# SAF for Land Surface Analysis
# LSA-SAF (Land SAF)

# Product Output Format Document
# Version 2.3

Reference Number: SAF/LAND/IM/POF/2.3

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## DOCUMENT SIGNATURE TABLE

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| Approved by: | LSA-SAF Project Manager (IM) | 03-10-2006 | |

## DOCUMENTATION CHANGE RECORD

| Issue / Revision | Date | Description: |
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| Version 1.0 | 31-05-2004 | Creation |
| Version 1.2 | 01/11/2004 | Version for SIV(V)RR-2<br><br>Changes due to SIV(V)RR-1 RIDs:<br>➢ RID 003: Appendix A updated.<br><br>Changes due to internal reviewing process:<br>➢ Document version, release date, headers and footers<br><br>All internal changes performed are documented in Edisoft/Skysoft change proposals:<br><br>    09077-084.NCR |
| Version 1.4 | 03/06/2005 | Changes in HDF5 attribute "MISSING_VALUE" |
| Version 1.6 | | Changes due to ORR1 RID 19:<br>➢ Update Appendix A and Table 5 to correct the incoherencies between UMARF TEN 30 and POF document. |
| Version 1.8 | 18-09-2006 | Correct a bug on REGION Attribute<br>Changes in the dissemination media and output formats. |
| Version 1.9 | 03-10-2006 | Clarify the meaning of "SCALING_FACTOR" & "OFFSET" |
| Version 2.1 | 09-11-2007 | • Put AIID attribute in bold in Table8.<br>• Clarify the meaning of SPECTRAL_CHANNEL_ID attribute<br>• Describe units [radians] for CFAC & LFAC attributes<br>• Add new attributes: MEAN_SSLAT, MEAN_SSLON and PLANNED_CHAN_PROCESSING<br>• Re-define the description & allowed values of several attributes.<br>• Re-arrange the document to accommodate EPS based products. |
| Version 2.2 | 07-03-2008 | • Minor modifications following ORR-A Part 1 |
| Version 2.3 | 11-11-2009 | • Changes on HDF5 documentation link |

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# 1  Introduction

## 1.1  Purpose

The strategy underneath the format specification applicable for the LSA-SAF system was to define a common data format that could be transversally used within the whole application. The idea is to define a data format that can be applied not only to the system and products, but also to all its internal files (internal products and pre-processed input data).

This document specifies the used formats within the LSA-SAF context and gives a detailed description of files contents. It is addressed to end users of the LSA-SAF user community as well as products developers. Both internal and externally available LSA SAF products follow the guidelines specified in this document.

Some of the information provided in this document was included previously in ADD [RD.2] Appendix J. After MTR-2 and resulting from a reorganisation on the provided information it was decided to keep a centralised document where all relevant information related to the LSA-SAF data formats could be found – this document. As a consequence a reference to this document was inserted in the previously mentioned ADD appendix.

## 1.2  LSA-SAF System Overview

The LSA-SAF system produces operationally a set of products based on geostationary and polar orbit satellite data for land pixels. The geostationary based products cover the earth disk centred in the sub-satellite point. For the case of MSG the disk is split into 4 geographical areas called **Euro** (Europe), **NAfr** (Northern Africa), **SAfr** (Southern Africa) and **SAme** (Southern America). The polar orbit based products are generated in pieces of orbit called **PDU** (Product Dissemination Unit). Besides these geographical areas other can be used such as **Full** for global data.

The processing level definition determines how far a product is from the original images. For LSA-SAF products the following levels are applied:

**02** – For products based on level 1.5 images.

**03** – For products based in time composites and for products that do not use directly satellite images as inputs.

**04** – For products based on models.

Concerning the development status of the products [RD.5] the following categories are used to describe them:

1.  **Operational:** products or software packages with documented non-relevant limitations that largely satisfy the requirements applicable and/or have been considered by the Steering Group mature enough for distribution to users.
2.  **Pre-Operational:** Products or software packages with documented limitations that are able to satisfy the majority of applicable requirements and/or have been considered by the relevant Steering Group suitable for distribution to users.

