



An evaluation of the surface radiation budget over North America for a suite of regional climate models and ECMWF reanalysis

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Longwave downward radiation, emitted by the atmosphere, and shortwave global (direct plus diffuse) radiation are very important parameters in climate models. The two radiation components are the main terms in the surface energy balance that control the evolution of surface temperature and moisture. Systematic biases in the representation of the surface radiation budget can lead to severe errors in a number of key near surface climate variables (e.g. soil moisture, snow cover and sea-ice amounts). The surface radiation budgets of three RCMs (Regional Climate Models) are compared to direct observations. Furthermore, we evaluate the accuracy of the ECMWF reanalysis surface radiation values against the same observations.

The models used in this study are: CRCM (The Canadian Regional Climate Model), GEM-LAM (Regional version of Global Environmental Multiscale Model, Canada) and RCA3 (Regional model of Rossby Centre, Sweden). The observations are derived from six different measurement sites within the SURFRAD (Surface Radiation Budget) network, coordinated by NOAA. These sites represent a cross-section of various climate types over North America.

In this work, a comparison of the mean seasonal and diurnal cycles of surface radiation between three RCMs, reanalyses and observations is presented. We present results for total sky conditions as well as overcast and clear sky conditions separately. We further present an analysis of the impact of varying cloud cover on the simulated and observed surface radiation budget.