



The CERES Surface EBAF Product

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The CERES project has developed a level 4, Surface Energy Balanced and Filled (Surface EBAF) product. The product contains global one-degree monthly mean top-of-atmosphere (TOA) and surface broadband shortwave and longwave fluxes. The product is based upon 10 years (Mar2000-Feb2010) of TOA broadband flux observations by CERES instruments aboard NASA's TERRA and AQUA satellites. CERES longwave (shortwave) fluxes have a 1% (2%) uncertainty. Level 3 CERES products have a TOA net imbalance; therefore the EBAF fluxes have a bias removal applied to force agreement with global ocean heat storage estimates made using ARGO (Loeb et al. 2012). The surface fluxes have been adjusted to remove biases consistent with recent measurements including active sensor measurement of cloud base, GEOS4 (Bloom et al 2005) upper troposphere humidity biases seen by AIRS retrievals and biases revealed by surface flux measurements. The adjustment of surface fluxes assumes uncertainty in physical variables such as cloud fraction, optical depth and height, skin temperature, precipitable water, surface albedo. Monthly mean TOA and surface flux Jacobians are computed. A constraint algorithm is applied to adjust the known flux biases while minimizing adjustment of physical variables. Preliminary ten year global mean total-sky results give TOA NET SW flux of 240 Wm^{-2} and a TOA NET LW flux of -240 Wm^{-2} with a SURFACE NET SW flux of 163 Wm^{-2} and a SURFACE LW NET of -55 Wm^{-2} . A clear-sky Surface EBAF product is also produced with partly cloudy TOA CERES data filled using MODIS clear-sky narrowband radiances to which a narrowband to broadband conversion has been applied.