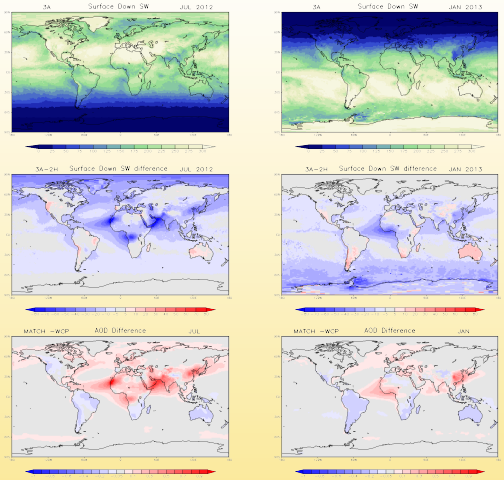
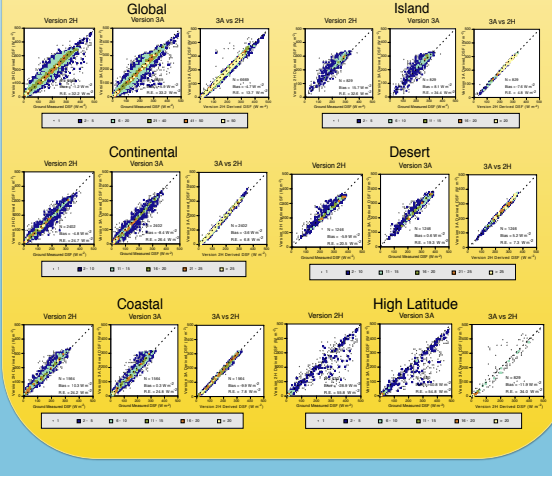
Evaluating Surface Flux Results from FLASHFlux Version 3A

Anne C. Wilber[1], David P. Kratz[2], Paul W. Stackhouse, Jr.[2], Shashi K. Gupta[1], and Parnchai K. Sawaengphokhai[1]
[1]Science Systems and Applications, Inc., Hampton, Virginia
[2]NASA Langley Research Center, Hampton, Virginia

Downward Shortwave Flux



Comparison to Ground Measurements

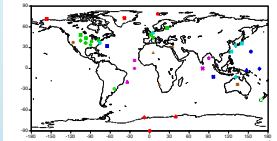


Introduction :

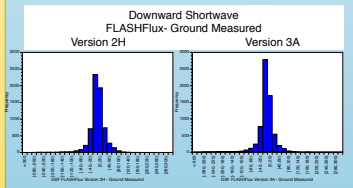
The Fast Longwave and Shortwave Radiative Flux (FLASHFlux) data product was developed to provide a rapid release version of the Clouds and Earth's Radiant Energy System (CERES) results, which could be made available to the research and applications communities within one week of the satellite observations by exchanging some accuracy for speed of processing. Unlike standard CERES products, FLASHFlux does not maintain a long-term consistent dataset. Therefore the latest changes in algorithms and input data can be incorporated into processing. FLASHFlux transitioned from Version 2H to Version 3A in January 2013 changing to the latest meteorological product from Global Modeling and Assimilation Office (GMAO), GEOS FP-IT (5.9.1), latest spectral response functions and gains for the CERES instruments, and aerosol climatology based on the latest MATCH data. Some algorithm changes were made in the cloud transmission coefficient and Rayleigh attenuation for the shortwave flux computation. Typically FLASHFlux does not reprocess when a new version is released. However, in order to investigate the effects of the changes in algorithms and input data, nine months (201207 – 201303) were processed with both Version2H and Version3A. The Time Interpolated Space Averaged (TISA) surface flux results from these overlap months have been compared to the ground-based measurements. The effects of the changes on the calculated surface fluxes were evaluated.

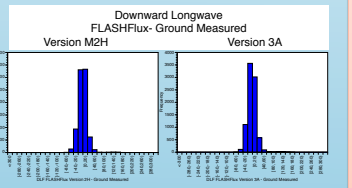
Summary of Changes Between Version 2H and Version 3A		
	Version 2H	Version 3A
Spectral Correction Coefficients	CERES Ed2	CERES Ed3
Solar Constant	1365 W m^{-2}	1361 W m^{-2}
Aerosols	WCP-55	MATCH Climatology
Rayleigh Scattering	Original LPSA	New based on Bodhaine et al. (1999)
Meteorology	GEOS-5.2.0	GEOS 5.9.1 (FP-IT)
Temperature Inversions	No special treatment	Improved Algorithm
Cloud Transmission Coefficient	0.80	0.75

Locations of Ground Measurement Sites



Sites Color-coded by Type
Surface Measurements from http://www-cave.larc.nasa.gov/





Conclusions:

Shortwave : : Replacing the WCP-55 aerosol properties in the SW algorithm with monthly climatological properties based on **10**-year monthly averages of MATCH aerosol optical depths made considerable difference in the resulting fluxes. Though the comparison with the ground measurements shows little improvement, the use of the more up-to-date optical depths correspond to an improvement in the ground measurement/FLASHFlux difference histograms shown above. For further improvement in the SW model, it is planned to use near real time aerosols in place of the climatology. Also, work continues on the cloud transmission algorithm.

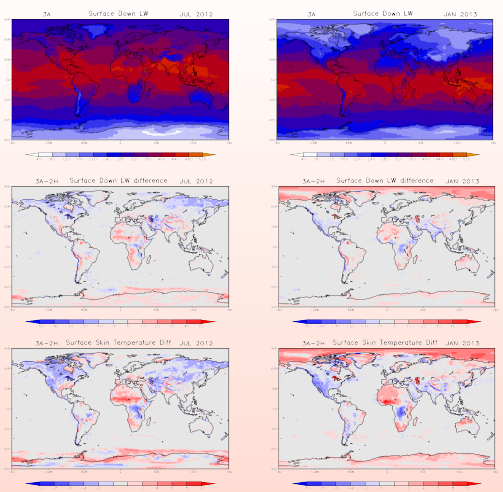
Longwave: The use of the new GEOS 5.9.1 meteorology with change in the lower atmospheric temperature, humidity and skin temperature made the largest difference in the surface LW results. FLASHFlux LW fluxes overall showed a slightly larger bias but a slightly improved RMSE. The most improved surface types were the the Island and Desert sites.

Continued assessment of the FLASHFlux data products is on-going. The TOA flux products are being successfully used to evaluate radiative flux variability for the annual "State of Climate" report published annually in BAMS (see poster 147). Year-to-year regional changes in the surface fluxes over oceans have also been used to assess changes in ocean energy fluxes for the same annual report. The data products are available through the "HDF" portion of the CERES ordering page or more directly through the FLASHFlux homepage: http://flashflux.larc.nasa.gov.

Acknowledgements:

The CERES FLASHFlux data products are part of the CERES production system and we acknowledge the CERES working groups at LaRC for their role in providing algorithms and the Atmospheric Science Data Center (ASDC) for their role in providing mechanisms to archive and distribute the data products.

Downward Longwave Flux



Comparison to Ground Measurements