

Lake Surface Temperature Dynamics as Precursors to Glacial Lake Outburst Floods: A Case Study of Lake Merzbacher, Central Tianshan

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Contents of this file

Supplementary Figures S1-S2

Supplementary Table S1

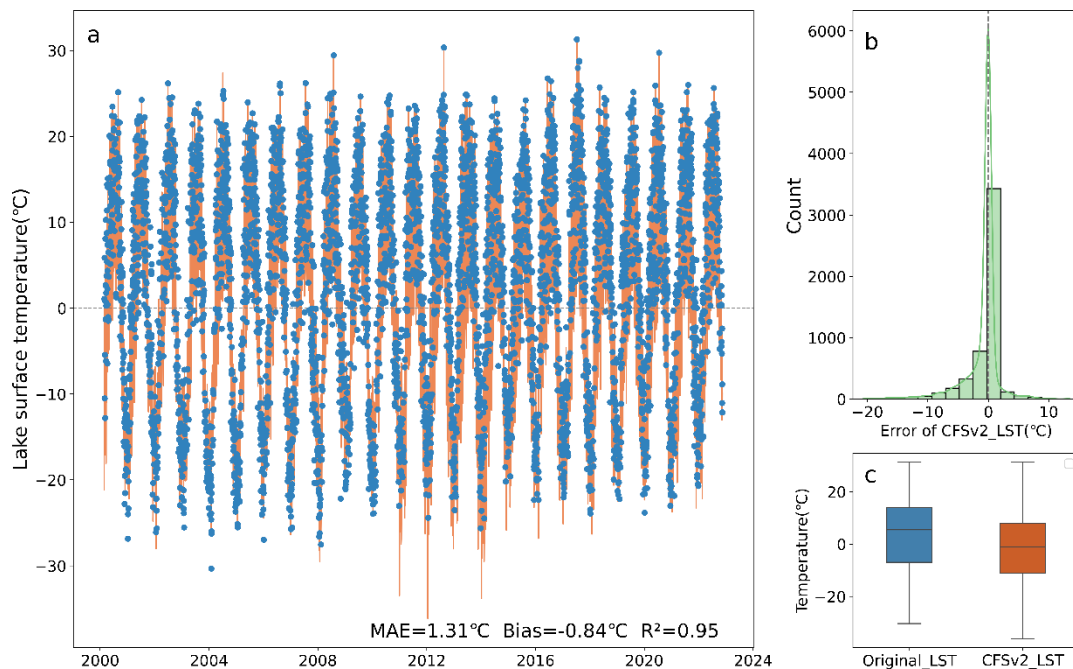
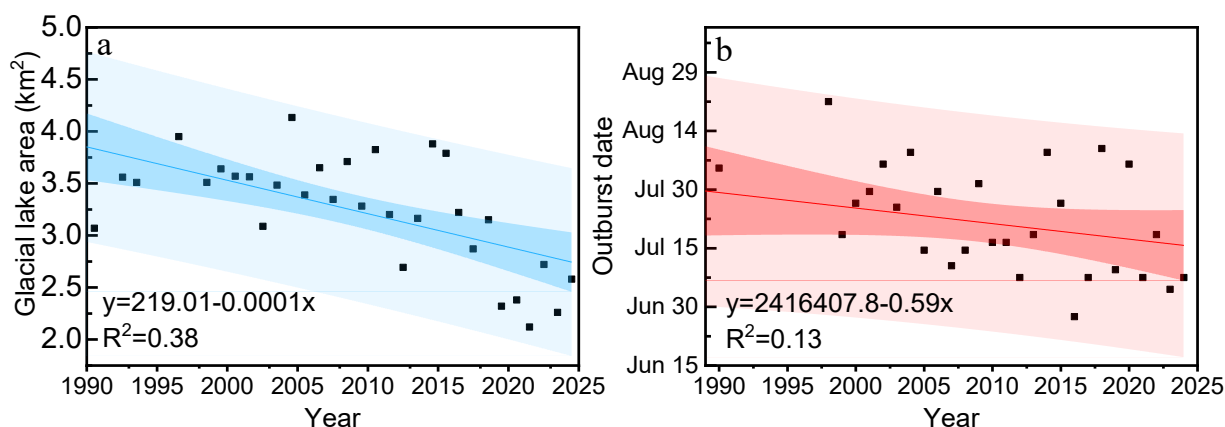


Figure S1. The relationship between the original LST (blue dot) and the filled LST (orange line) by CSFv2 model for the period 2000-2022 (a), error distribution of filled LST(CFSv2_LST) (b), and distribution tendency between original LST and filled

23 LST(c).

24 Figure S1b shows the distribution of errors between the filled data and the original
25 data. The errors are mainly concentrated in the range of -5°C to 5°C and show a normal
26 distribution trend, which indicates that the filling errors are small in most cases and
27 there is no significant systematic bias. To further evaluate the temperature distribution
28 characteristics of the filled data, box plots are used to compare the differences between
29 the original LST and the filled LST (Figure S1). The median of the filled data is
30 consistent with the original data, but the Interquartile Range (IQR) is relatively small,
31 indicating that the temperature variation range of the filled data is slightly smaller than
32 that of the original data. This may be due to the fact that filling methods tend to use
33 information from adjacent time steps when processing missing data, thus smoothing
34 out temperature changes to some extent. In addition, the extreme values of the filling
35 data (up and down) show some shrinkage, which may indicate that the filling model
36 has limited ability to capture abnormal temperature changes. Based on the above
37 analysis, the LST data of CFSv2 method in this study shows high accuracy and stability
38 on the whole. Its high R^2 value and low MAE prove the validity of the filling method
39 in the case of missing data, and it is suitable for the reconstruction of LST time series
40 in glacial lakes.

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43 Figure S2. Lake area changes before the outburst of Lake Merzbacher from 1990 to
44 2022 and the outburst dates of the glacial lake.

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46 Table S1. The outburst dates of Lake Merzbacher

No.	Year	Date	Source	No.	Year	Date	Source
1	2000	July, 27	(Li et al., 2020)	14	2011	July, 19	(Li et al., 2020)
2	2001	July, 31	(Li et al., 2020)	15	2012	July, 8	(Li et al., 2020)

3	2002	August, 1	(Li et al., 2020)	16	2013	July, 17	(Li et al., 2020)
4	2003	July, 22	(Li et al., 2020)	17	2014	August, 9	(Li et al., 2020)
5	2004	August, 9	(Li et al., 2020)	18	2015	July, 27	(Li et al., 2020)
6	2004	October, 13	(Liu et al., 2023)	19	2016	June, 28	This study
7	2005	July, 15	(Li et al., 2020)	20	2017	July, 8	This study
8	2006	July, 30	(Li et al., 2020)	21	2018	August, 10	This study
9	2007	July, 11	(Li et al., 2020)	22	2019	July, 10	This study
10	2008	July, 15	(Li et al., 2020)	23	2020	August, 6	This study
11	2009	August, 1	(Li et al., 2020)	24	2021	July, 8	This study
12	2010	July, 17	(Li et al., 2020)	25	2022	July, 20	This study
13	2010	October, 12	(Liu et al., 2023)				

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48 **References**

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50 in the Tianshan Mountains during 1998-2017. *Journal of Glaciology and*
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54