Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

AAS01-06 会場:301B 時間:5 月 27 日 16:45-17:15

Computation of surface irradiances using satellite observations

Computation of surface irradiances using satellite observations

KATO, Seiji[1*] ; LOEB, Norman[1] ; ROSE, Fred[2] ; RUTAN, David[2] ; DOELLING, David[1] ; RADKEVICH, Alexander[2] ; HAM, Seung-hee[2]
KATO, Seiji[1*] ; LOEB, Norman[1] ; ROSE, Fred[2] ; RUTAN, David[2] ; DOELLING, David[1] ; RADKEVICH, Alexander[2] ; HAM, Seung-hee[2]

[1]NASA Langley Research Center, [2]Science System & Applications Inc.
[1]NASA Langley Research Center, [2]Science System & Applications Inc.

Understanding the surface radiation budget is important for several reasons. At the global and large temporal scales, it should balance with the sum of surface latent and sensible heat fluxes and ocean heating. At regional scales, it is an indispensable boundary condition for ocean or snow models or any other models that need energy input to the surface. NASA's Clouds and the Earth's Radiant Energy System (CERES) project provides surface irradiance data products for a range of temporal and spatial scales computed using a radiative transfer model initialized using satellite-derived cloud and aerosol properties. Other inputs to the radiative transfer model include temperature and humidity profiles from NASA Global Modeling and Assimilation Office's (GMAO) reanalysis. The CERES team uses more than 80 surface observation sites located over land and ocean to evaluate computed irradiances. When computed monthly 1degree by 1 degree gridded mean downward irradiances are compared with 10 years of observed irradiances, the bias averaged over all land and ocean sites are, respectively, -1.7 Wm^{-2} and 4.7 Wm^{-2} for shortwave and -1.0 Wm^{-2} and -2.0 Wm^{-2} for longwave. The shortwave agreement is significantly better than other satellite-based surface irradiance products. One of reasons for the better agreement is careful treatment of diurnal cycle of clouds by merging 3-hourly geostationary satellite-derived cloud properties. In addition, computed surface irradiance variability shows a remarkable agreement with observed variability. However, these data sets have their shortcomings. The uncertainty in nighttime surface longwave irradiance over polar regions is larger than that of other regions primarily due to the difficulty of cloud detection and large uncertainties in skin temperature and near-surface temperature and humidity. The large uncertainty in polar region surface irradiances hampers, for example, investigation of surface radiation budget changes in response to changes in sea ice extent. In this presentation, we present an evaluation of the current CERES products and discuss ways these products can be improved in the future.

キーワード: surface radiation budget, climate data record
Keywords: surface radiation budget, climate data record