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# Metadata guidelines for the ESA Campaign Data Base (CDB)

## Version 0.02

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# Preface

The ESA Cal/Val database was developed and implemented at NILU to provide ENVISAT scientist with a common framework and repository for exchange of correlative data, mainly from ground based measurements. The experience from this activity led to a new ESA initiative to develop a more general database, the ESA Campaign Database (CDB). This system is a generalisation and further development of the Cal/Val system used for some ENVISAT calibration and validation campaigns. We have tried to keep the differences to a minimum, to make the transition easy for the user community of the original system. The CDB includes all data and metadata definitions from the previous Cal/Val data centre, but is able to handle data from all ESA campaigns. It is a system for storing and indexing complex data sets from a multitude of sciences, and is no longer a database for correlative data only. Addition of new functionality or redesign of existing components will be an evolutionary process in co-operation with ESA and user representatives. The first step in this process is the preparation to accommodate data from 3 pilot campaigns, ESAG02, LARA and DAISEX.

For maximum compatibility and easy re-use of data, the rules should be common for all campaigns that use the system. Yet, specific project policies are often required. The objective of the CALVAL guideline document was to define specific metadata guidelines for the Validation Campaign of the European Space Agency's Envisat earth observation mission, in particular for the validation of the AATSR, GOMOS, MERIS, MIPAS and SCIAMACHY sensors. Particular rules were formulated for use by the Envisat Principal Investigators (PIs) Data Originators (DOs) and Data Submitters (DSs). The CDB needs more general guidelines, that may sometimes conflict with the CALVAL rules.

The current document implements the following highlighting:

| | |
|---|---|
| Red text in red box | General alerts and warnings |
| Blue text | Additions/changes for generalisation and improvement |
| Gray shade | CALVAL specific rules, not recommended for general use |
| Green highlight | Additions made for DAISEX, LARA and/or ESAG02 |
| Blue highlight | Editorial comments in the draft version |
| Yellow highlight | New elements under debate, or incompatible with CALVAL |

The current draft will be subject to changes during the course of the project.

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# Contents

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## 1 Introduction

Earth observation satellite campaigns are multidisciplinary, and generally combine selected datasets from satellite instruments with correlative groundbased data. Participants are spread around the globe, and work in different fields of science and in different organisations. This creates a large demand for electronic data exchange, and for indexing and retrieval of many different types of datasets. Common file formats are important tools for efficient indexing and retrieval, although the diversity of the data material is too large for one single file format. Common data definitions (naming conventions and definitions for data and metadata elements) are essential for such complex data exchange. The data definitions constitute a common language, which ensures that the indexing and search terms are subject to one common interpretation by all participants. Furthermore, each data set must be accompanied by metadata that describe the content and context of the data set. These Metadata Guidelines define the meaning of the terms we use. They also define the metadata content that is required in each data set.

The CDB is a generic Campaign Data Base that will hold both selected satellite data sets and data from groundbased measurements and computations. Groundbased in this context covers measurements performed on the ground or inside the atmosphere, with instruments that may be stationary, or may be carried in cars, ships, aircraft, balloons or other vehicles. In many cases the groundbased datasets are created by satellite instruments during tests inside the atmosphere. In some cases groundbased data are created specifically for comparison with satellite data, and are commonly named correlative data. The datasets may be pure measurements, model calculations, or assimilation results (model computations adjusted by assimilation of actual measurements). Depending on the level of finishing, a dataset may have been processed by computer programs that perform anything from simple scaling and calibration to sophisticated outlier removal and assimilation into model computations.

Datasets may be usable for more than one campaign. While some datasets must be protected from viewing by others than campaign or project members, other data sets must be made available for other specified campaigns, or for the entire user community. Extensive mechanisms for user control and data ownership control are included in the system.

These Metadata Guidelines describe a generalised metadata standard based on the Envisat Cal/Val system (Bojkov et al. 2002). The definitions have been carefully chosen to allow new campaign data types to be included, while keeping as much as possible of the original definitions. This is a living document, and modification should be expected to both data definitions, reporting routines and file formats. In particular, trial data ingestion from three pilot campaigns (DAISEX, ESAG02 and

LARA) will provide valuable input on user requirements, and may result in extensive modifications or additions to the system and to these guidelines. The CDB consists of a central clearing house for data transfer files, a relational database index, web interfaces for data providers, data users and administrators, Metadata Guidelines and other documentation, software products for creation and quality control of data transfer files, and a group of support personnel at NILU (working under contract for ESA).

# 2 Concepts

The multidisciplinary exchange of data in earth observation depends heavily on *good* definitions for data and metadata. Freedom of choice would let different end-users describe similar data sets in very different terms, thus hindering efficient retrieval. To avoid this, we define a small set of data and metadata entities (the structure of our data), and allowed values for each of these entities (the metadata values). The central structural data-definitions are briefly discussed in the following paragraphs.

## 2.1 Terminology

***metadata*** Data about data. Parameters that describe, characterize and/or index the data.

***parameter*** A physical or chemical entity that is measured or computed (often pertaining to data), or predefined (often pertaining to metadata).

***dataset*** A set of one or more parameters reported in coincident time and space. In most cases, this refers to a collection of parameters in one single data transfer file, and to the time/space frame covered by this file.
In some cases, however, the time frame of a dataset is larger, and more than one file is needed to define the entire dataset. In some cases the spatial frame or the number of parameters included in the dataset definition may also be larger than what can be accommodated in a single data transfer file. The original definition of dataset above is recommended, but the flexibility of the main data transfer file format is not always sufficient to support a very large or complex dataset in a single file.

***variable*** A data parameter to be reported in a dataset. Characterized by variable name, variable mode, and variable descriptor (see detailed descriptions below).

***variable name*** The primary variable identifier. The name of the physical quantity observed or estimated by the measurement or model calculation

| | |
|---|---|
| ***variable mode*** | The mode generally describes how or in what context the variable was measured. In the Cal/Val system, only one mode could be associated with each variable name in a data transfer file. This causes a complex naming structure. Many conditions that could be described as modes are forced into the name section, since the measurement requires something else to be accommodated in the mode field. The solution to this is to use simple names, and allow several modes to be declared simultaneously. We will also need to declare for each mode which other modes it cannot coexist with. When this modification is implemented, the variable names and modes will need a thorough revision. |
| ***variable descriptor*** | The descriptor will shift the focus from the normal value of the variable to some other aspect, like its uncertainty, its minimum, a flag, etc. |
| ***unit*** | Ideally, any given combination of a variable name, mode and descriptor should have only one natural, legal unit and scale. The CDB adds the possibility to enforce correct use of units as a part of the campaign policy. |
| ***constant*** | A constant is named as a variable (with name, mode and descriptor, as required). In a global context the constant may actually be a variable entity, but in the context of a given data transfer file (for the range of independent variables covered by that file), the constant can only hold one single value. |
| ***independent variable*** | *Each data file must have at least one independent variable (more than* one if the dependent variable is multidimensional). The dependency is defined in the context of the current data transfer file. In a global context, the variable may not be independent, but it does not depend on the value of any other variable in the current file. |
| ***dependent variable*** | A parameter that is provided as a function of another parameter (for example temperature as a function of time) is called a dependent variable. The parameter on which it depends is an independent variable. The number of independent variables determines the dimensionality of the grid on which the dependent data are provided. In the CDB we increase control over the dependency declarations. A dependent parameter cannot be declared as depending on one or more constants only. The dependency is related to the context of the file itself, not to a global context. |

***data source*** — An instrument or a model. Data from the source is normally quality controlled, calibrated and scaled before it is formatted into a data file and submitted to the data centre. Some instruments gather samples that must be analysed in a laboratory before results are reported. The sampler is then considered to be the source. In the CDB we add an option to subdivide the data source name. The subdivision may define several channels as part of an instrument. In assimilation it is often convenient to define the output of each component as a separate "instrument channel", which can be named by the component name.

***data location*** — The position of the sampled or modelled site (this may be a mobile entity such as a plane or ship). The name may be subdivided with a dot separator. Some names cover large areas, like SH (the Southern Hemisphere). A station name often refers to a large area with several sampling spots. In some cases, like high accuracy GPS, the position of the antenna itself must be determined in coordinates with 8 decimals and altitude with 3cm accuracy – such antennas may be given separate station names. Our current metadata definitions do not cover local coordinate systems within the data location (like a local coordinate system within an aircraft), but information should be supplied in the various comment and description fields.

***DO*** — Data Originator. A defined role for a person that may be referenced in a data file. This role does not give web access or file upload privileges.

***DS*** — Data Supplier. A defined role for a person that is registered in metadata with permission to access the CDB web site, and to upload data files for one or more projects or campaigns.

***PI*** — Principal Investigator. A defined role for a person that may be referenced in a data file. This role does not give web access or file upload privileges.

### 2.2 Data transfer file structure

The main file format is a subset of the HDF 4.1r3 format. The current document limits the user to only use certain features of this format, and to add mandatory metadata information with the variable names and values listed in this document (and the updated on-line versions). In the future, the main file format may be changed to HDF5, which allows more flexibility and more logical formatting of some data types.

When technically feasible (and when required by project policy) the DS will create a data transfer file in the main format for each dataset, and include in this single file both the data and the associated metadata. After checking the file (preferably with the ASC2HDF tool provided from the data centre), the DS will upload the file to the data centre. In the future, the CDB may also accept data transfer files of other formats, or transfer files with only metadata and references to specific binary data files. Sufficient metadata must be available in the header of each file (as specified in Sections 4 and 5). This is required both for proper indexing, and to make the data useful to the end user that retrieves the file. The user will expect to be able to use the data properly without searching for metadata in other sources.

Metadata parameters are divided into Global Attributes (pertaining to an entire dataset contained in one single file), and Variable Attributes (pertaining to one single variable within a dataset). A variable is a chemical component or physical parameter that is reported in a file (the main content of the file). Several variables are normally included in a dataset. The term parameter is in our context normally used for a metadata element (a piece of information about a variable or an entire dataset). The term field is often used for a subdivision of the content of a parameter (for example, a person name parameter consists of both family name and first name). In many cases, a field may be subdivided into sub fields with dot separators.

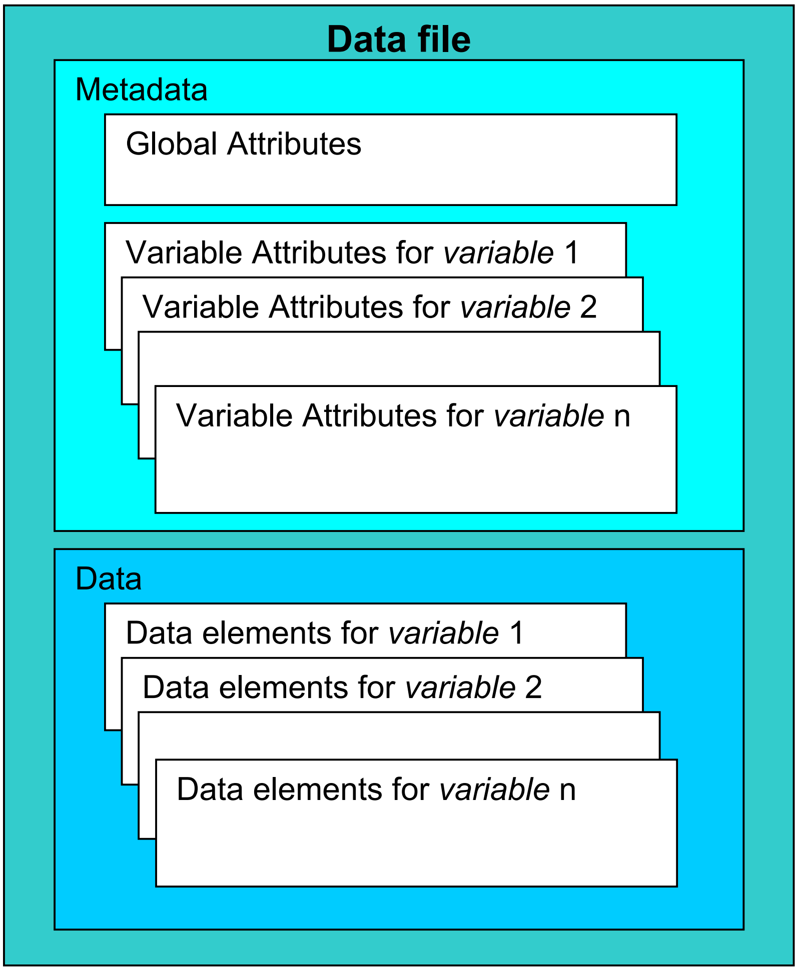


***Figure 1:*** *Simplified view of the file data structure.*

For the purposes described here, a dataset normally consists of all data from one single instrument, auxiliary data (such as related meteorological data), and metadata that describe the data. The main data (measurements or calculations) are often referred to as primary data. The auxiliary data are often referred to as secondary data. One particular class of auxiliary data are time and position information. These variables are often independent variables. The primary data and other secondary data parameters are normally dependent variables.

### 2.3 Considerations

In the context of effective data exchange and efficient data management various considerations must be given to the following:

1. The identification of the parameter is of great importance for application to validation. The description (consisting of **variable name**, **variable mode**, **variable descriptor**) should allow identification of parameters in various datasets with a similar physical basis. For that reason the **variable name** should contain a basic description in physical terms of the physical quantity estimated and of the geophysical or chemical target that is subject of the measurement, for example TEMPERATURE.AIR. The **variable mode** on the other hand, should emphasise those aspects of the measurement method that prevent simple direct comparison with other estimations: the measurement is an estimate of the underlying physical quantity, but when comparing estimations obtained with different methods, the differences in variable mode inform the user that differences between the results may actually be due to the estimation method. The third entry, the **variable descriptor**, can be used to construct a related variable that contains additional information (for example: error, uncertainty) on the original variable.

2. The **variable mode** or **variable descriptor** should not be used to distinguish measurement methods that are characterised by the use of specific but potentially different input values of a physical quantity. Typical examples are reference wavelength or pre-defined depths. Instead, these quantities should be provided as independent variables if several values are applicable to the measurements, or otherwise as constants. In practice this means that numeric values will generally not appear in the **variable mode** or **variable descriptor**. The consequence of this consideration is that the data are properly formatted as multidimensional datasets, instead of being presented as one-dimensional slices with independent parameters tucked away in the variable name.

3. A minimal set of time and position variables is mandatory: geolocation must be specified in terms of date, time (in the variable DATETIME), latitude, longitude and altitude or depth. If at all possible this geolocation must describe the effective location of the 'object' that is subject of measurement.

4. Pressure (PRESSURE) or geopotential height (ALTITUDE.GPH) for the measurement or calculation position is acceptable as an alternative if altitude cannot be provided. If this is not available, the geolocation of the instrument and relevant auxiliary parameters must be provided. In this case the geolocation is expressed as LATITUDE.INSTRUMENT, LONGITUDE.INSTRUMENT, ALTITUDE.INSTRUMENT.

5. Data may be reported over several different time scales, such as hourly, daily, monthly or seasonal in length, depending on need. One dataset may be divided into several data files, when this facilitates comparison to satellite data. Since satellite data files typically contain much less than one day of data, correlative data files should generally not contain more than one day of data.

6. There is always a possibility that someone can submit an erroneous dataset that appears to be legal in normal integrity checks. Some types of errors are difficult to detect even with stringent quality control routines. To minimise the workload for data originators and data suppliers, there is a tendency to minimise the amount of mandatory metadata. This removes redundancy that was originally intended for consistency checking. The system has numerous fields for free text comments and additional information from the data originators. Data originators must use these fields liberally to ensure that users gain sufficient knowledge of the data set and its intended usage.

7. The metadata guidelines may appear complex. However, the guidelines serve to reduce the complexity inherent in the data exchange problem. The majority of typical errors will be detected before the file is indexed and added to a file tree. This constitutes a major improvement in the management efficiency compared to a file tree that is not supported by such an index database. The resulting metadata index will facilitate both project management and scientific use of the collected data.

# 3 Formatting issues

## 3.1 Character set

- All metadata entries should be given with characters contained in the US ASCII character set.
- No special national characters are allowed (Å, ñ, ô, ö, etc.).
- Underscore characters "_" are used to separate metadata elements from each other, and cannot be part of a metadata element.
- The period symbol "." is used to separate sub fields from each other inside a metadata element.
- Other special characters ?, #, !, &, %, etc. ) should not occur, except in comment text strings.
- Hyphens and apostrophes may occur in names of people, locations or institutions. In other contexts such special characters are not allowed.

## 3.2 Capitalisation

- All metadata entries are generally all capitals.
- Variable names and measurement units are defined with specific capitalisation, and the input routines are case sensitive for such elements.
- File names are always set in lower case.

- Names of persons and addresses should be submitted with natural capitalisation.

### 3.3 Numeric Type:

The currently implemented numerical types are found in Table 3.3. These have been chosen carefully for compatibility in FORTRAN, C, IDL and HDF.

***Table 3.3:*** *Allowed numeric types implemented for the Envisat Cal/Val project.*

| Numeric Type | *Comment* |
|---|---|
| REAL | *HDF: 32 bit floating point numbers (FORTRAN: *4real)* |
| DOUBLE | *HDF 64-bit floating point numbers (FORTRAN: *8real)* |
| INTEGER | *HDF: 16-bit signed integers (FORTRAN: *2integer)* |
| LONG | *HDF: 32-bit signed integers (FORTRAN: *4integer)* |
| STRING | *character string<br>(Note that the maximum string length is software/tool dependent)<br>Note that string usage may be improved by transfer to HDF5.* |
| BLOB | *Binary Large Object – may be a picture or a binary data object. Not currently implemented, may be part of a future transfer to HDF5.* |

### 3.4 Fill value:

Data elements and metadata parameters cannot be left empty. A missing code (also called fill value) is normally used to fill an element when data is not available, but a measurement has been performed.

#### *3.4.1 Numeric fill values*

For numbers, the fill value is negative and consists of nines. In absolute value it must be 2 orders of magnitude larger than the absolute value of the real data. If the **VAR_DATA_TYPE** is of type floating point, then the fractional data of the fill value must be zeroes to the same number of digits as the measurement data.

**ATTENTION**

***Special care must be given to the data format to prevent that the larger fill values exceed the number of positions reserved in the data format.***

Example: *General*

*Data is of the order* **`0.1`** *the fill value must be:* **`-99.0`**

*Data is of the order* **`10000`** *the fill value must be:* **`-9999999`**

Example: *Exponentials*

*Data is of the order* **`2.dddE-6`** *the fill value is:* **`-9.000E-4`**

*Data is of the order* **`2.ddE+6`** *the fill value is:* **`-9.00E+8`**

***ALTERNATIVE NUMERIC FILL VALUES***

For numbers, the fill value is preferably negative, and consists of nines. Any value outside the limits set in VAR_VALID_MIN and VAR_VALID_MAX can be used. Decimals should normally not be used, but the fill value must be presentable in the format specified in VIS_FORMAT.

