

EUMETSAT Satellite Application Facility on
Support to Operational Hydrology and Water Management



**Product User Manual (PUM)
for product H43 – SE-D-FCI**

Snow detection (snow mask) MTG/FCI by VIS/IR radiometry

Reference Number:	SAF/HSAF/PUM-43/1.4
Issue/Revision Index:	1.5
Last Change:	30 April 2025

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DOCUMENT CHANGE RECORD

Issue / Revision	Date	Description
1.0	10/10/2021	Baseline version
1.1	09/09/2022	Updated version
1.3	12/02/2025	Updated version
1.4	14/03/2025	Updated version
1.5	30/4/2025	Updated version (RID updates)

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1 Introduction

1.1 Purpose of the document

Product User Manuals are available for each (pre)-operational H-SAF product, for open users, and also for demonstrational products, as necessary for *beta-users*.

Each PUM contains:

- Product introduction: principle of sensing, Satellites utilized, Instrument(s) description, Highlights of the algorithm, Architecture of the products generation chain, Product coverage and appearance;
- Main product operational characteristics: Horizontal resolution and sampling, Observing cycle and time sampling, Timeliness;
- Overview of the product validation activity: Validation strategy, Global statistics, Product characterisation
- Basic information on product availability: Access modes, Description of the code, Description of the file structure

An annex also provides common information on Objectives and products, Evolution of H-SAF products, User service and Guide to the Products User Manual.

Although reasonably self-standing, the PUM's rely on other documents for further details. Specifically:

- ATBD (*Algorithms Theoretical Basis Document*), for extensive details on the algorithms, only highlighted in this document;
- PVR (*Product Validation Report*), for full recount of the validation activity, both the evolution and the latest results.

These documents are structured as this PUM, i.e., one document for each product. They can be retrieved from the CNMCA site on HSAF web page at User Documents session.

On the same site, to obtain user and password please contact the Help Desk) it is interesting to consult, although not closely connected to this PUM, the full reporting on hydrological validation experiments (*impact studies*):

- HVR (*Hydrological Validation Report*), spread in 10 Parts, first one on requirements, tools, and models, then 8, each one for one participating country, and a last Part with overall statements on the impact of H-SAF products in Hydrology.

1.2 Introduction to product SE-D-FCI (H43 MTG/FCI snow extent)

1.2.1 Overview of the SE-D-FCI (H43) product

The MTG/FCI Snow Extent (H43) product is intended mainly for numerical weather prediction (NWP) and hydrological and meteorological applications which need information of presence of snow on surface (and possibly on trees). In these applications the focus is on the presence of snow which is important for the radiative properties of the surface.

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The H43 product algorithms are based on the methods used in earlier operational products e.g., H31, H32 and H34. These methods together with actual FCI observations have been used to develop single scene (RC) snow detection algorithms (two variants: flatland and mountain) which are used to generate single scene intermediate snow products. These are then combined into daily flatland and mountain snow detection variants and daily merged product variant. The H43 MTG/FCI snow extent product is a Day 1 product which is available when the FCI instrument is operational. Later, actual FCI data will be used to the development improved and enhanced Day-2 snow extent product (H243) which will succeed H43 in the future.

As the product development is based on user needs, therefore separate **flatland**, **mountain** and **merged** variants of the snow extent product for all pixels will be provided as part of the product H43. The merged version is targeting users who prefer a product which has as large coverage as possible while still retaining the high quality of the specialized product variants. Separate flatland and mountain products are calculated to all pixels, but the product requirements are not applicable and need not be reached outside the defined region. Even though the merged variant aims to meet even the most stringent users' requirements, in many cases users may prefer to use single algorithm products. For example, in areas where most of the pixels are in flatlands, the user may prefer to use the flatland version in the rare mountain pixels. In other cases, the mountain version may be preferred even in the valleys. Providing three variants also gives users full flexibility to apply their own mountain mask instead of the one used in the merged version.

The flatland algorithm is a multichannel semi-empirical thresholding algorithm. For mountainous areas, spectral thresholding methods is applied to the converted reflectance values gathered from MTG/FCI data. The enhanced spatial and spectral resolution of MTG/FCI will improve snow mapping in areas with small-scale variability, such as mountains, vegetation, and small-scale water bodies.

The flatland and mountainous MTG/FCI Snow Extent product will describe the presence of snow in each MTG/FCI image. In the flatland product each pixel of the FCI image will be classified to one of the several possible classes (snow covered, snow free, unclassified (clouds, darkness etc), water, non-processed). In the mountainous product each pixel of the FCI image will be classified to one of the several possible classes (snow, land, water, cloud) considering the morphological characteristics of snow in mountainous terrain. These intermediate products are then used in the generation of daily products. All available single image (RC) products of one type (flatland/mountain) of the day will be combined to produce the daily flatland and mountain products. The final daily product contains three different product variants (flatland/ mountain/merged) from which the users can select the most suitable for their applications. Details of the algorithm will be described in the ATBD. The merged product uses 6 classifications: snow, no snow, water, cloud, dark and not processed (outside FCI disk).

1.2.2 Principle of sensing

Product SE-D-FCI (*Snow detection (snow mask) by VIS/IR radiometry*) is based on multi-channel analysis of the FCI instrument onboard Meteosat satellites.

The FCI delivers data at a 0.5 - 2 km spatial sampling distance (resolution) at nadir (sub-satellite point the centre of the disc) depending on the channel used. These figures degrade over Europe to 2-4 kilometres. The observing cycle (10 min) enables continuous monitoring of the cloud situation,

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searching for time instants of cloud-free conditions in each time interval (e.g., 24 h). However, since short-wave channels play an essential role in the retrieval algorithm, the useful range of hours (i.e., day light time) depends on the time of year and location of observation.

The flat/forested variant has been developed and integrated in the operational environment in FMI. The mountain variant has been developed by METU.

The product variants from FMI and TSMS both cover the full MTG FCI Disk. Both are included in the final daily SE-D-FCI product. In addition, a merged variant is generated at FMI by combining the information on flat/forest areas from the FMI product and that one on mountainous areas from the TSMS product. Mountainous areas are defined based on the mean altitude and the standard deviation of the slope within $2 \text{ km} \times 2 \text{ km}$ nadir-resolution pixels. A region is classified as mountainous if either the mean altitude exceeds 1000 meters, or the mean altitude is above 700 meters and the standard deviation of the slope is greater than 2. Additionally, each participating country in the EUMETSAT-HSAF project provided feedback to refine and finalize the mountain mask accordingly. The mountain mask is presented in Figure 1.