3. **Demonstrational:** products or software packages that are provided to users without any commitment on the quality or availability of the service and have been considered by the Steering Group to be useful to be disseminated in order to enabling users to test the product and to provide feedback.
4. **In Development**: Products or software packages that are in development and not yet available to users
5. **Released**: Data sets that are made available to users, satisfying largely the applicable requirements, with documented characteristics, validations results and limitations, and that are considered by the relevant Steering Group mature enough for the targeted applications.
6. **Superseded**: products or software packages that have been (pre-) operationally provided to users but are not (pre-) operational anymore because the information of same or superior quality and/or coverage is provided with another product and considered by the relevant Steering Group as not useful for being continuously provided to the users.
7. **Discontinued**: products or software packages that have been previously (pre-) operationally provided to users but are not (pre-) operational anymore and are considered by the relevant Steering Group as not useful for further dissemination.
8. **Internal**: Products that are only internally used in the LSA SAF.

Once a product is declared superseded or discontinued, its generation on a regular basis will stop. Archived data may still be disseminated via off-line, if requested.

The generated products and the respective classification in terms of development status of MSG based products as well as the processing level are listed in the Table1.

| Acronym | Product | Development Status | Processing Level |
|---|---|---|---|
| ALBEDO | Surface Albedo | Pre-operational | 03 |
| BRDF | Bi-directional Reflectance Distribution Function | Internal | - |
| DSLF | Downwelling Surface Longwave Fluxes | Operational | 03 |
| DSSF | Downwelling Surface Shortwave Fluxes | Pre-operational | 03 |
| EM | Surface Emissivity | Internal | - |
| ET | Evapotranspiration | In development | 04 |
| fAPAR | fraction of Absorbed Photosynthetically Active Radiation | Demonstrational | 03 |
| FRP&FRE | Fire Radiative Power & Energy | In development | 03 |
| FVC | Fractional Vegetation Cover | Demonstrational | 03 |
| LAI | Leaf Area Index | Demonstrational | 03 |
| LST | Land Surface Temperature | Pre-operational | 02 |
| RFM | Risk fire manager | Demonstrational | 04 |
| SA | Solar Angles | Internal | - |
| SC1 | Snow Cover (15min) | Internal | - |
| SC2 | Snow Cover (daily) | Operational | 03 |
| TSP | Thermal Surface Parameter | Internal | 03 |

*Table 1: LSA-SAF MSG based products.*

In terms of data involved in the LSA-SAF products generation and distribution the following rationale applies:

➢ Raw data (not pre-processed) is ingested into the system, pre-processed by dedicated components and archived. Raw data can be in different formats since provide from different sources;

> ➢ After archived the pre-processed data is used by the system algorithms to generate the products.
> ➢ The Demonstrational, Pre- and Operational products are then distributed over the user community through different medias in HDF5 format.

## 1.3 Scope

The requirements on the LSA-SAF system in terms of products content, products format and distribution are expressed in the Software Requirements Document (SRD) [RD.1]. These are the bases for establishing the data format applicable to the system.

As it can be seen a myriad of different formats exist in LSA-SAF system entrance. To optimise the system and to assure data consistency, an internal data format is essential. The idea is to impose that inside the LSA-SAF all data, both input and output, shall comply with the established internal format. Only the components dealing with data ingestion deal with different data formats.

The HDF5 data format was selected as the LSA-SAF internal and output data format because:

> ➢ It is compliant with all system data format drivers;
> ➢ It is a mature format, adequate to be used with scientific data;
> ➢ IM experience in working with HDF5 data will ease the associated development activities.

