

# ***Aerosol Properties over Sea: Product Guide***

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## Document Change Record

<i>Issue / Revision</i>	<i>Date</i>	<i>DCN. No</i>	<i>Summary of Changes</i>
1	6 October 2013		Initial release of Document
1A	25 September 2015		Added the following content: Product description, content to specify product output and specifications for GRIB-2 Encoded Product.

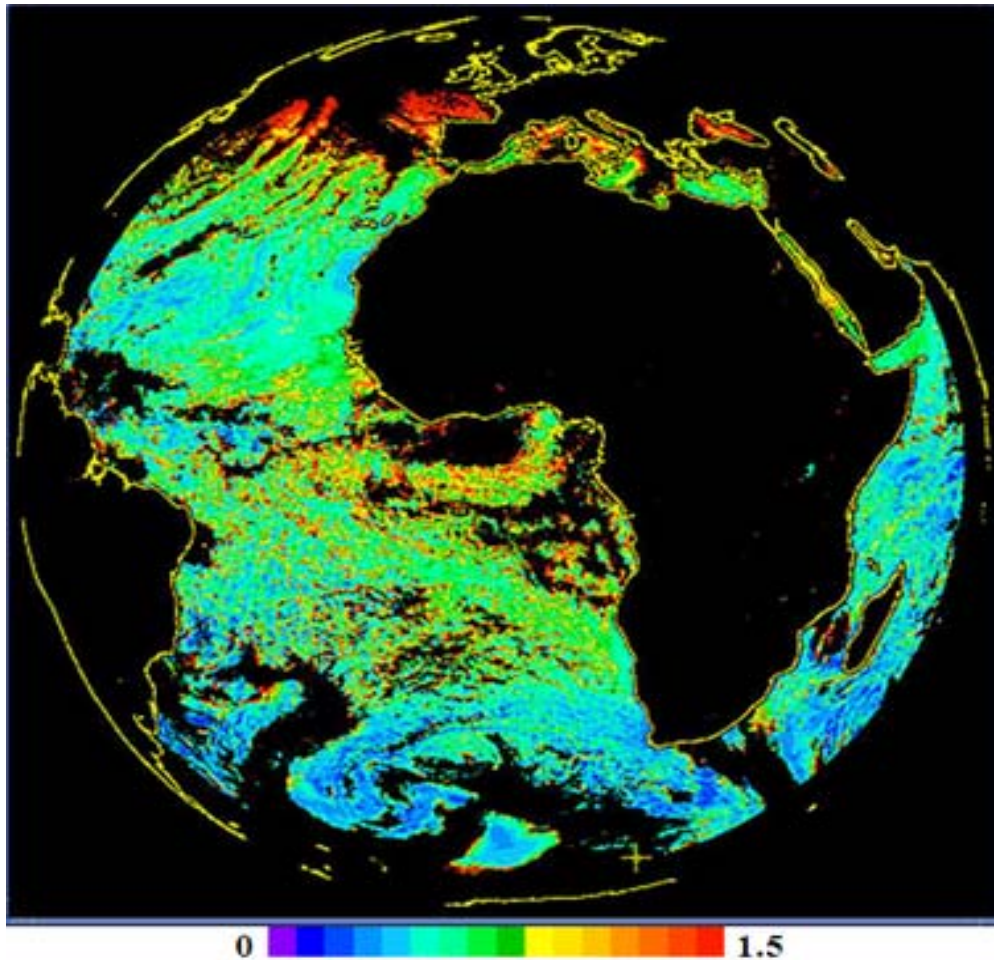
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## 1 PRODUCT DESCRIPTION

The Aerosol Properties of Sea (AES) intermediate product is generated every repeat cycle and delivers the optical thickness for the three visible channels (VIS0.6, VIS0.8 and NIR1.6) and the Angström coefficient for every pixel over sea. The retrieval is based on pre-calculated look-up tables. A daily product is also derived by temporally and spatially averaging the intermediate products over processing segments.

