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Title: Recent Spatial and Temporal Anomalies and Trends of OLR as Observed by CERES and Computed Based on AIRS Retrievals

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Abstract:

We show that a recent CERES-observed negative trend in OLR of ~ -0.1 W/m²/yr averaged over the globe, for the time period of September 2002 through February 2010 used in this study, is found in the AIRS OLR data as well. Most importantly, even minute details (down to 1 x 1 Degree GCM-scale resolution) of spatial and temporal anomalies and trends of OLR as observed by CERES and computed based on AIRS-retrieved surface and atmospheric geophysical parameters over this time period are essentially the same. We see this correspondance even in the very large spatial variations of these trends with local values ranging from -2.6 W/m²/yr to $+3.0$ W/m²/yr in the tropics. This essentially perfect agreement of OLR anomalies and even local trends derived from observations by two different instruments, in totally independent and different manners, implies that both sets of results must be highly accurate; and indirectly validates the anomalies and trends of other AIRS derived products as well. These products show that global and regional anomalies and trends of OLR, water vapor and cloud cover over the last 7+ years are strongly influenced by El-Niño-La Niña cycles . We use the anomalies and trends of AIRS derived products to explain why the global OLR has a large negative trend over this time period; Global and tropical OLR began to decrease significantly at the onset of a strong La Niña in mid-2007. AIRS products show that cloudiness and mid-tropospheric water vapor began to increase in the tropics at roughly the same time, especially in the region 5°N - 20°S latitude extending eastward from 150°W to 30°E longitude, with a corresponding very large drop in OLR in this region. Late 2009 is characterized by a strong El-Niño, with a corresponding change in sign of observed tropical water vapor, cloud cover, and OLR anomalies. If one excludes the area 5°N – 20°S, 150°W – 30°E from the statistics, area mean OLR trends over the rest of the globe are substantially reduced over the time period under study.