GERB data: average monthly diurnal cycle TOA fluxes for Obs4MIPs

NEW PRODUCTS FOR CLIMATE MODEL EVALUATION FROM THE GEOSTATIONARY EARTH RADIATION BUDGET INSTRUMENT

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SUMMARY

GERB provides observations of the top of the atmosphere (TOA) radiation budget at high time resolution from a geostationary orbit located over the equator and the Greenwich meridian. GERB radiances and fluxes are currently available to users from CEDA and are in HDF5 format (Harries et al. 2005) on an equal viewing angle grid at 15 minute temporal resolution.

Here we present new diurnally resolved monthly average products derived from the GERB observations which are designed for comparison with climate model output. Monthly hourly average outgoing longwave (OLR) and reflected shortwave (RSW) flux are provided on a regular 1°x1° degree longitude latitude grid in support of Obs4MIPs. The products, designed with CMIP-6 outputs in mind, are provided in a Climate and Forecast (CF) compliant Network Common Data Form (netCDF).

PRODUCING AVERAGE PRODUCTS

Quality controlled Edition 1 GERB products, with the recommended 'combined correction' applied to the RSW to unify and stabilise the record, form the basis of the GERB monthly hourly average products. These include RSW estimates for missing fluxes that occur in the observations near twilight (solar zenith angle 80 to 100°) and when observations are near the glint angle over ocean. Figure 1 illustrates schematically the production of the monthly hourly average GERB products.

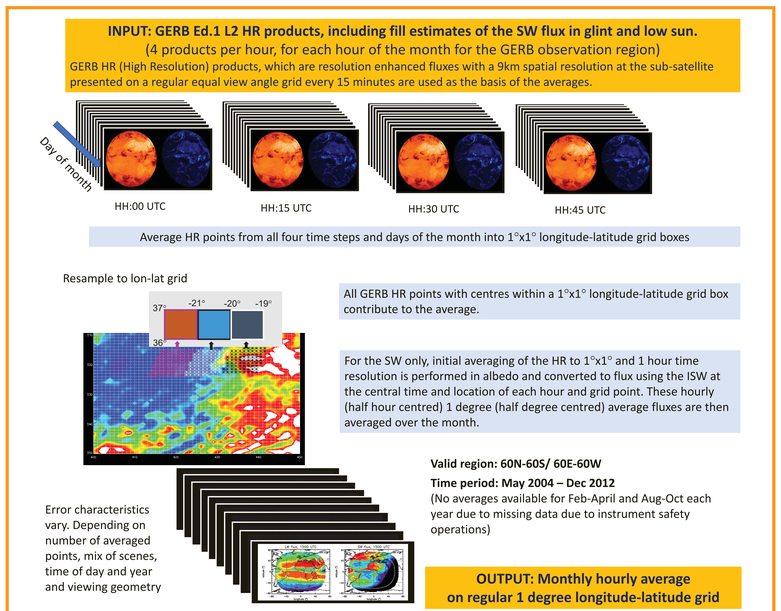

FIGURE 1: GERB HR data to monthly hourly average on regular longitude latitude grid

MONTHLY AVERAGE COMPARISON

No other instrument makes diurnally resolved broadband observations, however we can compare the associated overall monthly average RSW and OLR to the CERES EBAF monthly average products. Results for June 2008 are shown in figure 2.

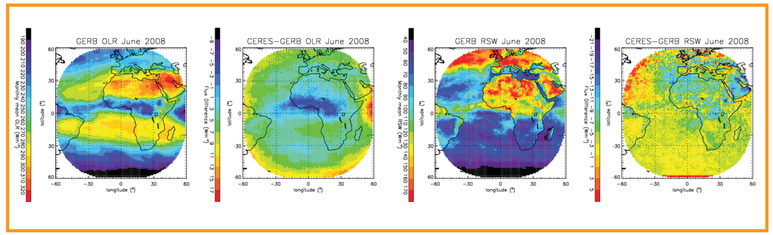

FIGURE 2: Derived monthly mean GERB 1°x1° fluxes for June 2008 and difference from CERES Ed 4 EBAF monthly mean for the OLR (left) and RSW (right).

MONTHLY HOURLY AVERAGE PRODUCTS

Example GERB Obs4MIPs monthly hourly average products are shown in figure 3 for June 2008 for hours starting at 06:00, 10:00, 14:00 and 18:00 UTC.