## 2 Product Format Drivers

The LSA-SAF internal data format was established taken into consideration the following drivers:

| SRD Requirement | Requirement text |
|---|---|
| SR-DS-PO-0100 | The ordered products shall be delivered to users using, as much as possible, a file format independent of hardware, software environment, tools, etc. Standard file format HDF5 will be used whenever it's met all the requirements needed for the product file format. |

*Table 2: LSA-SAF product format definition design drivers*

# 3 Raw Input Data Formats

After assessing the LSA-SAF algorithms needs it can be observed that input data ingested in the LSA-SAF system can be logically grouped as follows: time variant data and time invariant data. The first group comprise all data periodically ingested in the system like the satellite images, the SAF NWC products and the ECMWF forecasts. The time invariant group encompasses all static (or quasi-static) data like climatological data, land/water masks, land cover maps and digital elevation model, for example.

The following table summarises the LSA-SAF system inputs in terms of external input data providers and the data format applicable to each:

| Group | Data provider | Data | Format |
|---|---|---|---|
| Time variant data | MGS Ground Station | MSG Images | HRIT |
| | EPS | Metop Images | EPS Native |
| | NWC SAF | NWC SAF products | HDF5 |
| | ECMWF | ECMWF forecasts | GRIB |
| Time invariant data | Others[1] | Auxiliary quasi-static[2] data | HDF5, BINARY or ASCII |

*Table 3: Raw input data formats*

The LSA-SAF components responsible for taking care of the system input data ingestion will therefore have the capability of dealing with these different types of data. For data within the time variant group pre-processing routines will prepare the input data and assure the conversion to HDF5, when applicable (note that the NWC SAF outputs are already made available to the LSA-SAF in the desired format). For all other remaining input data it will be the LSA-SAF operator responsibility to insert them into the system, following a manual procedure, in order to make them available to the system processing chain.

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[1] This will encompass all other input data provided by external data sources different from the ECMWF, MSG images and NWC SAF.
[2] This quasi-static term means that the input data grouped under this category is not expected to vary significantly over time. This is due to the fact that the system operator inserts this input data in the LSA-SAF system manually and therefore it would be impractical to have highly time variant data considered here.

# 4   LSA-SAF Internal Format Definition

The internal data format for the LSA-SAF system is HDF5 [RD.3]. End products, internal products and input data files (already pre-processed) are in the same format and have the same structure.

## 4.1   File Structure

The HDF5 files in LSA-SAF system have the following structure:

- A common set of attributes for all kind of data, containing general information about the data (including metadata compliant with U-MARF requirements [RD.4]);
- A dataset for the parameter values;
- Additional datasets for metadata (e.g., quality flags).

In this context a dataset is composed by a set of common attributes and a space for the data. The datasets might have different dimensions and different number of bytes per pixel (1 or 2 bytes).

Each file contains a single product or parameter and the respective metadata although one product can be composed by more than one file, e.g. FRP&FRE product. Figure 1 shows an example of LSA-SAF files structure for the albedo product.
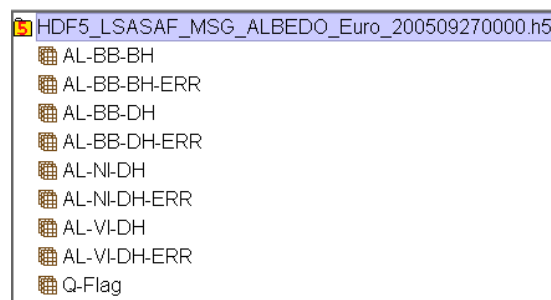


*Figure 1: Example of LSA-SAF files structure*

The set of general attributes to be part of all LSA-SAF files, and their possible values, are described in Table 5. The common attributes for the datasets are described in Table 6.

