A31C-0052

Evaluating Surface Flux Results from CERES-FLASHFlux

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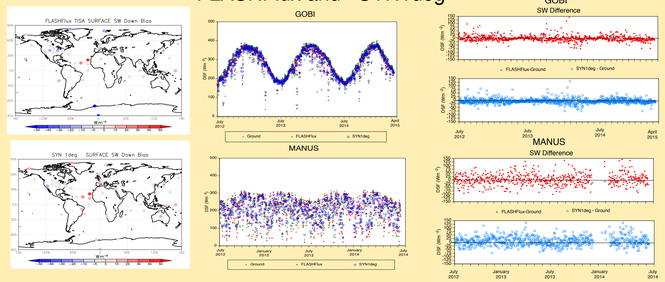
Downward Shortwave Flux

Comparison of Daily Mean Fluxes
201207-201504
FLASHFlux and SYN1deg



The maps show the variation of the bias of the daily modeled fluxes from the ground measurements at the 51 sites. The comparison of the modeled to measured fluxes at the Gobi Desert and the Manus Island sites shows good correlation to the measurements. Manus represents perhaps the most extreme variability of any site. At this island site the correlation coefficient is only 0.7 and at the Gobi Desert it is 0.9.

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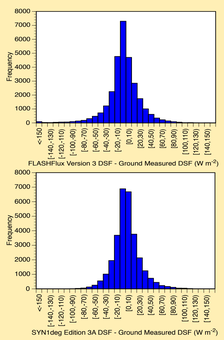
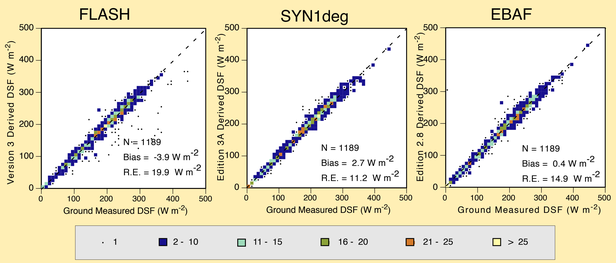


Comparison of Daily Shortwave Fluxes from FLASHFlux and SYN1deg to Ground Measurements

Surface Type	FLASHFlux N	FLASHFlux Mean (Wm-2)	FLASHFlux Bias (Wm-2)	FLASHFlux Random Error (Wm-2)	SYN 1deg N	SYN 1deg Mean (Wm-2)	SYN 1deg Bias (Wm-2)	SYN 1deg Random Error (Wm-2)
Ocean Buoys	4871	200	6.4	28.0	5396	204.2	3.5	23.1
Coastal	8914	152.9	-1.9	24.2	9167	157.1	2.0	22.1
Island	2733	219.4	4.6	30.9	2680	217.4	5.8	25.9
Desert	4207	257.6	-3.0	19.8	4247	257.4	-2.6	21.7
High Latitude	2527	186.5	-38.7	54.0	2833	167.4	1.9	27.0
Continental	12246	167.5	-4.2	27.5	12342	170.4	3.5	23.2
Ensemble	35498	184.8	-3.8	31.6	36665	183.8	2.6	23.9

Comparison of Monthly Mean Fluxes
201207-201502
FLASHFlux, SYN1deg and EBAF

Ensemble



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 record. Therefore the latest algorithm changes and input data can be incorporated into processing. FLASHFlux released Version3A (January 2013) and Version 3B (August 2014) which include the latest meteorological product from Global Modeling and Assimilation Office (GMAO), GEOS FP-IT (5.9.1), the latest spectral response functions and gains for the CERES instruments, and aerosol climatology based on the latest MATCH data. Version 3B included a slightly updated calibration and some changes to the surface albedo over snow/ice. Typically FLASHFlux does not reprocess earlier versions when a new version is released. The combined record of Time Interpolated Space Averaged (TISA) surface flux results from Versions3A and 3B for July 2012 to October 2015 have been compared to the ground-based measurements. The FLASHFlux results are also compared to two other CERES gridded products, SYN1deg and EBAF surface fluxes.

CERES SYN1deg: This data product The SYN1deg combines Terra and Aqua CERES and 3-hourly geostationary (GEO) data to produce 3-hourly TOA, in-atmosphere and surface fluxes based on a radiative transfer model. The use of GEO data enables the model to more accurately represent the diurnal variability between the CERES measurement times. For this study the daily averaged surface fluxes were used.

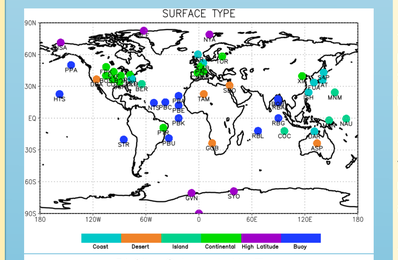
CERES EBAF and Surface-EBAF: The CERES Energy Balanced and Filled (EBAF) product also integrates the GEO observations with CERES and provides Top-of-Atmosphere fluxes. Global net flux is constrained to the ocean heat storage term. EBAF-surface product provides monthly mean LW and SW fluxes that are consistent with the TOA EBAF. For this study, monthly mean FLASHFlux and SYN1deg were compared with the surface measurements. EBAF is currently available through May 2015.

