

Convective Rain Rate (CRR) Factsheet

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Document Change Record

Version	Version Date (as on profile)	DCR* No. if applicable	Description of Changes
1	06/02/2019		Initial version
1A	07/02/2019		Template updated
1B	04/04/2019		Error corrections
1C	19/06/2019		Change of title
2	03/11/2020		Upgrade to NWC SAF GEO V2018

***DCR = Document Change Request**

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GEOSTATIONARY NOWCASTING PRODUCTS

Nowcasting and very short-term weather forecasting require very timely satellite data. In addition to image data, satellite-derived cloud products play an essential role in the analysis of the current weather situation. To support these types of applications, EUMETSAT established a dedicated SAF in Support of Nowcasting and Very Short Term Forecasting (NWC SAF). This SAF produces application software packages to generate, among other things, cloud parameters, rain fall rates from convective clouds, and a Rapidly Developing Thunderstorms product from images of Meteosat satellites and the polar-orbiting satellites NOAA and Metop. The software packages are available to users for local implementation <http://www.nwcsaf.org>. For those who cannot or do not want to set up the software, EUMETSAT produces the basic cloud products and products for users with special interest in convective systems and disseminates these products via EUMETCast-Africa.

1 CONVECTIVE RAINFALL RATE PRODUCT

The Convective Rainfall Rate (CRR) product is based on estimates of rainfall rates from convective systems, using Meteosat Second Generation (MSG) SEVIRI images from multiple spectral channels. The CRR rainfall rates are used in order to obtain five different parameters which form the CRR product. In addition to a parameter that describes the observation conditions (crr_conditions) and a quality indicator (crr_quality) these are:

CRR

The rainfall rates obtained by the CRR algorithm expressed in mm/h are converted into twelve classes as it is shown below:

CLASSES	RAINFALL RATE (mm/h)
0	< 0.2
1	0.2 - 1
2	1 - 2
3	2 - 3
4	3 - 5
5	5 - 7
6	7 - 10
7	10 - 15
8	15 - 20
9	20 - 30
10	30 - 50
11	≥ 50

In order to simplify the display of the product, a suitable colour palette is supplied as a separate parameter in the product.

CRR accum

Rainfall rates from the images in the last hour are used in order to compute the hourly accumulations. This output provides precipitation accumulations from 0.0 to 51.0 mm with a step of 0.2 mm and includes a palette that uses the same thresholds and colours as the classes output palette. In order to simplify the display of the product, a suitable colour palette is supplied as a separate parameter in the product. This palette has been used to produce the Image 1.

CRR INTENSITY

Rainfall rates in mm/h are necessary to calculate the hourly accumulations. This output provides rainfall rates from 0.0 to 51.0 mm/h with a step of 0.2 mm/h and includes a palette that uses the same colours as the classes output palette.