## 4.2 Data Types

The data types to be used in HDF5 files are given in the table below.

| Data Type | HDF5 Predefined Data Type |
|---|---|
| Int | H5T_NATIVE_INTEGER |
| Real | H5T_IEEE_F64BE or H5T_IEEE_F64LE<br><br>(Depends on the machine where the file is created) |
| String | H5T_NATIVE_CHARACTER |

Table 4: Data types for the HDF5 LSA-SAF files

## 4.3 Metadata

Hereafter the following naming convention applies:
{GOES}     =     'GOES-10', 'GOES-11', 'GOES-12',...
{METOP}    =     'M01', 'M02', 'M03',...
{MSG}      =     'MSG1', 'MSG2', 'MSG3',...
{NOAA}     =     'N15', 'N16', 'N17', 'N18', 'N19',...
{TERRA}    =     MODIS
{AQUA}     =     MODIS
{MTSAT}    =     ...
{COMS}     =     ...

| Attribute | UMARF Short Name | Description | Data Type | Allowed Values |
|---|---|---|---|---|
| SAF | - | SAF package | String<3> | LSA |
| CENTRE | PPRC | Institution (generating/disseminating data) | String<5> | IM-PT |
| **ARCHIVE_FACILITY** | **AARF** | Centre where the data is archived | String<5> | IM-PT |
| **PRODUCT** | **APNA** | Defines the acronym of the product | String<79> | One of: LST, AL, SC, … (see Table 1) |
| PARENT_PRODUCT_NAME | APPN | Array of up to 4 product acronym, upon which the product is based | Array(4) of string<79> | Up to 4 of: LST, AL, SC, … (see Table 1) |
| SPECTRAL_CHANNEL_ID | - | Channel Identification for images and derived products | Int | Depends on the channels used by the product or on the images present in file. 1 bit per channel: 0 if not used, 1 if used. The LSB (MSB) corresponds to the lower (higher) index channel e.g.: 0–No channel 2047–All SEVIRI Channels except (HRV) 24–MetOp Channels 4&5 |
| **PRODUCT_ALGORITHM_VERSION** | **AVPA** **GNFV** **AVBA** | Version of the Algorithm that produces the product. | String<4> | e.g. 1.10 |
| CLOUD_COVERAGE | QCCV | Indicator of the cloud coverage in the product | String<20> | Free text. e.g. NWC-CMa, … "-" No Text |
| OVERALL_QUALITY_FLAG | QQOV | Overall quality flag for the product | String<3> | OK, NOK |
| ASSOCIATED_QUALITY_INFORMATION | QQAI | Several miscellaneous quality indicator for the product | String<511> | Free text. "-" No text |
| REGION_NAME | AAAR | Processed Region Name | String<4> | One of: Euro, NAfr, SAfr, SAme, Full or PDU. |
| COMPRESSION | - | Compression Flag | Int | 0 – Uncompressed 1 – Compressed |
| FIELD_TYPE | - | Data field type | String<255> | One of: Image, Observation, Forecast, Static, Quasi-Static, or Product. |