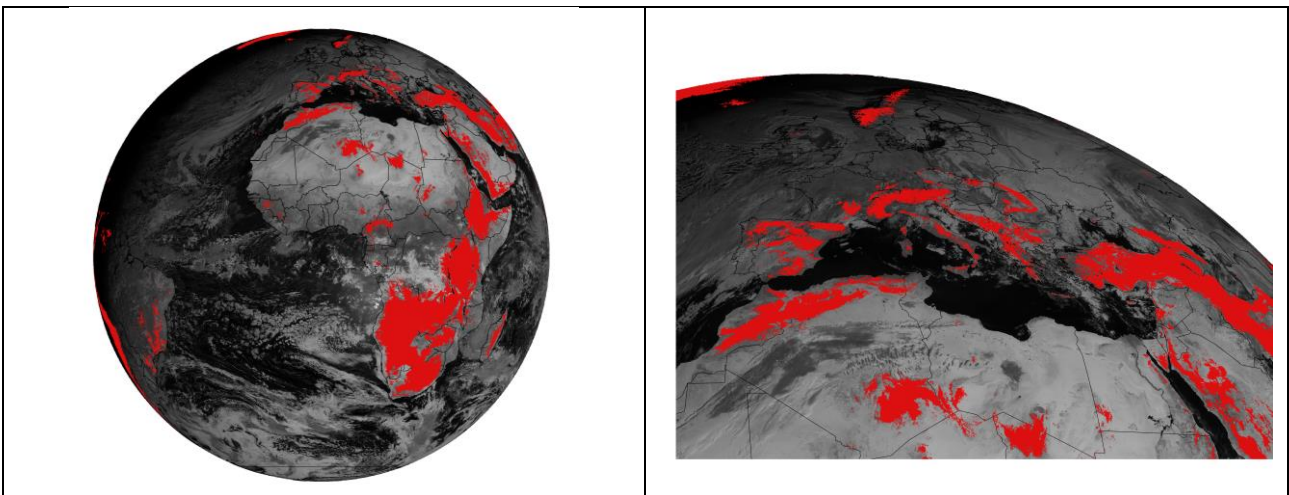


Figure 1 Mask for flat/forested vs mountainous regions (left full disk, right HSAF area)

1.2.3 Status of satellites and instruments

The status of Meteosat Third Generation satellites is shown in Table 1 and Table 2 shows the main features of the FCI instrument.

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Table 1 Current status of Meteosat Third Generation Satellites

Satellite	Launch	End of service	Position	Status	Instrument used in H-SAF
MTG-I1	13.12.2022	TBD	0°E	FDSS and RSS	FCI

Table 2 Main features of the FCI instrument

FCI	Flexible Combined Imager
Satellites	MTG-I (i.e., Meteosat Third Generation, Imager satellites)
Status	Operational
Mission	Multi-purpose imagery and wind derivation by tracking clouds and water vapour features
Instrument type	Multi-purpose imaging VIS/IR radiometer
Scanning technique	N/A (GEO)
Coverage/cycle	Full disk every 10 min. Limited areas in correspondingly shorter time intervals
Resolution (s.s.p.)	0.5 - 2 km nadir depending on channel
Resources	

1.2.4 Highlights of the algorithm

The baseline algorithm for SE-D-FCI processing is described in the ATBD. Only essential elements are highlighted here.

The presence of snow cover exerts a specific and strong influence on the energy and water budgets of the lower atmosphere. For this reason, large-scale automated snow cover mapping from satellite images is very useful. Accurate snow cover data is important for hydrological forecasting of river runoff during the melting season. Snow cover maps can be used as input for numerical weather prediction (NWP) models as well. Additionally, remote sensing of other surface parameters requires information on whether the surface is snow covered. The Algorithm Theoretical Basis Documents (ATBD, available from H SAF web site) contain the detailed description of the different HSAF snow product variant algorithms.

The measured radiances at visible (VIS), near infrared (NIR) and infrared (IR) window wavelengths, as obtained by the MTG/FCI are essentially determined by the spectral characteristics (e.g., radiances, reflectances, emittances, transmittances, temperatures) of land/ocean surfaces and clouds. The snow radiance differs from cloud and snow free land radiances in a characteristic way in the VIS/NIR region. There are several studies about the use of meteorological satellites for the remote sensing of snow. E.g. Siljamo and Hyvärinen (2011) and Siljamo et al (2020) describe the H SAF H31 and H32 snow extent products and there are also the papers by Piazzzi et al. (2019), Surer et al. (2014), Surer and Akyurek (2012).

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The H43 SC is a daily product, which is generated by combining two daily SC products (flatland and mountain). The main algorithms in flatland/mountain variants are used to generate the single image (RC scene) SC products which are then merged to generate the daily flatland/mountain SC variants. Finally, these two variants are merged to produce the daily merged product variant.

Classifications used in each pixel are described in Table 3. The coding table reserves code 50 for use in classification of partial snow cover, but this code is not used in the current product. Partial snow cover classification was available in some earlier H SAF snow extent products (especially H31 and H32), but it was rarely used.

The flatland variant is a pure snow cover product. All land pixels that are neither snow-covered nor snow-free use a single classification (250 unclassified) whether the pixel is affected by darkness, clouds, or classification uncertainty. However, the mountain algorithms separate cloudy and dark unclassified pixels. During merging, all unclassified pixels are classified as cloud and a final darkness limitation based on sun elevation angle is applied. Therefore, H43 merged variant must not be used as a substitute for actual cloud products. It is recommended to use dedicated cloud cover products if high quality cloud cover information is required.

Table 3 Classification values in the H43 product

	H43 merged	H43 flatland	H43 mountain
Description	Value	Value	Value
Snow free surface	0	0	0
Partial snow cover (usage TBD, currently disabled)	50	50	TBD
Total snow covered	100	100	100
Water (sea/lakes/rivers)	200	200	200
Unclassified (dark/cloudy/etc)	-	250	-
Cloud	252	-	252
Dark	253	-	253
Not processed	254	254	254

1.2.5 MTG/FCI SC flatland algorithm

The MTG/FCI flatland snow cover (SC) retrieval is based on multispectral threshold technique applied to each pixel of the image. Detailed description of the snow detection algorithm is in Algorithm Theoretical Basis Document (ATBD). As a Day-1 product the H43 algorithm development relied heavily on the methods used in earlier H31 (MSG/SEVIRI) and H32 (Metop/AVHRR) and similar products and pre-operational FCI data available during the development.