Examples:

| VAR_VALID_MIN | VAR_VALID_MAX | VIS_FORMAT | VAR_FILL_VALUE |
|---|---|---|---|
| 0 | 1000 | I4 | -99 |
| 0 | 1000 | F6.4 | -99 |
| 1.00E+2 | 1.00E+8 | E4.2 | -99 |
| 1.00E-8 | 1.00E-2 | E4.2 | -99 |

### *3.4.2 String fill values*

For string variables – the fill value is always "ZZZZZZZZZZ" (10"Z's"). String variables that are shorter than 10 characters will use the maximum number of Z's that can be accommodated.

Example: *Strings*

*The datum is a string* *the fill value is:* **`ZZZZZZZZZZ`**

## 3.5 Date formats

There are two date formats used in these guidelines: a numerical format (MJD2000) for data reporting and a string format (ISO 8106) used in the file name construction. The MJD2000 format is used for data records to facilitate calculations and plots.

### *3.5.1 MJD2000*

The Modified Julian Date (MJD2000) used throughout this document is defined as follows:

`MJD2000 is 0.000000 on January 1, 2000 at 00:00:00 UTC.`

### 3.5.2 MJD2000 algorithm

The general algorithm to calculate MJD2000 is as follows:

*For a given YYYY, MM, DD, hh, mm, ss:*

***STEP 1: Calculate the Julian date:***

```
IF ( MM GT 2 ) THEN
      y = DOUBLE(YYYY)
      m = DOUBLE(MM - 3)
      d = DOUBLE(DD)
ELSE BEGIN
      y = DOUBLE(YYYY - 1)
      m = DOUBLE(MM + 9)
      d = DOUBLE(DD)
ENDELSE

j =   INTEGER( 365.25*( y+4712.0 ) ) +
INTEGER( 30.6*m+0.5 )+ 59.0 + d - 0.5

Check for Julian or Gregorian calendar:
IF ( j LT 2299159.5D0 ) THEN; If Julian calendar.
    jd = j
ELSE            ; If Gregorian calendar.
    gn = 38.0 - INTEGER(3.0*INTEGER( 49.0+y/100.0 )/4.0)
    jd = j + gn
ENDELSE
```

***STEP 2: Calculate day fraction***

```
df = ( hh*3600.0 + mm*60.0 + ss ) / 86400.0
… for second resolution

or

df = ( hh*3.6E+6 + mm*6.0E+4 + ss*1.0E+3 + ms ) / 8.64E+7
… for milli-second resolution
```

***STEP 3: Calculate MJD2000***

```
mjd2000 = jd + df – 2451544.5
```

Example: *for* 2002/04/20 at 11:29:23 UTC `mjd2000 = 840.478738`

**ATTENTION**

***Special care must be given to the formatting of MJD2000 by reporting the appropriate number of significant figures to represent the actual time resolution.***

### *3.5.3 DATETIME (ISO-8106)*

The UTC DATETIME representation in ISO-8106 long format is (ISO, 1988):

`YYYYMMDDThhmmssZ`

*where*

| | |
|---|---|
| YYYY | is the numeric year |
| MM | is the numeric month |
| DD | is the numeric day |
| T | is a delimiter separating time from date |
| hh | is the numeric hour |
| mm | is the numeric minute |
| ss | is the numeric second |
| Z | is a flag indicating Universal Time (UTC). |

**ATTENTION**

***When appropriate, MM, DD, hh, mm, ss may require a leading zero.***

***For example 20010101T060501Z.***

# 4 Global attributes

To facilitate the understanding of the Global Attributes, three categories have been defined, namely **Originator Attributes** (Section 4.1), **Dataset Attributes** (Section 4.2) and **File Attributes** (Section 4.3). Each metadata parameter in these 3 groups is specified once for each data file. All these attributes (with some very few exceptions) need to be filled in.

***Table 4:*** *Overview of required Global Attributes for the Envisat Cal/Val project. 'X' indicate entries and 'O' indicate optional entries.*

| Originator Attributes | Section | Entry | Entry type | Req |
|---|---|---|---|---|
| PI_NAME | 4.1.1 | Family name; Given Name | 2 semi-colon separated | X |
| PI_AFFILIATION | 4.1.2 | Affiliation name, Affiliation Acronym | 2 semi-colon separated | X |
| PI_ADDRESS | 4.1.3 | Address; Postal code; Country name | 3 semi-colon separated | X |
| PI_EMAIL | 4.1.4 | E-mail address | Single entry | X |
| DO_NAME | 4.1.5 | Family name; Given Name | 2 semi-colon separated | X |
| DO_AFFILIATION | 4.1.6 | Affiliation name, Affiliation Acronym | 2 semi-colon separated | X |
| DO_ADDRESS | 4.1.7 | Address; Postal code; Country name | 3 semi-colon separated | X |
| DO_EMAIL | 4.1.8 | E-mail address | Single entry | X |
| DS_NAME | 4.1.9 | Family name; Given Name | 2 semi-colon separated | X |
| DS_AFFILIATION | 4.1.10 | Affiliation name, Affiliation Acronym | 2 semi-colon separated | X |
| DS_ADDRESS | 4.1.11 | Address; Postal code; Country name | 3 semi-colon separated | X |
| DS_EMAIL | 4.1.12 | E-mail address | Single entry | X |
| | | | | |

| Dataset Attributes | Section | Entry | Entry type | Req |
|---|---|---|---|---|
| DATA_DESCRIPTION | 4.2.1 | Data description | Single entry | X |
| DATA_DISCIPLINE | 4.2.2 | Field; Class; Subclass | 3 semi-colon separated | X |
| DATA_GROUP | 4.2.3 | Type; Subtype | 2 semi-colon separated | X |
| DATA_LOCATION | 4.2.4 | Location code name | Single entry | X |
| DATA_SOURCE | 4.2.5 | Concatenated:DATA_SOURCE Type + Institute acronym + 3-digit identifier | Concatenated entry | X |
| DATA_TYPE | 4.2.6 | Concatenated:Time scale code + Data level code | Single entry | X |
| DATA_VARIABLES | 4.2.7 | List of variables in the file | n semi-colon separated | X |
| DATA_START_DATE | 4.2.8 | MJD2000 | Single entry | X |
| DATA_FILE_VERSION | 4.2.9 | 3 digit integer | Single entry (ddd) | X |
| DATA_MODIFICATIONS | 4.2.10 | Description of the data modifications | Single entry | X |
| DATA_CAVEATS | 4.2.11 | Description of the data caveats | Single entry | O |
| DATA_RULES_OF_USE | 4.2.12 | Description of the data rules of use | Single entry | O |
| DATA_ACKNOWLEDGEMENT | 4.2.13 | Data acknowledgement | Single entry | O |
| | | | | |
| **File Attributes** | **Section** | **Entry** | **Entry type** | **Req** |
| FILE_NAME | 4.3.1 | Concatenated and underscore separated | Concatenated entry | X |
| FILE_GENERATION_DATE | 4.3.2 | MJD2000 | Single entry | X |
| FILE_ACCESS | 4.3.3 | File project association | Semi-colon separated | X |
| FILE_PROJECT_ID | 4.3.4 | Custom project identification related to 4.3.3 | Single entry | X |
| FILE_ASSOCIATION | 4.3.5 | File "other" project association | Semi-colon separated | O |
| FILE_META_VERSION | 4.3.6 | Meta data version used | 2 semi-colon separated (ddRddd; free format) | X |

## 4.1 Originator attributes

The Originator Attribute metadata entries describe the ownership of the data found in a given file as well as the guidelines for the use and/or publication of these data.

### *4.1.1 PI_NAME*

The Global Attribute **PI_NAME** is the data's (or instrument's) Principal Investigator's (PI) Name. The PI has the main scientific and/or institutional responsibility for the given data. Do not confuse the so-called Instrument PI with the main PI for a project or a campaign.

**ATTENTION**

***If there is no instrument PI for the reported data in the file (as is the case for some operational satellite instruments) – then the Data Submitter (DS) must substitute the PI information with the instrument's affiliation coordinates and institute's information.***

***The PI of the Envisat AO proposal is derived from the FILE_PROJECT_ID (section 4.3.4), the metadata PI field holds the name of the actual instrument PI.***

Type: STRING
Format: Family name; Given names
Entry: The entry consists of two fields separated by a semicolon.
Example: PI_NAME = Bojkov; Bojan R.

### *4.1.2 PI_AFFILIATION*

The Global Attribute **PI_AFFILIATION** is the Principal Investigator's **official** affiliation name and affiliation acronym.

Type: STRING
Format: Affiliation name; Affiliation acronym
Entry: The entry consists of two fields separated by a semicolon.
Example: PI_AFFILIATION = Norwegian Institute for Air Research; NILU

***Table 4.1.2:*** *Allowed affiliation names and affiliation acronyms of the agencies and institutes participating in the Envisat Cal/Val project.*

| AFFILIATION NAME | AFFILIATION ACRONYM |
|---|---|
| ACRI | ACRI |
| Alfred-Wegener-Institut fuer Polar und Meeresforschung | AWI |
| Aristotle University of Thessaloniki, Laboratory of Atmospheric Physics | LAP |
| Australian Institute of Marine Science | AIMS |
| Belgian Institute for Space Aeronomy | BIRA.IASB |
| British Antarctic Survey | BAS |
| Centre National d\'Etudes Spatiales | CNES |
| Chalmers University of Technology | CTH |
| Commonwealth Scientific and Industrial Research Organisation | CSIRO |
| Danish Meteorological Institute | DMI |
| Department of Meteorology Stockholm University | MISU |
| Deutscher Wetterdienst | DWD |
| Deutsches Zentrum fuer Luft- und Raumfahrt | DLR |
| Environmental Research and Services, Florence, Italy | ERS |
| European Centre for Medium-Range Weather Forecasts | ECMWF |
| European Commission - Joint Research Centre | JRC |
| European Space Agency | ESA |
| Finnish Meteorological Institute | FMI |
| Forschungszentrum Juelich | FZJ |
| Forschungszentrum Karlsruhe | FZK |
| Fraunhofer-Institut fuer Atmosphaerische Umweltforschung | IFU |
| Free University of Berlin | FUB |
| GKSS Forschungszentrum Geesthacht | GKSS |
| Hadley Centre | HADCEN |
| Informus GmbH | INF |
| Institut fuer Ostseeforschung | IOW |
| Institut fuer Umweltphysik, Universitaet Bremen | IUP |
| Institut National de la Recherche Agronomique | INRA |

| AFFILIATION NAME | AFFILIATION ACRONYM |
|---|---|
| Institute for Environmental Studies - Vrije Universiteit - Amsterdam | IVM |
| Institute of Atmospheric Physics - Russian Academy of Sciences | IAP.RAS |
| Insitute of Experimental Meteorology - Russia | IEM |
| Institute of Meteorology and Water Management | IMWM |
| Institute of Ocean Sciences | IOS |
| Instituto de Astrofisica de Andalucia | IAA |
| Instituto Nacional de Meteorologia | INM |
| Instituto Nacional de Tecnica Aerospacial | INTA |
| Istituto di Fisica Applicata Carrara | CNR.IFAC |
| Istituto di Fisica dell Atmosfera del CNR | CNR.ISAC |
| Istituto di Metodologie per l\'Analisi Ambientale del CNR | CNR.IMAA |
| Kyrgystan State National University | KSNU |
| Laboratoire de Meteorologie Dynamique du CNRS | CNRS.LMD |
| Laboratoire de Physique et Chimie de l\'Environnement du CNRS | CNRS.LPCE |
| Laboratoire de Physique et Chimie Marines du CNRS | CNRS.LPCM |
| Laboratoire de Physique Moleculaire et Applications du CNRS | CNRS.LPMA |
| Leibniz Institut fuer Atmosphaerenphysik | IAP |
| Main Geophysical Observatory - Russia | MGO |
| Management Unit of the North Sea Mathematical Models | MUMM |
| Meteorological Service of Canada | MSC |
| NASA\'s Goddard Space Flight Centre | NASA.GSFC |
| NASA\'s Jet Propulsion Laboratory | NASA.JPL |
| NASA\'s Jet Propulsion Laboratory - Table Mountain Facility | NASA.JPL.TMF |
| NASA\'s Langley Research Centre | NASA.LRC |
| National Center for Atmospheric Research | NCAR |
| National Institute for Environmental Studies, Tsukuba, Japan | NIES |
| National Institute of Public Health and the Environment | RIVM |
| National Institute of Water and Atmospheric Research | NIWA |
| National Oceanic and Atmospheric Administration | NOAA |
| National Physical Laboratory | NPL |
| National Taras Shevchenko University of Kyiv | KTSU |
| NOAA National Environmental Satellite Data and Information Service | NOAA.NESDIS |
| Norwegian Institute for Air Research | NILU |
| Norwegian Institute for Water Research | NIVA |
| Observatoire de Bordeaux (INSU/CNRS) | OBORDEAUX |
| Observatoire de Neuchatel | ON |
| Royal Meteorological Institute of Belgium | RMI |
| Royal Netherlands Meteorological Institute | KNMI |
| Russian Central Aerological Observatory | CAO |
| Rutherford Appleton Laboratory | RAL |
| Service Central d\'Exploitation Meteorologique | SCEM |
| Service d\'Aeronomie du CNRS | CNRS.SA |
| Smithsonian Astrophysical Observatory | SAO |
| St.Petersburg State University | SPBSU |
| Stockholm University | SU |
| Swedish Environmental Research Institute | IVL |
| Swedish Institute of Space Physics | IRF |
| Swiss Federal Institute of Technology - Zurich | ETHZ |
| Swiss Meteorological Institute | MCH |
| United Kingdom Meteorological Office | UKMO |
| Universite de la Reunion Laboratoire de Physique de l\'Atmosphere | UREUNION.LPA |
| University of Athens, Department of Physics, Division of Applied Physics | UOA |
| University of Bern | UBERN |
| University of Bonn | UBONN |
| University of Bremen | UBREMEN |
| University of Cambridge, Department of Chemistry | UCAMB.CHEM |

| AFFILIATION NAME | AFFILIATION ACRONYM |
|---|---|
| University of Denver | DU |
| University of Frankfurt | UFRANKFURT |
| University of Heidelberg | UHEIDELBERG |
| University of l\'Aquila | UNIVAQ |
| University of Leicester | ULEICESTER |
| University of Liege | ULG |
| University of Massachusetts | UMASS |
| University of Miami | UMIAMI |
| University of Nagoya | UNAGOYA |
| University of Oslo | UIO |
| University of Reading Data Assimilation Research Centre | UREADING.DARC |
| University of Reims | UREIMS |
| University of Sao Paulo | UNESP |
| University of Southampton | USOUTHAMPTON |
| University of Toronto | UT |
| University of Valencia | UVAL |
| University of Wales Aberystwyth | UWA |
| University of Wollongong | UOW |

### *4.1.3 PI_ADDRESS*

The Global Attribute **PI_ADDRESS** is the Principal Investigator's official mailing address. The country name must be the English entry in ISO 3166-1:1997 (ISO, 1997).

Type: STRING
Format: Address; Postal code; Country name
Entry: Three fields separated by semicolons
Example: PI_ADDRESS = P.O. Box 100; N-2027 Kjeller; Norway

### *4.1.4 PI_EMAIL*

The Global Attribute **PI_EMAIL** is the Principal Investigator's e-mail address.

Type: STRING
Format: Free format
Entry: Single field
Example: PI_EMAIL = bojan.bojkov@nilu.no

### *4.1.5 DO_NAME*

The Global Attribute **DO_NAME** is the Data Originator's (DO) Name. The DO may or may not be the same person as the PI. It is often important to distinguish the DO from the PI, since the person that has performed the measurements, computed and quality controlled the results, may know details of which the PI is not aware.

Type; STRING
Format: Family name; Given names
Entry: The entry consists of two fields separated by a semicolon.
Example: DO_NAME = Krognes; Terje

### 4.1.6 DO_AFFILIATION

The Global Attribute **DO_AFFILIATION** is the Data Originator's **official** affiliation (the DO_AFFILIATION may differ from the PI_AFFILIATION).

| | |
|---|---|
| Type: | STRING |
| Format: | Affiliation name; Affiliation acronym |
| Entry: | The entry consists of two fields separated by a semicolon. |
| Example: | DO_AFFILIATION = Norwegian Institute for Air Research; NILU |

### 4.1.7 DO_ADDRESS

The Global Attribute DO_ADDRESS is the Data Originator's mailing address (the DO_ADDRESS may differ from the PI_ADDRESS). The country name must be the English entry in ISO 3166-1:1997 (ISO, 1997).

| | |
|---|---|
| Type: | STRING |
| Format: | Address; Postal code; Country name |
| Entry: | Three fields separated by semicolons |
| Example: | DO_ADDRESS = P.O. Box 100; N-2027 Kjeller; Norway |

### 4.1.8 DO_EMAIL

The Global Attribute **DO_EMAIL** is the Data Originator's e-mail address (the DO_EMAIL may differ from the PI_EMAIL).

| | |
|---|---|
| Type: | STRING |
| Format: | Free format |
| Entry: | Single field |
| Example: | DO_EMAIL = terje.krognes@nilu.no |

### 4.1.9 DS_NAME

The Global Attribute **DS_NAME** is the Data Submitter's (DS) Name (the DS may or may not be the same person as the PI or the DO). Sometimes data are processed by and forwarded to the data centre by an additional person or institution. An institution that extracts a subset of the original dataset, may be named a Data Submitter.

**ATTENTION**

***The Data Submitter must be a registered user of the database, either as Principal Investigator or as Co-Investigator. To obtain this status, the DS must submit a signed data protocol to the data centre.***

| | |
|---|---|
| Type; | STRING |
| Format: | Family name; Given names |
| Entry: | The entry consists of two fields separated by a semicolon. |
| Example: | DS_NAME = De Maziere; Martine |

#### *4.1.10 DS_AFFILIATION*

The Global Attribute **DS_AFFILIATION** is the Data Submitter's **official** affiliation (he DS_AFFILIATION may differ from the PI_AFFILIATION and DO_AFFILIATION).

| | |
|---|---|
| Type: | STRING |
| Format: | Affiliation name; Affiliation acronym |
| Entry: | The entry consists of two fields separated by a semicolon. |
| Example: | DS_AFFILIATION = Belgian Institute for Space Aeronomy; BIRA.IASB |

#### *4.1.11 DS_ADDRESS*

The Global Attribute DS_ADDRESS is the Data Submitter's mailing address (the DS_ADDRESS may differ from the PI_ADDRESS and DO_ADDRESS). The country name must be the English entry in ISO 3166-1:1997 (ISO, 1997).

| | |
|---|---|
| Type: | STRING |
| Format: | Address; Postal code; Country name |
| Entry: | Three fields separated by semicolons |
| Example: | DS_ADDRESS = Ringlaan 3; B-1180 Brussels; Belgium |

#### *4.1.12 DS_EMAIL*

The Global Attribute **DS_EMAIL** is the Data Submitter's e-mail address (the DO_EMAIL may differ from the PI_EMAIL and the DO_EMAIL).

| | |
|---|---|
| Type: | STRING |
| Format: | Free format |
| Entry: | Single field |
| Example: | DS_EMAIL = Martine.deMaziere@bira-iasb.oma.be |

### 4.2 Dataset attributes

The global **Dataset Attributes** provide detailed description of the data contained in the given file. These attributes include the type and identity of the instrument or model, the discipline of the data, a list of the variables included in the file, etc.