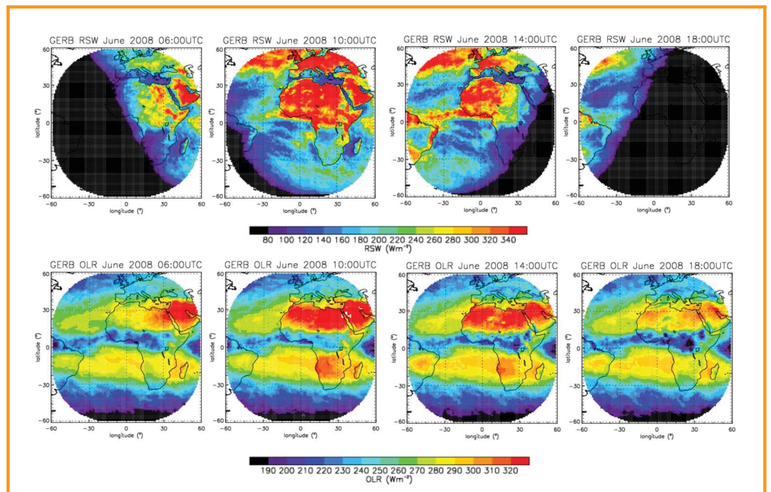

FIGURE 3: June 2008 GERB 1°x1° monthly hourly average obs4MIPs flux products for, from left to right, 06:00, 10:00, 14:00, 18:00 UTC. OLR (top) and RSW (bottom) .

REFERENCES

Harries, et al. (2005). Bulletin of the American Meteorological Society, 86(7), 945−960.

MONTHLY DIURNAL CYCLE

Figure 4 shows the year to year variation from 2008 to 2012 in the observed monthly average diurnal cycle, for June and December, for five example regions.

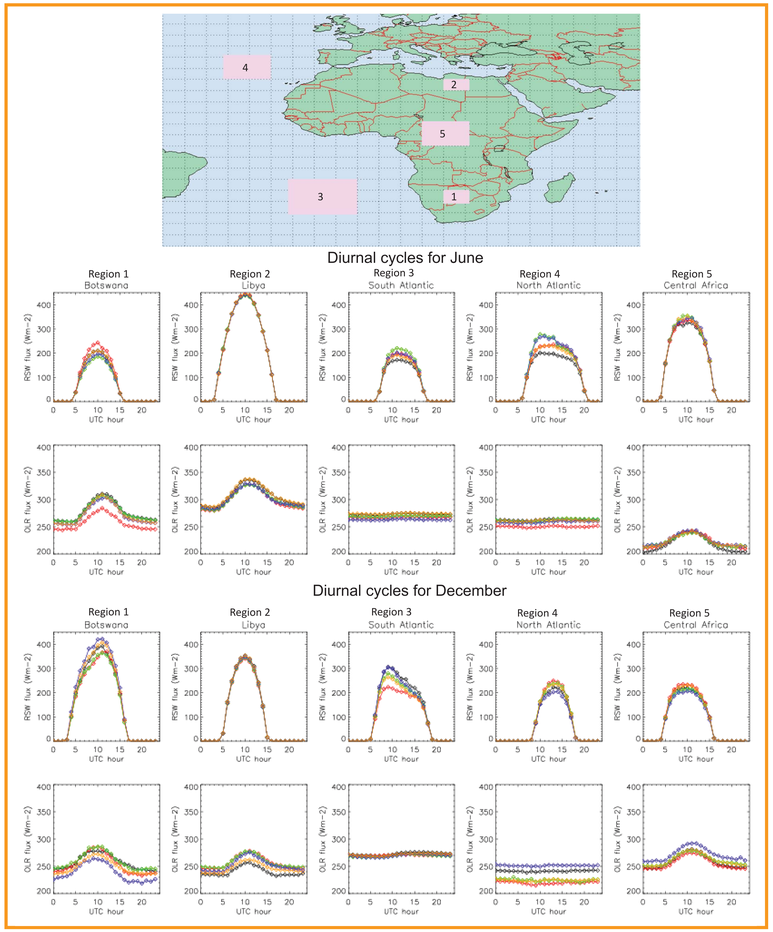

FIGURE 4: OLR and RSW monthly average diurnal cycle for June and December for 2008 (black), 2009 (red), 2010 (green), 2011 (blue), 2012 (yellow). One column for each example region defined as indicated in the maps shown in the top row.

DATA AVAILABILITY AND FURTHER INFORMATION

GERB Edition 1 data products available from CEDA (http://www.ceda.ac.uk).

For further information and latest news visit http://ggsps.rl.ac.uk