High Resolution Precipitation Index: Product Guide

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Document Change Record

Issue / Revision	*Date*	*DCN. No*	*Summary of Changes*
1	06/10/2010		Initial conception as Factsheet
v1A	08/12/2014		Document converted to Product Guide format
v1B	19/10/2015		Final review by SME, replacement of product illustration.

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1 PRODUCT DESCRIPTION

The High Resolution Precipitation Index Product (HPI) generation is based on the relationship between the channel top-of-atmosphere (TOA) radiance Equivalent Black Body Temperature (EBBT) of clouds and convective rainfall. This relationship is based on the premise that clouds with cold tops are convective, rain-bearing clouds. The scheme is a cloud indexing method based on the pixel values of an IR channel. The default HPI processing area covers a box bounded by ± 40° of latitude and ± 50° of longitude from the SSP. It is segmented into equal-angle latitude/longitude areas where the default size of the processing segments is 1° latitude × 1° longitude.

Precipitation index values for the various HPI processing segments are derived from satellite infrared image data accumulated hourly. An HPI data set is generated for each run of the HPI product generation. All HPI data sets accumulated for one day are put into the final HPI product. This provides a temporal and spatial distribution of the precipitation indices for the day. The precipitation indices are based on the black body temperatures being equivalent to the pixel counts of a particular IR channel–nominally the IR10.8 μm channel. In addition to the precipitation indices, the final HPI product also contains the EBBT mean for each individual run as an intermediate product, and the variance of the EBBT means for the individual runs of the day. There are 24 EBBT histogram classes. The cold EBBT classes are indicative of the likelihood of precipitation.

The HPI product is primarily generated to support the Global Precipitation Climatology Project (GPCP). In the framework of this project, the supporting centre (MPEF) is acting as a “Geostationary Satellite Data Processing Centre (GSDPC)”. The GPCP HPI product is not disseminated in real-time. This deliver schedule is done in accordance with the WMO/ICSU Global Precipitation Climatology Project rules. It is assumed that Meteosat Second Generation will support GPCP for the duration although the HPI product extraction method and the amount of requested data may be modified.

2 PRODUCT SPECIFICATIONS

Category	*Specification*
Type	Meteorological Product
Applications and users	Climate research by the World Meteorological Organization (WMO) Global Precipitation Climatology Project (GPCP)
Input satellite data	Equivalent Black Body Temperature readings derived from the SEVIRI Level 1.5 image data for the IR10.8 channel
Product Distribution	EUMETSAT Data Centre
Product Area	Full Earth Scanning (FES) Area: Limited to ± 40º of latitude and ± 50º of longitude
Product Resolution	pixel
Product Distribution Frequency	Daily distribution to EUMETSAT Data Centre
Product Size	Approximately 3.5 MB (fixed)

2.1 Product history and gaps in coverage:

Initial development and baseline:	26 November 1996	
Substantial Revision	25 July 2005	Output table split into two tables with additions
Substantial gaps in coverage	None	None

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3 PRODUCT ILLUSTRATION

A full-disk HPI product map is shown in Figure 2. The colour scheme represents most likely Effective Black Body Temperature (EBBT) class of the pixels within the 1° × 1° grid square.