#### *4.2.1 DATA_DESCRIPTION*

The Global Attribute **DATA_DESCRIPTION** is a brief sentence describing the data content.

| | |
|---|---|
| Type: | STRING |
| Format: | Descriptive text, free format |
| Entry: | Single field |
| Example: | DATA_DESCRIPTION= Weekly NILU ozonesonde launch from Orland, Norway. |

### *4.2.2 DATA_DISCIPLINE*

The Global Attribute **DATA_DISCIPLINE** is a character string describing the field of research to which the data in the file belongs. The string refers to the research field and area of the data.

Type: STRING
Format: Field; Class; Subclass
Entry: 3 semicolon-separated fields
Example: DATA_DISCIPLINE = ATMOSPHERIC.CHEMISTRY; INSITU; BALLOON

***Table 4.2.2a:*** *Allowed **DATA_DISCIPLINE Field** attribute entries. An entry consists of the combination of one of each Field, Class, and Subclass.*

| DATA_DISCIPLINE (*Discipline Field*) | *Comment* | *Debate* |
|---|---|---|
| ATMOSPHERIC.CHEMISTRY | *Entire atmosphere, chemistry only* | |
| ATMOSPHERIC.DYNAMICS | *Entire atmosphere, dynamics only* | |
| ATMOSPHERIC.PHYSICS | *Entire atmosphere, chemistry & dynamics* | |
| LAND.SURFACE.GEOPHYSICS | | |
| LAND.SURFACE.BIOLOGY | *Covers vegetation and soil characteristics* | *Created for DAISEX demo, December 2003.* |
| LUNAR.PHYSICS | | |
| OCEANOGRAPHIC.BIOLOGY | *Ocean, biology only* | |
| OCEANOGRAPHIC.CHEMISTRY | *Ocean, chemistry only* | |
| OCEANOGRAPHIC.DYNAMICS | *Ocean, dynamics only* | |
| OCEANOGRAPHIC.PHYSICS | *Ocean, chemistry and dynamics* | |
| SOLAR.PHYSICS | | |
| STELLAR.PHYSICS | | |

***Table 4.2.2b:*** *Allowed **DATA_DISCIPLINE Class** attribute entries. An entry consists of the combination of one of each Field, Class, and Subclass.*

| DATA_DISCIPLINE (*Discipline Class*) | *Comment* |
|---|---|
| INSITU | |
| NUMERICAL.SIMULATION | |
| REMOTE.SENSING | |
| SAMPLE | |

***Table 4.2.2c:*** *Allowed **DATA_DISCIPLINE Subclass** attribute entries. An entry consists of the combination of one of each Field, Class, and Subclass.*

| ***DATA_DISCIPLINE* (Discipline Subclass)** | ***Comment*** |
|---|---|
| AIRCRAFT | |
| ASSIMILATION | *data assimilation = combined use of model and experimental data* |
| BALLOON | |
| BUOY | |
| GROUNDBASED | |
| MODEL | |
| MOORING | |
| PLATFORM | *For marine use only* |
| ROCKET | |
| SATELLITE | *includes the space shuttle platform* |
| SHIP | |

### *4.2.3 DATA_GROUP*

The Global Attribute DATA_GROUP is a 2-fields entry, specifying (1) the origin of the data (experimental or model or a combination of both), and (2), the spatial characteristics of the data. The spatial characteristics include the dimensionality of the spatial grid of the dataset for a single data element, in addition to the information whether the 'footprint' of the spatial grid varies in space with time, i.e., over the successive data elements.

These concepts are best explained by considering the example of a travelling LIDAR system: At a given point in time, this LIDAR system provides measurements at a single latitude and longitude location but for multiple altitudes. With time, this 1-dimensional spatial grid (fixed latitude and longitude, vector of altitudes), is moving in latitude and longitude. The 2 field entry for this example thus becomes EXPERIMENTAL; PROFILE.MOVING.

***NOTE***

***The dimensionality that is expressed in DATA_GROUP by SCALAR (0D), PROFILE (1D) and FIELD (2D or more) only refers to the spatial dimensionality.***

Format: Type; Subtype
Entry: 2 semicolon-separated fields

Example 1: *A timeseries of column measurements from a ground-based instrument will have …*
DATA_GROUP = EXPERIMENTAL; SCALAR.STATIONARY.

Example 2: *A 3D model output on a fixed spatial grid will have …*
DATA_GROUP = MODEL; FIELD.STATIONARY.

***Table 4.2.3a**: Allowed **DATA_GROUP Type** entries. An entry consists of a combination of a Type and a Subtype.*

| ***DATA_GROUP*** **(Group Type)** | **Comment** |
|---|---|
| EXPERIMENTAL | *Measurements* |
| MIXED | *I.e. assimilation analyses* |
| MODEL | |

***Table 4.2.3b:** Allowed **DATA_GROUP Subtype** entries. An entry consists of a combination of a Type and a Subtype.*

| ***DATA_GROUP*** **(Group Subtype)** | **Comment** |
|---|---|
| SCALAR.MOVING | |
| SCALAR.STATIONARY | |
| PROFILE.MOVING | |
| PROFILE.STATIONARY | |
| FIELD.MOVING | |
| FIELD.STATIONARY | |

### *4.2.4 DATA_LOCATION*

The Global Attribute **DATA_LOCATION** is the code of the location, normally based on a fixed location (i.e. a station) or a moving platform name (i.e. a plane, a ship, a buoy, etc.), that the data originates from.

*NOTE*

**Depending on specific campaign policy, the data location for a moving platform (aircraft or ship) may be named after the air strip (where the aircraft is based for the duration of the campaign) or the body of water that the ship is cruising through.**

**ATTENTION**

***If the name consists of two or more words, they are separated with periods (.), blanks (space characters) should not occur in the names.***

Type: STRING
Format: Refer to Table DATA_LOCATION
Entry: Single field
Example: DATA_LOCATION = ORLAND

***Table 4.2.4:*** *Allowed DATA_LOCATION entry for the Envisat Cal/Val.*

| DATA_LOCATION (Location) | Comment | DEBATE | Longitude | Latitude | Elevation |
|---|---|---|---|---|---|
| ABERYSTWYTH | | | -004.1 | +052.4 | |
| ADEOS2 | | | | | |
| ADRIATIC.SEA | | | | | |
| AIRE.SUR.L.ADOUR | Aire sur l\'Adour | | | | |
| ALT1 | Alert, GPS antenna on Hilton building roof | Specified in ESAG02 documentation.High resolution needed for GPS position. | -62.32675594 | 82.51143720 | 56.271 |
| ALT2 | Alert, GPS antenna on tripod behid fuel tanks | Specified in ESAG02 documentation.High resolution needed for GPS position. | -62.31546422 | 82.51110986 | 42.810 |
| ALOMAR | Alomar, Andøya | | +016.0 | +069.3 | 385 |
| ALPILLES | | | | | |
| AMBURLA.SITE1 | | | | | |
| ANDENES | Airport, Andøya | | +016.2 | +069.3 | 14 |
| ARHANGELSK | | | +040.5 | +068.6 | |
| AROSA | | | +009.7 | +046.8 | 1840 |
| ARRIVAL.HEIGHTS | Arrival Heights | | +166.7 | -077.8 | 190 |
| ATHENS | | | +023.4 | +037.6 | |
| ATLANTIC | | | | | |
| AUSTRALIAN.SEA | | | | | |
| BALTIC.SEA | | | | | |
| BARENTSBURG | | | | | |
| BARRAX | DAISEX study area http://io.uv.es/projects/daisex/ | Specified in ESA CDB work statement for DAISEX. | | | |
| BAUCE | | | | | |
| BAURU | | | -049.0 | -022.3 | 300 |
| BELGRANO | | | -034.6 | -077.9 | 50 |
| BE.130 | | | | | |
| BE.230 | | | | | |
| BE.MC5 | | | | | |
| BERN | | | +007.5 | +047.0 | 550 |
| BILTHOVEN | | | | | |
| BLANCARES | DAISEX permanent station http://io.uv.es/projects/daisex/ | Specified in ESA CDB work statement for DAISEX. | -002.1 | +039.1 | |
| BLANES | | | | | |

| *DATA_LOCATION (Location)* | Comment | DEBATE | Longitude | Latitude | Elevation |
|---|---|---|---|---|---|
| BRASIL | | | | | |
| BREMEN | | | | | |
| CARIBBEAN | | | | | |
| COLMAR | *http://io.uv.es/projects/daisex/* | *Specified in ESA CDB work statement for DAISEX.* | | | |
| CNP | *Constape Pynt, GPS antenna on roof of Personnel Building* | *Specified in ESAG02 documentation. High resolution needed for GPS position.*<br><br>*MDB 20040228: Not yet evaluated.*<br><br>*NILU 20040318: Extended info now in metadata.* | *-22.64819019* | *77.74451119* | *70.770* |
| DE.BILT | *De Bilt* | | | | |
| DESERT.ALGERIA.SITE1 | | | | | |
| DESERT.ALGERIA.SITE2 | | | | | |
| DESERT.ALGERIA.SITE3 | | | | | |
| DESERT.ALGERIA.SITE4 | | | | | |
| DESERT.ALGERIA.SITE5 | | | | | |
| DESERT.ARABIA.SITE1 | | | | | |
| DESERT.ARABIA.SITE2 | | | | | |
| DESERT.ARABIA.SITE3 | | | | | |
| DESERT.EGYPT.SITE1 | | | | | |
| DESERT.LIBYA.SITE1 | | | | | |
| DESERT.LIBYA.SITE2 | | | | | |
| DESERT.LIBYA.SITE3 | | | | | |
| DESERT.LIBYA.SITE4 | | | | | |
| DESERT.MALI.SITE1 | | | | | |
| DESERT.MAURITANIA.SITE1 | | | | | |
| DESERT.MAURITANIA.SITE2 | | | | | |
| DESERT.NIGER.SITE1 | | | | | |
| DESERT.NIGER.SITE2 | | | | | |
| DESERT.NIGER.SITE3 | | | | | |
| DESERT.SUDAN.SITE1 | | | | | |
| DUMONT.D.URVILLE | *Dumont d\'Urville* | | *+140.0* | *-066.7* | *20* |
| DUNHUANG.SITE1 | | | | | |
| DYFAMED | *Buoy* | | | | |
| EGBERT | | | | | |
| EKATERINBURG | | | | | |
| EKRAFANE | | | | | |
| ENGLISH.CHANNEL | | | | | |
| EOS.AQUA | *EOS-AQUA Satellite* | | | | |
| EOS.AURA | *EOS-AURA Satellite* | | | | |
| EOS.TERRA | *EOS-TERRA Satellite* | | | | |
| EP | *Earth Probe satellite* | | | | |
| ERBS | *Earth Radiation Budget Satellite* | | | | |
| ERS2 | *ESA ERS-2 satellite* | | | | |
| ESRANGE | *Radar Hill* | | *+021.1* | *+067.9* | *485* |
| EUREKA | | | *-086.4* | *+080.1* | *610* |
| FALCON | *DLR Falcon Aircraft* | | | | |
| FORLI | | | | | |

| DATA_LOCATION (Location) | Comment | DEBATE | Longitude | Latitude | Elevation |
|---|---|---|---|---|---|
| FORT.SUMNER | Fort Sumner | | | | |
| GAP | | | | | |
| GARDERMOEN | | | | | |
| GARMISCH | Garmisch-Partenkirchen | | | | |
| GEOPHYSICA | M-55 | | | | |
| GERMAN.BIGHT | | | | | |
| GLOBAL | Model or satellite global coverage only | | | | |
| GOTLAND | | | | | |
| GREENLAND.SITE1 | | | | | |
| GSFC | NASA-GSFC | | | | |
| HALLEY.BAY | Halley Bay | | -026.8 | -075.6 | |
| HANTY.MANSIYSK | | | | | |
| HARESTUA | | | +010.8 | +060.2 | 580 |
| HARTHEIM | http://io.uv.es/projects/daisex/ | Specified in ESA CDB work statement for DAISEX. | | | |
| HAY.SITE1 | | | | | |
| HOBART | | | | | |
| HOHENPEISSENBERG | | | +011.0 | +047.5 | 980 |
| IGARKA | | | | | |
| INDIAN.OCEAN | | | | | |
| IRKUTSK | | | | | |
| IRSP3 | Indian Satellite IRS-P3 | | | | |
| ISL.DIKSON | | | | | |
| ISL.HEISA | | | | | |
| ISL.KOTELNIY | | | | | |
| ISSYK.KUL | | | | | |
| IZANA | | | -016.5 | +028.3 | 2367 |
| JOKIOINEN | | | | | |
| JUNGFRAUJOCH | International Scientific Station of the Jungfraujoch | | +008.0 | +046.6 | 3580 |
| KARAGANDA | | | | | |
| KARLSRUHE | | | | | |
| KEFLAVIK | | | -022.6 | +064.0 | 38 |
| KERGUELEN.ISLANDS | Kerguelen Islands | | +070.3 | -049.4 | 10 |
| KIRUNA | | | +020.4 | +067.8 | 419 |
| KISLOVODSK | | | +042.7 | +043.7 | |
| KITT.PEAK | | | -111.5 | +032.0 | 2090 |
| KRASNOYARSK | | | | | |
| KUS | Kulusuk airport temporary station, GPS reference | ESAG02 Raw Data Report, September 2002.<br><br>MDB 20040228: Request more info, ambiguous name.<br><br>NILU 20040318: Extended info now in metadata. | -37.15332542 | 65.57792386 | 72.042 |
| L.AQUILA | L\'Aquila | | | | |
| LA.REUNION | Saint-Denis de La Reunion | | +055.5 | -020.9 | 10 |

| DATA_LOCATION (Location) | Comment | DEBATE | Longitude | Latitude | Elevation |
|---|---|---|---|---|---|
| LAS.TIESAS.ANCHOR | Permanent station for for Surface Fluxes and Meteorological Data (http://io.uv.es/projects/daisex/ follow links to "Ground Instruments" and "Permanent Stations") | Specified in ESA CDB work statement for DAISEX.<br><br>MDB 20040212: Request more info.<br><br>NILU 20040318: Extended info now in metadata. | -2.082 | 39.042 | |
| LAS.TIESAS.LISIMETRO | Permanent station for for Surface Fluxes and Meteorological Data (http://io.uv.es/projects/daisex/ follow links to "Ground Instruments" and "Permanent Stations") | Specified in ESA CDB work statement for DAISEX.<br><br>MDB 20040212: Request more info<br><br>NILU 20040318: Specified in CDB Specification document from ESA, Appendix A, with different position from LAS.TIESAS.ANCHOR. | -2.090 | 39.058 | |
| LAUDER | | | +169.7 | -045.1 | 370 |
| LEGIONOWO | | | | | |
| LEON | | | | | |
| LOVOSERO | | | | | |
| LULEA | Radiosonde | | +022.1 | +065.6 | |
| LYR.8.5A | Svalbard, GPS antenna | Specified in ESAG02 documentation. High resolution needed for GPS position.<br><br>MDB 20040228: Ambiguous - what is the full name?<br><br>NILU 20040318: This is the full name used in the ESAG02 Raw data report. | 15.49307619 | 78.24762997 | 52.516 |
| LYR.8.5B | Svalbard, GPS antenna | Specified in ESAG02 documentation. High resolution needed for GPS position.<br><br>MDB 20040228: Ambiguous - what is the full name?<br><br>NILU 20040318: This is the full name used in the ESAG02 Raw data report. | 15.49307719 | 78.24762914 | 52.560 |
| LYR.9.5 | Svalbard, GPS antenna | Specified in ESAG02 documentation. High resolution needed for GPS position.<br><br>MDB 20040228: Ambiguous - what is the full name?<br><br>NILU 20040318: This is the full name used in the ESAG02 Raw data report. | 15.49307453 | 78.24762906 | 52.550 |
| MACQUARIE.ISLAND | Macquarie Island | | +159.0 | -054.8 | |
| MAGADAN | | | | | |
| MALEDIVES | | | | | |
| MARAMBIO | | | | | |

| *DATA_LOCATION (Location)* | Comment | DEBATE | Longitude | Latitude | Elevation |
|---|---|---|---|---|---|
| MARKOVO | | | | | |
| MAUNA.LOA | *Mauna Loa* | | *-155.6* | *+019.5* | *3397* |
| MEDITERRANEAN | | | | | |
| MERIDA | | | | | |
| METEOR.3M | *sattelite* | | | | |
| METOP1 | *sattelite* | | | | |
| MIR | *Montgolfier InfraRed* | | | | |
| MONKS.WOOD | | | | | |
| MONTE.CIMONE | | | | | |
| MORETON.BAY | *Moreton Bay* | | | | |
| MOSCOW | | | *+037.6* | *+055.8* | |
| MURMANSK | | | *+033.1* | *+069.0* | |
| NAIROBI | | | | | |
| NEUCHATEL | | | *+007.0* | *+047.0* | *487* |
| NEUMAYER | *Neumayer Station* | | *+008.4* | *-070.6* | |
| NH | *Northern Hemisphere (model or satellite use only)* | | | | |
| NH.HIGH.LATITUDE | | | | | |
| NH.LOW.LATITUDE | | | | | |
| NH.MID.LATITUDE | | | | | |
| NIKOLAEVSK | | | | | |
| NOAA14 | *Satellite in NOAA TIROS-N program* | | | | |
| NOAA16 | *Satellite in NOAA TIROS-N program* | | | | |
| NORTH.ATLANTIC | | | | | |
| NORTH.SEA | | | | | |
| NRD1 | *Station Nord, GPS antenna on roof of building 7* | *Specified in ESAG02 documentation. High resolution needed for GPS position.*<br><br>*MDB 20040228: Ambiguous - what is the full name?*<br><br>*NILU 20040318: This is the full name used in the ESAG02 Raw data report.* | *-16.66209092* | *81.60141603* | *70.037* |
| NRD2 | *Station Nord, GPS antenna on roof of building 22 ("Polar2")* | *Specified in ESAG02 documentation. High resolution needed for GPS position.*<br><br>*MDB 20040228: Ambiguous - what is the full name?*<br><br>*NILU 20040318: This is the full name used in the ESAG02 Raw data report.* | *-16.65691044* | *81.59715722* | *67.514* |
| NY.ALESUND | *Ny-Ålesund* | | *+011.9* | *+078.9* | *15* |
| O.BORDEAUX | *Observatoire de Bordeaux* | | *-000.5* | *+044.8* | *73* |
| OBERPFAFFENHOFEN | | | | | |
| OBNINSK | | *Corrected spelling 20040329.* | | | |
| ODIN | *sattelite* | | | | |
| OHP | *Observatoire de Haute Provence* | | *+005.7* | *+043.9* | *679* |

