as phytoplankton components during the Arctic or Antarctic summer in the future, warmed, polar regions. In optimal conditions, one of the PE-rich Synechococcus sp., reached the highest chlorophyll-specific exponential growth rate of 4.5 d−1 (3.7 h doubling time), a record for cyanobacteria, comparable only with genetically-modified industrial strains.

We demonstrate, for the first time, that picocyanobacteria show consistent patterns of effective absorption cross section for PSII photochemistry, versus increasing cumulative diel PAR doses. We also determined that growth yields of picocyanobacteria are well predicted by cumulative diel PSII electron fluxes across different photic regimes.

Our results suggest possible the expansion of the range of picocyanobacteria to new photic regimes in the near future and indicate that PE-rich Synechococcus sp. may turn out to be the dominant component of picophytoplankton in nutrient-rich environments.

Dear Editor-in-Chief

K. David Hambright,

Our work indicating that picocyanobacteria have the potential to expand into new photic regimes while PE-rich Synechococcus may emerge as the dominant phytoplankter.

The findings of this study are helpful for further research on picocyanobacteria ecophysiology, and should be of interest to readers of Limnology and Oceanography, which has previously published articles on similar topics.

The genus Synechococcus occurs between tropical and arctic zones with long-term scenarios forecasting range expansions of this picocyanobacteria into new areas.