This article presents small-scale mesocosm data from "Effect of micronutrients on algae in different regions of Taihu, a large, spatially diverse, hypertrophic lake" [1]. The data is for limitation of the micronutrients boron (B), cobalt (Co), copper (Cu), iron (Fe), and molybdenum (Mo). Data is provided in raw form and includes data from analysis for chlorophyll-a, microscopic counts, and flow cytometry measurement from each sample collected for a total of 255 samples.

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1. Data

This data is from a nutrient limitation bioassay (NLB) field mesocosm experiments that are a rapid assessment of nutrient limitation characteristics [2–4]. The data are for factorial treatments under environmental conditions (e.g. diel cycles, temperature conditions). For the data in this article, water samples were collected from three different parts of Lake Tai, a large hypereutrophic lake in China, including 1) a location actively subject to a harmful algal bloom at the time of sample collection, 2) a location partially impacted by bloom, and 3) a location not affected by an algal bloom (vide infra field site data given with Fig. 1 in Section 2.2 below). For this data, water was dosed with the micronutrients B, Co, Cu, Fe, and Mo in the presence and absence of NP (nitrogen and phosphorous together). Controls included no addition (C), N, P and NP. Data is for samples that, after dosing, were deployed in the water at a research station by the lake, and data was collected for three sampling times, \( t = 0 \) (initial conditions at the start of mesocosm experiments), \( t = 2 \), and \( t = 4 \) days. Normally three replicate analyses were performed for each treatment. In all, data is given for chlorophyll-a, microscopic counts, and flow cytometry measurement (FCM) from each sample collected, for a total of 255 samples. The data for chlorophyll-a and microscopic counts are given in two xlsx files. The data for FCM is given in the flow cytometry fcs (2.0) file format. See Supplementary Material.

2. Experimental design, materials and methods

2.1. Experimental design

The mesocosm experiments followed a factorial design as follows:

- 14 different control, nutrient, and micronutrient treatments (C, N, P, NP, B, B+NP, Co, Co+NP, Cu, Cu+NP, Fe, Fe+NP, Mo, Mo+NP)
- Water with in situ phytoplankton collected at three stations
- Mesocosms prepared in triplicate
- Sampling at three time points — for the first time point, data was collected for the original water samples prior to dosing, therefore, $t = 0$ (initial) samples = 3
- $t = 2$ and $t = 4$ samples $= 14 \times 3 \times 3 = 126$ at each time point, $84 \times 2$ for the two time points $= 252$
- total number of samples represented in data sets $= 255$

For more context on Lake Tai and issues with eutrophication in Lake Tai, see Qin [5].

2.2. Materials

The three sites from which water for mesocosm experiments was collected were in Meiliang Bay (monitoring Station 3), Gonghu Bay (monitoring Station 13), and Xukou Bay (monitoring Station 28), shown in Fig. 1. These locations were, respectively, highly, partially, and not impacted by a harmful algal bloom at the time of sampling in August, 2017. Water was sampled from 0.2 m below the surface into 40-L acid-cleaned polyethylene carboys. For more information about the water quality at the time of sampling for each site see Zhang et al. [1].

2.3. Methods

2.3.1. Mesocosm experiments

NLB experiments were carried out immediately after water sample collection and followed the method of Paerl et al. [6] (and supplemental references for interested readers [7–9]). First, samples were collected for $t = 0$ analysis. Subsequently, for each NLB treatment, triplicate water subsamples from each respective station were taken from the 40-L samples described in Section 2.2 and placed into 1-L transparent, chemically inert, cubitainers that were trace-metal clean, as described in Xu et al. [7]. Nutrient was then added to cubitainers by spiking with concentrated solution to achieve the final concentrations for each specific component ($N = 2.0$ mg/L added as KNO$_3$; $P = 0.20$ mg/L added as...
K₂HPO₄·3H₂O; B — 18 µg/L added as H₃BO₃; Co — 1 µg/L added as CoCl₂·6H₂O; Cu — 20 µg/L added as CuSO₄·5H₂O; Fe — 200 µg/L added as FeSO₄·7H₂O; Mo — 1 µg/L Mo added as Na₂MoO₄·2H₂O). After nutrient additions, the cubitainers were incubated in situ in Taihu near the surface for four days by placing them in a frame at Taihu Laboratory for Lake Ecosystem Research. Each treatment was sampled twice (once at 2 days, once at 4 days) for chlorophyll-a, count, and FCM analysis.

2.3.2. Chlorophyll-a determination and microscopic counting

For the determination of chlorophyll-a, water samples were filtered onto Whatman GF/F glass fiber filters, frozen at −20 °C for no more than 2 days, then the concentration of chlorophyll-a was determined spectrophotometrically after extraction in 90% hot ethanol [10]. Phytoplankton samples were preserved with Lugol’s iodine solution for storage and were stored in the dark at room temperature until analysis. Algal objects were counted from observations of samples sedimented in a Sedgwick-Rafter chamber and reported as counts [11]. The phytoplankton species were identified according to Zhou and Chen [12].

2.3.3. Flow cytometry measurement

FCM of single cells was performed using a FACSCalibur (Becton Dickinson, California, USA) with two lasers (argon solid-state, and red diode, excitation at 488 and 635 nm, respectively). For each sample, 800 µL of cell sample was inserted into a 10 mL plastic vial and placed into the flow cytometer with a sample intake speed of 12 µL/min. The sheath fluid was a commercial product (Beckman Coulter Inc., USA), composed of 9.84 g/L Na₂SO₄, 4.07 g/L NaCl and 0.11 g/L procaine hydrochloride, pH 7.0, delivered through a 150 µm nozzle at 4.5 psi. Measurements included forward scatter (FSC), side scatter (SSC) and four fluorescence channels: green fluorescence (FL1: 530/30 nm bandpass), yellow fluorescence (channel FL2: 585/42 nm bandpass), red fluorescence (channel FL3: 670 nm/longpass) and orange fluorescence (FL4: 661/16 nm bandpass). For FSC and SSC the amplification gain was set at 1 and measured in the linear mode. For fluorescence channels the amplification gain was set at 1 and measured in the log-mode. Acquisition was set to capture 50,000 total events for each sample.

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Transparency document

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.dib.2019.103778.

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