The AES retrieval algorithm is based on the work of Alexander Ignatov from NOAA. He developed similar algorithms for AVHRR and MODIS and also generated the look-up tables for SEVIRI. The theoretical background of his work is described in Ignatov and Stowe, 2002. The full document citation is in Section 5 of this Product Guide.



*Composite earth full-disk image with colour-coded optical thickness markings. See also Section 3 for detailed maps from each of the three channels.*

## 2 PRODUCT SPECIFICATIONS

<i>Category</i>	<i>Specification</i>
<b>Applications and users</b>	Numerical weather prediction, climate research and monitoring
<b>Input satellite data</b>	<ul style="list-style-type: none"> <li>• The reflectances in the VIS0.6, VIS0.8, and NIR1.6 channels</li> <li>• The satellite and solar zenith angles on pixel level</li> <li>• The relative sun/satellite azimuth angle on pixel level</li> <li>• The scenes type and quality</li> <li>• The Aerosol look-up tables</li> </ul>
<b>Product Distribution</b>	EUMETSAT Data Centre
<b>Product Area</b>	FES Area
<b>Product Resolution</b>	3 × 3 pixels
<b>Distribution Frequency</b>	Daily
<b>Product Format</b>	GRIB Edition 2 format
<b>Product Size</b>	Approximately 7.8 MB

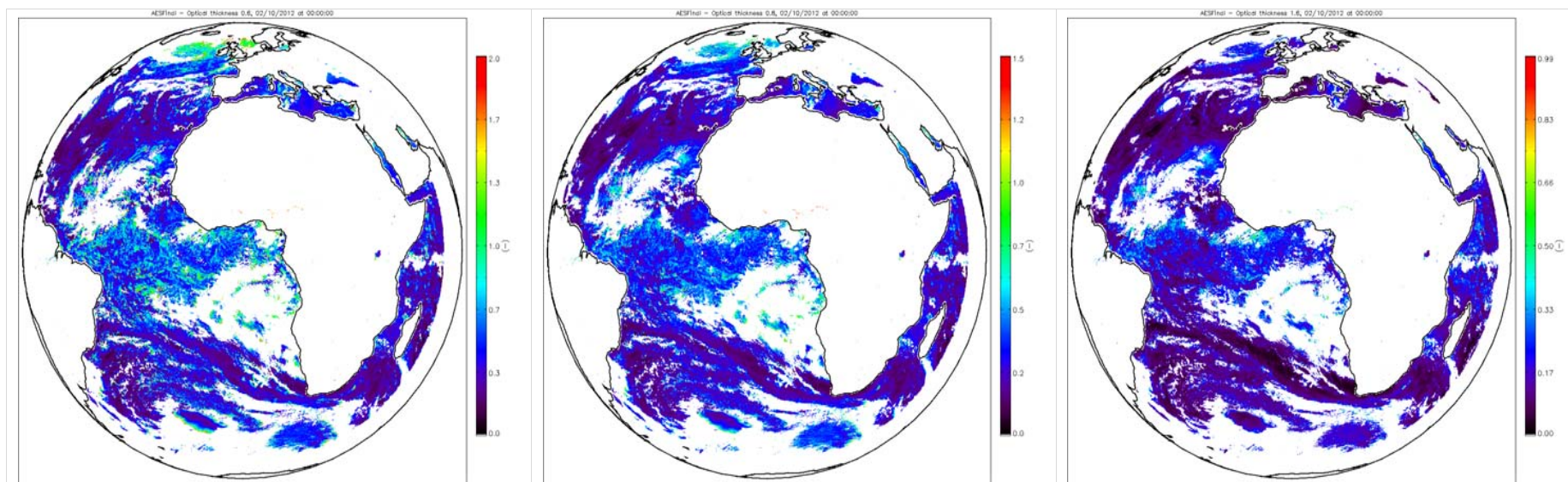
### 2.1 Product history

initial operational dissemination	2009	
Product upgrade	2013	GRIB descriptors modified to match WMO standards.

