

The Scientific Utility of GMD Surface Radiation Measurements

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The Earth system receives virtually all of its energy from the sun. Of the solar energy that reaches Earth orbit, about 30% is reflected away. Of the remaining absorbed energy, about 70% is absorbed at the surface and then balanced by net terrestrial infrared radiation and latent and sensible heat exchange. Thus the surface radiative energy budget is a fundamental energy driver of the earth-atmosphere-ocean system. These fundamental measurements made by the G-Rad group at various locations are used in many ways by the science community. A large contribution of ESRL/GMD Global Radiation (G-Rad) measurements has been the validation of satellite algorithms that attempt to estimate surface irradiance and the surface radiation budget. G-Rad measurements played an important role in NASA Earth Observing System and GOES validation, and algorithm development for GOES-R. This talk will present several examples of such use, including investigations of trends, cloud radiative effects, constraining global models for global energy budget estimations, and testing and development of models.

Hour average surface obs. versus the new CERES SYN 1-deg. product using the 7 U.S. SURFRAD sites (2003 – 2014)

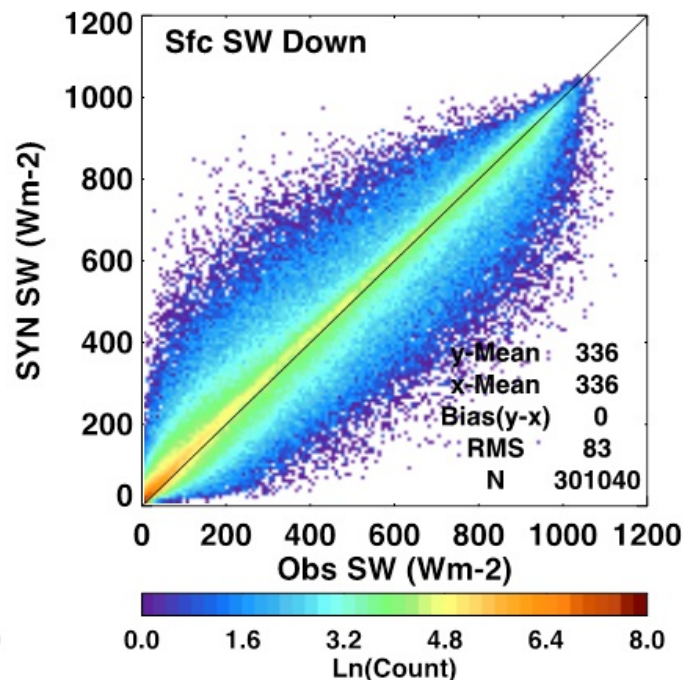


Figure 1. The SURFRAD sites have been used by many as ground truth in testing satellite retrievals and model calculations of surface radiation. This example shows a comparison between SURFRAD observed surface downwelling shortwave and CERES satellite-based retrievals from 2003 through 2014.