

Clear Sky Radiance: Product Guide

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EUMETSAT
Eumetsat-Allee 1, D-64295 Darmstadt, Germany
Tel: +49 6151 807-7
Fax: +49 6151 807 555
<http://www.eumetsat.int>

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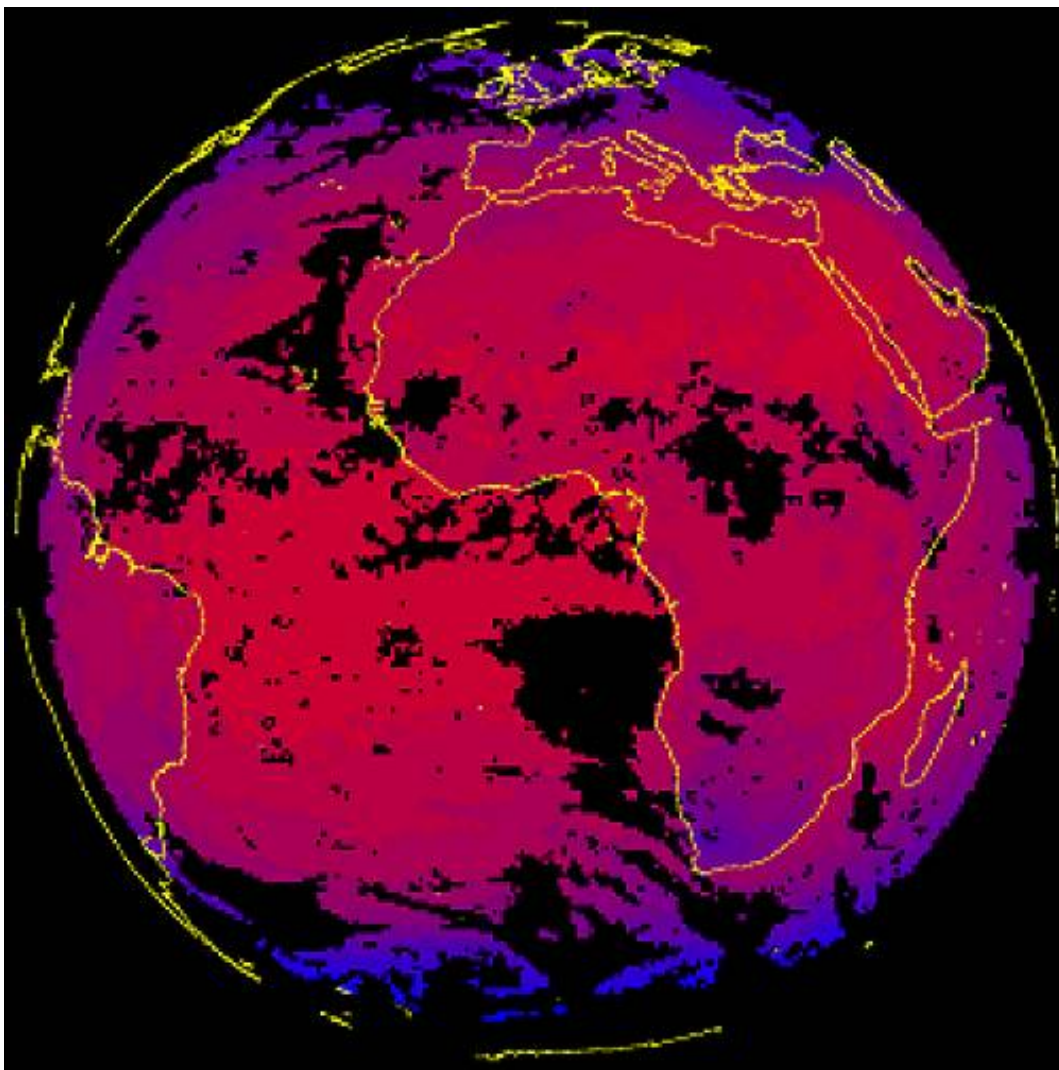
<i>Issue / Revision</i>	<i>Date</i>	<i>DCN. No</i>	<i>Summary of Changes</i>
1	6 October 2010		Initial release of Document
1A	2 September 2015		Added the following content: Product description, content to specify product output and specifications for GRIB-2 Encoded Product.

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1 PRODUCT DESCRIPTION

The Clear Sky Radiance (CSR) product is a subset of the information derived during the Scenes and Cloud Analysis processing. The product contains information on mean brightness temperatures and radiances from all thermal (infrared and water vapour) channels, for regions containing no or only low-level clouds. The product provides the radiances for a subset of the MSG channels averaged over all pixels identified as *clear* within a processing segment. This is carried out for all channels except WV6.2, where the CSR is also derived for areas containing low-level clouds. The accuracy of the product depends on the accuracy of the calibrated image data and the accuracy of the scenes analysis processing. The product provides valuable input to numerical weather prediction models. The horizontal resolution is on synoptic scale, 100 km or better. The CSR uses averaging segments of 16×16 pixels—about 80×80 km² at the sub-satellite point. The product provides valuable input to numerical weather prediction models. The horizontal resolution is on synoptic scale (100 km or better).