| Attribute | UMARF Short Name | Description | Data Type | Allowed Values |
|---|---|---|---|---|
| FORECAST_STEP | - | Forecast Step in Hours (Applicable only for Numerical Weather prediction data) | Int | 0, 3, …, 21 |
| NC | - | Maximum number of columns for all datasets in file | Int | |
| NL | - | Maximum number of lines for all datasets in file | Int | |
| **NB_PARAMETERS** | - | Number of datasets in file | Int | |
| **NOMINAL PRODUCT_TIME** | PPST | Nominal Time of the Product. Time in UTC at which product is generated. | String<14> | YYYYMMDDhhmmss |
| **SATELLITE** | ASTI | Platform identifier (identifies the mission and spacecraft from where the product is originated from). | Array[10] of String<9> | {GOES}, {METOP}, {MSG}, {NOAA}, {TERRA}, {AQUA}, {MTSAT}, {COMS} |
| **INSTRUMENT_ID** | AIID | Instrument which acquired the product or the data used by the product | Array [10] of String<6> | 'ATOV', 'ASCA', 'SEVI', 'AVHR', 'GERB', 'GOME', 'HIRS', 'GRAS', 'SCAT', 'Imager', MODIS |
| INSTRUMENT_MODE | SMOD | Scanning mode of the instrument at the time of the acquisition. | String<511> | 'NORTH_POLAR_VIEW', 'SOUTH_POLAR_VIEW', 'NARROW_VIEW', 'NORMAL_VIEW', 'STATIC_VIEW', 'OCCULTATION' |
| **IMAGE_ACQUISITION_TIME** | SNIT | Time in UTC at which the image or product is defined to be valid (or time slot). | String<14> | Start Acquisition Time for EPS & MSG based products and images. Format: YYYYMMDDhhmmss For daily products hhmmss=000000 |
| **ORBIT_TYPE** | **GORT** | Orbit type of the spacecraft from where the product is originated. | String<3> | "GEO" - geo-stationary "LEO" - low-earth (polar), "MMP" - multi-mission |
| PROJECTION_NAME | LMAP | Projection name. For MSG based products the longitude of sub-satellite point (after projection) is added. | String<15> | Free text. e.g. Geos<sub_lon> or Geos(sub_lon) "-" No text |
| NOMINAL_LONG | - | Actual Satellite Nominal Longitude (Applicable only when GORT=GEO) | Real | -180 to 180 0 for GORT /= GEO |
| NOMINAL_LAT | - | Actual Satellite Nominal Latitude (Applicable only when GORT=GEO) | Real | -90 to 90 0 for GORT /= GEO |

| Attribute | UMARF Short Name | Description | Data Type | Allowed Values |
|---|---|---|---|---|
| CFAC | - | Column Scaling Factor for Geo-referencing purposes [radians] (Applicable only when ASTI =MSG) | Int | 0 for ASTI /= MSG |
| LFAC | - | Line Scaling Factor for Geo-referencing purposes [radians] (Applicable only when ASTI =MSG) | Int | 0 for ASTI /= MSG |
| COFF | - | Column Offset for Geo-referencing purposes (Applicable only when ASTI =MSG) | Int | 0 for ASTI /= MSG |
| LOFF | - | Line Offset for Geo-referencing purposes (Applicable only when ASTI =MSG) | Int | 0 for ASTI /= MSG |
| START_ORBIT_NUMBER | LONS | First of two orbit numbers in the EPS product, valid at the starting of the sensing, i.e. at the beginning of a dump (Applicable only when GORT=LEO) | Int | 0 for GORT /= LEO |
| END_ORBIT_NUMBER | LONE | Final of the orbit numbers in the EPS product, valid at the ascending node crossing, i.e. towards the end of a dump (Applicable only when GORT= LEO) | Int | 0 for GORT /= LEO |
| SUB_SATELLITE_POINT_START_LAT | LLAS | Latitude of sub-satellite at start of acquisition (Applicable only when GORT= LEO) | Real | -90 to 90<br>0 for GORT /= LEO |
| SUB_SATELLITE_POINT_START_LON | LLOS | Longitude of sub-satellite at start of acquisition (Applicable only when GORT= LEO) | Real | -180 to 180<br>0 for GORT /= LEO |
| SUB_SATELLITE_POINT_END_LAT | LLAE | Latitude of sub-satellite at end of acquisition (Applicable only when GORT= LEO) | Real | -90 to 90<br>0 for GORT /= LEO |
| SUB_SATELLITE_POINT_END_LON | LLOE | Longitude of sub-satellite at end of acquisition (Applicable only when GORT= LEO) | Real | -180 to 180<br>0 for GORT /= LEO |
| **SENSING_START_TIME** | **SSBT** | UTC date and time at acquisition start of the product. | String<14> | YYYYMMDDhhmmss |
| SENSING_END_TIME | SSST | UTC date and time at acquisition end of the product. | String<14> | YYYYMMDDhhmmss |