| *DATA_LOCATION* (Location) | Comment | DEBATE | Longitude | Latitude | Elevation |
|---|---|---|---|---|---|
| OLENEK | | | | | |
| OMSK | | | *+073.4* | *+054.9* | |
| ORLAND | *Ørland* | | | | |
| OSLO | | | | | |
| PARACOU | | | | | |
| PARAMARIBO | | | | | |
| PAYERN | | | *+007.0* | *+046.8* | *491* |
| PECHORA | | | *+057.1* | *+065.1* | |
| PENCK | *Ship "Professor Albrecht Penck"* | | | | |
| PERTH | | | | | |
| PERUGIA | | | | | |
| PETCHORA | | | | | |
| PETROPAVLOVSK | | | | | |
| PLATEAU.DE.BURE | *Plateau de Bure* | | *+005.9* | *+044.6* | *2550* |
| POLARSTERN | *AWI Polarstern research ship* | | | | |
| POTENZA | | | *+015.7* | *+040.6* | *820* |
| PUNTA.ARENAS | *Punta Arenas* | | | | |
| ROME | | | | | |
| ROTHERA | | | *-068.1* | *-067.6* | |
| SALEKHARD | | | *+066.7* | *+066.5* | *419* |
| SAMARA | | | | | |
| SAN.PIETRO.CAPOFIUME | | | | | |
| SCO1 | *KMS permanent GPS station in Scoresbysund* | *Specified in ESAG02 documentation. High resolution needed for GPS position (missing)*<br><br>*MDB 20040228: Ambiguous - what is the full name?*<br><br>*NILU 20040318: This is the full name used in the ESAG02 Raw data report.* | | | |
| SCORESBYSUND | | | *-022.0* | *+070.5* | *10* |
| SFJ | *Kangerlussuaq, GPS antenna at meteorological hut* | *Specified in ESAG02 documentation. High resolution needed for GPS position.*<br><br>*MDB 20040228: Ambiguous - what is the full name?*<br><br>*NILU 20040318: This is the full name used in the ESAG02 Raw data report.* | *-49.29731186* | *67.00601436* | *72.014* |
| SH | *Southern Hemisphere (model or satellite use only)* | | | | |
| SH.HIGH.LATITUDE | | | | | |
| SH.LOW.LATITUDE | | | | | |
| SH.MID.LATITUDE | | | | | |
| SIDERADOUGOU | | | | | |
| SODANKYLA | *Sodankÿla* | | *+026.7* | *+067.4* | *100* |
| SONDRESTROMFJORD | | | *-050.7* | *+067.0* | *180* |
| SONORASITE1 | | | | | |
| SOUTHAMPTON | | | | | |

| ***DATA_LOCATION* (Location)** | **Comment** | **DEBATE** | **Longitude** | **Latitude** | **Elevation** |
|---|---|---|---|---|---|
| SPOT4 | *sattelite* | | | | |
| ST.PETERSBURG | | | | | |
| TABLE.MOUNTAIN | *Table Mountain Facility* | | *-117.7* | *+034.4* | *2300* |
| TARAWA | | | *+172.9* | *+001.4* | *0* |
| THANGOO.SITE1 | | | | | |
| THESSALONIKI | | | | | |
| THU | *Thule Air Base, GPS antennaon metal rod off Greenland home rule housing building* | *Specified in ESAG02 documentation. High resolution needed for GPS position.<br><br>MDB 20040228: Ambiguous - what is the full name?<br><br>NILU 20040318: This is the full name used in the ESAG02 Raw data report.* | *-68.79667478* | *76.53789506* | *43.884* |
| THU3 | *Thule Air Base, KMS permanent GPS station* | *Specified in ESAG02 documentation. High resolution needed for GPS position.<br><br>MDB 20040228: Ambiguous - what is the full name?<br><br>NILU 20040318: This is the full name used in the ESAG02 Raw data report.* | | | |
| THULE | | | *-068.7* | *+076.5* | *30* |
| TIKSI | | | | | |
| TINGATINGANA | | | | | |
| TOGO | | | | | |
| TOMELLOSO | *DAISEX study area* | *Specified in ESA CDB work statement for DAISEX..<br><br>MDB 20040212: Request more info<br><br>NILU 20040318: Used in DAISEX data files.* | | | |
| TOMELLOSO.ANCHOR | *Permanent station for for Surface Fluxes and Meteorological Data (http://io.uv.es/projects/daisex/ follow links to "Ground Instruments" and "Permanent Stations")* | *Specified in ESA CDB work statement for DAISEX.<br><br>MDB 20040212: Request more info.<br><br>NILU 20040318: Specified in CDB Specification document from ESA, Appendix A.* | | | |
| TOMSK | | | | | |
| TORONTO | | | *-079.5* | *+043.8* | *150* |
| TOWNSVILLE | | | | | |
| TRAPANI | | | | | |
| TROMSO | *EISCAT* | | *+019.2* | *+069.6* | |
| TURA | | | | | |
| UARS | *UARS satellite* | | | | |
| UCCLE | | | | | |
| VANSCOY | | | *-106.0* | *+052.0* | |
| VERNADSKY | | | *-064.3* | *-065.3* | |

| *DATA_LOCATION* (Location) | Comment | DEBATE | Longitude | Latitude | Elevation |
|---|---|---|---|---|---|
| VITIM | | | | | |
| VLADIVOSTOK | | | | | |
| VOLGOGRAD | | | | | |
| VORONEZH | | | | | |
| WMO????? | *TAO Buoy* | | | | |
| WMO13008 | *TAO Buoy* | | *-038.0* | *+015.0* | |
| WMO13009 | *TAO Buoy* | | *-038.0* | *+008.0* | |
| WMO13010 | *TAO Buoy* | | *+000.0* | *+000.0* | |
| WMO13011 | *TAO Buoy* | | *-010.0* | *+002.0* | |
| WMO15001 | *TAO Buoy* | | *-010.0* | *-010.0* | |
| WMO15002 | *TAO Buoy* | | *-010.0* | *+000.0* | |
| WMO15003 | *TAO Buoy* | | *-010.0* | *-005.0* | |
| WMO15004 | *TAO Buoy* | | *-023.0* | *+000.0* | |
| WMO15005 | *TAO Buoy* | | *-010.0* | *-002.0* | |
| WMO31001 | *TAO Buoy* | | *-035.0* | *+000.0* | |
| WMO31002 | *TAO Buoy* | | *-038.0* | *+004.0* | |
| WMO32303 | *TAO Buoy* | | *-095.0* | *+005.0* | |
| WMO32304 | *TAO Buoy* | | *-095.0* | *-005.0* | |
| WMO32305 | *TAO Buoy* | | *-095.0* | *-008.0* | |
| WMO32315 | *TAO Buoy* | | *-110.0* | *+005.0* | |
| WMO32316 | *TAO Buoy* | | *-110.0* | *+002.0* | |
| WMO32317 | *TAO Buoy* | | *-110.0* | *-002.0* | |
| WMO32318 | *TAO Buoy* | | *-110.0* | *-005.0* | |
| WMO32319 | *TAO Buoy* | | *-110.0* | *-008.0* | |
| WMO32320 | *TAO Buoy* | | *-095.0* | *+002.0* | |
| WMO32321 | *TAO Buoy* | | *-095.0* | *+000.0* | |
| WMO32322 | *TAO Buoy* | | *-095.0* | *-002.0* | |
| WMO32323 | *TAO Buoy* | | *-110.0* | *+000.0* | |
| WMO41026 | *TAO Buoy* | | *-038.0* | *+012.0* | |
| WMO43001 | *TAO Buoy* | | *-110.0* | *+008.0* | |
| WMO43301 | *TAO Buoy* | | *-095.0* | *+008.0* | |
| WMO46134 | *TAO Buoy* | | | | |
| WMO46146 | *TAO Buoy* | | *-123.7* | *+049.3* | |
| WMO51006 | *TAO Buoy* | | *-140.0* | *+009.0* | |
| WMO51007 | *TAO Buoy* | | *-140.0* | *+005.0* | |
| WMO51008 | *TAO Buoy* | | *-140.0* | *+002.0* | |
| WMO51009 | *TAO Buoy* | | *-140.0* | *-002.0* | |
| WMO51010 | *TAO Buoy* | | *-170.0* | *+000.0* | |
| WMO51011 | *TAO Buoy* | | *-125.0* | *+000.0* | |
| WMO51014 | *TAO Buoy* | | *-140.0* | *-005.0* | |
| WMO51015 | *TAO Buoy* | | *-125.0* | *+005.0* | |
| WMO51016 | *TAO Buoy* | | *-125.0* | *+002.0* | |
| WMO51017 | *TAO Buoy* | | *-125.0* | *-002.0* | |
| WMO51018 | *TAO Buoy* | | *-125.0* | *-005.0* | |
| WMO51019 | *TAO Buoy* | | *-155.0* | *-005.0* | |
| WMO51020 | *TAO Buoy* | | *-155.0* | *+005.0* | |
| WMO51021 | *TAO Buoy* | | *-155.0* | *+002.0* | |
| WMO51022 | *TAO Buoy* | | *-155.0* | *-002.0* | |
| WMO51023 | *TAO Buoy* | | *-155.0* | *+000.0* | |
| WMO51301 | *TAO Buoy* | | *-155.0* | *+008.0* | |
| WMO51302 | *TAO Buoy* | | *-155.0* | *-008.0* | |
| WMO51303 | *TAO Buoy* | | *-170.0* | *+005.0* | |

| *DATA_LOCATION* (*Location*) | Comment | DEBATE | Longitude | Latitude | Elevation |
|---|---|---|---|---|---|
| WMO51304 | *TAO Buoy* | | *-170.0* | *-005.0* | |
| WMO51305 | *TAO Buoy* | | *-170.0* | *+002.0* | |
| WMO51306 | *TAO Buoy* | | *-170.0* | *-002.0* | |
| WMO51307 | *TAO Buoy* | | *-125.0* | *+008.0* | |
| WMO51308 | *TAO Buoy* | | *-125.0* | *-008.0* | |
| WMO51309 | *TAO Buoy* | | *-170.0* | *+008.0* | |
| WMO51310 | *TAO Buoy* | | *-170.0* | *-008.0* | |
| WMO51311 | *TAO Buoy* | | *-140.0* | *+000.0* | |
| WMO52001 | *TAO Buoy* | | *+165.0* | *+002.0* | |
| WMO52002 | *TAO Buoy* | | *+165.0* | *-002.0* | |
| WMO52003 | *TAO Buoy* | | *+165.0* | *+005.0* | |
| WMO52004 | *TAO Buoy* | | *+165.0* | *-005.0* | |
| WMO52006 | *TAO Buoy* | | *+165.0* | *+008.0* | |
| WMO52007 | *TAO Buoy* | | *+165.0* | *-008.0* | |
| WMO52008 | *TAO Buoy* | | *+156.0* | *+005.0* | |
| WMO52010 | *TAO Buoy* | | *+156.0* | *-005.0* | |
| WMO52011 | *TAO Buoy* | | *+156.0* | *+002.0* | |
| WMO52012 | *TAO Buoy* | | *+156.0* | *-002.0* | |
| WMO52302 | *TAO Buoy* | | *+147.0* | *+005.0* | |
| WMO52307 | *TAO Buoy* | | *+137.0* | *+002.0* | |
| WMO52309 | *TAO Buoy* | | *-180.0* | *+005.0* | |
| WMO52310 | *TAO Buoy* | | *-180.0* | *+002.0* | |
| WMO52311 | *TAO Buoy* | | *-180.0* | *+000.0* | |
| WMO52312 | *TAO Buoy* | | *-180.0* | *-002.0* | |
| WMO52313 | *TAO Buoy* | | *-180.0* | *-005.0* | |
| WMO52315 | *TAO Buoy* | | *-180.0* | *+008.0* | |
| WMO52316 | *TAO Buoy* | | *-180.0* | *-008.0* | |
| WMO52317 | *TAO Buoy* | | *+156.0* | *+000.0* | |
| WMO52318 | *TAO Buoy* | | *+147.0* | *+000.0* | |
| WMO52319 | *TAO Buoy* | | *+156.0* | *+008.0* | |
| WMO52321 | *TAO Buoy* | | *+165.0* | *+000.0* | |
| WMO53001 | *TAO Buoy* | | *+116.0* | *+018.0* | |
| WMO53002 | *TAO Buoy* | | *+114.0* | *+013.0* | |
| WMO53003 | *TAO Buoy* | | *+115.0* | *+015.0* | |
| WOLLONGONG | | | *+150.9* | *-034.4* | *30* |
| YAKUTSK | | | *+129.6* | *+062.0* | |
| YUKUTSK | | | | | |
| YUZHNO.SAHALINSK | | | | | |
| ZHIGANSK | | | *+123.4* | *+067.7* | *50* |
| ZUGSPITZE | | | *+011.2* | *+047.4* | *2964* |
| ZVENIGOROD | | | *+035.8* | *+055.7* | |

### *4.2.5 DATA_SOURCE*

The Global Attribute **DATA_SOURCE** consists of three elements. These are the type of instrument or numeric model that created the data (the type may consist of several dot-separated words), the organisation that owns the instrument/model (which may differ from the organisations of the PI, the DO and the DS), and a unique numeric identifier concatenated to the organisation acronym (refer to the Affiliation acronyms in **Table 4.1.2** above).

Each laboratory must assure that no two instruments of the same type have the same identifier, even if they are operated in different locations (a simple number is a sufficient identifier). For example, if NILU acquired a second SAOZ instrument, the entire attribute for NILU's second instrument would become: UVVIS.SAOZ_NILU002

This instrument identification system allows each laboratory to create a worldwide unique identifier for each instrument, without conflict with other laboratories. Any laboratory may operate several instruments of the same type at the same location without identification errors. The instruments may be re-used at different locations, while the instrument history remains traceable. The instruments may be brought to national or international inter-calibration experiments at some common location without naming conflicts. In this particular case, a name is required for each instrument, even if each laboratory has only one. Therefore the naming system must be enforced even for single instruments.

***ATTENTION***

***Instrument names should in general not contain the parameters that it measures. Other metadata entries will ensure that this information is available to the data file users.***

***RECOMMENDATION***

***When an instrument is taken out of service, the identifier must not be reused for another instrument.***

***NOTE***

***A particular case exists for instruments that are used as "consumables" (for example weather sondes that are often lost after the balloon flight). In such cases a unique identifier may be useless. The identifier 000 is therefore reserved for the NON-UNIQUE case. A laboratory may re-use this particular identifier any number of times.***

Type: STRING
Format: Type (from **Table 4.2.5**) and Institute acronym (from **Table 4.1.2**) **concatenated** with a unique 3-digit identifier (for example 001, 007 or 111)
Entry: 2 fields concatenated by an underscore
Example 1: DATA_SOURCE = FTIR_NILU001
Example 2: DATA_SOURCE = UVVIS.SAOZ_NILU002

***Table 4.2.5:*** *Allowed entry for **DATA_SOURCE Type** in the COSE and Envisat Cal/Val projects.*

| DATA_SOURCE (*Instrument Type*) | *Comment* | *Debate* |
|---|---|---|
| AATSR | *only to be used for non-measurement data like for example the averaging kernels that are derived from theoretical analysis* | |
| AC9 | | |
| AIRMISR | | |
| ALIS | | |
| ALTIMETER.LASER | | *Specified in ESAG02 documentation.* |
| ALTIMETER.RADAR | | *Specified in ESAG02 documentation.* |
| AMON | | |
| AMSR | | |
| AMSU | | |
| ANAIS | | |
| ANEMOMETER | *Wind speed instrument* | *Specified in ESA CDB work statement for DAISEX.* |
| APEX | | |
| ASUR | | |
| ATMOINSPECTOR | *New nstrument name CHILD, database uses old name ATMOINSPECTOR* | |
| ATSR2 | | |
| AUTOCHEM | *Chemical data assimilation by UCAMB.CHEM* | |
| AVHRR | | |
| BAROMETER | | *Specified in ESA CDB work statement for DAISEX.* |
| BB4 | | |
| BLACKBODY.EVEREST.1000 | *Calibration source for IR thermometer* | *Specified in ESA CDB work statement for DAISEX.*<br><br>*MDB 20040228: Should not refer to instrument/location in DATA_SOURCE*<br><br>*NILU 20040318: Already common as extension (after first dot), like in UVVIS.BREWER, PHOTOMETER.PERKINELMER, and as entire name for scientific, "one-off" instruments or models.* |
| BMP | *Biospherical Multiband Profiler for Subsurface Ed/Lu and R measurements* | |
| BUCKET.EVAPORIMETRIC | | *Specified in ESA CDB work statement for DAISEX.* |

| DATA_SOURCE (*Instrument Type*) | *Comment* | *Debate* |
|---|---|---|
| BUOY.SST.DRIFTER | *Sea Surface temperature buoy, drifting* | |
| BUOY.SST.FIXED | *Sea Surface temperature buoy, fixed position* | |
| BUOY.TAO | *Tropical Atmosphere Ocean Buoy* | |
| CAESR | | |
| CASI | | |
| CEILOMETER | | |
| CH4TDL | | |
| CHLOROPHYLL.FLUORESCENCE.PROFILER | *Chlorophyll Fluorescence Profiler* | |
| CIMEL | | |
| COPAS | | |
| CRYOSAMPLER | | |
| CTD | *CTD* | |
| CYCLOMETER | | |
| CYTOMETERS | | |
| DATALOGGER.CR10 | | *Specified in ESA CDB work statement for DAISEX.<br><br>MDB 20040228: Too generic<br><br>NILU 20040318: The real sources vould be VOLTMETER, GPS, etc. (also generic). The DATALOGGER is often the most tangible source for a group of diverse signals logged during a mission. The source SHOULD be as generic as possible. In addition we have suggested a specific extension to identify one of several logger types used in the same campaign.* |
| DATALOGGER.CR500 | | *Specified in ESA CDB work statement for DAISEX.<br><br>MDB 20040228: Too generic<br><br>NILU 20040318: The real sources vould be VOLTMETER, GPS, etc. (also generic). The DATALOGGER is often the most tangible source for a group of diverse signals logged during a mission. The source SHOULD be as generic as possible. In addition we have suggested a specific extension to identify one of several logger types used in the same campaign.* |
| DESCARTES | | |
| DAIS7915 | *Digital Airborne Imaging Spectrometer, 79 channels 400nm to 12.3um* | *Specified in ESA CDB work statement for DAISEX.<br><br>MDB 20040228: Commercial name? What is the physical basis?<br><br>NILU 20040318: Could change name to SPECTROMETER.DAIS7915. Commercial names are commonly used elsewhere in these metadata.* |
| ECMWFMODEL.GOMOS | | |
| ECMWFMODEL.MIPAS | | |
| ECMWFMODEL.SCIAMACHY | | |
| ECOC | | |

