

JARE Data Reports, No. 335 (Terrestrial Biology 10), June 2015

Limnological parameters in Skarvsnes lakes between the 51st and 52nd

Japanese Antarctic Research Expeditions in 2010–2011

—Long-term monitoring study—

Sakae KUDOH^{1,2} and Yukiko TANABE^{1,2}

¹ National Institute of Polar Research, Research Organization of Information and Systems,
10–3, Midori-cho, Tachikawa, Tokyo 190-8518.

² Department of Polar Science, School of Multidisciplinary Sciences, SOKENDAI (The Graduate
University for Advanced Studies), 10–3 Midori-cho, Tachikawa, Tokyo 190-8518.

*Corresponding author. E-mail: skudoh@nipr.ac.jp

1. Introduction

This is a report on the limnological parameters which were continuously recorded by means of mooring data-logger arrays in two Skarvsnes lakes, Oyako Ike and Naga Ike ([Fig. 1](#)) during the 51st and 52nd Japanese Antarctic Research Expedition (JARE) in 2010–2011. This study was a part of NIPR basic research observations entitled “Monitoring of terrestrial ecosystems (AMB06)”, that aimed to record of environmental conditions for terrestrial organisms living on ice-free areas in Syowa Oasis since 2010, under the umbrella of the VIII term of JARE plans. Water temperature, photosynthetically active radiation (PAR), chlorophyll fluorescence and turbidity, and water level in lakes were measured and recorded automatically at intervals of 30–60 min. Similar continuous observation of limnological parameters in those lakes and some shallow lakes in Skarvsnes using mooring arrays have been reported by Kudoh *et al.* (2003), Tanabe *et al.* (2008), Kudoh *et al.* (2009a, b), and Tanabe *et al.*, (2012a, b).

2. Materials and methods

Design of the mooring array: The mooring array consisted of temperature loggers (NWT, Nichiyu Giken Kogyo), PAR loggers (ALW-CMP, JFE Advantech), chlorophyll-turbidity loggers

(ACLW-CMP, JFE Advantech), and a water level logger (Hobo U-20, Onset). These were attached at given depths of a rope which was connected to a plastic float and a steel sinker on both sides, as shown in [Fig. 2](#). The array was moored at the lake center where the nearly-maximum depth was detected. Exact depths at the mooring sites were 8.0 m and 10.0 m in Oyako Ike and Naga Ike, respectively. The positions measured by a portable GPS (GPSMAP 60 CS, Garmin) were 69°28.514'S, 39°36.154'E and 69°29.240'S, 39°35.850'E in Lake Oyako Ike and L. Naga Ike, respectively.

Setting of the data loggers: Triplicate temperature data were recorded every 30 minutes from 10:00 (local time) on 13 January 2010 to 14:30 on 3 February 2011 in Oyako Ike, and from 15:00 on 22 January 2010 to 11:00 on 4 February 2011 in Naga Ike. 10 times-repeats of PAR data, and chlorophyll-turbidity data were recorded at 60 minutes intervals during the same periods of the temperature loggers in Naga Ike. And a water level data were recorded at 60 minutes intervals during the same periods in both lakes, too. All loggers were pre- and post-calibrated by the manufacturers, who found no significant drifts in the measurements over the course of the study. Units of recorded data were °C and $\mu\text{mol}/\text{m}^2/\text{s}$ for temperature and PAR, respectively. Fluorescence from chlorophyll *a* was recorded as relative intensity against fluorescein sodium (Uranine) concentration, and turbidity was recorded as Formazin Nephelometric Units (FTU). The unit of water level was meter, which was calibrated using the record of a same sensor on lake shore.

3. Data

Triplicate temperature data measured at three different depths in Oyako Ike with 30 minutes intervals were averaged, summarized and converted to a CSV file ([Oyako_WaterTemp_3depths.csv](#)). Water level data with one hour intervals in Oyako Ike were converted to a CSV file ([Oyako_Waterlevel.csv](#)), too.

