Impact of meteorological forcing on seasonal phytoplankton succession in a peri-urban lake.
Nicolas Clercin, Brigitte Vinçon-Leite, Francesco Piccioni, Philippe Dubois, Mohamed Saad

To cite this version:
Nicolas Clercin, Brigitte Vinçon-Leite, Francesco Piccioni, Philippe Dubois, Mohamed Saad. Impact of meteorological forcing on seasonal phytoplankton succession in a peri-urban lake.. 12th Symposium for European Freshwater Sciences, Jul 2021, Dublin, Ireland. hal-03463976

HAL Id: hal-03463976
https://enpc.hal.science/hal-03463976
Submitted on 2 Dec 2021

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L’archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.
Impact of meteorological forcing on seasonal phytoplankton succession in a peri-urban lake
Nicolas Clercin*, Brigitte Vinçon-Leite, Francesco Piccioni, Philippe Dubois, Mohamed Saad
*nicolas.clercin@enpc.fr

Context
As commonly assumed, global warming will increase water temperatures, strengthen water column thermal stratifications and subsequently lead to more frequent and more severe cyanobacterial blooms. However, complex interplays between meteorological conditions and phytoplankton may result in different species assemblages, potentially outcompeting cyanobacteria. A study conducted between 2019 and 2020 in Lake Champs-sur-Marne, a small peri-urban lake in Eastern Paris, revealed two different algal successions during the summer periods despite similar air temperatures.

Study site & Methodology
Lake Champs-sur-Marne (LDC) is a former gravel pit:
• small (12 ha) and shallow (Zmax = 3m);
• near the Marne River (Fig. 1).
Water temperatures: 0.5m and 2.5m; every 10 mins.
Water samples: at 1.5m, biweekly
Lab analyses:
• N-NO3, P-PO4,
• Chlorophyll (Chla) and Phycocyanin (PC),
• Phytoplankton identification and enumeration

Algal successions
• During the summer 2019, a massive bloom of nitrogen-fixing cyanobacteria Aphanizomenon flos-aquae (Fig. 2).
• No cyanobacteria bloomed during summer 2020;
• A dominance of chlorophyceae (Eudorina elegans and Dictyosphaerium pulchellum) and later cryptophyceae (Cryptomonas ovata and Chroomonas spp.) species were observed.

Environmental variables and phytoplankton
• Similar air temps and nutrient levels were measured throughout both summer periods;
• Weaker Delta_Temp values indicated more turbulent water columns in summer 2020 (Fig. 3);
• Interplay of these conditions were not favorable for cyanobacterial growth (Fig. 4).

Fig. 1 – Lac Champs-sur-Marne France
Fig. 2 – Algal dynamics in LDC, 2019-2020.
Fig. 3 – Temperature differences (Delta_Temp) between lake surface and bottom.
Fig. 4 – PCA of main algal groups versus environmental parameters. C1 and C2 axes represent 28.4% and 16.1%, respectively.