The Observatory on LAkes (OLA) database: Sixty years of environmental data accessible to the public

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Supplemental data S1: Administrative entities funding the main monitorings

Lake Annecy: monitoring is funded by "Syndicat Mixte du lac d'Annecy", website: https://www.sila.fr/

Lake Bourget: monitoring is funded by "Comité Intersyndical pour l'Assainissement du lac du Bourget", website: http://www.cisalb.com/

Lake Aiguebelette: monitoring is funded by "Communauté de Communes du Lac d'Aiguebelette", website: http://www.ccla.fr/
The French Water Agency Rhone-Méditerranée and Corse also supports these monitoring programs, as does the Ministry in charge of environmental protection and its regional agencies (*e.g.*, Directions Régionales de l'Environnement, de l'Aménagement et du Logement).

Lake Geneva (also called Lake Léman) is a transnational lake: monitoring is funded by both France and Switzerland (cantons of Geneva, Valais and Vaud) through the "International Commission for the Protection of Lake Geneva Waters" (CIPEL). Website of the CIPEL: https://www.cipel.org/

Supplemental data S2: Picocyanobacteria

Picocyanobacteria are examined in Lakes Annecy, Bourget and Geneva from samples taken at 6 discrete depths (between the surface and 50 m). This community is identified and counted using flow cytometry. Analyses are always performed the day after sampling. Samples are kept in the dark at 4°C to 8°C in a cool box filled with ice packs while being transported to the laboratory, where they are stored in a 4°C refrigerator until analysis (Jacquet *et al*., 2018). Neither fixative nor fluorochrome are used because fixation is known to induce considerable cell loss (Vaulot, 1989; Jacquet *et al*., 1998). Hence, analyses are performed using fresh samples metabolically fixed using a low temperature (Jacquet *et al*., 1998), to which a suspension of 1-µm beads (molecular probes) can be added. The flow cytometer 'listmode' files are analyzed using custom-designed software known as CYTOWIN (Vaulot, 1989).

Supplemental data S2: Picocyanobacteria

Supplemental data S3: Fish

Two sampling strategies are used for this biological compartment: net-sampling and hydro-acoustics.

Net sampling is performed following the CEN (European Committee for Standardization, 2005) standard procedure (Yule *et al.*, 2013). Sampling efforts are based on the recommended levels calculated, using lake area and maximum depth and two types of multi-mesh gillnets. One is benthic, 30 m long and 1.5 m high, comprised of panels 2.5 m in length with 12 mesh sizes (5, 6.25, 8, 10, 12.5, 15.5, 19.5, 24, 29, 35, 43 and 55 mm, stretch measure). The other is pelagic, 27.5 m long and 6 m high, containing the same mesh sizes except for the smallest, 5 mm. Locations of benthic gillnets are randomly selected based on bathymetry, and pelagic gillnets are used as a supplement, positioned at the deepest part of the lake. Using Lake Annecy as an example, a target of 66 benthic nets are collected annually (Fig. 1) for the total surface area of 2970 m^2. Pelagic nets are set by suspending them horizontally at varying depths (0-6 m to 48-54 m) at the deepest region of the lake (Fig.1). Nets are set before sunset, and retrieval begins at dawn (soak time, approximately 12 hours) to include crepuscular activity periods and to maximize fish catches. Fish are identified to the specie level, weighed to the nearest gram and measured (in length) to the nearest millimeter. Study location, gillnet information (set and lift date and time, coordinates, type, mesh, depth strata and mean depth) and fish information (species, length and weight) are available.

Hydro-acoustic data acquisition is based on the CEN (2009) standard (Axenrot *et al.*, 2016). From 2010 to 2017, a Simrad EK60 (Simrad Kongsberg Maritime AS, Horten, Norway), equipped with a 70-kHz split-beam transducer with a half-power beam angle of 11° and connected to a GPS system to record positional data, was used (Yule *et al.*, 2013). In 2017, intercalibration work was performed using the EK60 and a Simrad EK80 (Simrad Kongsberg Maritime AS, Horten, Norway) equipped with a 120-kHz split-beam transducer with a half-power beam angle of 7°. Hydroacoustic metrics and biomass results were found to be similar between the two generations of echosounders. A transducer attached to a pole along the boat at a depth of 0.5 m is aimed vertically.