| Attribute | UMARF Short Name | Description | Data Type | Allowed Values |
| :--- | :--- | :--- | :--- | :--- |
| PIXEL_SIZE | - | Size of pixel at nadir for image or images based products. Resolution/accuracy for meteorological products. | String<10> | Free text. e.g.: "3.1km" for MSG based products "1.1km" for EPS based products "1Deg" for Regular lat/lon projections "-" No text |
| **GRANULE_TYPE** | **GGTP** | Type description of the item. | String<2> | "DP" - Data Product, "SP" - Spacecraft Telemetry |
| **PROCESSING_LEVEL** | **GPLV** | Processing level applied for generation of the product. | String<2> | "15" for SEVIRI images "1B" for AVHRR images Refer to Table 1 for other products. "-" for other data |
| **PRODUCT_TYPE** | **APNM** | Abbreviated name of the product type for UMARF (Concatenation of SAF name with Product name) | String<8> | One of: LSALST, LSAALBEDO, LSASC2, LSADSSF, ... (see Table 1) |
| PRODUCT_ACTUAL_SIZE | APAS | Actual size of the product in bytes (needed for information to end-users). | Integer > 0, encoded as String<11> | Depends on number of bytes per pixel and on region |
| PROCESSING_MODE | GPMD | Processing mode applied for generation of the product. | String<1> | 'N' := Nominal 'B' := Backlog 'R' := Reprocessing 'V' := Validation |
| DISPOSITION_FLAG | GDMD | Disposition mode applied for generation of the product. | String<1> | 'O' := Operational |
| **TIME_RANGE** | **AATR** | Temporal resolution of product generation | String<20> | 'annual', 'seasonal', 'monthly', 'weekly', 'daily', 'hourly', 'instantaneous', 'twice a day', '10-day', '15-min', '30-min', 3-min, ... |
| STATISTIC_TYPE | AAST | Statistic type applied to the time composites when applicable | String<20> | 'mean', 'sum', 'diurnal cycle', 'frequency',..., or '-' |
| MEAN_SSLAT | - | Mean Sub-Satellite latitude for the coverage area | Real | -90 to 90 |
| MEAN_SSLON | - | Mean Sub-Satellite longitude for the coverage area | Real | -180 to 180 |
| PLANNED_CHAN_PROCESSING | - | Indicates whether the channel were processed in spectral or effective radiance (Applied only to MSG radiances) | Integer | 0 – N/A 1 - Spectral Radiances 2 - Effective Radiances |

| Attribute | UMARF Short Name | Description | Data Type | Allowed Values |
|---|---|---|---|---|
| FIRST_LAT | - | Initial latitude for regular grid projections | | -90 to 90<br>0 for other than grid projections |
| FIRST_LON | - | Initial longitude for regular grid projections | | -180 to 180<br>0 for other than grid projections |

*Table 5: General Attributes of LSA-SAF files. Mandatory attributes are in bold.*

| Attribute | Description | Data Type | Value |
|---|---|---|---|
| CLASS | Dataset type | String | One of: Image, Data, Palette. |
| PRODUCT | Defines the name of the product | String | Depends on dataset<br>One of: LST, AL, SC…, Quality_Flags,… |
| PRODUCT_ID | Product identification accordingly with WMO tables | Int | Depends on dataset |
| **N_ COLS** | Number of columns | Int | Depends on dataset |
| **N_ LINES** | Number of lines | Int | Depends on dataset |
| **NB_BYTES** | Number of bytes per pixel | Int | Depends on dataset |
| SCALING_FACTOR | Scaling factor for the parameter | Real | Depends on dataset. |
| OFFSET | Offset of the scaling factor | Real | $Var = X/Scaling\_Factor+Offset$<br><u>Var</u> is the variable in units given in UNITS attribute;<br><u>X</u> is the value of the parameter in the file. |
| MISSING_VALUE | Missing value | Int | Depends on dataset |
| UNITS | Parameter Unities | String | Free text. |
| CAL_SLOPE | Calibration Constant (used to compute MSG radiances) | Real | As from SEVIRI 1.5 Images.<br>$(Physical\_Unit = CAL\_OFFSET + CAL\_SLOPE \times Pixel\_Count)$. |
| CAL_OFFSET | Calibration Constant (used to compute MSG radiances) | Real | Units are mW m$^{-2}$ sr$^{-1}$ (cm$^{-1}$)$^{-1}$ |

