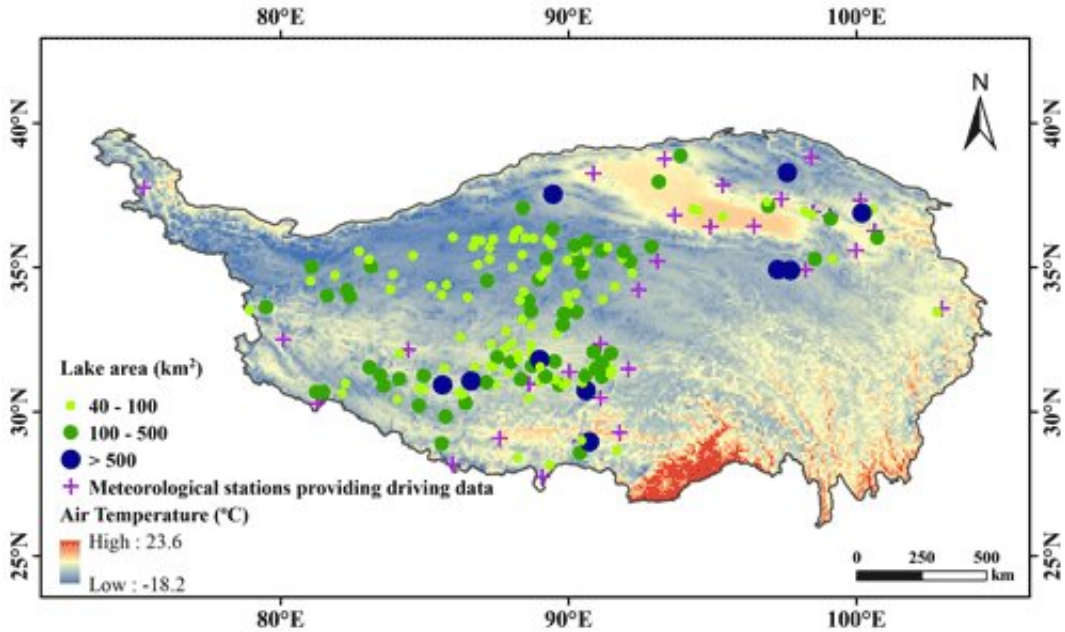
Rising daily surface temperatures of 160 lakes across Tibetan Plateau shown over 40 years

September 30 2022, by Li Yuan



Locations of studied lakes in the Tibetan Plateau. Credit: *Earth System Science Data* (2022). DOI: 10.5194/essd-14-3411-2022

The annual surface temperature of 160 lakes across the Tibetan Plateau has increased significantly in the period of 1978–2017, according to a study on large-scale dynamic monitoring and simulation of lake water temperature.

The study was conducted by researchers from the International Research Center of Big Data for Sustainable Development Goals and the Aerospace Information Research Institute (AIR), Chinese Academy of Sciences (CAS). It was published in *Earth System Science Data*.

The research team integrated remote sensing and numerical model to reconstruct the daily water surface temperature series of 160 lakes across the Tibetan Plateau from 1978 to 2017.

Lake water temperature is an important variable in regional water and energy balance and is also a key parameter for lake aquatic ecosystems. However, due to the limitation of conventional ground observations, there is lack of data of lake water temperature on the Tibetan Plateau.

The team took advantage of both remote sensing and numerical simulation technology, and developed a technical framework for reconstruction of lake surface water temperature series.

Aiming at the basic characteristics and data basis of lake water and heat balance in the Tibetan Plateau, the team improved a one-dimensional lake energy balance model. Then, the daily lake surface water temperature dataset of 160 lakes on the Tibetan Plateau during 1978 to 2017 was reconstructed.

Further validations showed that the product was in good agreement with the ground-measured lake surface temperature.

Based on the reconstructed time series of lake surface water temperature, the study found that in the past 40 years, the surface water was significantly warming in most lakes on the Tibetan Plateau, with an increasing rate ranging from 0.01 to 0.47°C per decade, and the increase trend was more evident in winter than in summer.

This data product has wide coverage, long time span and high time resolution, which can provide technical and data support for understanding the response of the lake energy balance to climate change on the Tibetan Plateau.

In addition, the technical framework developed in this study has high universality and portability. In the future, the framework can be used for monitoring water-related ecosystems, revealing the impact of changes in lake water temperature on lake water quality and aquatic biota, and providing basic data and decision-making basis for the regulation of lake water quality and aquatic biota.

The data is available on the National Tibetan Plateau Third Pole Environment Data Center.

More information: Linan Guo et al, An integrated dataset of daily lake surface water temperature over the Tibetan Plateau, *Earth System Science Data* (2022). DOI: 10.5194/essd-14-3411-2022

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