Triplicate temperature data measured at 8 different depths in Naga Ike with 30 minutes intervals were averaged, summarized and converted to a CSV file ([Naga_WaterTemp_8depths.csv](#)). Water level data with one hour intervals in Naga Ike were converted to a CSV file ([Naga_Waterlevel.csv](#)), too. Ten times repeated PAR at 2.5 m and 9.25 m depths, chlorophyll *a*, and turbidity data at 2.75 m

depth in Naga Ike were averaged every 1 hour interval, and summarized in a CSV file ([Naga_PAR_CHL_TURB.csv](#)).

List of data files are as follows;

1. Data from Oyako Ike mooring array

[Oyako_WaterTemp_3depths.csv](#)

[Oyako_Waterlevel.csv](#)

2. Data from Naga Ike mooring array

[Naga_WaterTemp_8depths.csv](#)

[Naga_Waterlevel.csv](#)

[Naga_PAR_CHL_TURB.csv](#)

4. Members who carried out the field study

Installation of the mooring arrays was carried out by Sakae Kudoh, Yukiko Tanabe, Masaki Uchida and Takashi Osono (the 51st JARE members). And the retrievals and data acquisitions were carried through by Sakae Kudoh, Yousuke Kokubo (the 51st JARE winter member), Takeshi Naganuma, Shingo Kobayashi (the 52nd JARE summer members).

5. Data policy

Before using the data for publication or presentation in any media, please request permission in writing. Inquiries should be addressed to:

Sakae KUDOHI or Yukiko TANABE

Inter-university Research Institute Corporation Research Organization of Information and Systems,

National Institute of Polar Research, 10-3, Midori-cho, Tachikawa-shi, Tokyo 190-8518, Japan

Telephone +81-42-512-0739 / Facsimile +81-42-528-3492

E-mail: skudoh@nipr.ac.jp or ukko@nipr.ac.jp

Acknowledgements

We thank all the members of JARE-51, and JARE-52 for their great supports and helps. We also wish to thank the officers and crews of the icebreaker *Shirase*.

References

- Kudoh, S., Watanabe, K. and Imura, S. (2003): Ecological studies of aquatic moss pillars in Antarctic lakes 2. Temperature and light environment at the moss habitat. *Polar Biosci.* **16**, 23–32.
- Kudoh, S., Kasamatsu, N., Hoshino, T., Han, D.-H., Tanabe, Y. and Kanda, H. (2009a): Limnological parameters in Skarvsnes lakes between the 47th and 48th Japanese Antarctic Research Expedition in 2006–2007 —Long-term monitoring study—. JARE data reports, **309**, (Terrestrial biology **4**), 47 p.
- Kudoh, S., Tanabe, Y. and Kanda, H. (2009b): Limnological parameters in Skarvsnes lakes during the 48th and 49th Japanese Antarctic Research Expeditions in 2007–2008 —Long-term monitoring study—. JARE data reports, **310**, (Terrestrial biology **5**), 78 p.
- Tanabe, Y., Kudoh, S., Imura, S. and Fukuchi, M. (2008): Phytoplankton blooms under dim and cold conditions in freshwater lakes of East Antarctica. *Polar Biol.*, **31**, 199–208.
- Tanabe, Y., Uchida, M., Osono, T. and Kudoh, S. (2012a): Limnological parameters in Skarvsnes lakes between the 49th and 50th Japanese Antarctic Research Expedition in 2008–2009 —Long-term monitoring study—. JARE data reports, **322**, (Terrestrial biology **6**), 49 p.
- Tanabe, Y., Uchida, M., Osono, T. and Kudoh, S. (2012b): Limnological parameters in Skarvsnes lakes between the 50th and 51st Japanese Antarctic Research Expedition in 2009–2010 —Long-term monitoring study—. JARE data reports, **323**, (Terrestrial biology **7**), 53 p.

