

The freeze-thaw cycle and key parameters in a Tibetan Plateau lake using LAKE2.0 model and field observation

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Few studies have paid attention to the freeze-thaw process of Tibetan Plateau (TP) lakes and key control parameters. By combining 216 simulation experiments using a LAKE2.0 model with the observation, we evaluated the effects of ice and snow albedo, ice and water extinction coefficients on the lake ice phenology, water temperature, sensible and latent heat fluxes in Ngoring Lake. The increase of ice albedo, snow albedo and the ice extinction coefficient (K_{di}) induce significant decrease in water temperature. Compared with the latent heat, the sensible heat flux is more sensitive to these three parameters. With the decrease in high K_{di} , the ice thickness, water temperature and frozen days present an extensive increase. If K_{di} less than 2.5 m^{-1} , the increase of ice thickness is no longer obvious. In the frozen period with little snow, the K_{di} exhibit little influence on frozen days. The frozen days is significantly affected by the snow albedo and changes fastest in the snow albedo from 0.5 to 0.75.

Keywords: lake ice, snow, albedo, extinction coefficient