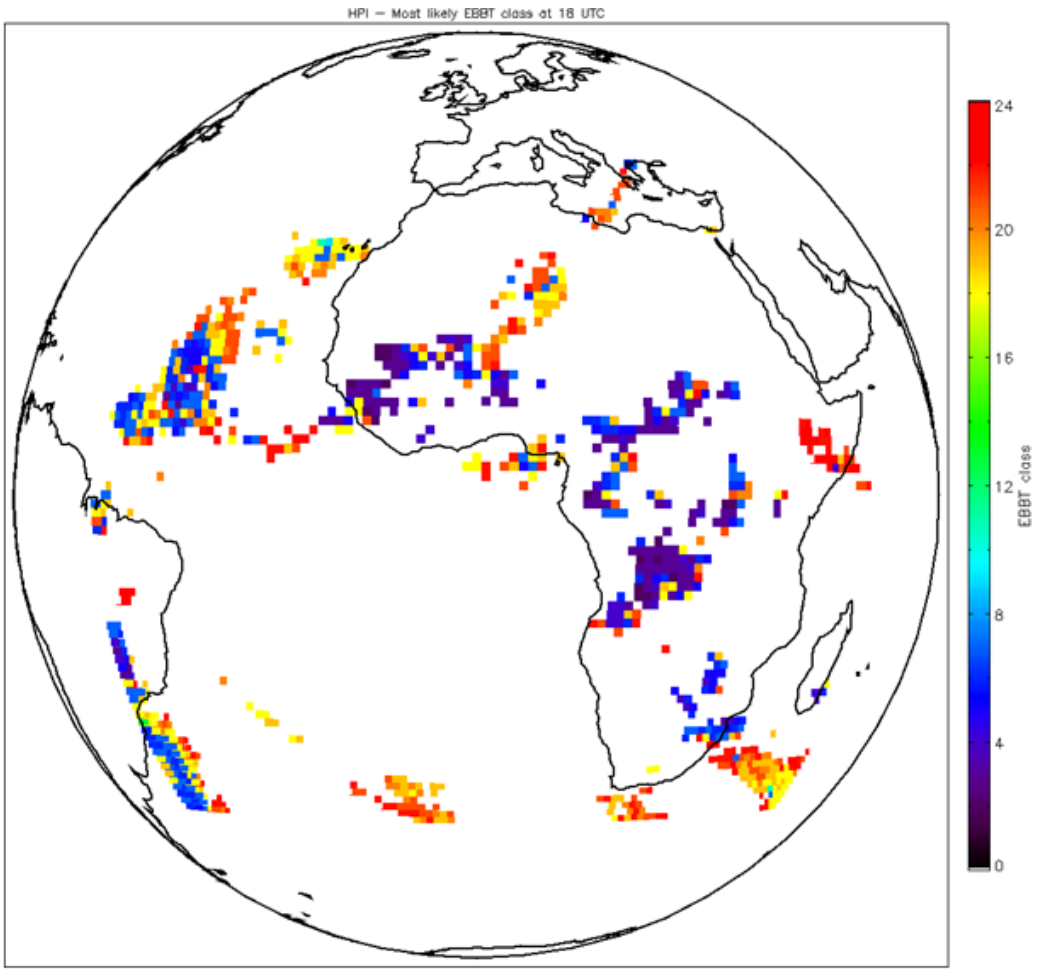

Figure 1: Full-disk HPI Product for 18 UTC 16 October 2012.

Another view of the product is in Figure 2. The percentage of pixels within a selected temperature class is shown for each 1° × 1° grid square. Brighter colours indicate a greater fraction of cold pixels with potential precipitation. Blue/purple represents approximately 0%, green 50% and red 100%.

