Unexpected cyanobacterial dominance in a deep oligo-mesotrophic lake, Lake Stechlin, Germany: *Aphanizomenon flos-aquae*, an ecosystem engineer

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Probably the most coherent observation, almost without latitudinal limitations, in phytoplankton ecology is the proliferation of heterocytic cyanoprokaryotes as a response to increasing P load of lakes and the withdrawal of this group after successful eutrophication management. However, an ongoing expansion of cyanobacteria in European lakes with moderate trophic states has been observed recently without parallel increase in trophic state indicators. An unexpected and perennial *Aphanizomenon flos-aquae* bloom in Lake Stechlin, Germany in 2009-2010 represents such a case since no increase in P load was detected prior to the bloom. Lake Stechlin is a deep (z_{max}: 69.5 m) glacial lake that used to be considered oligotrophic in the recent past of its history. Its oligotrophic status was supported by all commonly used measures (TP, chlorophyll-a) and also by phytoplankton assemblage structure and seasonal development. Cyanoprokaryotes, however, were well represented by seasonally developing upper hypolimnetic maxima of *Cyanobium* or occasionally *Planktothrix rubescens*. In late summers, various species of coccoid green algae were typical, and the only planktonic heterocytic cyanoprokaryote, *Anabaena lemmermannii* provided summer peaks no higher than 100 µg L^{-1}. The first filament of *Aphanizomenon flos-aquae* appeared in the lake in 2000 and then it developed a minor peak by every late summers. In 2009, however, an intensive growth started reaching a maximum (310 µg L^{-1}) in August. After a decline in August a winter population started to develop with a maximum around 920 µg L^{-1} in December-February that persisted almost as monoculture under thick ice and snow. This winter population provided net photosynthesis in the euphotic layer at 2 °C. The ice-break was followed by a short peak of *Stephanodiscus neoastraea* and by June (normally the clear-water phase in the lake) another *Aphanizomenon* bloom developed reaching a maximum of 2380 µg L^{-1}. These repeated blooms had a cascade of consequences including spatial and temporal patterns of the phytoplankton community and zooplankton development.