Later, an improved new algorithm will be developed based on actual MTG/FCI observations from longer period. In this work empirical approach will be used with AI and machine learning (if feasible) as a development tool. These improved algorithms will be used in the future H243 MTG/FCI snow extent product.

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In the algorithm MTG/FCI reflectances and brightness temperatures of several channels are used together with estimated land surface temperature (LST) and solar and satellite angles to classify each pixel on land areas. For example, snow and ice can be separated from water clouds by their low reflectance at 1.6 μm or at 3.8 μm channels. Cirrus clouds can be separated using the difference between brightness temperatures at 10.5 μm and 12.3 μm channels. A combination of these and similar characteristics are used to separate snow covered and snow free pixels.

The resulting snow cover map produced from MTG/FCI data contains a classification of each surface pixel or resolution cell into one (and only one) of the following classes: totally snow covered, no snow, unclassified, non-processed and water (sea, lake, river etc.). An additional set of quality/processing flags for each pixel may be included to indicate e.g., product quality and some specific conditions relevant to each pixel.

Figure 2 shows the flowchart of snow cover product generation at Finnish Meteorological Institute. Unit 1 produces the single image snow cover maps from 10-minutely imagery (RC scenes). Unit 2 combines the intermediate RC snow products of each day to a single daily product. After the daily flatland SC has been generated, it is combined with the mountain SC version to produce the final daily H43 SC product.

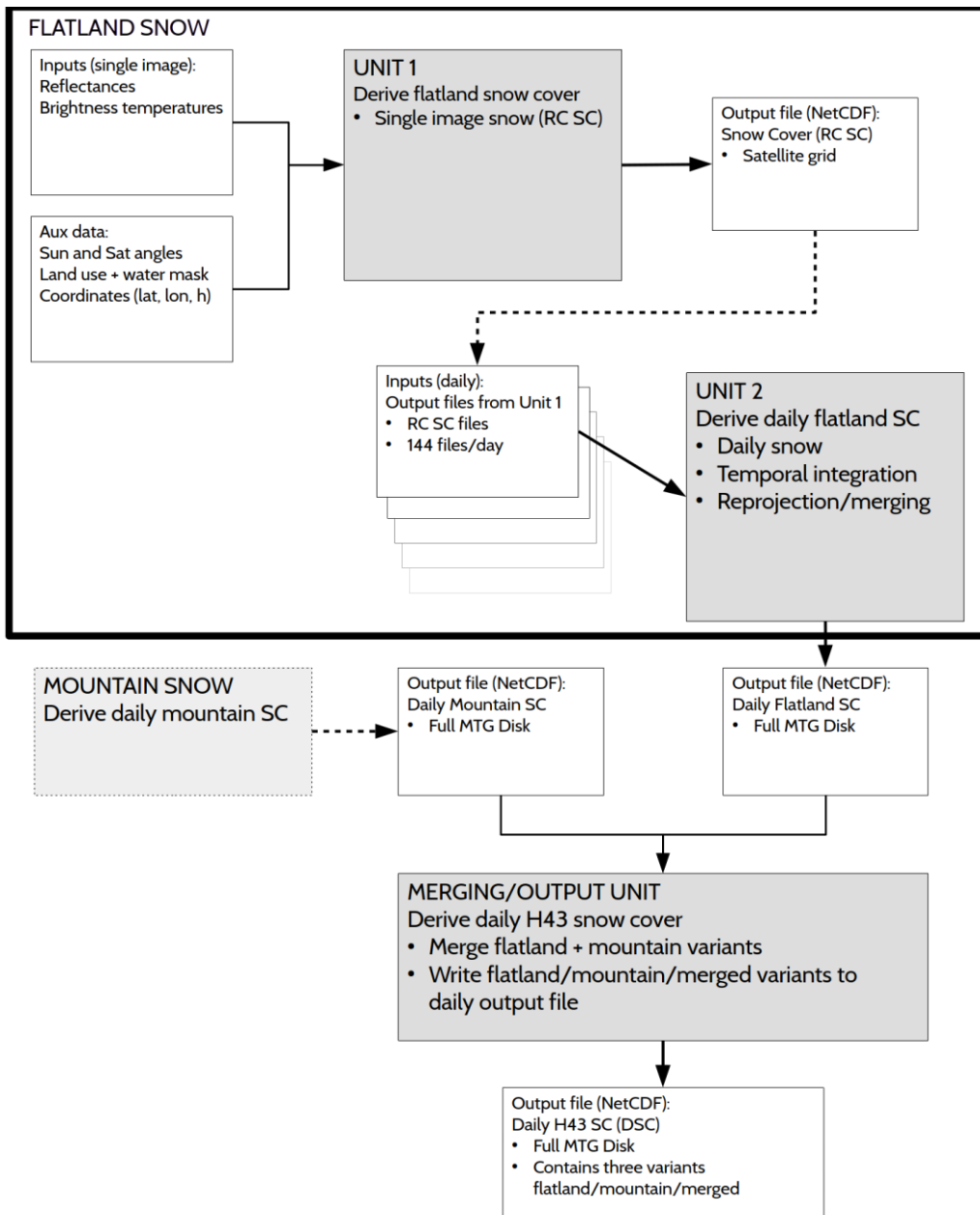


Figure 2 Flow chart of the Snow Recognition processing chain (flatland variant and the daily product)

1.2.5.1 Unit 1: MTG/FCI SC flatland algorithm

The information on snow cover is based mainly on MTG/FCI reflectances and brightness temperatures. Solar and satellite angles and other auxiliary data are used as well.

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In the H43 SC product full snow cover and snow free surface are indicated by intuitive values of 100 and 0, respectively. The benefit is that the same coding can be used in future products, which may provide more detailed snow coverage data.

The data retrieval step produces a full resolution snow cover map, with information on the state of each pixel (snow/no snow), provided the input data are available, and there is sufficient illumination. The pixels which were not classified by any of the rules used in the algorithm are set as unclassified. This includes also most of the cloud covered pixels as there is no separate cloud masking phase in the flatland algorithm. The algorithm is using also some static auxiliary data such as elevation and land use.

1.2.5.2 Unit 2: Generation of daily flatland snow cover

The last step in the flatland MTG/FCI SC algorithm is to produce a 24-hour composite snow cover map using all available single scene snow cover maps. This reduces the effect of clouds obscuring the surface and further reduces the risk of misclassification.