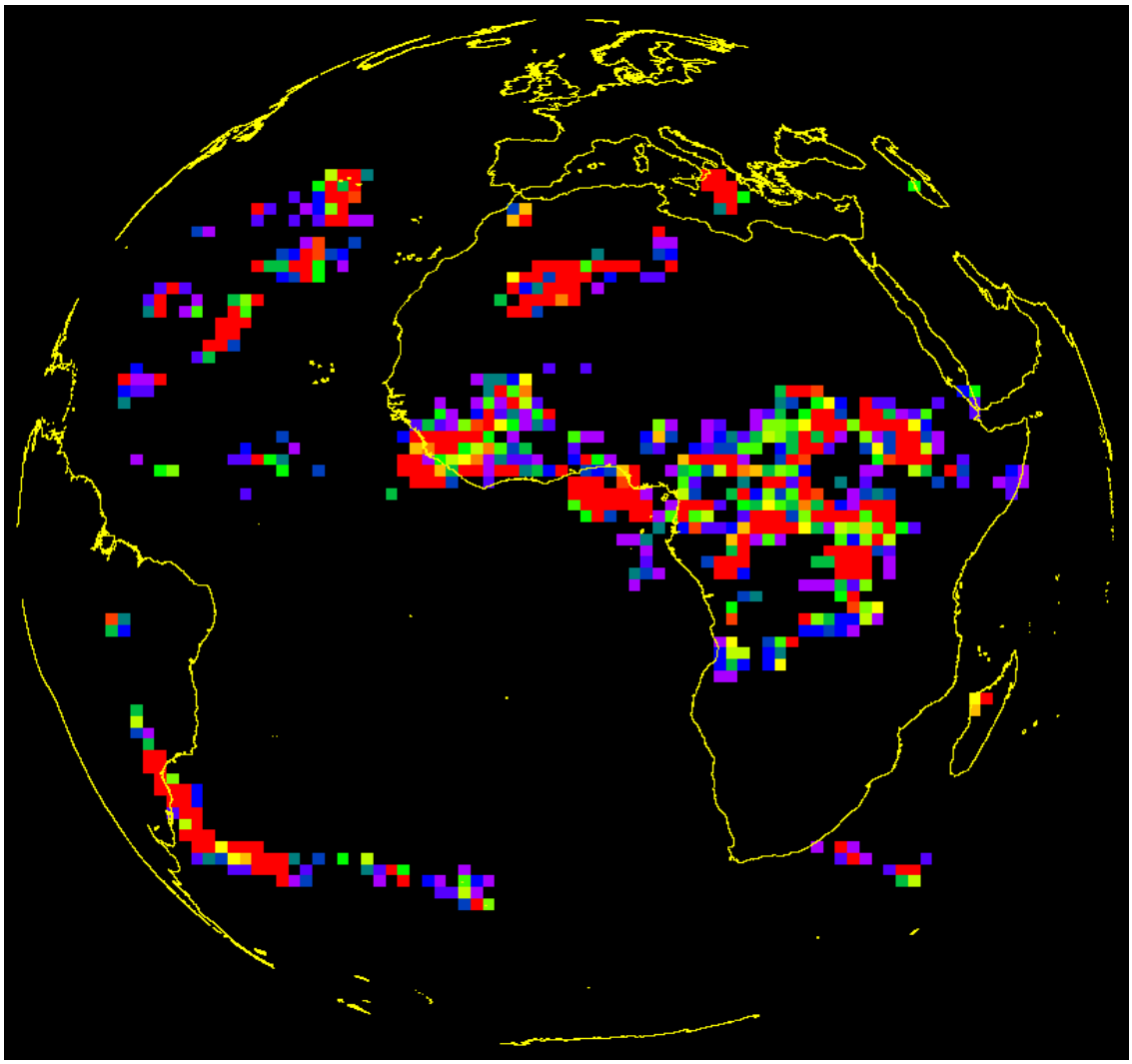

Figure 2: Example HPI at 23:45 UTC on 4 October 2005.

4 BASIC STRUCTURE OF THE ALGORITHM

The High Resolution Precipitation Index generation is based on the relationship between the channel top-of-atmosphere (TOA) radiance-equivalent black body temperature (EBBT) of clouds and convective rainfall. The scheme is a cloud-indexing method based on the pixel values of an IR channel. It estimates an hourly accumulated precipitation. The final HPI product is sent to the EUMETSAT Data Centre archive once a day and stored.

Step 1	On the first run of the HPI product of a day, initialise the accumulative PI product regardless of whether an image is available for processing or not. Nominally the first run of the day is at 03:00 UTC—the repeat cycle covering 02:45 to 03:00 UTC.

Step 2	On the last HPI product run for a day (nominally 00:00 UTC the following day), produce the final HPI product even if no image that can be processed image or backup image is available. This last HPI product run is 00:00 UTC the following day.

Step 3	Process the level 1.5 image data from the processing cycle that matches the requested image recording time. If that image is not available or of bad quality, process a backup image as specified by the backup parameter. The backup parameter specifies the number of images before the nominal extraction time than can be used for backup purposes. The most recently available image should be used. If the backup image is not available or of bad quality, mark in the product header the HPI data set as missing and issue an error message, otherwise mark in the product header the availability of the HPI data set with the time of the used image.

Step 4	Do the HPI product data set generation as follows. For each HPI processing segment contained in the processing area of the HPI product: • Increase the histogram count of that EBBT class which corresponds to the pixel's EBBT value for each pixel in the processing segment. • Calculate the mean and the variance of the EBBT values of all pixels in the processing segment. • Divide the number of pixels in each EBBT class by the total number of pixels in the processing segment and multiply the quotient by the scaling factor

Step 5	Generate the final HPI product. After completion of the generation of the last HPI data set of the day—even if the last accumulation was not possible, put all HPI data sets of the day into the Final HPI product.

5 REFERENCES AND LINKS

Reference Documents

Type	*Document Name*	*Reference*
Validation	MSG-3 System Commissioning Product Validation Test Report	EUM/MSG/REP/12/0190
Detailed Algorithm	MSG Meteorological Products Extraction Facility Algorithm Specification Document	EUM/MSG/SPE/022

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

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