Pulse duration is fixed at 0.256 ms (Godlewska *et al.*, 2011), and samplings at 5 pulses per second while travelling at a boat speed of around 8 km.h^{-1}. Sounder calibrations are regularly performed according to the standard protocol of Foote *et al.* (1987). Sound speed and the attenuation coefficient are adjusted based on temperature profiles determined in the same week

during lake monitoring. In Lake Annecy, annually from 2012 to 2016, a series of equally spaced parallel transects separated by roughly 500 m, was monitored. Since 2017, zigzag transects have been proposed, achieving a similar degree of coverage according to the comparison survey of Guillard and Vergès (2007). Such a survey covers bathymetric depths exceeding 5 m (Fig. 2). Shallower depths are avoided for safety reasons and to avoid blind areas close to the sounder. This level of sampling coincides with a degree of coverage of 6 (Aglen, 1983). Raw data from Simrad devices, stored by transect, are available.
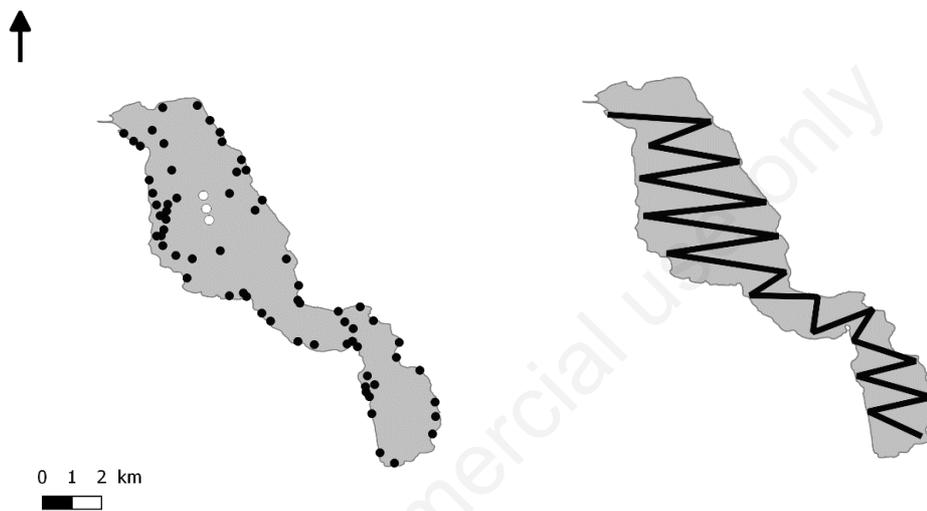
Fig. 1. Sampling strategy for gillnetting and hydroacoustics in Lake Annecy. A) Location of benthic (black spots) and pelagic gillnets (white spots) and B) Location of hydroacoustic transects (black line). In grey: lake Annecy.
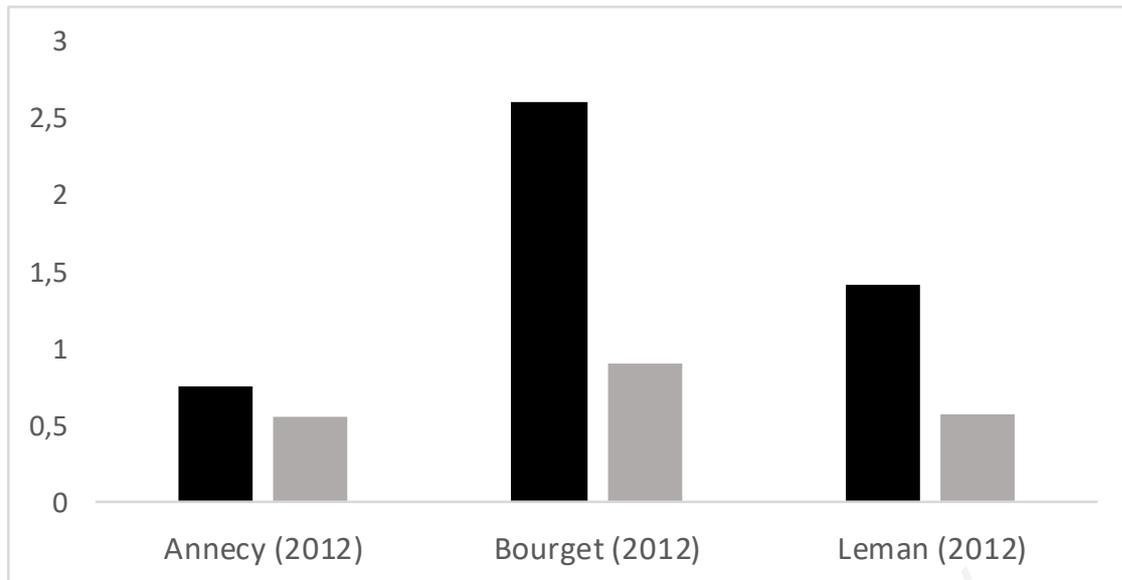
Fig. 2. Mean area backscattering strength SA (m^2.ha^{-1}), for three peri-alpine lakes obtained in 2012, Annecy (oligotrophic) , Bourget (oligo-mesotrophic) and Geneva (mesotrophic).

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