Numerical simulation of the climate effect of high-altitude lakes on the Tibetan Plateau

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In this study, the Weather Research and Forecasting Model (WRF v. 3.6.1) is employed to conduct three numerical experiments in the Ngoring Lake Basin (the original experiment, an experiment with a tuned model, and a no-lake experiment) to investigate the influences of parameter optimization on the lake simulation and of the high-altitude lake on the regional climate. After the lake depth, the roughness lengths, and initial surface temperature are corrected in the model, the simulation of the air temperature is distinctly improved. In the experiment using a tuned model, the simulated sensible-heat flux (H) is clearly improved, especially during periods of ice melting (from late spring to early summer) and freezing (late fall). The improvement of latent-heat flux (LE) is mainly manifested by the sharp increase in the correlation coefficient between simulation and observation, whereas the improvement in the average value is small.After the lakes are removed, the air temperature increases significantly from June to September over the area corresponding to the two lakes, and an abnormal convergence field appears; at the same time, the precipitation clearly increases over the two lakes and surrounding areas.

Keywords: Lake-surface temperature, roughness length, turbulent flux