A pixel is classified as snow covered if it is snow covered in all single images (unclassified pixels excluded). Similarly, the pixel is snow free if all observations show that the pixel is snow free. If the observations disagree slightly (there are both snow free and snow-covered observations, but there is a reasonable majority) the more probable alternative is selected. The rules used are described in detail in the ATBD.

The snow cover product derived from MTG/FCI data is generated daily for MTG/FCI full disk. The most obvious limitation of the geostationary product is that almost all the snow-covered pixels are near the edge of detection disk where low viewing angle makes the snow detection challenging.

1.2.6 MTG/FCI mountain algorithm

Snow recognition for mountainous regions through multi-spectral threshold technique has been implemented on VIS and IR satellite imagery from MTG/FCI. Figure 3 presents the processing chain. The algorithm is based on a spectral thresholding method applied on sub-pixel scale of MSG-MTG/FCI images. No atmospheric correction is applied for the images and top of the atmosphere (TOA) values are used in the algorithm. The different spectral characteristics of cloud, snow and land determines the structure of the algorithm. The threshold values for the mountainous areas are collected from the RGB composite images where VIS 0.6 (centred at 0.64 mm), IR 1.6 (centred at 1.64 mm), IR 3.8 (TIR) (centred at 3.8 mm) and IR 10.5 (TIR) (centred at 10.5 mm) are used.

Discriminating cloud and snow pixels is the challenging part in snow cover mapping. In order to get rid of cloud covered pixels, cloud mask (Cma) and cloud type (CT) products of Nowcasting Satellite Application Facilities (SAFNWC) (SAF/NWC/IOP/MFL/SCI/SUM/01 2007: the User Manual for the Cloud Products of the SAFNWC/MSG) have been used. As cloud mask (Cma) cloud filled class (pixel value class 3), indicating the opaque clouds completely filling the IFOV, was used. As cloud types: high opaque and stratiform, very high opaque and stratiform and high semi-transparent thick clouds were used. If the cloud mask and cloud type products of SAFNWC were not available, clouds were determined based on thresholds for channel 1, channel 3, channel 4 and channel 9. In the merged product the cloud and dark pixels are classified as unclassified.

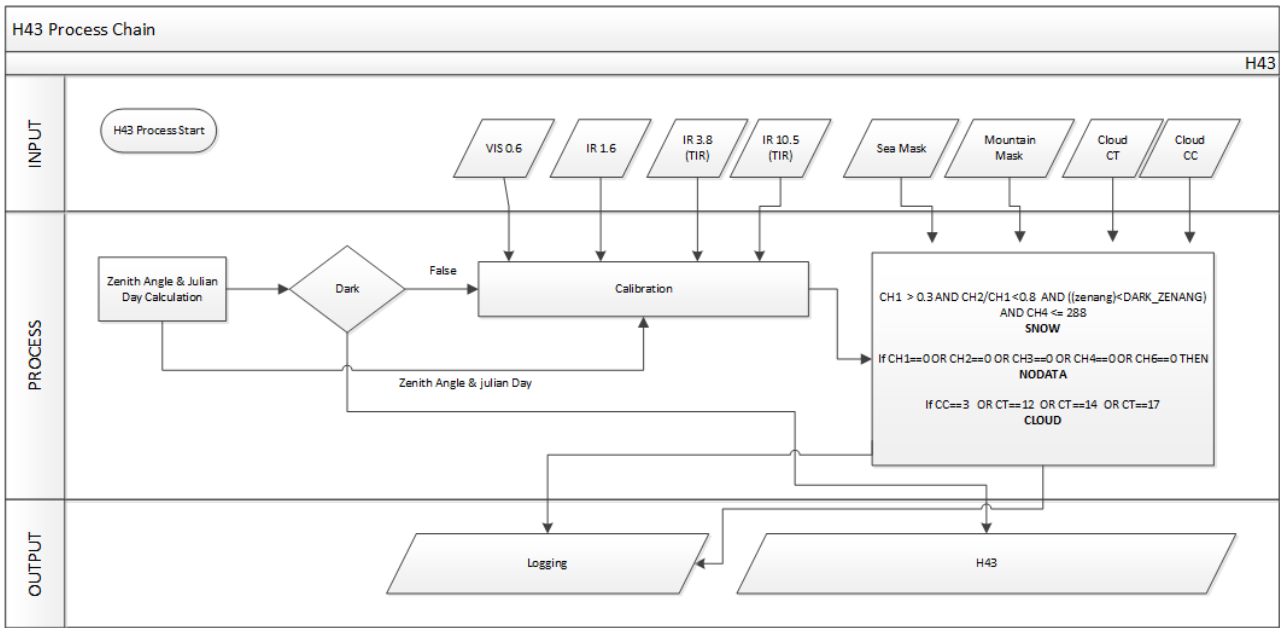
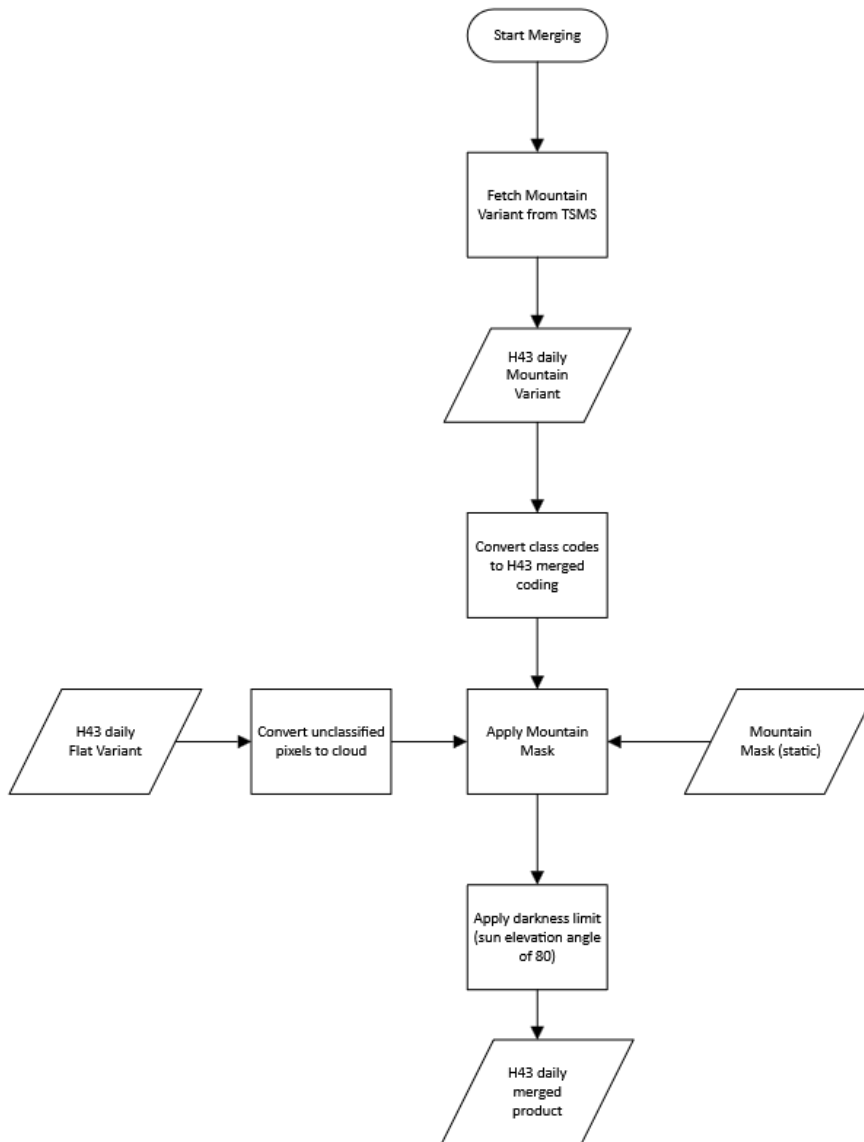