| DATA_SOURCE (*Instrument Type*) | *Comment* | *Debate* |
|---|---|---|
| ELHYSA | | |
| EMISSIVITY.BOX.1 | *Thermal remote sensing unit* | *Specified in ESA CDB work statement for DAISEX.*<br><br>*MDB 20040228: BOX.1 not allowed*<br><br>*NILU 20040318: Correct comment, could use EMISSIVITY.BOX, and leave the 1 and 2 to the last element in the naming convention in 4.2.5. If NILU has 2 emissivity boxes, they would be named EMISSIVITY.BOX_NILU001 and EMISSIVITY.BOX_NILU002.* |
| EMISSIVITY.BOX.2 | *Global change unit* | *Specified in ESA CDB work statement for DAISEX.*<br><br>*MDB 20040228: BOX.1 not allowed*<br><br>*NILU 20040318: Correct comment, could use EMISSIVITY.BOX, and leave the 1 and 2 to the last element in the naming convention in 4.2.5. If NILU has 2 emissivity boxes, they would be named EMISSIVITY.BOX_NILU001 and EMISSIVITY.BOX_NILU002.* |
| FAR.IR.INTERFEROMETER | *Far Infrared Interferometer* | |
| FILTRATION | | |
| FIRS2 | | |
| FISH | *Airborne alpha-Lyman Hygrometer (balloon)* | |
| FLUORIMETER | | |
| FOZAN | | |
| FSSP | | |
| FTIR | *Infrared Fourier Transform Spectrometer* | |
| FTS | *Fourier Transform Spectrometer (UV + IR)* | |
| GASCOD | | |
| GOME | *ESA ERS-2 satellite instrument* | |
| GOME2 | | |
| GOMOS | *only to be used for non-measurement data like for example the averaging kernels that are derived from theoretical analysis* | |
| GONIOMETER | *Instrument for angle measurements* | *Specified in ESA CDB work statement for DAISEX.* |
| GPS | *Global Positioning System receiver* | *Specified in ESA CDB work statement for DAISEX.* |
| GPS.AIR1 | *Trimble airborne GPS receiver on forward antenna in ESAG02* | *Specified in ESAG02 documentation..*<br><br>*MDB 20040228: Not yet evaluated.*<br><br>*NILU 20040318: Extended info now in metadata. May drop the .AIRx part, and add the internal serial number after the owner isntitution acronym. The comments would then need to be entered in each file, instead of in the central metadata.* |

| DATA_SOURCE (*Instrument Type*) | *Comment* | *Debate* |
|---|---|---|
| GPS.AIR2 | *Ashtec airborne GPS receiver on forward antenna in ESAG02* | *Specified in ESAG02 documentation..*<br><br>*MDB 20040228: Not yet evaluated.*<br><br>*NILU 20040318: Extended info now in metadata. May drop the .AIRx part, and add the internal serial number after the owner isntitution acronym. The comments would then need to be entered in each file, instead of in the central metadata.* |
| GPS.AIR3 | *Javad airborne GPS receiver on aft antenna in ESAG02* | *Specified in ESAG02 documentation..*<br><br>*MDB 20040228: Not yet evaluated.*<br><br>*NILU 20040318: Extended info now in metadata. May drop the .AIRx part, and add the internal serial number after the owner isntitution acronym. The comments would then need to be entered in each file, instead of in the central metadata.* |
| GRAVIMETER.LCR | *Airborne gravimeter. Primary LCR data and auxiliary data (platform stabilization, etc) logged on laptop during ESAG02* | *Specified in ESAG02 documentation..*<br><br>*MDB 20040228: Not yet evaluated.* |
| HAGAR | | |
| HALOE | | |
| HALOX | | |
| HIRDLS | | |
| HPLC | | |
| HUMIDITY.SENSOR | | |
| HY2P | *NILU ECMWF T106 Analysis extraction data on isobaric model levels* | |
| HY2TH | *NILU ECMWF T106 Analysis extraction data on isentropic model levels* | |
| HYDROSCAT | *Backscattering measurements* | |
| HYGROMETER | *Relative humidity* | *Specified in ESA CDB work statement for DAISEX.* |
| HYMAP | *HyMap Imaging Spectrometer, whisk-broom scanner, 400nm to 2500 nm in 125 bands* | *Specified in ESA CDB work statement for DAISEX.*<br><br>*NILU 20040328: Could be named SPECTROMETER.HYMAP ?* |
| IMU | *Inertial Measurement Unit* | *Specified in ESAG02 documentation..*<br><br>*MDB 20040228: What is it?*<br><br>*NILU 20040318:  Description in Comment field.* |
| INS | *Inertial Navigating System* | *Specified in ESAG02 documentation..*<br><br>*MDB 20040228: What is it?*<br><br>*NILU 20040318:  Description in Comment field.* |
| INS.H764G | *Honeywell H764-G EGI (inertial navigation system)* | *Specified in ESAG02 documentation..*<br><br>*MDB 20040228: What is it?*<br><br>*NILU 20040318:  Description in Comment field.* |
| IRRADIANCE.SENSOR | | |

| DATA_SOURCE (*Instrument Type*) | *Comment* | *Debate* |
|---|---|---|
| IRTDL | | |
| ISAMS | *Improved Strat. And Mesos. Sounder aboard UARS* | |
| ISAR | *Infrared Sea surface temperature Autonomous Radiometer* | |
| IUE | | |
| LABS | | |
| LAI | *Leaf Area Index measurements* | *Defined under Cal/Val, not used by 20040318.* |
| LEAF.CHAMBER.ANALYSER | *Portable infrared gas analyzer (model LCA-4, ADC Ltd.)* | *Specified in ESA CDB work statement for DAISEX.* |
| LICOR1800UW | *Spectroradiometer for Subsurface Ed and Eu Measurements* | *Defined under Cal/Val, not used by 20040318.* |
| LICOR.LAI.2000 | *Plant Canopy Analyser, non-destructive Leaf Area Index (LAI) measurements* | *Specified in ESA CDB work statement for DAISEX.*<br><br>*MDB 20040228: Commercial name? What is the physical basis?*<br><br>*NILU 20040318: Comment added. Could use the LAI entry, and leave the LICOR LAI-2000 name for the free-text comments in the HDF file?* |
| LIDAR.BACKSCATTER | | |
| LIDAR.DIAL | | |
| LIDAR.OLEX | *Airborne LIDAR (DLR Falcon)* | |
| LIDAR.RIEGL | *Riegl Scanning Lidar* | *Specified in ESAG02 documentation.*<br><br>*MDB 20040228: Riegel is commercial name? What is the physical basis?*<br><br>*NILU 20040318: Commercial names already common as extension (after first dot), like in UVVIS.BREWER, PHOTOMETER.PERKINELMER, and as entire name for scientific, "one-off" instruments or models.* |
| LIDAR.RMR | *Rayleigh-Mie-Raman Lidar* | |
| LYSIMETER.HERBAL.CROP | | *Specified in ESA CDB work statement for DAISEX.*<br><br>*MDB 20040228: Not yet evaluated* |
| LYSIMETER.LIGNEOUS.CROP | | *Specified in ESA CDB work statement for DAISEX.*<br><br>*MDB 20040228: Not yet evaluated* |
| LYSIMETER.REFERENCE | *Instrument for determining solubility, esp. the amount of water-soluble matter in soil. (http://www.wordreference.com/english/definition.asp?en=lysimeter)*<br><br>*A lysimeter is essentially a large, stainless steel box or cylinder which is filled with soil, open on the top, and closed at the bottom so all liquid that runs through it can be collected. (http://extoxnet.orst.edu/newsletters/n81_88.htm)* | *Specified in ESA CDB work statement for DAISEX.*<br><br>*MDB 20040228: Explain*<br><br>*NILU 20040318: Corrected spelling to English LYSIMETER, added explanatory references* |
| LPMA | *Balloon-borne experiment operated by LPMA* | |
| MACSIMS | | |
| MAERI | | |
| MAS | | |

| DATA_SOURCE (*Instrument Type*) | *Comment* | *Debate* |
|---|---|---|
| MERIS | *only to be used for non-measurement data like for example the averaging kernels that are derived from theoretical analysis* | |
| METEOSAT | | |
| MICROWAVE.RADIOMETER | | |
| MIPAS | *only to be used for non-measurement data like for example the averaging kernels that are derived from theoretical analysis* | |
| MIPAS.B | *MIPAS on balloon* | |
| MIPAS.STR | *MIPAS on ?* | |
| MISR | | |
| MIR | *Montgolfier InfraRed* | |
| MLS | | |
| MODIS | | |
| MOPITT | *EOS-TERRA Satellite Instrument* | |
| MOS | *Modular Optoelectronic Scanner (on IRS-P3)* | |
| MSDOL | *ACRI model* | |
| MSDOL.ATMOS | | |
| MSDOL.GOMOS | | |
| MSDOL.MIPAS | | |
| MSDOL.SCIAMACHY | | |
| MSDOL.SMR | | |
| MSX | | |
| MVIRI | | |
| OMI | *Ozone satellite instrument* | |
| OPC | | |
| OPER | | |
| OSIRIS | | |
| OVID | | |
| PARABOLA | | |
| PHOTOMETER | | |
| PHOTOMETER.CIMEL | | |
| PHOTOMETER.PERKINELMER | | |
| PHOTOMETER.SUN | | |
| PHOTOMETER.SUN.MICROTOPS.II | | *Specified in ESA CDB work statement for DAISEX.* |
| PHOTOMETER.SUN.REAGAN | | *Specified in ESA CDB work statement for DAISEX.* |
| PLANKTONNET | | |
| PLUVIOMETER | *Precipitation amount* | *Specified in ESA CDB work statement for DAISEX.* |
| POAM3 | | |
| POLDER | *POLarization and Directionality of Earth Reflectances, spectral bands at 443, 500, 550, 590, 670, 700, 720, 800, 864 nm* | *Created for Cal/Val, but not used by 20040318. Needed for DAISEX demo, December 2003* |
| PROFILOMETER.PIN | *Soil roughness measurements* | *Specified in ESA CDB work statement for DAISEX.* |
| PSICAM | | |
| PYGIOMETER | | |

| DATA_SOURCE (*Instrument Type*) | *Comment* | *Debate* |
|---|---|---|
| PYRANOMETER | | *Created for Cal/Val, but not used by 20040318. Needed for DAISEX demo, December 2003* |
| RADAR | *Rain radar* | |
| RADAR.PROFILER | *Windprofiler, MST radar* | |
| RADIANCE.SENSOR.UPWELLING | | |
| RADIOMETER.BIOSPHERICAL | | |
| RADIOMETER.IR.CIMEL | *CIMEL 312, Channel 1: 8 - 13 um, Channel 2: 11.5 - 12.5 um, Channel 3: 10.5 - 11.5 um, Channel 4: 8.2 - 9.2 um.* | *Specified in ESA CDB work statement for DAISEX.*<br><br>*NILU 20040328: Added .IR in name* |
| RADIOMETER.IR | *Infrared radiometer (thermometer) typically covering the 8 um to 14 um band.* | *Replaces RADIOMETER.IR.RAYTEK, RADIOMETER.IR.OMEGA, THERMOMETER.IR.EVEREST, THERMOMETER.IR.EVEREST.3400.4Z LC* |
| RADIOMETER.IR.RAYTEK | | *Specified in ESA CDB work statement for DAISEX.*<br><br>*MDB 20040228: What is the difference between RAYTEK and OMEGA?*<br><br>*NILU 20040328: Same class of instruments. Delete this and us RADIOMETER.IR* |
| RADIOMETER.IR.OMEGA | | *Specified in ESA CDB work statement for DAISEX.*<br><br>*MDB 20040228: What is the difference between RAYTEK and OMEGA?*<br><br>*NILU 20040328: Same class of instruments. Delete this and us RADIOMETER.IR* |
| RADIOMETER.SIMBADA | | |
| RADIOMETER.SATLANTIC | | |
| RADIOMETER.TRIOS | *Radiometer UV-A / UV-B / PAR, 280 nm to 720 nm* | *Created and used for Cal/Val. Also specified for DAISEX* |
| RAMSES | *Hyperspectral Profiler for Subsurface Ed/Lu and R measurements* | *Created for Cal/Val, but not used by 20040318. May be identical to the Trios Radiometer? http://www.trios.de/start.html* |
| REFLECTOMETER | *For hydric soil content* | *Specified in ESA CDB work statement for DAISEX.* |
| ROSIS | *Reflective Optics System Imaging Spectrometer, compact airborn, 84 bands in spectral mode, 32 bands in imaging mode from 430nm to 850nm* | *Specified in ESA CDB work statement for DAISEX.* |
| SABER | | |
| SAFIREA | | |
| SAGE2 | | |
| SAGE3 | | |
| SALOMON | | |
| SAMPLE.GAS | | |
| SAMPLE.LIQUID | | |
| SATLANTICSENSOR | | |
| SAW | | |

| DATA_SOURCE (*Instrument Type*) | *Comment* | *Debate* |
|---|---|---|
| SBUV2 | | |
| SCIAMACHY | *only to be used for non-measurement data like for example the averaging kernels that are derived from theoretical analysis* | |
| SDLA | *Tunable Diode Laser Spectrometer* | |
| SEA.ATM.STATE | *placeholder for MAVT aux info* | |
| SECCHIDISC | | |
| SIMBAD | | |
| SIOUX | | |
| SISTER | | |
| SMR | | |
| SMSR | *SeaWiFS Multichannel Surface Reference* | |
| SOAP | | |
| SODAR | *Windprofiler, sonar principle* | |
| SOLSPEC | | |
| SOLSTICE2 | | |
| SONDE.BACKSCATTER | | |
| SONDE.AIR | *AS-1C-PTH* | *Specified in ESA CDB work statement for DAISEX.*<br><br>*MDB 20040228: Same as SONED.PTU?*<br><br>*NILU 20040318: Wright - there seems to be no distincion between the PTH and PTU terms.* |
| SONDE.O3 | *Like Vaisala RS80 ozone* | *Created and used for Cal/Val. Also specified for DAISEX* |
| SONDE.PTU | *PTU sonde, Pressure, Temperature, Humidity (also sometimes referred to as PTH sonde). Carried by balloon, or used as drop sonde. Like Vaisala RS80 radiosonde series.* | *Created and used for Cal/Val. Also specified for DAISEX* |
| SPAD | | |
| SPECTRALON | *Reference panel. Spectralon is the commercial name for the reflective covering material.* | *Specified in ESA CDB work statement for DAISEX.* |
| SPECTROMETER | | *Specified in ESA Cal/Val (all Cal/Val files could have used SPECTROMETER.IR), also needed for DAISEX demo in CDB* |
| SPECTROPHOTOMETER | | |
| SPECTRORADIOMETER | | |
| SPECTRORADIOMETER.OL754.PMT | *Optronics Spectroradiometer with PMT monochromator, 200nm - 800 nm* | *Specified in ESA CDB work statement for DAISEX.*<br><br>*MDB 20040228: What is OL754*<br><br>*NILU 20040318: Changed from OL754 to OL754.PMT. OL754 is the instrument commercial name, PMT the monochromator type.* |
| SPECTRORADIOMETER.LICOR1800 | *Li-Cor Spectroradiometer with PMT monochromator, 300 nm to 1100 nm range, 6 nm bandwidth.* | *Specified in ESA CDB work statement for DAISEX.*<br><br>*MDB 20040228: What is OL754*<br><br>*NILU 20040318: Li-Cor 1800 is the company and instrument commercial name, PMT the monochromator type.* |

| **DATA_SOURCE (*Instrument Type*)** | ***Comment*** | ***Debate*** |
|---|---|---|
| SPECTRORADIOMETER.GER1500 | *Portable spectroradiometer 350 nm - 1050 nm in 512 channels (http://www.ger.com/)* | *Specified in ESA CDB work statement for DAISEX.*<br><br>*MDB 20040228: What is GER*<br><br>*NILU 20040318: Corrected from RADIOMETER to SPECTRORADIOMETER. GER is the company name, GER 1500 the instrument name* |
| SPECTRORADIOMETER.GER2600 | *Portable spectroradiometer 350 nm - 2500 nm in 640 channels (http://www.ger.com/)* | *Specified in ESA CDB work statement for DAISEX.*<br><br>*MDB 20040228: What is GER*<br><br>*NILU 20040318: Corrected from RADIOMETER to SPECTRORADIOMETER. GER is the company name, GER 2600 the instrument name* |
| SPECTRORADIOMETER.GER3700 | *Portable spectroradiometer 350 nm - 2500 nm in 704 channels (http://www.ger.com/)* | *Specified in ESA CDB work statement for DAISEX.*<br><br>*MDB 20040228: What is GER*<br><br>*NILU 20040318: GER is the company name, GER 3700 the instrument name* |
| SPEXTUBE | | |
| SPIRALE | | |
| SPMR | *SeaWiFS Profiling Multichannel Radiometer* | |
| SSBUV | | |
| SSC | | |
| SSM | | |
| SUSIM | | |
| TES | | |
| THERMOMETER | | *Specified in ESA CDB work statement for DAISEX.* |
| THERMOMETER.IR.EVEREST | | *Specified in ESA CDB work statement for DAISEX.*<br><br>*MDB 20040228: What is the difference between EVEREST and EVEREST.3400.4ZLC?*<br><br>*NILU 20040328: Same class of instruments. Delete this and us RADIOMETER.IR* |
| THERMOMETER:IR.EVEREST.3400.4 ZLC | | *Specified in ESA CDB work statement for DAISEX.*<br><br>*MDB 20040228: What is the difference between EVEREST and EVEREST.3400.4ZLC?*<br><br>*NILU 20040328: Same class of instruments. Delete this and us RADIOMETER.IR* |
| TOMS | | |
| TOVS | | |
| TRIOS | *Radiance-Irradiance Spectrometer* | |
| TRIPLE | | |
| TYCHO | | |

| DATA_SOURCE (*Instrument Type*) | *Comment* | *Debate* |
|---|---|---|
| UNIFIEDMODEL.GOMOS | *UK Met Office Unified Model* | |
| UNIFIEDMODEL.MIPAS | *UK Met Office Unified Model* | |
| UNIFIEDMODEL.SCIAMACHY | *UK Met Office Unified Model* | |
| UVVIS | *UV-visible spectrometer* | |
| UVVIS.AMAXDOAS | *Airborne DOAS, Cooperation between Universities of Bremen and Heidelberg* | |
| UVVIS.BREWER | | |
| UVVIS.DOAS | | |
| UVVIS.DOBSON | | |
| UVVIS.GUV | | |
| UVVIS.NILUV | | |
| UVVIS.OFFAXIS | | |
| UVVIS.SAOZ | | |
| VEGETATION | | |

### *4.2.6 DATA_TYPE*

The Global Attribute **DATA_TYPE** specifies the data time resolution and the data product level. The identifiers are **concatenated into one field**.

