

# ***Tropospheric Humidity Product: 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>

## Document Change Record

<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	02/09/2015		Review by subject matter expert. Graphics revised and added in Section 3.

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## 1 PRODUCT DESCRIPTION

The Tropospheric Humidity (TH) product delivers estimates of the relative humidity in the troposphere on a synoptic scale (i.e. 100 km or better). The product describes the relative humidity in both mid (MTH) and upper (UTH) layers of the troposphere, using a  $16 \times 16$  pixel segment grid. The Meteosat Second Generation (MSG) spacecraft will have two channels providing information about the water vapour content in the troposphere and one IR channel highly affected by the low-layer humidity, so the TH product will be derived in the form of a mean-layer tropospheric humidity, providing the mean relative humidity in at least two layers. The following MSG channels are used to derive mean-layer humidities:

- Channel WV6.2 reports upper tropospheric humidity (UTH), with the mean layer relative humidity nominally between 600 hPa and 300 hPa.
- Channel WV7.3 reports mid-tropospheric humidity (MTH), with the mean layer relative humidity between nominally 850 hPa and 600 hPa.

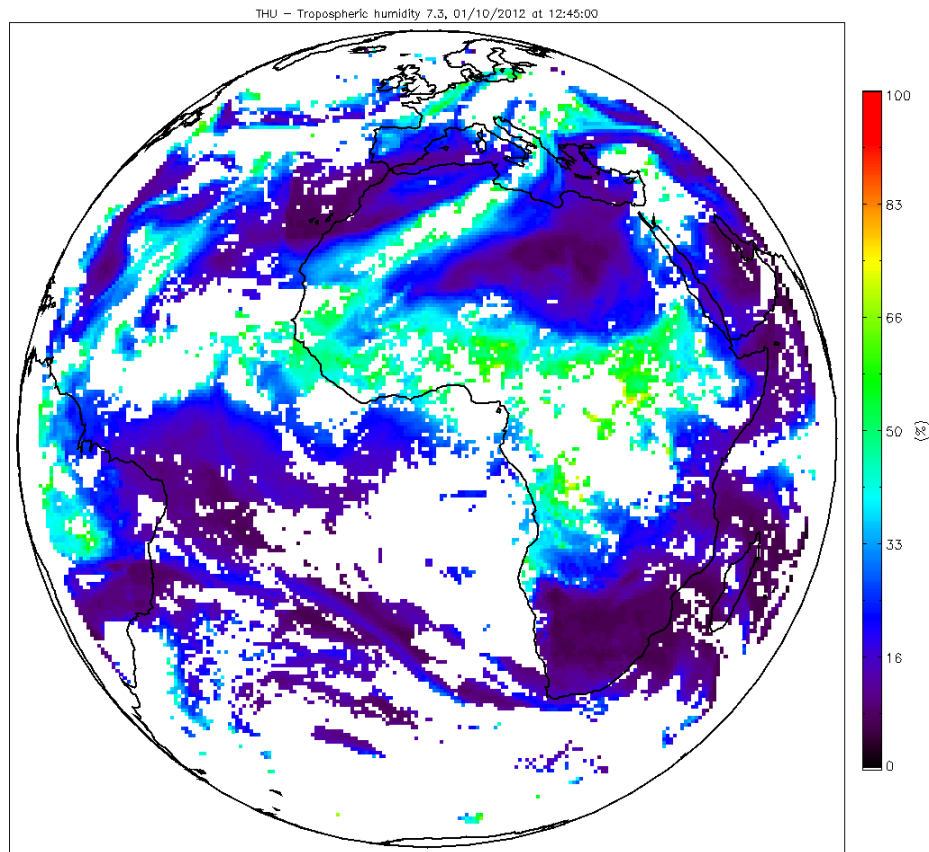


Figure 1: TH product for WV7.3 displayed on full-earth disk. Color band at right is percentage of humidity.