Example of CSR product on full-disk image.

2 PRODUCT SPECIFICATIONS

<i>Category</i>	<i>Specification</i>
Applications and users	Numerical weather prediction
Product Distribution	<ul style="list-style-type: none"> • GTS • EUMETCast • EUMETSAT Data Centre
Product Area	<ul style="list-style-type: none"> • FES (Full Earth Scan) Area • RSS (Rapid Scanning Service) Area
Product Resolution	<ul style="list-style-type: none"> • FES: 16 × 16 pixels • RSS: Variable
Product Distribution Frequency	<p>FES Area</p> <ul style="list-style-type: none"> ▪ GTS: hourly for the 00:45, 01:45, 02:45, ...23:45 UTC products ▪ EUMETCast: hourly for the 00:45, 01:45, 02:45, ...23:45 UTC products ▪ EUMETSAT Data Centre: hourly for the 00:45, 01:45, 02:45, ...23:45 UTC products <p>RSS Area</p> <ul style="list-style-type: none"> ▪ GTS: every 15 minutes for the 00:00, 00:15, 00:30, ...23:45 UTC products ▪ EUMETCast: every 15 minutes for the 00:00, 00:15, 00:30, ...23:45 UTC products ▪ EUMETSAT Data Centre: every 15 minutes for the 00:00, 00:15, 00:30, ...23:45 UTC products
Product Format	BUFR format
Product Size	<ul style="list-style-type: none"> • FES Area: about 3 MB (variable) • RSS Area: about 320 KB (variable)

2.1 Product history

Initial development and baseline:	1997	
Operational start	1998	
Substantial Revision	2001	product upgraded to replace single quality flag with quality index.
Substantial gaps in coverage		none