### 2.2 Known Operations Limitations

Cloud edges may be interpreted as aerosol, especially for the VIS0.6 µm channel.

### 3 PRODUCT ILLUSTRATION



*The full-disk image for the AES product for the VIS 0.6, VIS 0.8, and VIS 1.6 channels. Scale shows aerosol optical thickness.*

## 4 ALGORITHM BASICS

The AES retrieval algorithm is based on the work of Alexander Ignatov from NOAA. He developed similar algorithms for AVHRR and MODIS and also generated the look-up tables for SEVIRI. The theoretical background of his work is described in Ignatov and Stowe, 2002. See Section 5 for the complete document citation.

### 4.1 Inputs

The main input to the AES algorithm is the Level 1.5 data from the MSG VIS channels, in the form of top of atmosphere reflectances.

Level 1.5 image data and data derived from the image data								
<i>Parameter</i>	<i>Mnemonic</i>	<i>Units</i>	<i>Min</i>	<i>Max</i>	<i>Prec</i>	<i>Acc</i>	<i>Res</i>	<i>Source</i>
Reflectances for channels VIS0.6, VIS0.8 and NIR1.6	REFL <sub>channel</sub>	%	0	150	0.1	0.1	pixel	Derived from level 1.5 image data
Solar zenith angle	sol_zenith	degrees	0	90	10 <sup>-6</sup>	10 <sup>-6</sup>	pixel	Derived from Level 1.5 image data
Satellite zenith angle	sat_zenith	degrees	0	90	10 <sup>-6</sup>	10 <sup>-6</sup>	pixel	Derived from Level 1.5 image data
Relative azimuth angle sun/satellite	sol_sat_azimuth	degrees	0	360	0.1	0.1	pixel	Derived from Level 1.5 image data
Scene type	scene_type	-	0	100	1	1	pixel	Scenes Analysis
Scene quality	scene_quality	-	0	100	1	1	pixel	Scenes Analysis

### 4.2 Outputs

<i>Parameter</i>	<i>Mnemonic</i>	<i>Units</i>	<i>Min</i>	<i>Max</i>	<i>Prec</i>	<i>Acc</i>	<i>Format</i>
Segment row number	SegRowNo	-	0	3712	-	-	Short Int
Segment column number	SegColNo	-	0	3712	-	-	Short Int
Segment latitude	Latitude	°	-90	90	0.01	0.01	Real
Segment longitude	Longitude	°	-180	180	0.01	0.01	Real
Aerosol optical thickness for channels 0.6, 0.8 and 1.6	AOTValues	-	0	10	0.1	0.1	Real(3)
Angström coefficient	AngstCoeff	-	0	3	0.1	0.1	Real
Quality indicator	Quality	%	0	100	1	1	Real

### 4.3 Encoded Product

The AES final product is encoded in GRIB Edition 2 format. The specific GRIB codes for AES (Code Table 4.2, Product Discipline 3, Parameter Category 1) are defined in the following table:

<i>Code Figure</i>	<i>Meaning</i>
14	Aerosol optical thickness at 0.635 $\mu\text{m}$
15	Aerosol optical thickness at 0.810 $\mu\text{m}$
16	Aerosol optical thickness at 1.640 $\mu\text{m}$
17	Angström coefficient

### 4.4 Future Enhancements

This process also derives optical depth values over small water bodies like rivers and lakes. For an optimal product, such non-ocean pixels would be removed from the product: this is very difficult to do with the existing cloud mask.

## 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
Science	Ignatove and Stowe, 2002, Aerosol retrievals from individual AVHRR channels. Part I: Retrieval algorithm, and transition from Dave to 6S RTM,	Journal of Atmospheric Science, 59, 313-334.

### 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

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

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

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