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Newly discovered long-term freezing/breaking-up dates record of Lake Juhsan in Northern Japan during 1705-1860 as compared with those of Lake Suwa

Takehiko Mikami (1), Naoko Hasegawa (2), and Junpei Hirano (3)
(1) Tokyo Metropolitan University(takehiko.mikami@gmail.com), (2) Ochanomizu University, (3) Teikyo University

Long-term freezing dates record of Lake Suwa in Central Japan since 15th century would be well-known among the historical climatologists as a valuable documentary data for the winter climate reconstruction (e,g., Gray,1974; Lamb,1977; Tanaka and Yoshino,1982; Mikami,2008; Sharma et al.,2016). Recently, we newly discovered long-term continuous records of lake freezing/breaking-up dates of Lake Juhsan in Northern Japan during 1705-1860, which were described in the official diaries of "Hirosaki" clan in Northern Japan during the Tokugawa Edo Period. Our previous studies for Lake Suwa freezing records indicate high correlations between the lake freezing dates and the winter temperatures, and we attempted to reconstruct winter temperatures in Japan since the mid-15th century (e.g., Mikami, 2008). Preliminary analysis for the 155-year time series of the freezing and breaking-up dates of Lake Juhsan since 1705 shows large year-to-year variations and long-term trends. Regarding the freezing dates, it was the earliest around 1740, and the latest around 1820s. As for the breaking-up dates, it was the earliest around 1720 and gradually became late until the 1830s. The duration of ice freezing on Lake Juhsan shows no clear trend for 155 years. These results are compared with our previous studies on the winter climate reconstruction based on Lake Suwa freezing records and daily weather records in old diaries since the 18th century.

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