Figure 3 Flow chart of the mountain part of the H43 product at TSMS.

1.2.7 Merging Algorithm

Flat and mountainous variant of the H43 that are explained in previous sections are merged to obtain the final H43 product. Merging is done by utilizing a mountain mask which is shown in Figure 1 Mask for flat/forested vs mountainous regions (left full disk, right HSAF area)

so that flatland pixels are taken from the flat variant and mountainous region pixels are taken from the mountain variant. During the merging process, product codes of all the variants are standardized and a darkness limitation based on sun elevation angle is applied. Flowchart of the merging process is given below in



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Figure 4 Flowchart of the merging process

1.2.8 Architecture of the products generation chain

The architecture of the SE-D-FCI product generation chain is shown in the Figure 5. The SE-D-FCI (H43) snow extent product is processed in two institutes, FMI and TSMS. TSMS is responsible for the production chain of the mountain variant, while FMI produced the flatland variant. The daily product is generated at the FMI where flatland and mountain variants are merged and the final daily product containing all three versions (flatland/mountain/merged) produced and delivered.

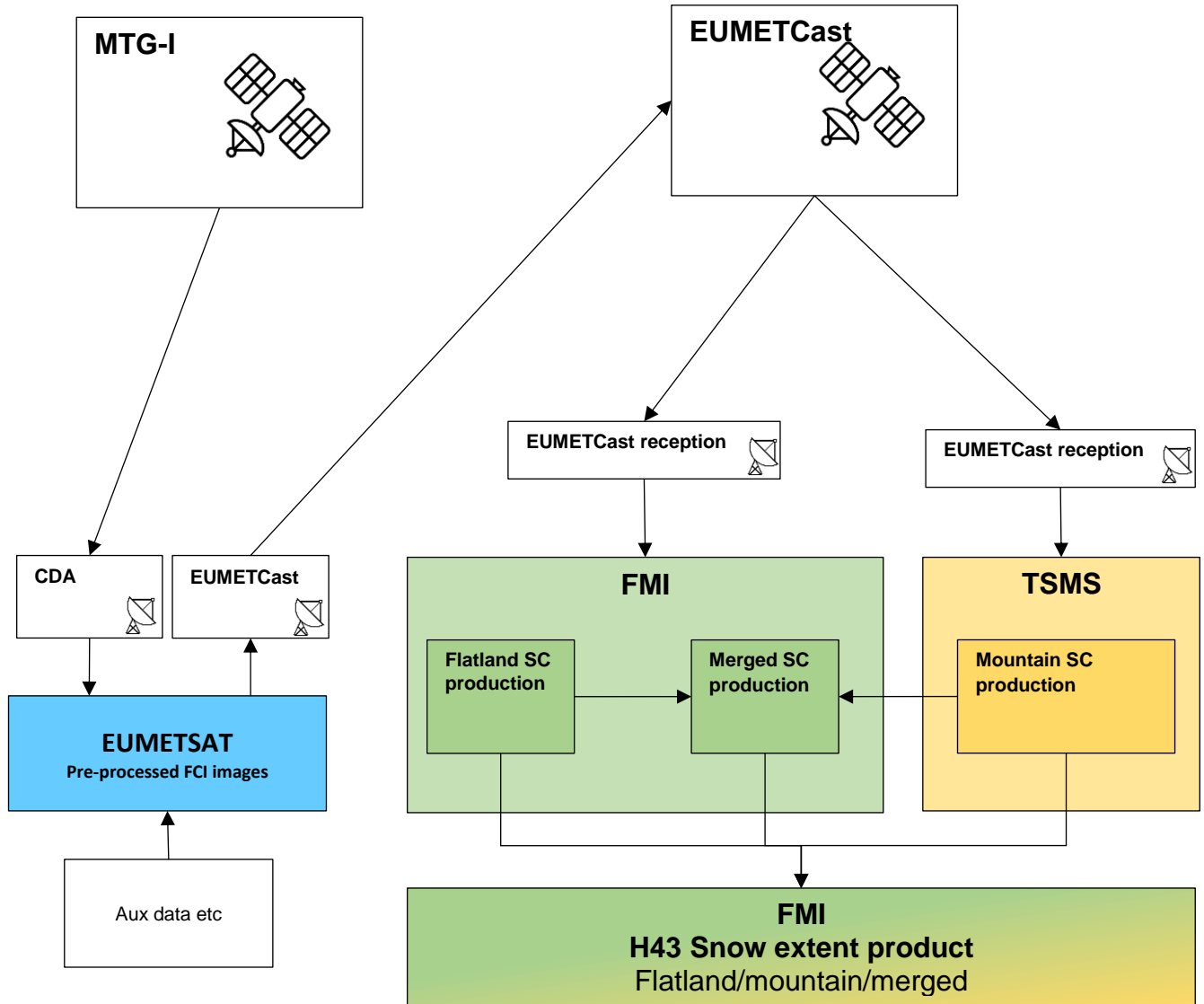


Figure 5 Conceptual design of the H43 production chain

2 Product operational characteristics

2.1 Horizontal resolution and sampling

The product resolution is about 2 km × 2 km at nadir. In Europe the resolution is lower, about 2 to 4 km depending on the region.

