European Satellite Snow Monitoring Activities

Overview

Title	**EUMETSAT Satellite Application Facility on Support to Operational Hydrology and Water Management (H SAF)**
Objective	*The objective of the H SAF is 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 mean of the following 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);* *Furthermore, H SAF performs independent validation of the usefulness of the new 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 raingauge networks;* • *assimilation of satellite-derived products in hydrological models;* • *assessment of the impact of the new satellite-derived products on hydrological applications.* http://hsaf.meteoam.it/
Programme	*The EUMETSAT H SAF is integral part of the EUMETSAT Application Ground Segment consisting of the Central Facilities at the EUMETSAT Headquarter in Darmstadt and the Satellite Application Facility Network.* *The SAF is co-funded by EUMETSAT and the SAF consortium members. The EUMETSAT funding is allocated as part of the mandatory satellite programmes (currently MTG).*
Sustainability	*The current phase (CDOP-2) covers the years 2012-2017 and is funded through the Meteosat Third Generation (MTG) Programme.* *The funding for a follow on phase (CDOP-3) covering 2017-2022 is already allocated within the MTG Programme as well.* *The funding for further SAF Network phases beyond 2022 is planned to*

	be part of the EUMETSAT Polar System Second Generation Programme (EPS-SG), which is currently under the approval process.

Individual Snow Products

Product Name	***Snowfall intensity (H22, PR-OBS-10)***
Description	Threshold method calibrated with mid- and high-latitude radar dataset. Requirements: POD (≥ 1 mm/h) 0.6 FAR (≥ 1 mm/h) 0.4 Validation against radar and rain gauges Product in development, expected finalization : 2016
Spatial Coverage	H-SAF area (25°N to 75°N latitude, 25°W to 45°E longitude) extended to Africa and southern Atlantic
Temporal Coverage	NRT, timeliness 2.5h
Producers	CNR Istituto di Scienze dell'Atmosfera e del Clima
Data Source(s)	AMSU-A/B on NOAA AMSU-A and MHS on EPS MHS (Metop, NOAA 18/19)
Data Policy	Free and open for all, subject to registration
Source	http://hsaf.meteoam.it/ EUMETCast us_hsaf@meteoam.it

Product Name	**Snow detection (snow mask) by VIS/IR radiometry (H10, SN-OBS-1)**
Description	Binary map of snow / no-snow situation. VIS/IR images from GEO are used, based on thresholding of several channels of SEVIRI. Different methods used for flat/forested and mountainous regions.daylight product, output result every 24h Requirements: • Probability Of Detection (POD): Flat / Forested areas: 85 % Mountainous areas: 70% • False Alarm Rate (FAR): Flat / Forested areas: 15 %, Mountainous areas: 20% Validation against snow observing stations Product status: Operational
Spatial Coverage	H-SAF area (25°N to 75°N latitude, 25°W to 45°E longitude)
Temporal Coverage	NRT, timeliness 30min
Producers	FMI/TSMS
Data Source(s)	MSG/SEVIRI
Data Policy	Free and open for all, subject to registration
Source	http://hsaf.meteoam.it/ EUMETCast us_hsaf@meteoam.it

Product Name	**Snow status (dry/wet) by MW radiometry (H11, SN-OBS-2)**
Description	status of the snow mantle, whether it is wet or dry and, in time series, thawing or freezing. Multi-channel MW observations are used (middle frequencies), and the algorithm is based on thresholding. In order to remove ambiguity between wet snow and bare soil, use is made of product SN-OBS-1 for preventive snow recognition, and of exploitation of change detection Requirements: • Hit Rate (HR): 80 % • False Alarm Rate (FAR): 10 % Validation against snow observing stations Product in Development. Finalization expected 2013
Spatial Coverage	H-SAF area (25°N to 75°N latitude, 25°W to 45°E longitude)
Temporal Coverage	NRT , timeliness 6h
Producers	FMI/TSMS
Data Source(s)	SSMIS on DMSP
Data Policy	Free and open for all, subject to registration
Source	http://hsaf.meteoam.it/ EUMETCast us_hsaf@meteoam.it