*Table 6: Dataset Attributes. Mandatory attributes in bold.*

## 4.4 File names

The file name of the LSA-SAF internal, input and output files is a string of up to **255 characters** made of **6 fields** separated by **single underscores** with shape:

**FORMAT_FREE_SOURCE_VARIABLE_AREA_DATE**

Where:
- **FORMAT** is HDF5 for all output files;
- **FREE** is a free field;
- **SOURCE** is the data provider (see Table 3);
  For EPS based products: SOURCE=EPS-*Sensor*
- **VARIABLE** is the parameter or product stored in the file;
- **AREA** is one of the processed regions: Euro, NAfr, SAfr, SAme, Full or PDU;
- **DATE** is the time slot or the time at which the product is defined to be valid.
  For MSG based products: YYYYMMDDhhmm
  For EPS based products: YYYYMMDDhhmmss
  For daily products: hhmm(ss)="0000(00)"

Note: If data are disseminated via EUMETCast the FORMAT field is prefixed by "S-LSA_-" string.

# 5 Formats for Products Dissemination

## 5.1 Dissemination Media

Products are disseminated in near real time (NRT) via EUMETCast. Off-line distribution to users is also possible via ftp (http://landsaf.meteo.pt) or by request to helpdesk.landsaf@meteo.pt.

| Media | Acronym | Description |
|---|---|---|
| EUMETCAST | AL | Surface Albedo |
| | LST | Land Surface Temperature |
| | FVC | Fractional Vegetation Cover |
| | LAI | Leaf Area Index |
| | FAPAR | fraction of Absorbed Photosynthetically Active Radiation |
| | SC2 | Snow Cover (daily) |
| | DSSF | Downwelling Surface Shortwave Fluxes |
| | DSLF | Downwelling Surface Longwave Fluxes |
| Offline distribution | All | All products |

*Table 7: Dissemination media*

## 5.2 Disseminated Products Format

### 5.2.1 EUMETCast

This link is a dedicated line to EUMETSAT for subsequent dissemination via the EUMETCast system, with products formats defined in conjunction with EUMETSAT. Currently for meteorological products, EUMETCast is distributing using BUFR and GRIB2, and HDF5. The latter is the format used for LSA SAF products.

### 5.2.2 Offline Distribution

Products may also be disseminated off-line through the LSA SAF website (http://landsaf.meteo.pt) and through requests to the LSA SAF helpdesk (helpdesk.landsaf@meteo.pt) as well as via UMARF catalogue. In any case, products shall be distributed in HDF5 format.

# Appendix A.  Traceability matrix  - UMARF and LSA-SAF metadata

The following table lists the relationship between the LSA-SAF attributes and the UMARF metadata. The bold attributes are the mandatory ones.

