GERB-2 Indian Ocean Processing Update

RMI
Johan Moreels, Edward Baudrez, Nicolas Clerbaux, Alessandro Ipe

ICL
James Rufus

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email: gerb@oma.be
web pages: http://gerb.oma.be
GERB-2 History

- Meteosat-8 (MSG-1) launched 2002-08-28
- GERB-2 commissioning started Jan-2003
- Started normal operations Feb-2004
- Apr-2007 GERB-1 becomes primary instrument
- May-2007 parallel operation of GERB-1&2 ceased
- Move of MSG-1 to Indian ocean (41.5 E) Jul-2016 -> Sep-2016
  [MSG-1 moves to Indian ocean](#)
- Operation GERB-2 over Indian Ocean started 2016-10-26
First GERB-2 image over Indian Ocean

2016-10-26 11:56 UTC (~14:42 local time)
Aging problems
GERB-2 aging problems (1)

- Sensors with reduced output (see previous figures) -> masked out
- Asymmetric aging of the de-spin mirror faces, wavelength dependent (present in SW and not in LW)
GERB-2 aging problems(2)

- Similar asymmetric mirror response for GERB-3
  - Different origin (parking position (GERB-2), technical problem (GERB-3)
  - Same correction method used

LW
GERB-2 aging problems(3)

- Noise on the Earth Sensor Unit (ESU) timing (TSOL jitter). Affects data taken from mid February to mid August.

Image: J. Rufus (ICL)
Problem handling
Correcting mirror face difference

- Difference is wavelength dependent: larger at shorter wavelengths
  - SEVIRI lacks blue and UV channels
  - Use SEVIRI to evaluate correction
- Determine correction factor in function of reflectivity:

\[
\rho_{SW} = \frac{L_{SW}d^2}{L_{sun}\cos \theta_{ZA}}
\]

\[
R_{est}(k) = \frac{R_{meas}(k - 1) + R_{meas}(k + 1)}{2}
\]
Correcting mirror face difference

- Need separate correction for ocean and land scenes
Correcting mirror face difference

- Comparison between GERB and GERB-like (SEVIRI)
- Sum correction factors of 100 vertical pixels (central region) for each column
Correcting mirror face difference

*0.005 + 1.0

Before correction

*0.005 + 1.0

After correction
Correcting TSOL jitter

- Avoiding mirror face problem -> double length scan. Normal 282 columns -> 564 columns
- Split image into 2, each containing only columns taken by the same mirror face
Correcting TSOL jitter

- Sequentially acquired (one mirror side only)
- Evenly spaced
- Inaccurate pointing

- Random acquisition
- Repositioned
- Accurate location

- No acquisition time
- Regularly gridded

by J. Rufus
Correcting TSOL jitter

- Noise on the Earth Sensor Unit (ESU)
Summary

• GERB-3 data is handled by the regular RGP chain with mirror face correction

• GERB-2 IODC data is handled by the regular RGP chain but …

• GERB-2 has aging problems
  • Different mirror face response can be handled
  • Bad column location can be handled separately for each mirror face

• Still (considerable?) work to be done to include column corrections in the RGP chain
Thank you for your attention!

Questions?
RMIB GERB Processing (RGP) Overview

RGP Inputs
- GERB level 1.5 from RAL
- SEVIRI level 1.5 from EUM

RGP main steps
- LW separation
- Unfiltering
- Scene identification
- Angular Dependency Models
- Various spatial and temp. processing
  - to combine GERB and SEVIRI
  - tuning of the GERB geolocation
  - resolution enhancement

RGP outputs
- Level 2 solar and thermal fluxes at TOA, in 3 formats:
  - ARG: Averaged Rectified Geolocated (45km, 17’, no correction of PSF)
  - BARG: Binned Averaged Rectified Geolocated (45km, 15’, PSF corrected)
  - HR: High Resolution (9km, 15’, PSF corrected)
(+ GERB level 1.5 geolocation)