Product Name	**Effective snow cover by VIS/IR radiometry (H12, SN-OBS-3)**
Description	Multichannel (VIS, NIR, IR) analysis Requirement: 65% overall accuracy Validation against snow observing stations Product status: In development Finalisation expected 2012
Spatial Coverage	H-SAF area (25°N to 75°N latitude, 25°W to 45°E longitude)
Temporal Coverage	NRT timeliness 30min
Producers	FMI/TSMS
Data Source(s)	AVHRR NOAA and Metop
Data Policy	Free and open for all, subject to registration
Source	http://hsaf.meteoam.it/ EUMETCast us_hsaf@meteoam.it

Product Name	**Snow water equivalent by MW radiometry (H13, SN-OBS-4)**
Description	Maps of snow water equivalent derived from MW measurements sensitive to snow thickness and density. Algorithm is based on assimilating MW brightness temperatures of several channels at frequencies with different penetration in snow, into a first-guess field built by the (sparse) network of stations measuring snow depth. Requirements: • Flat / Forested areas: 20mm • Mountainous areas: 25mm Validation against Snow observing stations
Spatial Coverage	H-SAF area (25°N to 75°N latitude, 25°W to 45°E longitude)
Temporal Coverage	NRT, timeliness 6h
Producers	FMI/TSMS
Data Source(s)	SSMIS on DMSP
Data Policy	Free and open for all, subject to registration
Source	http://hsaf.meteoam.it/ EUMETCast us_hsaf@meteoam.it

Product Name	**Snow detection for flat land (snow mask) by VIS/NIR of SEVIRI (H31, SN-OBS-0G)**
Description	Multichannel (VIS, NIR, IR) analysis Requirements: • False Alarm: 15% • Hit Rate: 80% Validation against Synop and MODIS Product status: operational
Spatial Coverage	MSG disk
Temporal Coverage	NRT, timeliness 3h
Producers	FMI
Data Source(s)	MSG SEVIRI
Data Policy	Free and open for all, subject to registration
Source	LSA SAF (www.landsaf.meteo.pt) EUMETCast helpdesk.landsaf@meteo.pt

Product Name	**Snow detection for flat land (snow mask) by VIS/NIR of AVHRR (H32, SN-OBS-0P)**
Description	Algorithm based on multichannel (VIS, NIR, IR) analysis Requirements: • False Alarm: 15% • Hit Rate: 80% Product status: In development Finalisation expected 2015
Spatial Coverage	global
Temporal Coverage	NRT timeliness 3h
Producers	FMI
Data Source(s)	AVHRR on Metop
Data Policy	Free and open for all, subject to registration
Source	*LSA SAF (www.landsaf.meteo.pt)* *EUMETCast* helpdesk.landsaf@meteo.pt

Product Name	**Snow detection (snow mask) by VIS/NIR of SEVIRI (H34, SN-OBS-1G)**
Description	Algorithm based on H SAF products H10 and H31. Requirements: • False Alarm: 15% • Hit Rate: 80% Validation against snow observing stations Product status: in development Finalisation expected 2016
Spatial Coverage	MSG disk
Temporal Coverage	NRT timeliness 3h
Producers	FMI, TSMS
Data Source(s)	MSG SEVIRI
Data Policy	Free and open for all, subject to registration
Source	http://hsaf.meteoam.it/ EUMETCast us_hsaf@meteoam.it

Product Name	**Snow detection (snow mask) and Effective snow cover by VIS/NIR of AVHRR (H35, SN-OBS-1P)**
Description	The combined effect, within a product resolution element, of fractional snow cover and other reflective contributors is used to estimate the fractional cover at resolution element level. The algorithm is based on multi-channel analysis of AVHRR, the most important being those in short-wave, thus the product is generated in daylight. Requirement: 65% overall accuracy Validation against snow observing stations Product status: In development Finalisation expected 2016
Spatial Coverage	global
Temporal Coverage	NRT, timeliness 30 min
Producers	FMI/TSMS
Data Source(s)	AVHRR (NOAA, Metop)
Data Policy	Free and open for all, subject to registration
Source	http://hsaf.meteoam.it/ EUMETCast us_hsaf@meteoam.it

Product Name	**Snow detection (snow mask) by VIS/NIR of MTG FCI (H43, SN-OBS-0G-FCI)**
Description	Multichannel (VIS, NIR, IR) analysis Product status: In development Finalisation expected: 2020
Spatial Coverage	MTG disk
Temporal Coverage	NRT
Producers	FMI/TSMS
Data Source(s)	MTG FCI
Data Policy	Free and open for all, subject to registration
Source	http://hsaf.meteoam.it/ EUMETCast us_hsaf@meteoam.it