2.2 Known Operations Limitations

None

3 PRODUCT ILLUSTRATION

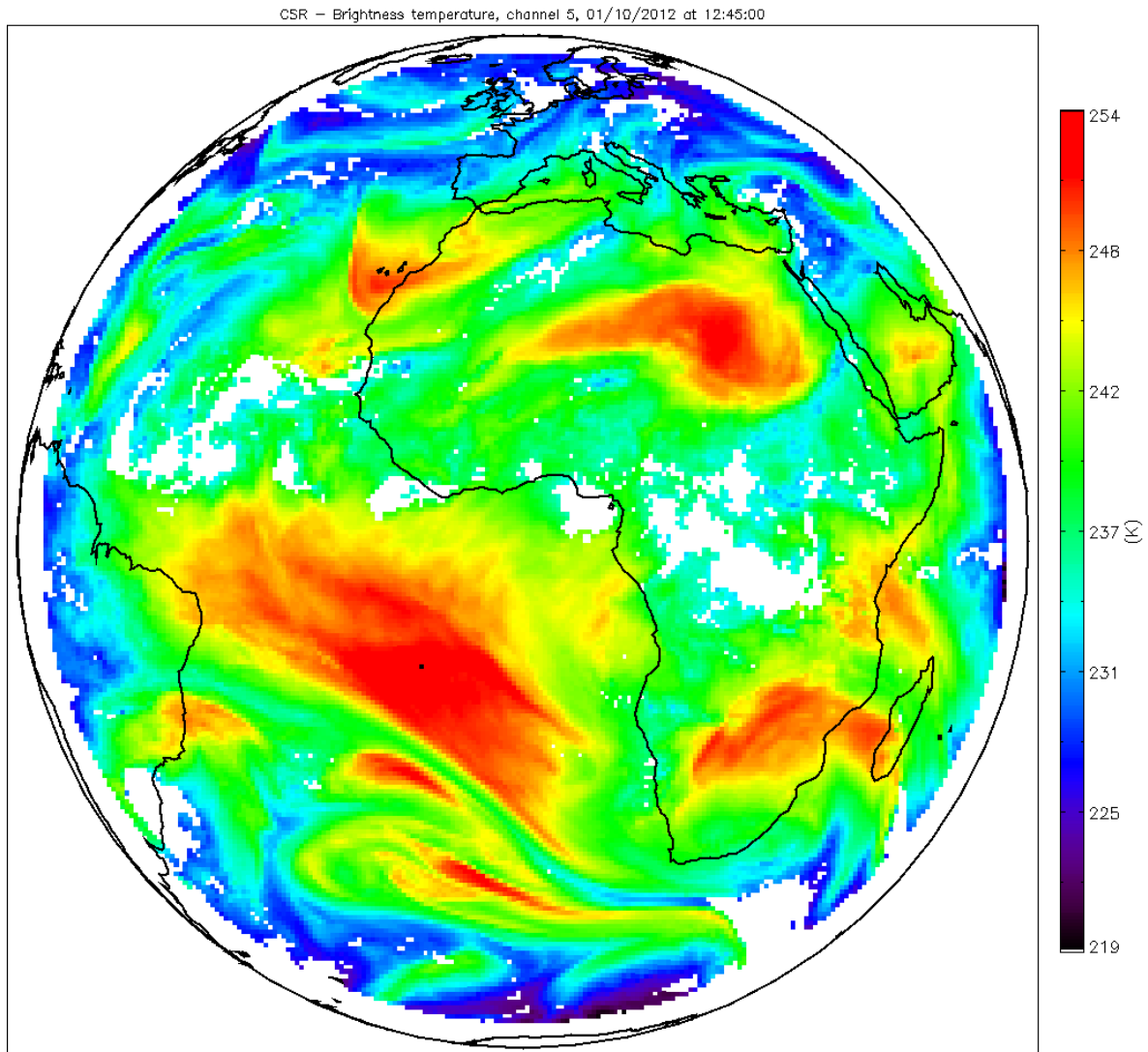
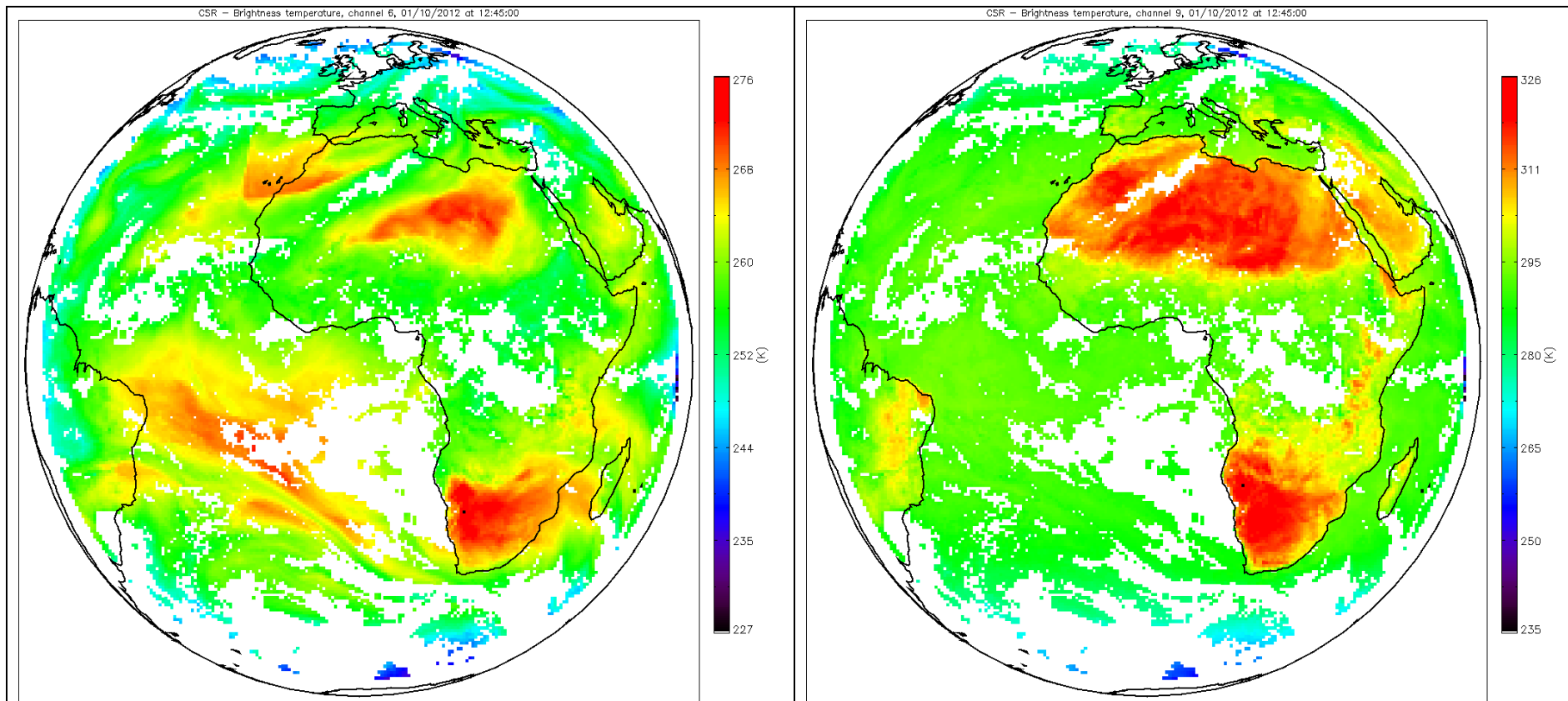


Figure 1: Full disk scan for channel IR6.2. Colour scheme (at right) shows brightness temperatures in K.



