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Developing Consistent Earth System Data Records for the Global Terrestrial Water Cycle: Focus on Shortwave and Longwave Radiative Fluxes

R. T. Pinker, Y. Ma, and E. A. Nussbaumer

University of Maryland, Dept. of Atmospheric and Oceanic Science, College Park, MD 20742, United States (pinker@atmos.umd.edu)

The overall goal of the MEaSUREs activity titled: "Developing Consistent Earth System Data Records for the Global Terrestrial Water Cycle" is to develop consistent, long-term Earth System Data Records (ESDRs) for the major components of the terrestrial water cycle at a climatic time scale. The shortwave (SW) and longwave (LW) radiative fluxes at the Earth's surface determine the exchange of energy between the land and the atmosphere are the focus of this presentation. During the last two decades, significant progress has been made in assessing the Earth Radiation Balance from satellite observations. Yet, satellite based estimates differ from each other and long term satellite observations at global scale are not readily available. There is a need to utilize existing records of satellite observations and to improve currently available estimates. This paper reports on improvements introduced to an existing methodology to estimate shortwave (SW) radiative fluxes within the atmospheric system, on the development of a new inference scheme for deriving LW fluxes, the implementation of the approach with the ISCCP DX observations and improved atmospheric inputs for the period of 1983-2007, evaluation against ground observations, and comparison with independent satellite methods and numerical models. The resulting ESDRs from the entire MEaSUREs Project are intended to provide a consistent basis for estimating the mean state and variability of the land surface water cycle at a spatial scale relevant to major global river basins.

MEaSUREs Project "Developing Consistent Earth System Data Records for the Global Terrestrial Water Cycle" Team Members: E. F. Wood (PI)1, T. J Bohn2, J. L Bytheway3, X. Feng4, H. Gao2, P. R.Houser4 (CO-I), C. D Kummerow3 (CO-I), D. P Lettenmaier2 (CO-I), C. Li5, Y. Ma5, R. F MacCracken4, M. Pan1, R. T Pinker5 (CO-I), A. K. Sahoo1, J. Sheffield1
1. Dept of CEE, Princeton University, Princeton, NJ, USA.
2. Dept of CEE, University of Washington, Seattle, WA, USA.
3. Dept of Atmospheric Science, Fort Collins, CO, USA.
4. Dept of Geography and GeoInformation Scie., George Mason University,
Fairfax, VA, USA.
5. Dept of Meteorology, University of Maryland, College Park, MD, USA.