## 2 PRODUCT CHARACTERISTICS

<i>Category</i>	<i>Specification</i>
<b>Type</b>	Meteorological Product
<b>Product abbreviation</b>	TH
<b>Product Area</b>	FES Area
<b>Product Resolution</b>	16 × 16 pixels
<b>Input satellite data</b>	<ul style="list-style-type: none"> <li>• EBBTs for these SEVIRI channels: WV6.2 and WV7.3</li> <li>• satellite zenith angles on pixel level</li> <li>• the scenes type</li> </ul>
<b>Product Distribution</b>	<ul style="list-style-type: none"> <li>• GTS: hourly for the these UTC products: 00:45, 01:45, 02:45, ...23:45</li> <li>• EUMETSAT Data Centre: hourly for these UTC products: 00:45, 01:45, 02:45, ...23:45</li> <li>• EUMETCast: every three hours for these UTC products: 02:45, 05:45, 08:45, ...23:45</li> <li>• Direct: every three hours for these UTC products: 02:45, 05:45, 08:45, ...23:45</li> </ul>
<b>Product Area</b>	<ul style="list-style-type: none"> <li>• Full earth scanning (FES) area</li> <li>• RSS Area</li> </ul>
<b>Format</b>	BUFR format
<b>Product Size</b>	About 0.5 MB (variable)

### 2.1 Product history and gaps in coverage:

Initial operational dissemination:	1998	
Parameter updates and additions	2008	
Gaps in coverage:	None	

### 3 PRODUCT ILLUSTRATION

An example of the UTH field is shown here. Some of the highlights can be summarised as follows:

- The extension of the Azores high pressure with its associated dry air extends through Europe as far as the Baltic states.
- To the west of Ireland you see an area of moist air over the North Atlantic west of Ireland. This is associated with an extratropical cyclone centre and its frontal system.
- The moist area over the western Atlantic is the extension of hurricane *Rita*.
- The south Atlantic moist area is the result of the South Atlantic convergence zone.
- Finally, a large area of moist air over central Africa is the manifestation of tropical convective systems.