2.2 Observing cycle and time sampling

The H43 product is generated daily for the previous 24-hour period.

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2.3 Timeliness

H43 product is available ~2 hours after the last repeat cycle data of the day is received.

2.4 Summary of product characteristics

Product Name	Snow Cover
Product Code	SC
Product Level	Level 3
Description of Product	Snow Cover
Product Parameters	Snow Cover Extent
Coverage	MTG/FCI full disk
Packaging	Full disk
Units	n.a.
Range	0-255
Sampling	pixel by pixel basis
Spatial Resolution	2 km × 2 km at nadir
Accuracy	n.a.
Format	8 bits integer
Frequency of generation	once every day
Size of Product	Full disk

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3 Product validation

3.1 Validation strategy

An overview of the validation results of the H43 snow cover product will be presented here when the first validation results are available. A more detailed report of the validation of the H43 SC product will be available in the Validation report, available from the H SAF web site.

4 Product availability

4.1 Sites

Product can be downloaded after creating a user from [H SAF webpage](#).

4.2 Formats and codes

Each MTG/FCI H43 SC product file contain all three product variants (flat/mountain/merged) to support different applications and user groups. The H43 product is provided in the widely supported NetCDF format (see <https://www.unidata.ucar.edu/software/netcdf/> for more details). The NetCD format allows defining a set of attributes that provide the relevant information about the respective file.

4.3 Description of the files

Data users have access to the following data:

- flatland/mountain/merged full disk snow cover fields
- potentially quality control information field for each data field

The data is coded in NetCDF format. The NetCDF files in the system have the following structure:

- A common set of attributes for all kind of data, containing general information about the data
- A dataset for the parameter values
- Additional datasets for metadata (quality flags to be added).

A detailed description of the attributes (general and common) defined for the product files is given in the Table 4 below.

The Snow Cover product consists of a NetCDF file containing three datasets. The relevant information concerning the data fields is included in NetCDF attributes.

The MTG/FCI-based Snow Cover fields are generated pixel-by-pixel, maintaining the 2 km at nadir resolution of MTG/FCI level 1c data. These correspond to rectified images to 0° longitude, which present a typical geo-reference uncertainty of about 1/3 of a pixel. Data is kept in the native geostationary projection. The coding used is given in Table 3.

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Table 4 Description of the product file

Filename	h43_YYYYMMDD_day_merged.nc.gz
Data bands	merged_sc flat_sc mountain_sc lat lon
Spatial Resolution	2 km at nadir
Shape of the data	5568 × 5568
Data type	8-bit unsigned integer for sc bands 32-bit float for latitude and longitude bands
File size	~140 MB compressed (gzip) ~320 MB uncompressed
Flat values	See Table 3

4.4 Product Quicklooks

Example figures of all MTG/FCI H43 product variants are presented in Figures Figure 6, Figure 7 and Figure 8.