Comparison of Monthly Mean Shortwave Fluxes from FLASHFlux, SYN1deg and EBAF to Ground Measurements

Surface Type	N	Mean (Wm-2)	FLASHFlux Bias (Wm-2)	FLASHFlux Random Error (Wm-2)	SYN 1deg Bias (Wm-2)	SYN 1deg Random Error (Wm-2)	EBAF Bias (Wm-2)	EBAF Random Error (Wm-2)
Ocean Buoys	176	202.8	6.0	12.6	4.2	12.2	-6.6	15.3
Coastal	284	154.3	-1.9	8.4	2.0	8.3	-1.0	9.6
Island	97	215.4	5.6	11.6	7.0	10.9	4.5	8.7
Desert	133	256.9	-2.8	7.8	-2.1	13.6	-2.6	12.2
High Latitude	108	147.1	-35.0	37.5	1.3	15.5	0.5	16.1
Continental	391	167.9	-4.5	12.2	3.5	9.3	-1.5	9.3
Ensemble	1189	181.7	-3.9	19.9	2.7	11.2	0.4	14.9

Comparison of Monthly Mean Longwave Fluxes from FLASHFlux, SYN1deg and EBAF to Ground Measurements

Surface Type	N	Mean (Wm-2)	FLASHFlux Bias (Wm-2)	FLASHFlux Random Error (Wm-2)	SYN 1deg Bias (Wm-2)	SYN 1deg Random Error (Wm-2)	EBAF Bias (Wm-2)	EBAF Random Error (Wm-2)
Ocean Buoys	144	381.7	-6.5	6.0	-4.4	4.9	-2.2	5.4
Coastal	284	347.2	-3.3	11.7	-4.0	11.7	0.7	3.8
Island	96	409.4	6.3	11.6	3.0	3.3	-0.2	9.0
Desert	133	331.3	-4.5	8.9	-5.3	10.9	-1.2	10.0
High Latitude	135	198.3	0.8	10.3	3.7	7.6	5.4	8.7
Continental	391	319.3	-8.3	9.4	-6.2	11.6	-4.0	11.4
Ensemble	1183	329.0	-3.8	11.5	-3.0	9.6	-0.6	11.1



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

Conclusions:

- FLASHFlux results compare very well to to the ground measurement of daily and monthly mean Longwave and Shortwave Surface Fluxes within ± 5 Wm-2 for everywhere except in polar areas.
- FLASHFlux biases and random errors are generally larger than those from climate quality datasets, i.e. SYN1-deg and EBAF, but useful for numerous scientific (see A31C-0051, this session), applied science and educational uses.
- Improvements of the FLASHFlux surface models continue to be made. A new cloud transmission algorithm is under development for improving SW flux computation.

The FLASHFlux 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: This work was funded by the NASA CERES Project, Norman Loeb PI. Data were obtained from the NASA Langley Research Center Atmospheric Science Data Center. Thanks go to John Kusterer, Tonya Davenport, Don Land and Fenny Wang for data production.

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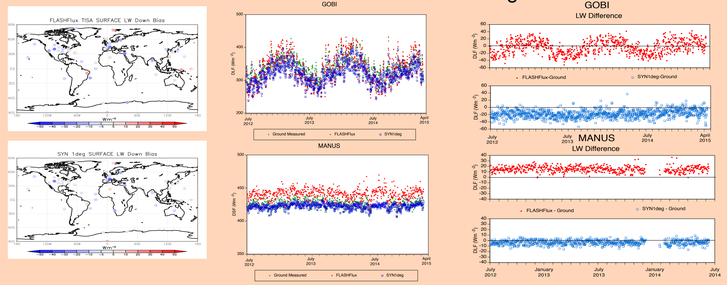
FLASHFlux SYN1deg

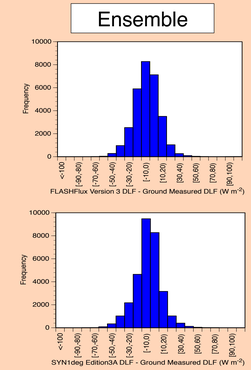


The maps show the variation of the bias of the daily mean modeled fluxes from the Longwave ground measurements at the 51 sites. The comparison of the modeled to measured fluxes at the Gobi Desert site show good agreement with the ground measured and a strong annual cycle. There is a small bias of SYN1deg results from the measured. There is an annual cycle evident in the FLASHFlux difference. There is very little variation in the annual Longwave Flux at the tropical island Manus. Both models show a modest bias. FLASHFlux has a slightly larger positive bias.

Comparison of Daily Longwave Fluxes from FLASHFlux and SYN1deg to Ground Measurements

Surface Type	FLASHFlux N	FLASHFlux Mean (Wm-2)	FLASHFlux Bias (Wm-2)	FLASHFlux Random Error (Wm-2)	SYN 1deg N	SYN 1deg Mean (Wm-2)	SYN 1deg Bias (Wm-2)	SYN 1deg Random Error (Wm-2)
Ocean Buoys	4193	381.7	-6.3	10.8	4702	382.2	-4.4	9.3
Coastal	8951	345.4	-1.7	12.4	9192	345.6	0.4	11.4
Island	2612	411.2	4.6	9.7	2707	411.3	-2.9	5.6
Desert	4145	330.8	-4.3	13.6	4218	330.7	-5.2	14.4
High Latitude	3598	196.36	0.8	16.8	4011	197.0	4.0	17.7
Continental	13425	320.5	-6.2	16.3	13696	320.4	-4.3	17.2
Ensemble	38526	328.6	-2.3	31.6	38526	328.6	-2.3	14.9

Ensemble



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