



An Investigation of Lake Surface Albedo during Frozen Period and Its Influence on the High-Altitude Lakes of the Tibetan Plateau

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Most high-altitude lakes are more sensitive to global warming than the regional atmosphere. However, most existing climate models produce unrealistic surface temperatures on the Tibetan Plateau (TP) lakes, and few studies have focused on the influence of ice surface albedo on high-altitude lakes. Based on field albedo measurements, moderate resolution imaging spectrometer (MODIS) albedo products and numerical simulation, this study evaluates the ice albedo parameterization schemes in existing lake models and investigates the characteristics of the ice surface albedo in six typical TP lakes, as well as the influence of ice albedo error in the FLake model. Compared with observations, several ice albedo schemes all clearly overestimate the lake ice albedo by 0.26 to 0.66, while the average bias of MODIS albedo products is only 0.07. The MODIS-observed albedo of a snow-covered lake varies with the snow proportion, and the lake surface albedo in a snow-free state is approximately 0.15 during the frozen period. And the lake surface albedos in February and March are varies with different lakes and different time period. The simulated lake surface temperature, latent heat flux and sensible heat flux are sensitive to variations in lake ice albedo especially in the spring and winter.