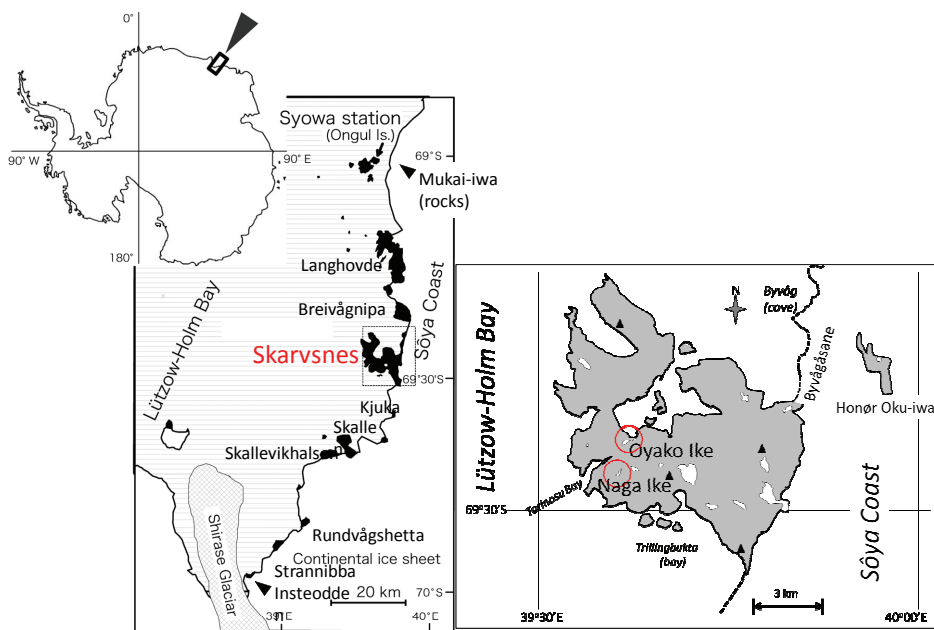


Fig. 1. Maps of studied lakes.

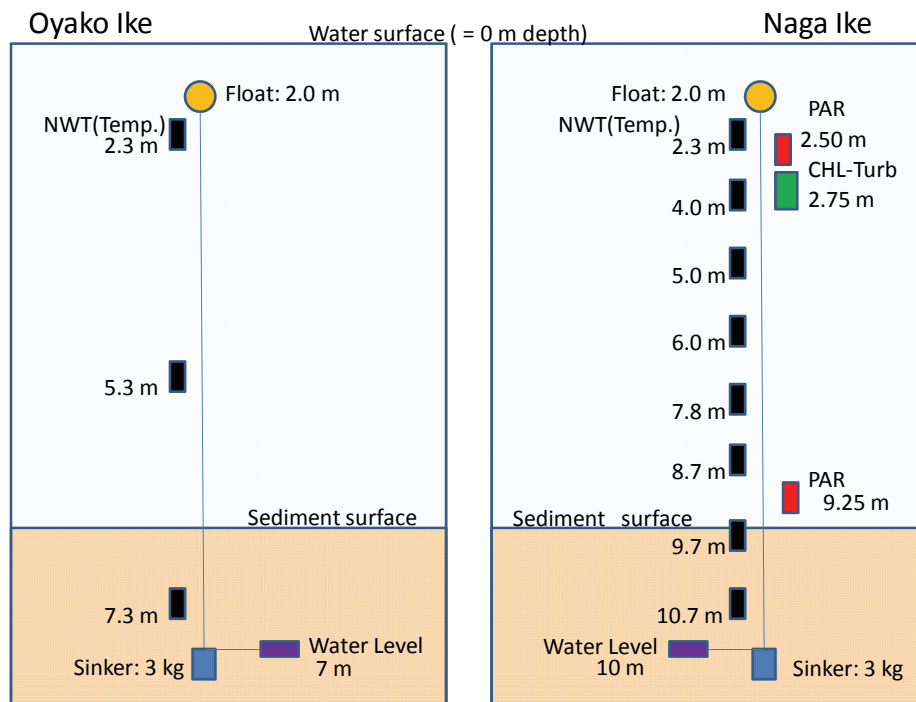


Fig. 2. Designs of mooring arrays set in Oyako Ike (left) and Naga Ike (right). Temperature loggers are indicated in black, PAR loggers are in red, a chlorophyll-turbidity logger is in green, and Water level loggers are in purple colors. Some loggers attached at deeper depths were got into sediments of these lakes as shown in the figure.