The Mongolian Plateau is characterized by cold and arid winters with very little precipitation (snowfall), strong solar insolation, and dry air. But little is known about the thermal regimes of ice and ice-covered lakes and their response to the distinct weather and climate in this region. In a typical large, shallow lake, ice and ~~/~~snow processes(cover) and under-ice thermodynamics were monitored for four winters in 2015–2019. Heat transfer at the ice-water interface and the lake heat budget were investigated. The results revealed that persistent bare ice of 35–50 cm thickness ~~permits~~ transmits 20–35% of incident solar radiation ~~to get transmitted~~ into the ~~under-ice~~ water below. This~~,~~ ~~providing the~~ is a source ~~for~~ of under-ice energy flows and causes~~ing~~/maintains~~ing~~ high water temperature (up to 6–8°C) and high heat flux from water to ice (averages of 20–45 W m^{-2}) in mid-winter, as well as ~~along with~~ higher heat conduction in the ice interior during freezing. The heat balance shows that the transmitted radiation and the heat flux from water to ice are the dominant and highly correlated heat flows in the lake. Both bulk water temperature and temperature structure are sensitive to solar transmittance and occasional snow events. Under-ice convective mixing does not necessarily occur because of stratification of salinity in the water body. ~~Especially~~In particular, salt exclusion ~~in~~ during freezing changes both the bulk salinity and the salinity profile, which ~~that~~ plays a major role in the stability and mixing of the water column in this shallow lake.