Channel: IR7.3

Channel: IR10.8

4 ALGORITHM COMPONENTS

4.1 Inputs/Dynamic Application Data

As an input, level 1.5 image data of all channels for every repeat cycle is available for the CSR processing in the form of radiances, or reflectances and brightness temperatures. Also, the CSR product results from the previous repeat cycle and the scenes type information from the Scenes Analysis of the current repeat cycle is available.

The visible channels are not processed and the CSR product provides missing values instead. The output for the infrared channels provide brightness temperatures (K) and the radiance values are also set to missing.

Note: The complete algorithm specification is in the ATBD for this product. See the document reference section in Section 5 for the document reference number.

<i>Parameter</i>	<i>Units</i>	<i>Resolution</i>	<i>Source</i>
Scenes type	-	pixel	CLA int
Radiances/reflectances/ brightness temperatures from all channels	$\text{mWm}^{-2}\text{sr}^{-1}(\text{cm}^{-1})^{-1}$ % K	pixel	Derived from Level 1.5 image data
CSR from previous repeat cycle	$\text{mWm}^{-2}\text{sr}^{-1}(\text{cm}^{-1})^{-1}$ % K	CSR processing segment	CSR prev
Solar Zenith angle	degree	pixel	Derived from level 1.5 image header data

Table 1: Dynamic Application Data required for CSR Product.

4.2 Outputs

The following list of output parameters are generated per CSR processing segment for both the final and the intermediate CSR products.

<i>Parameter</i>	<i>Units</i>	<i>To</i>
CSR _{channel_1}	$\text{mWm}^{-2}\text{sr}^{-1}(\text{cm}^{-1})^{-1}$, %, K	CSR final & intermediate products
CSR _{channel_2}	$\text{mWm}^{-2}\text{sr}^{-1}(\text{cm}^{-1})^{-1}$, %, K	
CSR _{channel_N}	$\text{mWm}^{-2}\text{sr}^{-1}(\text{cm}^{-1})^{-1}$, %, K	
Location of the CSR for the solar channels (latitude /longitude)	degree degree	CSR final & intermediate products
Location of the CSR for channel WV6.2 (latitude /longitude)	degree degree	CSR final & intermediate products
Location of the CSR for the IR channels (latitude /longitude)	degree degree	CSR final & intermediate products
Quality flag	-	CSR final & intermediate products

<i>Parameter</i>	<i>Units</i>	<i>To</i>
Percentage of clear pixels contributing to the CSR for each segment for each channel	%	CSR final & intermediate products
Standard Deviation of clear pixels contributing to CSR for each segment for each channel	$\text{mWm}^{-2}\text{sr}^{-1}(\text{cm}^{-1})^{-1}$, %, K	CSR final & intermediate products

Table 2: Output parameters per CSR Processing Segment for both final and intermediate CSR products.

4.3 Essential Quality Flags

<i>Parameter</i>	<i>Value</i>	<i>Meaning</i>
CSR_quality_flag	Bit 0: 1	No CSR derived for VIS channels, insufficient number of clear day pixels
	Bit 1: 1	No CSR derived for WV channels, insufficient number of pixels
	Bit 2: 1	No CSR derived for IR channels, insufficient number of pixels
	Bit 3: 1	AQC Temporal Check failed for VIS channels
	Bit 4: 1	AQC Temporal Check failed for WV channels
	Bit 5: 1	AQC Temporal Check failed for IR channels
	Bit 6: 1	AQC Spatial Check failed
	Bit 7: 1	AQC SD Check failed for VIS channels
	Bit 8: 1	AQC SD Check failed for WV channels
	Bit 9: 1	AQC SD Check failed for IR channels

Table 3: CSR Quality Flags and Bit breakdown

5 REFERENCES AND LINKS

Reference Documents

<i>Type</i>	<i>Document Name</i>	<i>Reference</i>
Detailed Algorithm	MSG Meteorological Products ATBD	EUM/MSG/SPE/022
Validation	MSG-3 System Commissioning Product Validation Test Report	EUM/MSG/REP/12/0190

Online Resources and Assistance

All of the reference documents listed above are in the EUMETSAT Technical Documents page.

www.eumetsat.int > Satellites > Technical Documents
> Meteosat Services
> 0° Meteosat Meteorological Products

To register for data delivery from this product, go to the Data Registration page on the EUMETSAT web page:

www.eumetsat.int > Data > Data Delivery > Data Registration

To get answers to any of your questions about data delivery, registration or documentation, contact the EUMETSAT User Service Help Desk:

Telephone: +49 6151 807 3660/3770

e-mail: ops@eumetsat.int