***The Envisat data products subject to validation are grouped into files. These files contain one entire orbit of data, or subsets of the data acquired during an orbit. To facilitate collocation, the correlative data should be grouped also in files not too different from the Envisat grouping. In continuation of earlier validation campaigns, correlative data are to be grouped in one file per day or subset of a day, although specific datasets may require different grouping of data (in particular correlative satellite and model datasets)."***

Type: STRING, maximum 2 characters
Format: Time Scale Code + Data Level Code
Entry: Single concatenated entry
Example: DATA_TYPE = H2 *… is hourly level 2 data*

***Table 4.2.6a:*** *Time Scale Codes to construct the DATA_TYPE attribute entry. The attribute entry is built by concatenating the Time Scale Code with a Data Level Code.*

| *DATA_TYPE (Time Scale Code)* | *Comment* |
|---|---|
| D | *Daily* |
| H | *Hourly* |
| M | *Minutes* |
| S | *Seconds* |
| O | *Other* |

***Table 4.2.6b:*** *Data Level Codes to construct the DATA_TYPE attribute entry. The attribute entry is built by concatenating the Time Scale Code with a Data Level Code.*

| ***DATA_TYPE (Data Level Code)*** | ***Comment*** |
|---|---|
| 0 | *Reformatted, time-ordered instrument data* |
| 1 | *Geolocated, radiometrically and/or spectrally calibrated instrument data* |
| 2 | *Extracted geolocated geophysical data* |
| 3 | *Added-value/derived geophysical data, typically gridded data* |
| 4 | *Assimilated geophysical data* |

### *4.2.7 DATA_VARIABLES*

The Global Attribute **DATA_VARIABLES** lists the variables, such as the chemical compounds or physical parameters, found in the current data file. This entry contains one field for each variable. Each field consists of the variable name, the variable mode and the variable descriptor (underscore separated). Only DATETIME, ALTITUDE, LATITUDE and LONGITUDE variables are always modeless. All other parameters always must have a mode. The descriptor is used only when required. The last part of the variable entry field is therefore optional. Some entries may be subdivided by dots where required (but only in the exact manner stated in the Table 4.2.7 a, b, or c below).

The variable **name** is a basic declaration of the measurable described in the dataset, i.e. the physical property of the measurement subject that is measured or computed by a model. The name includes the chemical or physical identification of the measurement subject. A typical example of a variable name is the concentration of ozone:

```
O3.CONCENTRATION
```

Stringent naming criteria apply to those **independent variables that specify geolocation**. Every datafile must contain a specification of geolocation in four dimensions. In addition to the DATETIME variable, latitude, longitude and a vertical geolocation parameter are mandatory.

- The vertical geolocation should be expressed as ALTITUDE or DEPTH.
- If ALTITUDE is not available, acceptable substitutes are PRESSURE and ALTITUDE.GPH (Geo-Potential Height).

The geolocation provided should specify the location where the measurement variables are sampled (when possible). Only in the event that this information cannot be provided is it acceptable to provide the instrument location with auxiliary information that allows to derive the location of the sampling. In this case the label ".INSTRUMENT" is to be appended to the geolocation parameters. For example:

```
LATITUDE.INSTRUMENT; LONGITUDE.INSTRUMENT;
ALTITUDE.INSTRUMENT.
```

*ATTENTION*

***The mode and the descriptor parts discussed below do not apply to the geolocation variables.***

**ACCEPTABLE COMBINATIONS OF MANDATORY DATA**

***1. DATETIME; ALTITUDE; LATITUDE; LONGITUDE***

***2. DATETIME; ALTITUDE.GPH; LATITUDE; LONGITUDE***

***3. DATETIME; PRESSURE; LATITUDE; LONGITUDE***

***4. DATETIME; DEPTH; LATITUDE; LONGITUDE***

***5. DATETIME; ALTITUDE.INSTRUMENT; LATITUDE.INSTRUMENT; LONGITUDE.INSTRUMENT***
**(Please provide relevant auxiliary parameters)**

***6. DATETIME; DEPTH.INSTRUMENT; LATITUDE.INSTRUMENT; LONGITUDE.INSTRUMENT***
**(Please provide relevant auxiliary parameters)**

The **mode** is the context in which the entity is described **and is a mandatory entry**. The mode should contain the information on the measurement method that can lead to differences when comparing to other methods to observe the same quantity. Exceptions are those categories of differences that are already present elsewhere in the metadata, for example the REMOTE.SENSING data are already distinguished from SAMPLE or INSITU in the entry DATA_DISCIPLINE.. We may construct several examples compliant with tables 4.2.7a and 4.2.7b where we add typical modes to the ozone variable name:

```
O3.COLUMN_SLANT.SOLAR
O3.COLUMN_VERTICAL.SOLAR
```

**Descriptors** are needed only when a property is variable over the dataset. As an example, the descriptor DETECTIONLIMIT is used to construct a variable that contains the changing detection limits for a series of measurements. A constant detection limit (or any other static, descriptive information) should be specified in a comment (see sections VAR_DESCRIPTION and VAR_NOTES), and not as a descriptor variable. The descriptor is added only to construct auxiliary variables that describe some particular property of a primary variable (such as the last variable entry H2O_COLUMN_ERROR in the example below). We can create additional examples using the ozone + mode examples above:

```
O3.COLUMN_ SLANT.SOLAR_ UNCERTAINTY.STDEV
O3.COLUMN_ VERTICAL.SOLAR_UNCERTAINTY.STDEV
```

*NOTE*

***The descriptor is not intended to distinguish subsets of a dataset. Such distinctions should be made by providing additional dependent or independent parameters, as outlined in the following examples.***

**The ozone column obtained by SAOZ measurements are traditionally distinguished in two subsets: measurements at dawn and measurements at dusk. The solar azimuth angle is the parameter is the relevant basis for distinction of these measurements and should be provided together with every measurement of the ozone column.**
**Irradiance measurements are often performed at specific wavelengths. Wavelength should therefore be an independent parameter if values at more than one wavelength are reported**
**Water samples are often performed at three depths with optical thickness parameter (DEPTH.SECCHI) 0, 0.5 and 1.0 respectively. Parameters retrieved from these samples and the optical thickness parameter should all be reported as functions of the independent parameter DEPTH.**

***Variable names, modes, descriptors and units are case sensitive. Please observe the exact capitalisation given in the tables below.***

*ATTENTION*

***The combination of a variable name, mode and descriptor must be unique. If the exact combination you need is not yet listed in the table, please contact the authors of this metadata document to declare the combination and assign an appropriate default measurement unit.***

| | |
|---|---|
| Type: | STRING |
| Format: | Variable name_Variable mode_Variable descriptor |
| Entry: | Multiple semicolon separated fields (each field constructed according to the format above) |
| Example: | DATA_VARIABLES = DATETIME; LATITUDE; LONGITUDE; ALTITUDE; O3.CONCENTRATION_VERTICAL.SOLAR; H2O.COLUMN_VERTICAL.SOLAR; H2O.COLUMN_VERTICAL.SOLAR_ERROR |

***Table 4.2.7a:*** *Allowed DATA_VARIABLES (combinations of Variable Name, Variable Mode and Variable Descriptor).*

| DATA_VARIABLES (Variable Name) | Comment | Debate |
|---|---|---|
| ABSORPTION.COEFFICIENT | | |
| ACCELLERATION.LINEAR | *Use with modesX, Y or Z* | *Indicated in ESAG02 documentation* |
| ACCELLERATION.ANGULAR | *Use with modes PITCH, ROLL or YAW* | *Indicated in ESAG02 documentation* |
| AEROSOL.BACKSCATTER.COEFFICIENT | *Aerosol/cloud backscatter coefficient* | |
| AEROSOL.BACKSCATTER.RATIO | *Aerosol/cloud Backscatter Ratio* | |
| AEROSOL.COLOUR.RATIO | | |
| AEROSOL.COLUMN | | |
| AEROSOL.CONCENTRATION | *Aerosol/cloud* | |
| AEROSOL.DEPOLARIZATION.RATIO | *Aerosol/cloud Depolarization Ratio* | |
| AEROSOL.EPSILON | | |
| AEROSOL.EXTINCTION.COEFFICIENT | *Aerosol/cloud Extinction Coefficient* | |
| AEROSOL.EXTINCTION.RATIO | *Aerosol/cloud Extinction Ratio* | |
| AEROSOL.LIDAR.RATIO | *Aerosol/cloud extinction coefficient over backscatter coefficient* | |
| AEROSOL.OPTICAL.DEPTH | *Aerosol/cloud Optical Depth* | |
| AIR.CONCENTRATION | *Air density* | |
| AIR.MASS.FACTOR | | |
| ALBEDO | | |
| ALTITUDE | *(Modeless)* | |
| ALTITUDE.GPH | *Geopotential height* | |
| ALTITUDE.INSTRUMENT | *Altitude of the instrument (Modeless)* | |
| ALTITUDE.SURFACE | *Altitude of Lake Surface* | |
| ANGLE | *May be used with modes AZIMUTH and ZENITH, and sometimes with descriptor OFFSET, START, END, MEAN, DELTA or DELTA2CAL.MEAN* | *Indicated in DAISEX documentation. See file /GCUDATA/ANGLES.TXT in archive http://io.uv.es/projects/daisex/database/DB-Daisex99/Temperature_99.zip* |
| ANGLE.CORSP | *Corresponding angle, corrected for magnetic declination from geographical north. May be used with modes AZIMUTH and ZENITH, and sometimes with descriptor OFFSET, START, END, MEAN, DELTA or DELTA2CAL.MEAN* | *Indicated in DAISEX documentation. See file /GCUDATA/ANGLES.TXT in archive http://io.uv.es/projects/daisex/database/DB-Daisex99/Temperature_99.zip* |
| ANGLE.ALA | *Average Leave Inclination Angle in degrees* | |
| ANGLE.LUNAR | | |
| ANGLE.SOLAR | | |
| ANGLE.STELLAR | | |
| ANGLE.VIEW | *View Angle, Line of Sight Angle* | |
| ATMOSPHERIC.TRANSMISSION | | |
| ATTITUDE.PITCH | *Instrument attitude relative to global or platform coordinate system* | *NILU 20040324: May need to combine with mode to describe if we reference a local platform coordinate system or a global coordinate system. Therefore include PITCH in the name instead of as a mode.* |
| ATTITUDE.ROLL | *Instrument attitude relative to global or platform coordinate system* | *NILU 20040324: May need to combine with mode to describe if we reference a local platform coordinate system or a global coordinate system. Therefore include ROLL in the name instead of as a mode.* |
| ATTITUDE.YAW | *Instrument attitude relative to global or platform coordinate system* | *NILU 20040324: May need to combine with mode to describe if we reference a local platform coordinate system or a global coordinate system. Therefore include YAW in the name instead of as a mode.* |

| DATA_VARIABLES (Variable Name) | Comment | Debate |
|---|---|---|
| B.PHASE.FUNCTION | | |
| BACKSCATTERING.COEFFICIENT | | |
| BAROMETRIC.PRESSURE | | |
| BEAM.ATTENUATION.COEFFICIENT | | |
| BEAM.POSITION | *Platform stabilisation data for ESAG0. Combine with mode X, Y, Z, PITCH, ROLL YAW if appropriate.* | *Indicated in DAISEX documentation for LCR gravimetry.* |
| BPA | *Bleached particle absorption* | |
| Br.COLUMN | | |
| Br.CONCENTRATION | | |
| Br2.COLUMN | | |
| Br2.CONCENTRATION | | |
| BrCl.COLUMN | | |
| BrCl.CONCENTRATION | | |
| BrO.COLUMN | | |
| BrO.CONCENTRATION | | |
| BrONO.COLUMN | | |
| BrONO.CONCENTRATION | | |
| BrONO2.COLUMN | | |
| BrONO2.CONCENTRATION | | |
| C2H2.COLUMN | | |
| C2H2.CONCENTRATION | *Acetylene* | |
| C2H6.COLUMN | | |
| C2H6.CONCENTRATION | *Ethane* | |
| CFC11.COLUMN | | |
| CFC11.CONCENTRATION | *CFC11 == CFCl3* | |
| CFC12.COLUMN | | |
| CFC12.CONCENTRATION | *CFC12==CF2Cl2* | |
| CH2O.COLUMN | | |
| CH2O.CONCENTRATION | | |
| CH3.COLUMN | | |
| CH3.CONCENTRATION | | |
| CH3Br.COLUMN | | |
| CH3Br.CONCENTRATION | | |
| CH4.COLUMN | | |
| CH4.COLUMN.AMF | *air-mass factor* | |
| CH4.CONCENTRATION | *Methane* | |
| CH4.CONCENTRATION.AMF | *air mass factor* | |
| CH4.CONCENTRATION.AVK | *averaging kernel* | |
| CHL.1.CONCENTRATION | | |
| CHL.1.INDEX | *Algal pigment index valid in Case 1 waters* | |
| CHL.2.CONCENTRATION | | |
| CHL.2.INDEX | *Algal pigment index valid in Case 2 waters* | |
| CHL.A.CONCENTRATION | *Chlorophyll* | *Specified in Cal/Val. Also needed for DAISEX.* |
| CHL.A.INDEX | *Chlorophyll* | *Specified in Cal/Val. Also needed for DAISEX.* |
| CHL.B.CONCENTRATION | *Chlorophyll* | *Specified in DAISEX data files.* |
| CHL.B.INDEX | *Chlorophyll* | *Specified in DAISEX data files.* |
| CHL.TOTAL.CONCENTRATION | *Chlorophyll* | *Specified in DAISEX data files.* |
| CHL.TOTAL.INDEX | *Chlorophyll* | *Specified in DAISEX data files.* |
| CHL.FLUORESCENCE | *Chlorophyll-Fluorescence* | |
| Cl.COLUMN | | |
| Cl.CONCENTRATION | *Chlorine* | |
| Cl2.COLUMN | | |
| Cl2.CONCENTRATION | | |

| ***DATA_VARIABLES (Variable Name)*** | ***Comment*** | ***Debate*** |
|---|---|---|
| Cl2O2.COLUMN | | |
| Cl2O2.CONCENTRATION | | |
| ClO.COLUMN | | |
| ClO.CONCENTRATION | *(Do not confuse the small l with a capital I)* | |
| ClONO.COLUMN | | |
| ClONO.CONCENTRATION | | |
| ClONO2.COLUMN | | |
| ClONO2.CONCENTRATION | | |
| ClOO.COLUMN | | |
| ClOO.CONCENTRATION | | |
| CLOUD.BOTTOM.HEIGHT | *Cloud Bottom Height* | |
| CLOUD.BOTTOM.PRESSURE | *Cloud Base Pressure* | |
| CLOUD.CONDITION | *Text entries only* | |
| CLOUD.COVER | *Cloud Cover* | |
| CLOUD.DROPLET.EFFECTIVE.RADIUS | *Cloud droplet effective radius (ref)* | |
| CLOUD.DROPLET.NUMBER.CONCENTRATION | *Cloud droplet number concentration* | |
| CLOUD.LAYER.HEIGHT | | |
| CLOUD.LAYER.THICKNESS | | |
| CLOUD.LAYER.TRANSMISSION | | |
| CLOUD.OPTICAL.THICKNESS | *Cloud Optical Thickness* | |
| CLOUD.TOP.HEIGHT | *Cloud Top Height* | |
| CLOUD.TOP.PRESSURE | *Cloud Top Pressure* | |
| CLOUD.TYPE | *WMO codes* | |
| CN.COLUMN | | |
| CN.CONCENTRATION | | |
| CO.COLUMN | | |
| CO.COLUMN.AMF | *air-mass factor* | |
| CO.CONCENTRATION | *Carbon monoxide* | |
| CO.CONCENTRATION.AMF | *air mass factor* | |
| CO.CONCENTRATION.AVK | *averaging kernel* | |
| CO2.COLUMN | | |
| CO2.CONCENTRATION | *Carbon dioxide* | |
| COF2.COLUMN | | |
| COF2.CONCENTRATION | | |
| COLOUR.INDEX | *Colour index f550/f350 after molecular absorption correction* | |
| COLOUR.RATIO | | |
| CONDUCTIVITY | | |
| CROP.SEED.DENSITY.MASS | *Kg seeds/ha* | *Specified in DAISEX vegetation data files.* |
| CROP.SEED.DENSITY.PLANTS | *Number of seeds/ha* | *Specified in DAISEX vegetation data files.* |
| CROP.ROW.SPACING | *Row spacing in meters* | *Specified in DAISEX vegetation data files.* |
| CROP.PLANT.SPACING | *plant spacing in meters* | *Specified in DAISEX vegetation data files.* |
| CROP.PLANT.HEIGHT | *Plant height in meters* | *Specified in DAISEX vegetation data files.* |
| CROP.LEAVES.WEIGHT | *Weight in grammes of leaves (use with mode FRESH or DRY)* | *Specified in DAISEX vegetation data files.* |
| CROP.LEAVES.MOISTURE | *Water content of leaves in weight %* | *Specified in DAISEX vegetation data files.* |
| CROP.LEAVES.DRYMATTER | *Dry matter content of leaves in %* | *Specified in DAISEX vegetation data files.* |
| CROP.STEM.WEIGHT | *Weight in grammes of stem (use with mode FRESH or DRY)* | *Specified in DAISEX vegetation data files.* |
| CROP.STEM.MOISTURE | *Water content of stem in weight %* | *Specified in DAISEX vegetation data files.* |

| DATA_VARIABLES (Variable Name) | Comment | Debate |
|---|---|---|
| CROP.STEM.DRYMATTER | *Dry matter content of stem in %* | *Specified in DAISEX vegetation data files.* |
| CROP.TOTAL.WEIGHT | *Weight in grammes of total plant (use with mode FRESH or DRY)* | *Specified in DAISEX vegetation data files.* |
| CROP.TOTAL.MOISTURE | *Water content of total plant in weight %* | *Specified in DAISEX vegetation data files.* |
| CROP.TOTAL.DRYMATTER | *Dry matter content of total plant in %* | *Specified in DAISEX vegetation data files.* |
| DATETIME | *ENVISAT day in MJD2000, meaning that Jan. 1, 2000 at 00:00:00 hrs = DATETIME 0.000000* | |
| DAY.MISSION.ELAPSED | *Mission start (e.g., launch) = day 0* | |
| DAY.OF.YEAR | *Day 1 is January 1st.at 24hrs.* | |
| DEPTH | *Water depth* | |
| DEPTH.KD | | |
| DEPTH.SEA.FLOOR | *Depth of the Sea Floor* | |
| DEPTH.SEA.OPT | *OPT depth of samples* | |
| DEPTH.SECCHI | *Can be dependent or independent. As independent variable it has values 0, 0.5 and 1* | |
| DISCOLOUR.CODE | *possible values according to MAVT definition* | |
| DISTANCE | | |
| EMISSIVITY | | *Specified in ESA CDB work statement for DAISEX.* |
| FLAG.ABSOA.CONT | | |
| FLAG.ABSOA.DUST | | |
| FLAG.CASE2.ANOM | | |
| FLAG.CASE2.S | | |
| FLAG.CASE2.Y | | |
| FLUORESCENCE | | |
| FOAM | *Text entrie only, description of Foam and other Sea Surface Conditions* | |
| GRAVITY | | *Indicated in ESAG02 documentation* |
| H.COLUMN | | |
| H.CONCENTRATION | | |
| H2.COLUMN | | |
| H2.CONCENTRATION | | |
| H2CO.COLUMN | | |
| H2CO.COLUMN.AMF | *air-mass factor* | |
| H2CO.CONCENTRATION | *Formaldehyde* | |
| H2CO.CONCENTRATION.AMF | *air mass factor* | |
| H2CO.CONCENTRATION.AVK | *averaging kernel* | |
| H2O.ABOVE.CLOUD | *Water vapour content above clouds* | |
| H2O.COLUMN | | |
| H2O.COLUMN.AMF | *air-mass factor* | |
| H2O.CONCENTRATION | *Water Vapour* | |
| H2O.CONCENTRATION.AMF | *air mass factor* | |
| H2O.CONCENTRATION.AVK | *averaging kernel* | |
| H2O.LIQUID.COLUMN | | |
| H2O.LIQUID.CONCENTRATION | *Liquid Water Content* | |
| H2O.LIQUID.PATH | *Liquid Water Path* | |
| H2O2.COLUMN | | |
| H2O2.CONCENTRATION | | |
| HBr.COLUMN | | |
| HBr.CONCENTRATION | | |
| HCFC22.COLUMN | | |
| HCFC22.CONCENTRATION | | |
| HCHO.COLUMN | | |