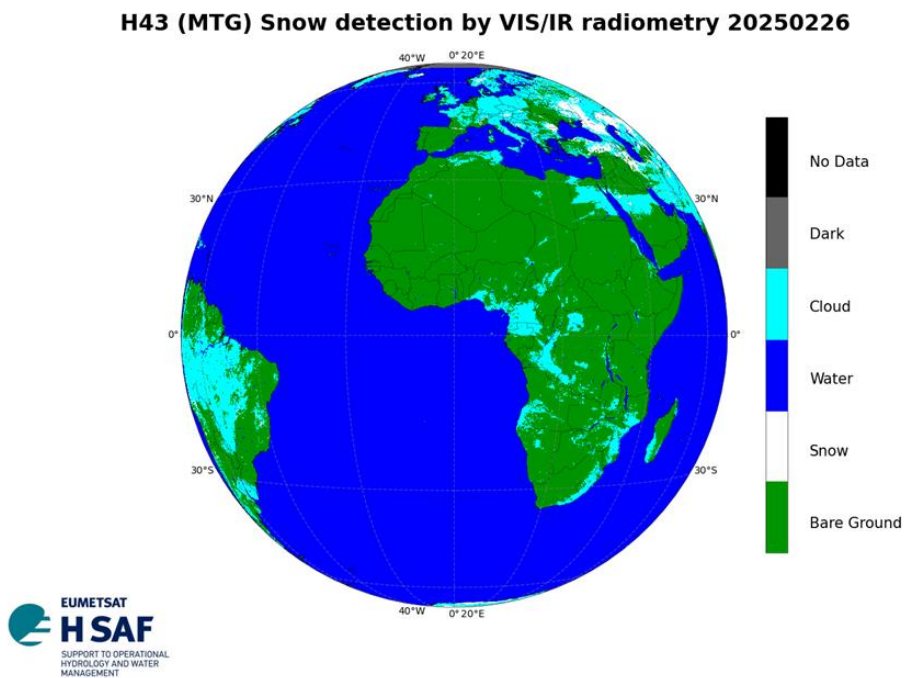


Figure 6 H43 merged variant on February 26, 2025

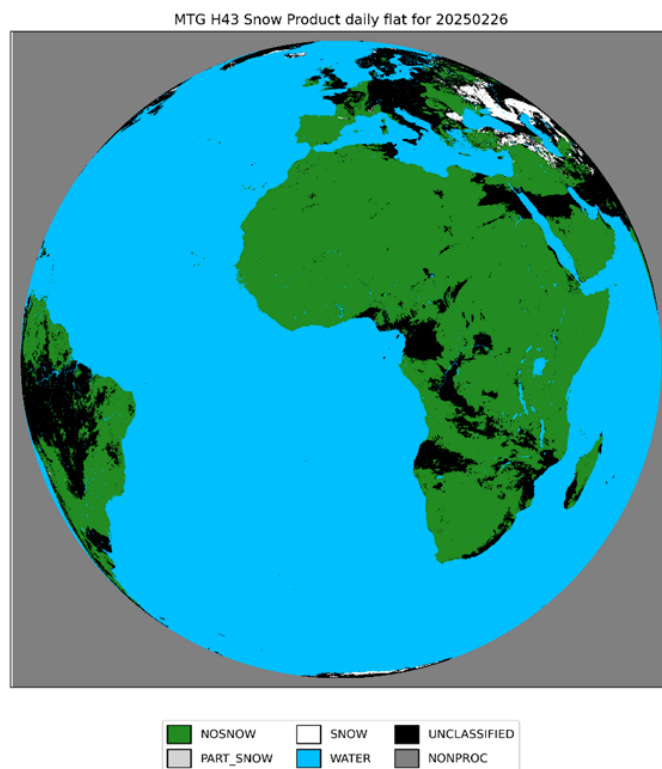


Figure 7 H43 flatland variant on February 26, 2025

H43 (MTG) Snow detection by VIS/IR radiometry 20250226

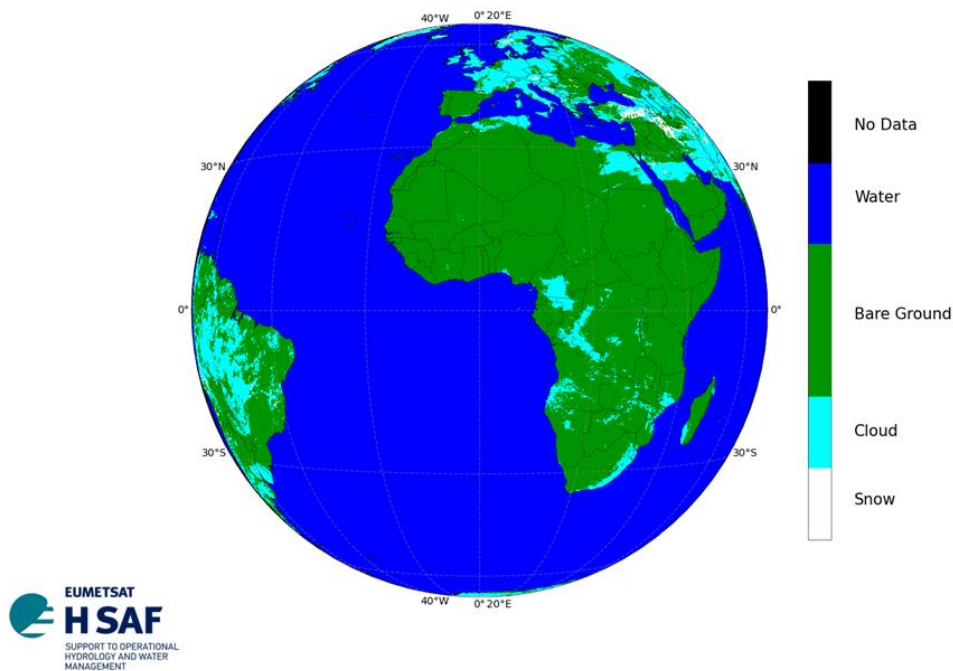


Figure 8 H43 mountain variant on February 26, 2025

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5 Developers

Responsible developers:

Institute	Responsible for:	Name	Email address
Finnish Meteorological Institute (FMI)	Flatland snow and daily merging	Niilo Siljamo	niilo.siljamo@fmi.fi
		Burak Simsek	burak.simsek@fmi.fi
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7 Annex A: Introduction to the H SAF

7.1 The EUMETSAT Satellite Application Facilities

H-SAF is part of the distributed application ground segment of the “European Organization for the Exploitation of Meteorological Satellites (EUMETSAT)”. The application ground segment consists of a “Central Application Facilities” located at EUMETSAT Headquarters, and a network of eight “Satellite Application Facilities (SAFs)”, located and managed by EUMETSAT Member States and dedicated to development and operational activities to provide satellite-derived data to support specific user communities (see Figure 9):

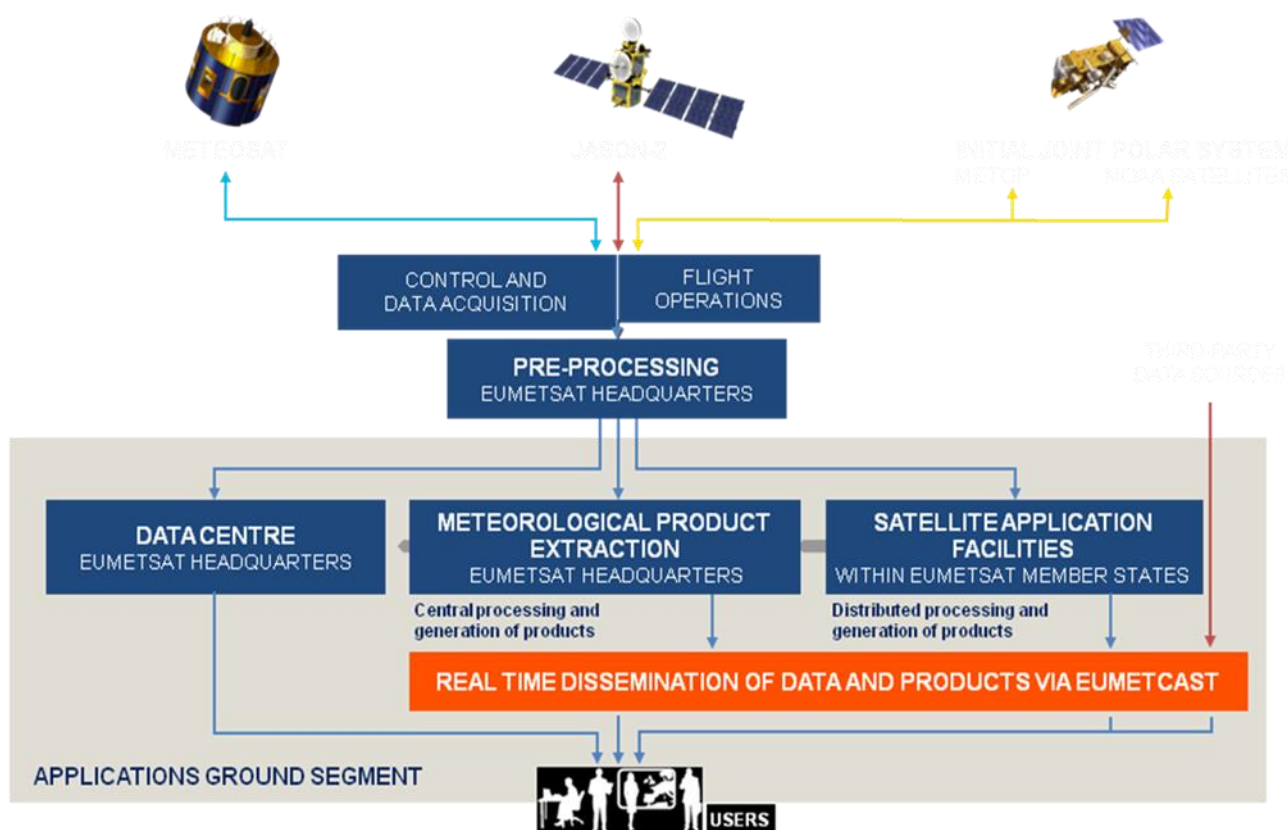


Figure 9 Conceptual scheme of the EUMETSAT Application Ground Segment

Figure here following depicts the composition of the EUMETSAT SAF network, with the indication of each SAF’s specific theme and Leading Entity.

