



Using a one-dimensional lake model coupled to a regional climate model to improve the surface energy balance over large water bodies

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Lakes have a significant influence on the surrounding regional climate through the exchange of surface energy fluxes. As large bodies of water they supply an unlimited amount of moisture to the atmosphere, or, when ice is present, inhibit the exchange of heat and moisture. These modifications to the surface energy balance can induce feedback mechanisms and modify the regional climate. Thus, it is important to accurately represent the interaction between the atmosphere and lakes in regional climate models.

We present results from simulations performed over lake areas using the regional climate model, RegCM4, coupled to the Hostetler one-dimensional lake model. In the lake model, energy is transferred between vertical model layers by eddy and molecular diffusion and by convective mixing. The model is able to simulate the effects of lake ice and snow over ice on the surface energy balance which is an important factor in many mid-to-high latitude lakes. Lake surface temperatures and ice cover are validated using the ARCLake global observations which are derived from the series of Advanced Along Track Scanning Radiometers (AATSR).