| DATA_VARIABLES (Variable Name) | Comment | Debate |
|---|---|---|
| HCHO.CONCENTRATION | | |
| HCl.COLUMN | | |
| HCl.CONCENTRATION | *(Do not confuse the lower case L with a capital I)* | |
| HCN.COLUMN | | |
| HCN.CONCENTRATION | *Hydrogen cyanide* | |
| HCO.COLUMN | | |
| HCO.CONCENTRATION | | |
| HDO.COLUMN | | |
| HDO.CONCENTRATION | | |
| HEADING | *Compass heading* | |
| HEAVE | | |
| HF.COLUMN | | |
| HF.CONCENTRATION | | |
| HNO3.COLUMN | | |
| HNO3.COLUMN.AMF | *air-mass factor* | |
| HNO3.CONCENTRATION | | |
| HNO3.CONCENTRATION.AMF | *air mass factor* | |
| HNO3.CONCENTRATION.AVK | *averaging kernel* | |
| HNO4.COLUMN.AMF | | |
| HNO4.CONCENTRATION | | |
| HO2.COLUMN | | |
| HO2.CONCENTRATION | | |
| HO2NO2.COLUMN | | |
| HO2NO2.CONCENTRATION | | |
| HOBr.COLUMN | | |
| HOBr.CONCENTRATION | | |
| HOCl.COLUMN | | |
| HOCl.CONCENTRATION | | |
| HONO.COLUMN | | |
| HONO.CONCENTRATION | | |
| HUMIDITY | | |
| HUMIDITY.RELATIVE | *Relative humidity* | |
| ICE.THICKNESS | | *Indicated in ESAG02 documentation* |
| ICE.FREEBOARD.HEIGHT | | *Indicated in ESAG02 documentation* |
| IO.COLUMN | | |
| IO.CONCENTRATION | | |
| IRRADIANCE.DOWNWELLED | *Downwelling irradiance* | |
| IRRADIANCE.DOWNWELLED.SURFACE | | |
| IRRADIANCE.SURFACE | *Surface irradiance* | |
| IRRADIANCE.UPWELLED | *Upwelling irradiance* | |
| LAI | *Leaf Area Index, DIMENSIONLESS* | *Specified in DAISEX vegetation data files.*<br><br>*MDB20040228: What is this?*<br><br>*NILU 20040325: See http://io.uv.es/projects/daisex/instr/instrs.htm and http://www.licor.com/env/PDF_Files/LAI2000_150dpi.pdf* |
| LATITUDE | *(Modeless), Latitude North* | |
| LATITUDE.EQUIVALENT.PV | | |
| LATITUDE.INSTRUMENT | *(Modeless), Latitude of the Instrument (North)* | |
| LAYER | | |
| LEVEL | | |
| LONGITUDE | *(Modeless) Longitude East* | |

| DATA_VARIABLES (Variable Name) | Comment | Debate |
|---|---|---|
| LONGITUDE.INSTRUMENT | *(Modeless) Longitude (East) of the Instrument* | |
| MeO.COLUMN | | |
| MeO.CONCENTRATION | | |
| MeOCl.COLUMN | | |
| MeOCl.CONCENTRATION | | |
| MeOH.COLUMN | | |
| MeOH.CONCENTRATION | | |
| MeONO2.COLUMN | | |
| MeONO2.CONCENTRATION | | |
| MeOO.COLUMN | | |
| MeOO.CONCENTRATION | | |
| MeOOH.COLUMN | | |
| MeOOH.CONCENTRATION | | |
| N.COLUMN | | |
| N.CONCENTRATION | | |
| N2.COLUMN | | |
| N2.CONCENTRATION | | |
| N2O.COLUMN | | |
| N2O.COLUMN.AMF | *air-mass factor* | |
| N2O.CONCENTRATION | | |
| N2O.CONCENTRATION.AMF | *air mass factor* | |
| N2O.CONCENTRATION.AVK | *averaging kernel* | |
| N2O5.COLUMN | | |
| N2O5.CONCENTRATION | *dinitrogenpentoxide* | |
| NCO.COLUMN | | |
| NCO.CONCENTRATION | | |
| NH3.COLUMN | | |
| NH3.CONCENTRATION | | |
| NLC.BOTTOM.HEIGHT | *Noctilucent Cloud (NLC)* | |
| NLC.BOTTOM.PRESSURE | | |
| NLC.LAYER.HEIGHT | | |
| NLC.LAYER.THICKNESS | | |
| NLC.LAYER.TRANSMISSION | | |
| NLC.OPTICAL.THICKNESS | | |
| NLC.TOP.HEIGHT | | |
| NLC.TOP.PRESSURE | | |
| NO.COLUMN | | |
| NO.CONCENTRATION | | |
| NO2.COLUMN | | |
| NO2.COLUMN.AMF | *air-mass factor* | |
| NO2.CONCENTRATION | *nitrogen dioxide* | |
| NO2.CONCENTRATION.AMF | *air mass factor* | |
| NO2.CONCENTRATION.AVK | *averaging kernel* | |
| NO3.COLUMN | | |
| NO3.COLUMN.AMF | *air-mass factor* | |
| NO3.CONCENTRATION | | |
| NO3.CONCENTRATION.AMF | *air mass factor* | |
| NO3.CONCENTRATION.AVK | *averaging kernel* | |
| O.1D.COLUMN | | |
| O.1D.CONCENTRATION | | |
| O.3P.COLUMN | | |
| O.3P.CONCENTRATION | | |
| O2.COLUMN | | |
| O2.COLUMN.AMF | *air-mass factor* | |
| O2.CONCENTRATION | | |

| DATA_VARIABLES (Variable Name) | Comment | Debate |
|---|---|---|
| O2.CONCENTRATION.AMF | *air mass factor* | |
| O2.CONCENTRATION.AVK | *averaging kernel* | |
| O3.COLUMN | | |
| O3.COLUMN.AMF | *air-mass factor* | |
| O3.CONCENTRATION | *Ozone* | |
| O3.CONCENTRATION.AMF | *air mass factor* | |
| O3.CONCENTRATION.AVK | *averaging kernel* | |
| O4.COLUMN | | |
| O4.CONCENTRATION | | |
| OCIO.COLUMN | | |
| OCIO.COLUMN.AMF | *air-mass factor* | |
| OCIO.CONCENTRATION | *(Do not confuse the small L with a capital I)* | |
| OCIO.CONCENTRATION.AMF | *air mass factor* | |
| OCIO.CONCENTRATION.AVK | *averaging kernel* | |
| OCS.COLUMN | | |
| OCS.CONCENTRATION | *Carbonyl sulfide* | |
| OH.COLUMN | | |
| OH.CONCENTRATION | | |
| OIO.COLUMN | | |
| OIO.CONCENTRATION | | |
| PAN | | |
| PAN.COMPLEX | | |
| PAR | *Photosyntetically available radiation* | |
| PATH.DIFFERENCE | | |
| PHYTOPLANKTON.PIGMENTS | | |
| PITCH | | |
| PLATFORM.ACCELLERATION | *Platform stabilisation data for ESAG0. Combine with mode X, Y or Z if appropriate. In other cases, modes PITCH, ROLL or YAW may also be used* | *Indicated in ESAG02 documentation for LCR gravimeter data.*<br><br>*MDB 20042028: Explain*<br><br>*NILU 20040325: We do not know if this is intended to describe movement of the aircraft platform relative to a global coordinate system, or movement of a stabilised instrument platform relative to an aircraft coordinate system. These variable names may potentially also be of use for image geo-referencing?* |
| PMC.BOTTOM.HEIGHT | *Polar Mesospheric Cloud (PMC)* | |
| PMC.BOTTOM.PRESSURE | | |
| PMC.LAYER.HEIGHT | | |
| PMC.LAYER.THICKNESS | | |
| PMC.LAYER.TRANSMISSION | | |
| PMC.OPTICAL.THICKNESS | | |
| PMC.TOP.HEIGHT | | |
| PMC.TOP.PRESSURE | | |
| POTENTIAL.VORTICITY | | |
| PRESSURE | *Pressure* | |
| PRESSURE.SURFACE | | |
| PRESSURE.WATER | | |
| PSC.BOTTOM.HEIGHT | *Polar Stratospheric Cloud (PSC)* | |
| PSC.BOTTOM.PRESSURE | | |
| PSC.LAYER.HEIGHT | | |
| PSC.LAYER.THICKNESS | | |
| PSC.LAYER.TRANSMISSION | | |
| PSC.OPTICAL.THICKNESS | | |

| DATA_VARIABLES (Variable Name) | Comment | Debate |
|---|---|---|
| PSC.TOP.HEIGHT | | |
| PSC.TOP.PRESSURE | | |
| RADIANCE.DOWNWELLED | *Downwelled radiance* | |
| RADIANCE.DOWNWELLED.SKY | | |
| RADIANCE.SQUARED | | |
| RADIANCE.UPWELLED | *Upwelling radiance* | |
| RANGE | *distance for e.g. radar, not [min-max]* | *Indicated in ESAG02 documentation* |
| REFLECTANCE | | |
| REFLECTANCE.RHOW | | |
| RELAZ | *Relative Azimuth Transmittance* | |
| RHOW | *p\'w – water-leaving reflectance* | |
| ROLL | | |
| SALINITY | *Salinity* | |
| SEA.STATE | | |
| SF6.COLUMN | | |
| SF6.CONCENTRATION | | |
| SIGNAL | | |
| SIGNAL.NOISE.RATIO | *Signal to noise ratio* | |
| SIGNIFICANT.WAVE.HEIGHT | | |
| SITE.NAME | *Textual info on sampling sit. Use short name, and include verbose info in comment or description fields.* | *Specified in DAISEX vegetation data files.*<br><br>*MDB20040228: No*<br><br>*NILU 20040325: Independent variable name needed to describe name of sampling site* |
| SITE.ZONE | *Textual info on sampling sit. Use short name, and include verbose info in comment or description fields.* | *Specified in DAISEX vegetation data files.*<br><br>*MDB20040228: No*<br><br>*NILU 20040325: Independent variable name needed to indicate named position within sampling site* |
| SITE.FIELD | *Textual info on sampling site. Use short name, and include verbose info in comment or description fields.* | *Specified in DAISEX vegetation data files.*<br><br>*MDB20040228: No*<br><br>*NILU 20040325: Independent variable name needed to indicate named position within sampling site* |
| SITE.CROP | *Textual info on sampling site. Use short name, and include verbose info in comment or description fields.* | *Specified in DAISEX vegetation data files.*<br><br>*MDB20040228: No*<br><br>*NILU 20040325: Independent or dependent variable name needed to describe crop at this part of sampling site* |
| SITE.POINT | *Textual info on sampling site. Use short name, and include verbose info in comment or description fields.* | *Specified in DAISEX vegetation data files.*<br><br>*MDB20040228: No*<br><br>*NILU 20040325: Independent variable name needed to indicate named sampling points within sampling site* |

| DATA_VARIABLES (Variable Name) | Comment | Debate |
|---|---|---|
| SITE.DESCRIPTION | *Short descriptive string that may be used as free-text DEPENDENT or INDEPENDENT variable* | *Specified in DAISEX vegetation data files.<br><br>MDB20040228: No<br><br>NILU 20040325: Dependent variable name needed to describe a sampling site* |
| SITE.X | *X size of sampling site in meters. Add orientation and other georeferencing info in comment or description fields.* | *Specified in DAISEX vegetation data files.<br><br>MDB20040228: No<br><br>NILU 20040325: Independent variable name needed to indicate position in local coordinate system within sampling site* |
| SITE.Y | *Y size of sampling site in meters. Add orientation and other georeferencing info in comment or description fields.* | *Specified in DAISEX vegetation data files.<br><br>MDB20040228: No<br><br>NILU 20040325: Independent variable name needed to indicate position in local coordinate system within sampling site* |
| SKY.CODE | *possible values according to MAVT definition* | |
| SKY.CONDITION | | |
| SKY.RADIANCE.DISTRIBUTION | | |
| SM | *Suspended matter (marine use)* | |
| SO2.COLUMN | | |
| SO2.COLUMN.AMF | *air-mass factor* | |
| SO2.CONCENTRATION | | |
| SO2.CONCENTRATION.AMF | *air mass factor* | |
| SO2.CONCENTRATION.AVK | *averaging kernel* | |
| SOIL.WEIGHT | *Use mode FRESH or DRY* | *Specified in DAISEX vegetation data files.* |
| SOIL.MOISTURE | *Use mode FRESH or DRY* | *Specified in DAISEX vegetation data files.* |
| SOIL.ROUGHNESS | *Combine with direction MODE (X or Y) and add orientation and other georeferencing info in comment or description fields.* | *Specified in DAISEX vegetation data files.* |
| SPECTRAL.ABSORPTION.COEFFICIENT | *Spectral absorption coefficient* | |
| SPECTRAL.BACKSCATTER.COEFFICIENT | *Spectral backscattering coefficient* | |
| SPECTRAL.BEAM.ATTENUATION.COEFFICIENT | *Spectral beam attenuation coefficient* | |
| SPEED | *Velocity (also see VELOCITY.X, VELOCITY.Y and VELOCITY.Z, which can be combined with modes like FREE.INERTIAL or GPS.INTEGRATED.KALMAN.FILTERED)* | |
| SPM | *Suspended particulate matter (atmospheric use)* | |
| SPRING.TENSION | *Platform stabilisation data for ESAG02* | *Indicated in ESAG02 documentation* |
| SURFACE.CODE | *possible values according to MAVT definition* | |
| SURFACE.CONDITION | *Text entries only* | |
| SWELL.DIRECTION | | |
| SWELL.HEIGHT | | |
| TEMPERATURE | *Temperature* | |
| TEMPERATURE.AIR | | |
| TEMPERATURE.BRIGHTNESS | *Brightness Temperature. DAISEX will use these with modes SKY or TRANSECT* | *Indicated in DAISEX documentation* |

| ***DATA_VARIABLES (Variable Name)*** | ***Comment*** | ***Debate*** |
|---|---|---|
| TEMPERATURE.BUCKET | *Bucket Temperature (Ship use)* | |
| TEMPERATURE.INTERNAL.BOX | | |
| TEMPERATURE.INTERNAL.INSTRUMENT | | |
| TEMPERATURE.LAND.SURFACE | | |
| TEMPERATURE.RADIOMETRIC | *In DAISEX files named Trad(´C)* | *Indicated in DAISEX documentation* |
| TEMPERATURE.SEA.SUBSURFACE | | |
| TEMPERATURE.SEA.SURFACE | | |
| TEMPERATURE.WATER | | |
| THETA | *Potential Temperature* | |
| TRANSECT.NAME | *Use in DAISEX GCU-data. Use to define a transect (a straight path to fly over a groundbased sampling site)* | *Indicated in DAISEX documentation*<br><br>*MDB 20040228: Explain?*<br><br>*NILU 20040326: Definition of TRANSECT given in the comment field. We need TRANSECT as a variable name to declare a transect by name and initial/final positions. We also need TRANSECT as a mode to indicate that some other variable is measured in a profile along a transect.* |
| TRANSECT.LATITUDE | *Use to define start and end position of a transect (with modes INITIAL and FINAL)* | |
| TRANSECT.LONGITUDE | *Use to define start and end position of a transect (with modes INITIAL and FINAL)* | |
| TROPOSPHERIC.DELAY | | |
| TSM.CONCENTRATION | *Total suspended matter (combine with DRYW,B442)* | |
| UV.INDEX | *UV Index* | |
| VEGETATION.INDEX | | |
| VELOCITY | *Can be combined with modes like X, Y or Z* | *Indicated in ESAG02 documentation* |
| VELOCITY.ANGULAR | *Can be combined with modes like PITCH, ROLL or YAW* | *Indicated in ESAG02 documentation* |
| VELOCITY.ANGULAR.PITCH | *Can be combined with modes like FREE.INERTIAL or GPS.INTEGR.KALMAN.FILT.INERTIAL* | *Indicated in ESAG02 documentation* |
| VELOCITY.ANGULAR.ROLL | *Can be combined with modes like FREE.INERTIAL or GPS.INTEGR.KALMAN.FILT.INERTIAL* | *Indicated in ESAG02 documentation* |
| VELOCITY.ANGULAR.YAW | *Can be combined with modes like FREE.INERTIAL or GPS.INTEGR.KALMAN.FILT.INERTIAL* | *Indicated in ESAG02 documentation* |
| VELOCITY.X | *Can be combined with modes like FREE.INERTIAL or GPS.INTEGR.KALMAN.FILT.INERTIAL* | *Indicated in ESAG02 documentation* |
| VELOCITY.Y | *Can be combined with modes like FREE.INERTIAL or GPS.INTEGR.KALMAN.FILT.INERTIAL* | *Indicated in ESAG02 documentation* |
| VELOCITY.Z | *Can be combined with modes like FREE.INERTIAL or GPS.INTEGR.KALMAN.FILT.INERTIAL* | *Indicated in ESAG02 documentation* |
| VISIBILITY | *WMO codes* | |
| VMG | | |
| WAVE.DIRECTION | | |
| WAVE.HEIGHT | | |
| WAVE.PERIOD | | |

| *DATA_VARIABLES (Variable Name)* | *Comment* | *Debate* |
|---|---|---|
| WAVE.TYPE | | |
| WAVELENGTH | | |
| WAVENUMBER | | |
| WIND.DIRECTION | *Wind direction* | |
| WIND.SPEED | | |
| YS | *Yellow substance absorption* | |
| YSBPA | *Yellow substance and bleached particle absorption* | |

