

Impact of Improved Narrow-to-Broadband Transformations and Anisotropic Corrections on Satellite Estimates of Radiative Fluxes

Xiaolei Niu, Rachel T. Pinker

Department of Atmospheric and Oceanic Science
University of Maryland
College Park, MD

Abstract:

Newly available information from multiple satellite sources makes it timely to revisit current methodologies for estimating shortwave radiation budgets. Two critical elements in the formulation of an inference scheme for radiative flux estimates from satellite observations are: 1) transformation from narrow-band observations into broadband values (n/b); b) application of Angular Distribution Models (ADMs) to correct for angular anisotropy. To keep up with the standards of the meso-scale modeling community of land-atmosphere interactions, there is also a need to update land use models in the satellite inference schemes. In this study utilized will be new information on land use to update n/b transformations, and new ADMs will be applied to improve an existing inference scheme to derive radiative fluxes at the surface and at the Top of the Atmosphere. The n/b transformations are based on theoretical simulations with a radiative transfer model (MODTRAN-3.7) for the IGBP land use classifications. The new ADMs are a combination of MODTRAN-3.7 simulations and the Clouds and the Earth's Radiant Energy System (CERES) observed ADMs. To evaluate possible improvements in derived fluxes, the modifications are implemented in the University of Maryland Surface Radiation Budget Model (UMD/SRB) as driven with GOES and METEOSAT observations. The newly derived surface radiative fluxes show improvements when compared to ground observations and CERES TOA observations.

Corresponding author: Xiaolei Niu

Xiaolei Niu

Mailing address: 4363 CSS Building, University of Maryland, College Park, MD, 20742

Email: xiaolei@atmos.umd.edu

Rachel T. Pinker

Mailing address: 2427 CSS Building, University of Maryland, College Park, MD, 20742

Email: pinker@atmos.umd.edu