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## Photosynthesis and primary production in Lake Kasumigaura (Japan) monitored monthly since 1981

Received: 29 May 2015 / Accepted: 19 February 2016 / Published online: 10 March 2016  
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**Abstract** This study reports the primary production of phytoplankton determined with a  $^{13}\text{C}$  tracer, and their related variables, in Lake Kasumigaura, a shallow, hyper-eutrophic lake, and the second largest lake in Japan. Measurements were conducted monthly from August 1981 to December 2013 at four stations within the lake. Monitoring was a component of the Lake Kasumigaura Long-term Environmental Monitoring program, conducted by the National Institute for Environmental Studies (NIES) since 1977. The program collects data on water quality, and plankton and benthic communities. Lake Kasumigaura is registered as a core site of the Japan Long-term Ecological Research Network (JaLTER), which is a member of the International Long-term Ecological Research Network (ILTER). This dataset includes daily primary production ( $P_{zd}$   $\text{gC m}^{-2} \text{d}^{-1}$ ) and the six parameters required to calculate  $P_{zd}$ : maximum photosynthesis rate ( $P_{max}$   $\text{gC gC}^{-1} \text{h}^{-1}$ ); light irradiance at the junction of the initial slope ( $\alpha$  ( $\text{gC gC}^{-1} \text{h}^{-1}$ ) ( $\mu\text{mol photon m}^{-2} \text{s}^{-1}$ ) $^{-1}$ ) and  $P_{max}$  of the photosynthesis vs. irradiance ( $P$  vs.  $E$ ) curve ( $E_k$   $\mu\text{mol photon m}^{-2} \text{s}^{-1}$ ); attenuation coefficient of photosynthetically available radiation (PAR) ( $K_{PAR}$   $\text{m}^{-1}$ ); water depth at each sampling station ( $Z_b$ , m); dissolved inorganic car-

bon (DIC  $\text{mgC L}^{-1}$ ) and particulate organic carbon concentrations (POC  $\text{gC m}^{-3}$ ); and chlorophyll a amounts (Chl.a  $\mu\text{g L}^{-1}$ ). Daily primary production was calculated by obtaining a  $P$  vs.  $E$  curve over a short-term incubation (approximately 1 h) in a water tank using in situ water temperature in the laboratory, based on the field conditions of the sampling date. The dataset has been used for ecological studies as well as for management studies on water quality and ecosystems. This dataset is unique among the available published papers concerning lakes or primary production in various ecosystems, collected over a long period of time and freely available.

**Keywords** Phytoplankton · Chlorophyll a · Carbon fixation with  $^{13}\text{C}$  · Primary production · Photosynthesis vs. irradiance ( $P$  vs.  $E$ ) curve · Maximum photosynthesis rate · Shallow and eutrophic lake · Lake Kasumigaura · Long-term Ecological Research (LTER) · Ecosystem function

*Ecological Research Data Paper Archives* [http://db.cger.nies.go.jp/JaLTER/ER\\_DataPapers/](http://db.cger.nies.go.jp/JaLTER/ER_DataPapers/)  
Accession number: ERDP-2016-01

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The complete data set for this abstract published in the Data Paper section of the journal is available in electronic format in at Ecological Research Data Paper Archives [http://db.cger.nies.go.jp/JaLTER/ER\\_DataPapers/archives/2016/ERDP-2016-01](http://db.cger.nies.go.jp/JaLTER/ER_DataPapers/archives/2016/ERDP-2016-01).

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