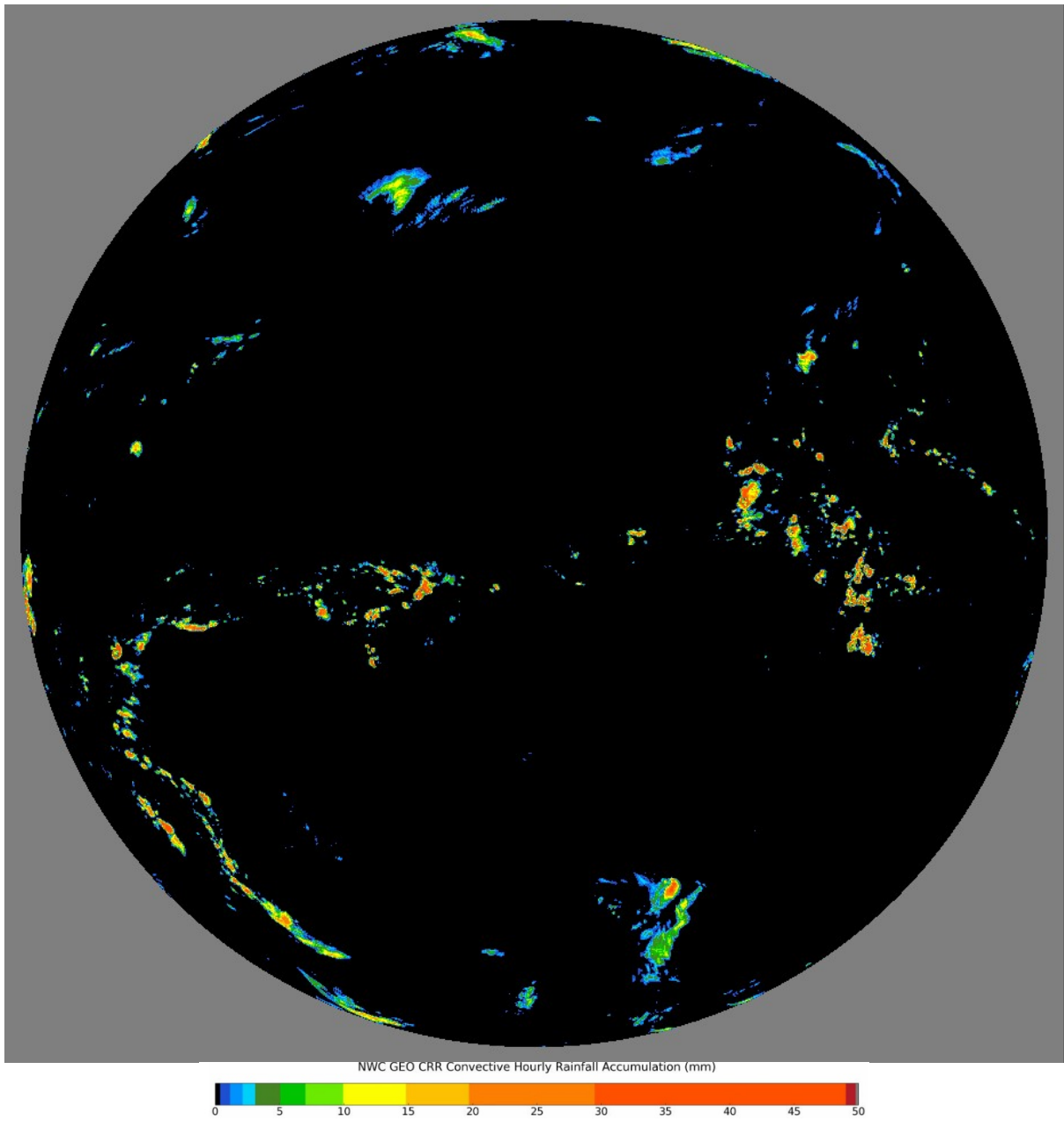


Figure 1: CCR accumulated for 2020/10/12, 11:15-12:15 UTC

2 RETRIEVAL ALGORITHMS

The CRR algorithm developed within the SAF NWC context estimates rainfall rates from convective systems, using MSG SEVIRI channels in the Infra Red window (IR), Water Vapour absorption band (WV) and visible (VIS) together with calibration analytical functions generated from both SEVIRI and Radar data.

A detailed description of the algorithms can be found in the Algorithm Theoretical Basis Documents (ATBD) [RD 1] and the Product User Manual (PUM) [RD 2] of the CRR product of the NWC SAF GEO Software package. See the list of references below. All products have quality indicators (QI). The definition of the QIs can also be found in the ATBD.

The data are provided in the [netCDF](#) data format. The files include generic colour tables which can be used to display the parameters of the products.

3 PRODUCT GENERATION

The product generation of the geostationary nowcasting CRR product takes place at EUMETSAT Headquarter, using the standard user setup of the NWC SAF GEO processing package. Therefore all standard specifications of the Product User Manual (PUM) of this software packages are applicable. The following local configurations are applied for the processing:

- Products are derived for the full disk of the operational 0° geostationary MSG-satellite.
- Original MSG pixel resolution is used.
- Products are available for each repeat-cycle—every 15 minutes.
- In the case of a swap of the operational satellite (e.g. Meteosat-11 to Meteosat-9), the product generation is automatically switched as well to the new operational satellite.
- One file per product and repeat cycle is generated.
- As additional input to the processing, forecast data from the ECMWF operational model are used. The 6-hour, 12-hour, 18-hour, and 24-hour forecasts from the midday and midnight forecasts are made available for the processing.
- Production is based on Version 2018.1 of the NWC SAF GEO processing package.

3.1 Limited List of References Documents

All documents are on the EUMETSAT Technical Documents Page:

<http://www.eumetsat.int/website/home/Data/TechnicalDocuments/index.html>

Note: Documentation on the NWC SAF webpage could be referring to a newer version of the NWC SAF software package than the one which was used to generate the Global Nowcasting CRR Products. Always use the applicable versions of the documentation on the EUMETSAT Technical Documents Page, as specified in the table below.

RD 1	Algorithm Theoretical Basis Document for the Precipitation Product Processors of the NWC/GEO	NWC/CDOP2/GEO/AEM ET/SCI/ATBD/Precipitation	Version 2.1
RD 2	User Manual for the Precipitation Product Processors of the NWC/GEO	NWC/CDOP3/GEO/AEM ET/SCI/UM/Precipitation	Version 1.0

4 PRODUCT SPECIFICATIONS

<i>What data is available?</i>	EUMETSAT has generated Geostationary Nowcasting CRR Products since January 2019. Data are not archived.
<i>Allocation:</i>	Near-real time full disk products are available 10-25 minutes after sensing time finishes.
<i>Product available:</i>	Geostationary Nowcasting CRR Products in netCDF can be received in near-real time—10-15 minutes after the end of the image acquisition by the MSG satellite—via the EUMETSAT EUMETCast -Africa system. For details on <i>data provision, file naming, and file sizes</i> , please access the Product Navigator page and search for Geostationary Nowcasting.
<i>Product Support:</i>	The EUMETSAT help desk (ops@eumetsat.int) will answer any of your questions about the Geostationary Nowcasting Cloud Products.
<i>Future Developments</i>	N/A