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Figure 10 Current composition of the EUMETSAT SAF Network

7.2 Purpose of the H-SAF

The main objectives of H-SAF are:

- a. *to provide new satellite-derived products* from existing and future satellites with sufficient time and space resolution to satisfy the needs of operational hydrology, by generating, centralizing, archiving and disseminating the identified products:
 - precipitation (liquid, solid, rate, accumulated);
 - soil moisture (at large-scale, at local-scale, at surface, in the roots region);
 - snow parameters (detection, cover, melting conditions, water equivalent);
- b. *to perform independent validation of the usefulness of the products* for fighting against floods, landslides, avalanches, and evaluating water resources; the activity includes:
 - downscaling/upscaling modelling from observed/predicted fields to basin level;
 - fusion of satellite-derived measurements with data from radar and rain gauge networks;

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- assimilation of satellite-derived products in hydrological models;
- assessment of the impact of the new satellite-derived products on hydrological applications.

7.3 Products / Deliveries of the H-SAF

For the full list of the Operational products delivered by H-SAF, and for details on their characteristics, please see H-SAF website hsaf.meteoam.it.

All products are available via EUMETSAT data delivery service (EUMETCast, <http://www.eumetsat.int/website/home/Data/DataDelivery/EUMETCast/index.html>), or via ftp download; they are also published in the H-SAF website hsaf.meteoam.it.

All intellectual property rights of the H-SAF products belong to EUMETSAT. The use of these products is granted to every interested user, free of charge. If you wish to use these products, EUMETSAT's copyright credit must be shown by displaying the words "copyright (year) EUMETSAT" on each of the products used.

7.4 System Overview

H-SAF is led by the Italian Air Force Meteorological Service (ITAF MET) and carried on by a consortium of 21 members from 11 countries (see website: hsaf.meteoam.it for details)

Following major areas can be distinguished within the H-SAF system context:

- Product generation area
- Central Services area (for data archiving, dissemination, catalogue and any other centralized services)
- Validation services area which includes Quality Monitoring/Assessment and Hydrological Impact Validation.

Products generation area is composed of 5 processing centres physically deployed in 5 different countries; these are:

- for precipitation products: ITAF COMET (Italy)
- for soil moisture products: ZAMG (Austria), ECMWF (UK)
- for snow products: TSMS (Turkey), FMI (Finland)

Central area provides systems for archiving and dissemination; located at ITAF COMET (Italy), it is interfaced with the production area through a front-end, in charge of product collecting.

A central archive is aimed to the maintenance of the H-SAF products; it is also located at ITAF COMET.

Validation services provided by H-SAF consists of:

- Hydrovalidation of the products using models (hydrological impact assessment);
- Product validation (Quality Assessment and Monitoring).

Both services are based on country-specific activities such as impact studies (for hydrological study) or product validation and value assessment.

Hydrovalidation service is coordinated by IMWM (Poland), whilst Quality Assessment and Monitoring service is coordinated by DPC (Italy): The Services' activities are performed by experts

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from the national meteorological and hydrological Institutes of Austria, Belgium, Bulgaria, Finland, France, Germany, Hungary, Italy, Poland, Slovakia, Turkey, and from ECMWF.

8 Annex B: Acronyms

AC-SAF	SAF on Atmospheric Composition Monitoring
ATDD	Algorithms Theoretical Definition Document
BfG	Bundesanstalt für Gewässerkunde (in Germany)
CAF	Central Application Facility (of EUMETSAT)
CDOP	Continuous Development-Operations Phase
CM-SAF	SAF on Climate Monitoring
CNMCA	Centro Nazionale di Meteorologia e Climatologia Aeronautica (in Italy)
CNR	Consiglio Nazionale delle Ricerche (of Italy)
CNRS	Centre Nationale de la Recherche Scientifique (of France)
DMSP	Defense Meteorological Satellite Program
DPC	Dipartimento Protezione Civile (of Italy)
ECMWF	European Centre for Medium-range Weather Forecasts
EDC	EUMETSAT Data Centre, previously known as U-MARF
EUMETCast	EUMETSAT’s Broadcast System for Environmental Data
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
FMI	Finnish Meteorological Institute
FTP	File Transfer Protocol
GEO	Geostationary Earth Orbit
HDF	Hierarchical Data Format
H-SAF	SAF on Support to Operational Hydrology and Water Management
IFOV	Instantaneous Field Of View
IMWM	Institute of Meteorology and Water Management (in Poland)
IR	Infra Red
IRM	Institut Royal Météorologique (of Belgium) (alternative of RMI)
LEO	Low Earth Orbit
LSA-SAF	SAF on Land Surface Analysis
LST	Local Satellite Time (if referred to time) or Land Surface Temperature (if referred to temperature)
METU	Middle East Technical University (in Turkey)
MSG	Meteosat Second Generation (Meteosat 8, 9, 10, 11)
MTG	Meteosat Third Generation
NWC-SAF	SAF in support to Nowcasting & Very Short Range Forecasting
NWP	Numerical Weather Prediction
NWP-SAF	SAF on Numerical Weather Prediction
ORR	Operations Readiness Review
OSI-SAF	SAF on Ocean and Sea Ice
Pixel	Picture element
PUM	Product User Manual
PVR	Product Validation Report
RMI	Royal Meteorological Institute (of Belgium) (alternative of IRM)
ROM-SAF	SAF on Radio Occultation Meteorology
SAF	Satellite Application Facility
SEVIRI	Spinning Enhanced Visible and Infra-Red Imager (on Meteosat from 8 onwards)
SSM/I	Special Sensor Microwave / Imager (on DMSP up to F-15)
SSMIS	Special Sensor Microwave Imager/Sounder (on DMSP starting with S-16)
SYKE	Suomen ympäristökeskus (Finnish Environment Institute)
T _{Bb}	Equivalent Blackbody Temperature (used for IR)
TSMS	Turkish State Meteorological Service
U-MARF	Unified Meteorological Archive and Retrieval Facility
URD	User Requirements Document

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UTC	Universal Coordinated Time
VIS	Visible
ZAMG	Zentralanstalt für Meteorologie und Geodynamik (of Austria)