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## Historic changes and future projections of surface water temperature in Lake Titicaca

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Lake Surface Water Temperature (LSWT) plays a crucial role in aquatic ecosystems, influencing lake physical and biogeochemical processes. LSWT serves as a critical measure of the effects of climate change on lakes. Therefore, analysing LSWT variability is vital for understanding lake response to a warming climate. Lake Titicaca, the largest lake in South America and one of the highest lakes in the world, served as an important water resource in Peru-Bolivia. However, Lake Titicaca is also affected by climate change and anthropogenic activities. In this study, we investigate the historical and future change in LSWT of Lake Titicaca at different timescales (diel, seasonal, and annual). This research used the Global Lake Surface water Temperature (GLAST) dataset for the historical period of 1981-2020 and the future projected period of 2021-2099 for LSWT of Lake Titicaca. Model projections were validated with LSWT from the ESA CCI Lakes dataset (2000-2020). The results showed that (1) LSWT has an increasing trend of  $+0.16 \text{ K decade}^{-1}$  annually and of  $+0.01 \text{ K decade}^{-1}$  in diel range from 1981 to 2020, (2) LSWT is expected to warm at a rate of 1-4 K under future climate change scenarios. This finding gives an insight into LSWT and diel temperature range in Lake Titicaca, and LSWT changes in historical and future under climate change. This study could be beneficial for water resource managers and decision-makers to adapt and mitigate the climate change impacts.