The CM SAF Top-Of-Atmosphere Radiation Data Record from GERB and SEVIRI (ed02)
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Introduction

- A data record of TOA Radiation from GERB and SEVIRI instrument is developed within the EUMETSAT Climate Monitoring Satellite Application Facility (CM SAF).
- The data record complements other data records already released by CM SAF e.g. cloud products, surface radiation, water vapour, ...
- A Delivery Readiness Review will be held on 25 Nov. 2016 to check the data record and associate documents (Product User Manual, ATBD, Scientific Validation report) before official release.

Processing flowchart

- The “Data preprocessing” subsystem performs several corrections of the input GERB and GERB-like data such as recalibration, homogenization, aging correction … In this step, the gaps in the GERB data record are filled with the GERB-like (a subset based on SEVIRI).
- The output of the preprocessing is a stream of homogenized 15’ instantaneous level 2 High Resolution (HR) data, called here “cmstaf instantaneous fluxes”.
- In the “Clear sky processing”, the fluxes are combined with the CM-SAF MSG/SEVIRI cloud mask (CM-21012) to derive the 15’ cmstaf instantaneous clear sky fluxes.
- Finally, in the “Daily and Monthly averaging”, all the sky and clear sky streams are averaged in hourly boxes, from which the daily mean, monthly mean and monthly mean diurnal cycle are estimated. This last part of the processing is also in charge of creating the final NetCDF files.

Product features

<table>
<thead>
<tr>
<th>Covered period</th>
<th>1 February 2004 to 30 April 2015 (~11 years)</th>
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<tbody>
<tr>
<td>Spatial resolution and grid</td>
<td>Geostationary grid at 4km subpixel grid (similar to the GERB high resolution grid). This grid allows an easy combination with other SEVIRI products (AOD, cloud…)</td>
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<tr>
<td>Improved stability of the SW fluxes</td>
<td>The GERB and GERB-like SW fluxes are corrected for temporal degradation. Several improvements (wrt GERB ED01) are applied to the solar and thermal flux processing.</td>
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<tr>
<td>Improved SW fluxes processing</td>
<td>Using data from backscattering satellite allows reducing the number and the length of the input data gaps.</td>
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<td>Use of backup cloud data</td>
<td>SW and IR fluxes in presence of “all sky” and “clear sky” conditions.</td>
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<td>Output quantities</td>
<td>SW and IR fluxes interpolated on a 3h sub-pixel grid and a diurnal cycle.</td>
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<tr>
<td>Validation</td>
<td>Validation performed at lower resolution (15’) by inter-comparison with CERES and HIRS-OLR CDR data records.</td>
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<tr>
<td>Format</td>
<td>A NetCDF file format following the CF convention.</td>
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</table>

Illustrations - monthly mean and daily mean

Example of applications : cloud forcing

- The full data record is compared with CERES EBAF ed2.8, SYN1deg Edition 3A (monthly, daily, 3hr) and SSF Edition 3A (monthly, day).
- The all sky thermal flux is compared with HIRS OLR CDR daily v2.2.
- Biases wrt CERES and HIRS are stable (< 2 W/m²).
- RMS differences are stable over the data record and agree with the targeted accuracies (users req.).

Summary

- New ERB data record to be released soon via http://www.cmsaf.eu
- Good agreement with the CERES and HIRS OLR products
- Fine spatial resolution (9km subpixel point)
- Diurnal cycle at 1 hour resolution
- Accurate daily mean products
- Limited to Meteosat FOV
- Monthly averaging less efficient to reduce ADM errors due to constant direction of observation.

More info and access to CM SAF data : www.cmsaf.eu