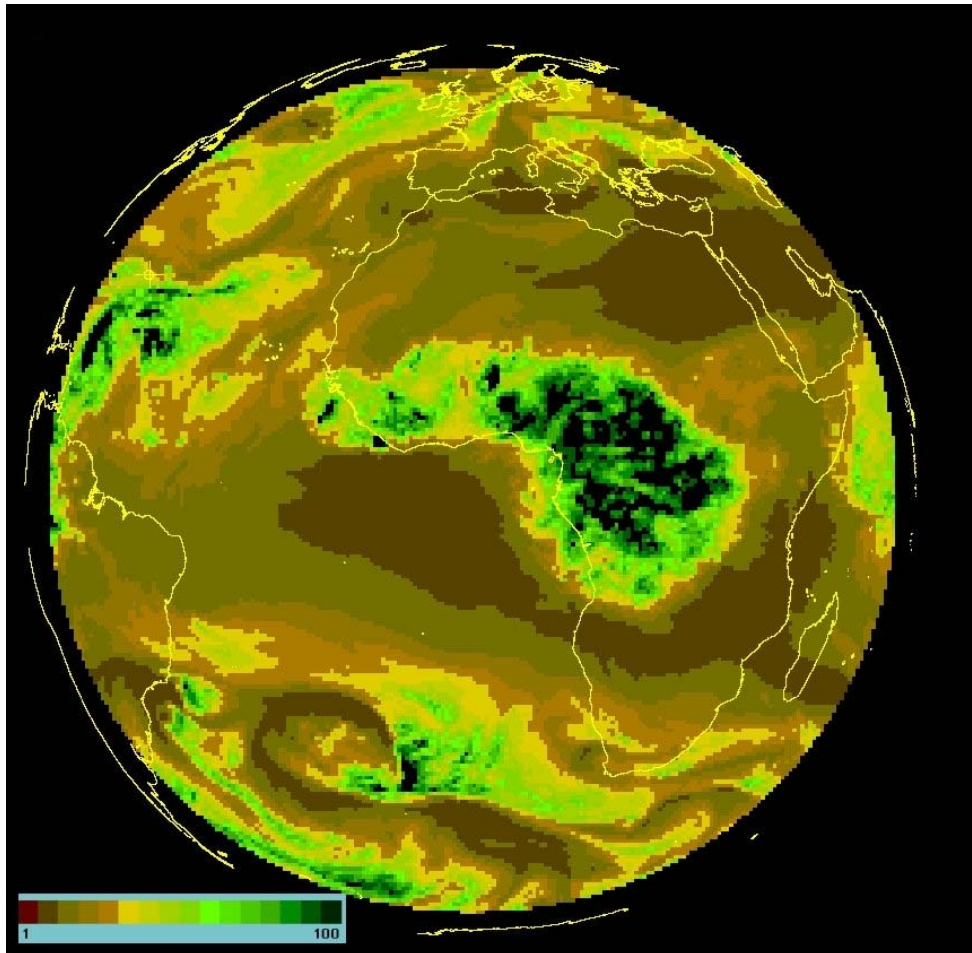


Figure 2: Example of upper tropospheric humidity (UTH) at 07:45 UTC on 20 September 2005. Scale is in hPa.

## 4 ALGORITHM COMPONENTS

This algorithm is to derive a relative humidity measure in percentage for each of the two water vapour channels on a TH processing segment scale. The WV6.2 channel produces an upper tropospheric humidity (UTH) and the WV7.3 channel produces a mid-tropospheric humidity (MTH) which is the mean layer relative humidity between *TH\_level\_2*, nominally 600 hPa, and *TH\_level\_3*, nominally 850 hPa. The product is generated for the repeat cycle closest to the required extraction time for the TH product. The description here is a very general, listings of the inputs and outputs to the algorithm. See the algorithm specification document listed in Section 5 for a complete description of the algorithm and processing sequence.

### 4.1 Inputs

#### 4.1.1 Dynamic application data

<i>Parameter</i>	<i>Units</i>	<i>Resolution</i>	<i>Source</i>
EBBT for WV6.2 channel	K	pixel	Derived from level 1.5 image data
EBBT for WV7.3 channel	K	pixel	Derived from level 1.5 image data
Satellite Zenith Angle	Degree	pixel	Derived from level 1.5 image data
Predicted EBBT 5% Humidity for WV6.2 channel	K	pixel	RTM
Predicted EBBT 40% Humidity for WV6.2 channel	K	pixel	RTM
Predicted EBBT 5% Humidity for WV7.3 channel	K	pixel	RTM
Predicted EBBT 40% Humidity for WV7.3 channel	K	pixel	RTM
Scenes Type	-	pixel	CLA
Radiosonde Observations	-	-	Observations

*Table 1: Tropospheric Humidity Product: Inputs, dynamic application data.*

### 4.2 Outputs

<i>Parameter</i>	<i>Units</i>	<i>Min</i>	<i>Max</i>	<i>To</i>
Tropospheric Humidity for WV6.2 channel, clear sky	%	TH_l	TH_u	TH product
Tropospheric Humidity for WV7.3 channel, clear sky	%	TH_l	TH_u	TH product
Percentage of 'cloudy' pixels for WV6.2 channel	%	0	100	TH product
Percentage of 'cloudy' pixels for WV7.3 channel	%	0	100	TH product
Number of 'algorithm fail' pixels for WV6.2 channel	-	0	1024	TH product
Number of 'algorithm fail' pixels for WV7.3 channel	-	0	1024	TH product
TH Segment Centre Latitude	°	-90	90	TH product
TH Segment Centre Longitude	°	-180	180	TH product
Quality indicator for channel 6.2	%	0	100	TH product
Quality indicator for channel 7.3	%	0	100	TH product
Verification Results				TH Product Header

*Table 2: Tropospheric Humidity Product: outputs.*

**Note:** For the BUFR-encoded product, in the case that the percentage of cloud is 100, the Tropospheric Humidity values are set to *missing*.

## 5 REFERENCES AND LINKS

### 5.1 Reference Documents

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

### 5.2 Online Resources and Assistance

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

[www.eumetsat.int](http://www.eumetsat.int) > Satellites > Technical Documents  
> Meteosat Services  
> 0° Meteosat Meteorological Products

An explanation and demonstration in the use of BUFR format and templates for its use are here:

<http://www.eumetsat.int> > home > Data > Products > Formats

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

[www.eumetsat.int](http://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