| UMARF short name | LSA-SAF attribute name | Notes |
| --- | --- | --- |
| AAAR | REGION_NAME | |
| **AARF** | **ARCHIVE_FACILITY** | |
| AAST | STATISTIC_TYPE | |
| **AATR** | **TIME_RANGE** | |
| ABID | | Spectral Band Ids; N/A for LSA-SAF |
| **AIID** | **INSTRUMENT_ID** | |
| APAS | PRODUCT_ACTUAL_SIZE | |
| **APNA** | **PRODUCT** | |
| **APNM** | **PRODUCT_TYPE** | |
| APPN | PARENT_PRODUCT_NAME | |
| **ASTI** | **SATELLITE_ID** | |
| **AVBA** | **PRODUCT_ALGORITHM_VERSION** | |
| **AVPA** | **PRODUCT_ALGORITHM_VERSION** | |
| **GDMD** | **DISPOSITION_FLAG** | |
| **GGTP** | **GRANULE_TYPE** | |
| **GNFV** | **PRODUCT_ALGORITHM_VERSION** | |
| GNPO | | Native Pixel Order; N/A for LSA-SAF |
| GNSP | | Number of Spectral Bands; N/A for LSA-SAF |
| **GORT** | **ORBIT_TYPE** | |
| **GPLV** | **PROCESSING_LEVEL** | |
| GPMD | PROCESSING_MODE | |
| LLAE | SUB_SATELLITE_POINT_END_LAT | |
| LLAS | SUB_SATELLITE_POINT_START_LAT | |
| LLOE | SUB_SATELLITE_POINT_END_LON | |
| LLOS | SUB_SATELLITE_POINT_START_LON | |
| LMAP | PROJECTION_NAME | |
| LONE | END_ORBIT_NUMBER | |
| LONS | START_ORBIT_NUMBER | |
| LSVT | | Ascending Node Crossing Date and Time; N/A for LSA-SAF |
| OCLA | | Occultation Latitude; N/A for LSA-SAF |
| OCLO | | Occultation Longitude; N/A for LSA-SAF |

| UMARF short name | LSA-SAF attribute name | Notes |
|---|---|---|
| OCSA | | Occultation Satellite ID; N/A for LSA-SAF |
| OCTM | | Occultation Date and Time; N/A for LSA-SAF |
| PPDT | | Processing Start Date and Time; N/A for LSA-SAF |
| PPRC | CENTRE | |
| PPST | NOMINAL_PRODUCT_TIME | |
| QCCV | CLOUD_COVERAGE | |
| QDLC | | Missing Data Count; N/A for LSA-SAF |
| QDLP | | Missing Data Percentage; N/A for LSA-SAF |
| QDRC | | Degraded Record Count; N/A for LSA-SAF |
| QDRP | | Degraded Record Percentage; N/A for LSA-SAF |
| QQAI | ASSOCIATED_QUALITY_INFORMATION | |
| QQOV | OVERALL_QUALITY_FLAG | |
| RRBT | | Reception Start Date and Time; N/A for LSA-SAF |
| RRCC | | Receiving Centre; N/A for LSA-SAF |
| RRST | | *Ibid.* End Date and Time; N/A for LSA-SAF |
| SMOD | INSTRUMENT_MODE | |
| **SNIT** | **IMAGE_ACQUISITION_TIME** | |
| **SSBT** | **SENSING_START_TIME** | |
| SSST | SENSING_END_TIME | |
| UUDT | | Ingestion Date and Time; N/A for LSA-SAF |

*Table 8: UMARF to LSA-SAF attributes traceability matrix*

# 6   Reference documents

[RD.1]   LSA-SAF (Land SAF) System/Software Requirements Document (SRD)
Ref.: SAF/LAND/IM/SRD/

[RD.2]   LSA-SAF (Land SAF) Architectural Design Document (ADD)
Ref.: SAF/LAND/IM/ADD/

[RD.3]   HDF5 File Format Specification
Ref.: http://www.hdfgroup.org/HDF5/doc/H5.format.html

[RD.4]   UMARF SAF Metadata Definition
Ref.: EUM/UMA/TEN/030/

[RD.5]   Project Plan
Ref.: SAF/LAND/IM/PP/

# Annex A – Definitions and acronyms

HDF           Hierarchical Data Format
LSB           Lower Significant Bit
IOP           Initial Operations Phase
MSB           Most Significant Bit
RD            Reference Document
RMDCN         Regional Meteorological Data Communication Network
U-MARF        Unified Meteorological Archive and Retrieval Facility
WMO           World Meteorological Organization

**Attribute**   A small dataset that can be used to describe a specific characteristic of the data stored in the same file.
**Dataset**   A multi-dimensional array of data elements. A dataset can support several attributes.
**HDF5 file**   A container for storing datasets and attributes in Hierarchical Data Format.

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