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Comparisons of Radiative Flux Distributions from Satellite Observations and Global Models

Ehrhard Raschke (1,2), Stefan Kinne (1), Martin Wild (3), Paul Stackhouse (4), and Bill Rossow (5)

(1) Max-Planck-Institute, Aerosol and Climate, Hamburg, Germany (stefan.kinne@zmaw.de, 0049 40 41173 298), (2) Univeritaet Hamburg (Ehrhard.Raschke.zmaw.de), (3) Institute for Atmospheric and Climate Science ETH Zurich (martin.wild@env.ethz.ch), (4) NASA Langley Research Center (Paul.W.Stackhouse@NASA.gov), (5) CREST at The City College of New York (wbrossow@ccny.cuny.edu)

Radiative flux distributions at the top of the atmosphere (TOA) and at the surface are compared between typical data from satellite observations and from global modeling. Averages of CERES, ISCCP and SRB data-products (for the same 4-year period) represent satellite observations. Central values of IPCC-4AR output (over a 12-year period) represent global modeling. At TOA, differences are dominated by differences for cloud-effects, which are extracted from the differences between all-sky and clear-sky radiative flux products. As satellite data are considered as TOA reference, these differences document the poor representation of clouds in global modeling, especially for low altitude clouds over oceans. At the surface the differences, caused by the different cloud treatment are overlaid by a general offset. Satellite products suggest a ca 15Wm-2 stronger surface net-imbalance (and with it stronger precipitation). Since surface products of satellite and modeling are based on simulations and many assumptions, this difference has remained an open issue. BSRN surface monitoring is too short and too sparsely distributed for clear answers to provide a reliable basis for validation.