***Table 4.2.7b:** DATA_VARIABLES Variable mode (not used for DATETIME, ALTITUDE, LATITUDE AND LONGITUDE).*

| DATA_VARIABLES (Variable Mode) | Comment | Debate |
|---|---|---|
| A442 | *optical method for determination of Chl.2.Index* | |
| ABSORPTION | | |
| ALONG.TRACK | | |
| APRIORI | | |
| ASSIMILATION | *Chemical data assimilation* | |
| AZIMUTH | *Use with ANGLE* | *Indicated in DAISEX data file ANGLE.TXT, see reference under ANGLE in table 4.2.7a* |
| AZIMUTH.AVERAGE | | *Indicated in DAISEX data file ANGLE.TXT, see reference under ANGLE in table 4.2.7a*<br><br>*NILU 20040326: Use variable name ANGLE with mode AZIMUTH and descriptor MEAN (=average) instead* |
| AZIMUTH.DELTA | *Use with ANGLE* | *Indicated in DAISEX data file ANGLE.TXT, see reference under ANGLE in table 4.2.7a*<br><br>*NILU 20040326: Use variable name ANGLE with mode AZIMUTH and descriptor DELTA instead.* |
| AZIMUTH.CORSP | *Angle corrected for magnetic declination from geographical north.* | *Indicated in DAISEX data file ANGLE.TXT, see reference under ANGLE in table 4.2.7a*<br><br>*MDB 20040228: Could be a descriptor (4.2.7c)*<br><br>*NILU 20040326: Use variable name ANGLE.CORSP instead, combine with mode AZIMUTH.* |
| AZIMUTH.CORSP.AVERAGE | *Angle corrected for magnetic declination from geographical north.* | *Indicated in DAISEX data file ANGLE.TXT, see reference under ANGLE in table 4.2.7a*<br><br>*MDB 20040228: Could be a descriptor (4.2.7c)*<br><br>*NILU 20040326: Use variable name ANGLE.CORSP instead, combine with mode AZIMUTH and desciptor MEAN.* |
| AZIMUTH.DELTA2CAL.AVERAGE | *May need clarification…* | *Indicated in DAISEX data file ANGLE.TXT, see reference under ANGLE in table 4.2.7a*<br><br>*MDB 20040228: Could be a descriptor (4.2.7c)*<br><br>*NILU 20040326: Use variable name ANGLE, combine with mode AZIMUTH and desciptor DELTA2CAL.MEAN.* |
| BACKSCATTER | | |
| B442 | *optical method for determination of TSM* | |
| BBC?? | *Black Body Cavity, where ?? is 00 to 99* | |
| BOLTZMANN | *method for LIDAR temperature retrieval* | |
| BULK | *Use with TEMPERATURE to get Bulk Sea Surface temperature (SST)* | |
| COLLOCATED | | |
| DECLINATION | | |
| DIFFSLANT | | |
| DIFFSLANT.EMISSION | | |
| DIFFSLANT.LIMB | | |
| DIFFSLANT.LUNAR | | |

| DATA_VARIABLES (Variable Mode) | Comment | Debate |
|---|---|---|
| DIFFSLANT.SOLAR | | |
| DIFFSLANT.STELLAR | | |
| DIFFSLANT.NADIR | | |
| DIFFSLANT.ZENITH | | |
| DRY | *Used for crop characterisation (opposite of FRESH)* | *Indicated in DAISEX vegetation data files.*<br><br>*MDB 20040228: Is this a mode?*<br><br>*NILU 20040326: Yes, we believe so.* |
| DRYW | *method for determination of TSM* | |
| ELEVATION | | |
| EMISSION | | |
| FINAL | *Use with DAISEX transect LATITUDE and LONGITUDE* | *Indicated in DAISEX vegetation data files.*<br><br>*MDB 20040228: Is this a mode?*<br><br>*NILU 20040326: Yes, we believe so.* |
| FREE.INERTIAL | *Use with aircraft position, velocity or attitude.* | *Indicated in ESAG02 Raw Data Report for use with INS data* |
| FRESH | *Used for crop characterisation (opposite of DRY)* | *Indicated in DAISEX vegetation data files.*<br><br>*MDB 20040228: Is this a mode?*<br><br>*NILU 20040326: Yes, we believe so.* |
| GPS.INTEGR.KALMAN.FILT.INERTIAL | *Use with aircraft position, velocity or attitude.* | *Indicated in ESAG02 Raw Data Report for use with INS data* |
| INITIAL | *Use with DAISEX transect LATITUDE and LONGITUDE* | *Indicated in DAISEX vegetation data files.*<br><br>*MDB 20040228: Is this a mode?*<br><br>*NILU 20040326: Yes, we believe so.* |
| INSITU | | |
| INTERFEROGRAMME | *to be used with PATH.DIFFERENCE* | |
| HPLC | *method for determination of Chl.2.Index* | |
| HYDROSTATIC | *method for LIDAR temperature retrieval* | |
| LIMB | | |
| LINEWIDTH | *method for LIDAR temperature retrieval* | |
| LUNAR | *with reference to the moon* | |
| LUNAR.OCCULTATION | *With reference to the moon\'s occultation* | |
| NADIR | | |
| OFFAXIS | *Off-axis* | |
| PARALLEL | *Reference to parallel polarisation* | |
| PERPENDICULAR | *Reference to perpendicular polarisation* | |
| PITCH | *Attitude angle* | *From ESAG02 documentation*<br><br>*MDB 20040228: Is this different fromATTITUDE.PITCH?*<br><br>*NILU 20040324: ATTITUDE.PITCH is a complex name, that can be combined with modes like OFFSET (which may incidentally become a DESCRIPTOR instead), or others. We are currently not certain what is needed by the community. If we need to reference both a global coordinate system and a local one inside an aircraft, more work may be needed to define this properly.*<br><br>*Use with ACCELLERATION.ANGULAR.* |

| ***DATA_VARIABLES (Variable Mode)*** | ***Comment*** | ***Debate*** |
|---|---|---|
| ROLL | *Attitude angle* | *From ESAG02 documentation*<br><br>*MDB 20040228: Is this different fromATTITUDE.ROLL?*<br><br>*NILU 20040324: ATTITUDE.ROLL is a complex name, that can be combined with modes like OFFSET (which may incidentally become a DESCRIPTOR instead), or others. We are currently not certain what is needed by the community. If we need to reference both a global coordinate system and a local one inside an aircraft, more work may be needed to define this properly.*<br><br>*Use with ACCELLERATION.ANGULAR.* |
| SAMPLE | | |
| SKIN | *Use with TEMPERATURE to get Skin Sea Surface temperature (SST)* | |
| SKY | *Use with BRIGHTNESS.TEMPERATURE* | *Indicated in DAISEX temperature data files.*<br><br>*MDB 20040228: Explain context*<br><br>*NILU 20040326: Brightness temperature is measured with the sonde pointing to the sky, or to the surface. Angle ZENITH or some specific angle from ZENITH is also used. The README.TXT file indicates the mode TRANSECT, we do not know the significance of this.* |
| SLANT | | |
| SLANT.EMISSION | | |
| SLANT.LIMB | | |
| SLANT.LUNAR | | |
| SLANT.SOLAR | | |
| SLANT.STELLAR | | |
| SLANT.NADIR | | |
| SLANT.ZENITH | | |
| SOLAR | *With reference to the sun* | |
| SOLAR.OCCULTATION | *With reference to the solar occultation* | |
| SP | *spectrophotometic method for determination of Chl.2.Index* | |
| STELLAR | *With reference to a star* | |
| STELLAR.OCCULTATION | *With reference to a star occultation* | |
| SURFACE | *Use with BRIGHTNESS.TEMPERATURE* | *Indicated in DAISEX temperature data files.*<br><br>*NILU 20040326: Brightness temperature is measured with the sonde pointing to the sky, or to the surface. Angle ZENITH or some specific angle from ZENITH is also used. The README.TXT file indicates the mode TRANSECT, we do not know the significance of this.* |
| TILT | | |
| TOA | *Top Of Atmosphere* | |

| DATA_VARIABLES (Variable Mode) | Comment | Debate |
|---|---|---|
| TRANSECT | *Use with BRIGHTNESS.TEMPERATURE* | *Indicated in DAISEX temperature data files.*<br><br>*MDB 20040228: Explain context*<br><br>*NILU 20040326: Brightness temperature is measured with the sonde pointing to the sky, or to the surface. Angle ZENITH or some specific angle from ZENITH is also used. The README.TXT file indicates the mode TRANSECT, we do not know the significance of this.* |
| U | *velocity component* | |
| UMKEHR | *Dobson/Brewer specific profiling technique* | |
| UNPOLARISED | | |
| V | *velocity component* | |
| VERTICAL | | |
| VERTICAL.EMISSION | | |
| VERTICAL.LIMB | *vertical column retrieved from limb data* | |
| VERTICAL.LUNAR | | |
| VERTICAL.NADIR | | |
| VERTICAL.SOLAR | *direct-sun observations* | |
| VERTICAL.SOLAR.FOCUS | *sun-focus observations* | |
| VERTICAL.STELLAR | | |
| VERTICAL.ZENITH | | |
| W | *velocity component* | |
| X | | |
| Y | | |
| YAW | *Attitude angle* | *From ESAG02 documentation*<br><br>*MDB 20040228: Is this different fromATTITUDE.YAW?*<br><br>*NILU 20040324: ATTITUDE.YAW is a complex name, that can be combined with modes like OFFSET (which may incidentally become a DESCRIPTOR instead), or others. We are currently not certain what is needed by the community. If we need to reference both a global coordinate system and a local one inside an aircraft, more work may be needed to define this properly.*<br><br>*Use with ACCELLERATION.ANGULAR.* |
| Z | | |
| ZENITH | *Use with ANGLE* | *Indicated in DAISEX data file ANGLE.TXT, see reference under ANGLE in table 4.2.7a* |
| ZENITH.AVERAGE | | *Indicated in DAISEX data file ANGLE.TXT, see reference under ANGLE in table 4.2.7a*<br><br>*NILU 20040326: Use variable name ANGLE with mode ZENITH and descriptor MEAN (=average) instead* |
| ZENITH.DELTA | *Use with ANGLE* | *Indicated in DAISEX data file ANGLE.TXT, see reference under ANGLE in table 4.2.7a*<br><br>*NILU 20040326: Use variable name ANGLE with mode ZENITH and descriptor DELTA instead.* |

***Table 4.2.7c:*** *Variable descriptor (optional).*

| DATA_VARIABLES (Variable Descriptor) | Comment | Debate |
|---|---|---|
| APPARENT | | |
| ASTRONOMICAL | | |
| BEGIN | | |
| CONTRIBUTION | relative contribution e.g. of apriori profile to retrieved profile | |
| DETECTIONLIMIT | | |
| DIFF.MODEL.OBS | Difference Model - Observed | |
| DIFF.SAT.BUOY | Difference Satellite - Observed by buoy | |
| DIFF.SAT.OBS | Difference Satellite - Observed by other instrument | |
| END | | |
| LIMIT | | |
| MAX | Maximum value of a set of variables | |
| MEAN | Average | |
| MEASUREMENT.SPACING | space between grid points (note the difference with resolution). | |
| MEDIAN | Median | |
| MIN | Minimum value of a set of variables | |
| OFFSET | Difference between ideal and actual mounting angle when an instrument is mounted on a platform. Use with ATTITUDE.PITCH, ATTITUDE.ROLL and ATTITUDE.YAW for correction constants.<br><br>Other uses (linear offsets) are also conceivable, but currently not specified. | Offset angles discussed for the Riegl Lidar in the ESAG02 documentation. |
| REGISTRATION.ACCURACY | use with e.g. ALTITUDE for absolute accuracy of altitude values | |
| RESOLUTION | closest distance between points that can be distinguished. | |
| RESOLUTION.ALTITUDE | | |
| RESOLUTION.TIME | | |
| RESOLUTION.X | | |
| RESOLUTION.Y | | |
| SATURATION | | |
| START | | |
| STOP | | |
| UNCERTAINTY.RANDOM | Random uncertainty | |
| UNCERTAINTY.RELATIVE | Relative uncertainty | |
| UNCERTAINTY.RMS | Root mean square uncertainty | |
| UNCERTAINTY.STDEV | 1 sigma (standard deviation) uncertainty | |
| UNCERTAINTY.SYSTEMATIC | Systematic uncertainty == accuracy | |
| UNCERTAINTY.TOTAL | Total uncertainty | |
| ZONAL | | |

### *4.2.8 DATA_START_DATE*

The Global Attribute **DATA_START_DATE** specifies the earliest/first measurement date found in the current data file. The date/time format to be used is MJD2000 with fractional days. For resolution in seconds, MJD is to be reported with 6 digits behind the decimal point, for milliseconds 9 decimals should be used.

***ATTENTION***

**An appropriate number of digits after the decimal must be reported to properly represent the desired time resolution**

| | |
|---|---|
| Type: | DOUBLE |
| Format: | MJD2000 date time specification |
| Entry: | Single field |
| Example: | DATA_START_DATE = 800.348678 |

### *4.2.9 DATA_FILE_VERSION*

The Global Attribute **DATA_FILE_VERSION** specifies the version of the file submitted to the database.

**ATTENTION**

***DATA_VERSION begins with 001 (leading zeroes), each new version should by incremented by 1.***

| | |
|---|---|
| Type: | INTEGER |
| Format: | DDD with leading zeroes. |
| Entry: | Single field |
| Example: | DATA_FILE_VERSION = 003 |

### *4.2.10 DATA_MODIFICATIONS*

The Global Attribute **DATA_MODIFICATIONS** describes the data modification history of **DATA_VERSION** found in the data file. Detail of the information is up to the discretion of the data originator.

| | |
|---|---|
| Type: | STRING |
| Format: | Free format |
| Entry: | Single field |
| Example: | DATA_MODIFICATIONS = Version 002, uses the pump correction table of Komhyr (1986). |

#### *4.2.11 DATA_CAVEATS*

The optional Global Attribute **DATA_CAVEATS** refers to potential caveats with the data in the current data file.

| | |
|---|---|
| Type: | STRING |
| Format: | Free format |
| Entry: | Single field |
| Example: | DATA_CAVEATS = This is near real-time data, final revised data will be available within 3 months. |

#### *4.2.12 DATA_RULES_OF_USE*

The optional Global Attribute **DATA_RULES_OF_USE** entry is the PI's (the data owner) guidelines for the data usage.

**NOTE**

***This entry is usually guided through a specific project data protocol.***

| | |
|---|---|
| Type: | STRING |
| Format: | Free format |
| Entry: | Single field |
| Example: | DATA_RULES_OF_USE = Refer to Envisat Cal/Val data protocol, for more information contact nadirteam@nilu.no. |

#### *4.2.13 DATA_ACKNOWLEDGEMENT*

The optional Global Attribute **DATA_ACKNOWLEDGEMENT** is the PI's 'desired' acknowledgement of the data when used in publications, presentations, etc.

| | |
|---|---|
| Type: | STRING |
| Format: | Free format |
| Entry: | Single field |
| Example: | DATA_ACKNOWLEDGEMENT = We thank B. Bojkov (NILU) for providing us with the revised ozonesonde data from Orland. |

### 4.3 File attributes

The global **File Attributes** provide detailed description of the data file. These attributes include the file name and generation date, the names of projects that have access to the file, and the version of the metadata used in the given file.

#### *4.3.1 FILE_NAME*

The Global Attribute **FILE_NAME** is the current data file name. The file should always have the same official name at the NADIR data centre as that used by the DO (to prevent errors when updating files). The name must therefore be generated by the PI, DO or DS according to the following rules:

**ATTENTION**

***The file name is always set in lower case, even if the fields it contains are capitalised.***

Type: STRING

Format: **FILE_NAME must be constructed using 6 underscore separated Global Attributes + the correct file extension:**

The **DATA_DISCIPLINE** subclass entry from Table 4.2.2c
The **DATA_SOURCE** entry from Section 4.2.5
The **DATA_LOCATION** entry from Table 4.2.4
The **DATA_TYPE** entry from Section 4.2.6
The **DATA_STARTDATE** entry from Section 4.2.8, **but converted to ISO format.**
The **DATA_VERSION** entry from Section 4.2.9
The **.hdf** file extension (referring in this case to the HDF file format).

Entry: Lower case, underscore separated + ".hdf"

Example: FILE_NAME =groundbased_uvvis.saoz_nilu002_jungfraujoch_h2_19990301t110000z_001.hdf

*… illustrating how a NILU instrument could operate at Jungfraujoch without creating identification problems in the metadata or the file naming.*

### *4.3.2 FILE_GENERATION_DATE*

The Global Attribute **FILE_GENERATION_DATE** is the date of generation of the current file and is to be reported in MJD2000.

Type: DOUBLE
Format: MJD2000 date/time specification
Entry: Single field
Example: FILE_GENERATION_DATE = 890.857575

### *4.3.3 FILE_ACCESS*

The Global Attribute **FILE_ACCESS** is a multi-field character string referring to the file project association at the NADIR data centre. FILE_ACCESS is used to define the file's UNIX grouping and access rights on the database.

Type: STRING
Format: project_1; project_2, project_3, …, project_n
Entry: Multiple fields separated by semicolons
Example: FILE_ACCESS = CALVAL; COSE; THESEO

*Table 4.3.3: Allowable project names and equivalent FILE_ACCESS currently active at NADIR data centre.*

| FILE_ACCESS (Group Access Rights) | Comment |
|---|---|
| ARCHIVE | Pseudo project with files removed from main data directory |
| CALVAL | ENVISAT Cal/Val Data Centre |
| CDBTEST | Test campaign for CDB system |
| COSE | COSE - Compilation of Atmospheric Observations in Support of Satellite Measurements over Europe |
| DAISEX | CDB Demo Campaign |
| ESAG02 | CDB Demo Campaign |
| LARA | CDB Demo Campaign |
| NDSC | Network for the Detection of Stratospheric Change |
| PUBLIC | Unrestricted access to the data |
| THESEO | |

### *4.3.4 FILE_PROJECT_ID*

The Global Attribute **FILE_PROJECT_ID** is a multi-field string defining the custom projects that have access to the file. The Envisat Cal/Val project requires the AOID responsible for providing the file to be given here, other projects may leave this metadata entry blank.

> ***For Envisat only one Envisat Cal/Val FILE_PROJECT_ID is allowed.***

Type: STRING
Format: id_1; id_2; id_3; …; id_n
Entry: Multiple fields separated by semicolons, but a single entry in the Envisat Cal/Val project
Example: FILE_PROJECT_ID = AOID126

### *4.3.5 FILE_ASSOCIATION*

The optional Global Attribute **FILE_ASSOCIATION** is a multi-field character string defining the file's other associations such as National Programs, special campaigns, or funding programs.

Type: STRING
Format: project_1; project_2; project_3; …; project_n
Entry: Multiple fields separated by semicolons
Example: FILE_ASSOCIATION = …

### *4.3.6 FILE_META_VERSION*

The Global Attribute **FILE_META_VERSION** is a single field character string defining the version of the metadata definitions used in the given file and the name of the tool used to generate the file.

Type: STRING
Format: ddRddd; tool name (free format)
Entry: Two fields
Example: FILE_METAVERSION = 02R001; ASC2HDF ver. 001R032

# 5 Variable attributes

Unlike the global attributes, the variable attributes refer specifically to one single variable. For each variable listed under DATA_VARIABLES in section 4.2.7, there must be one section containing the metadata parameters described under Sections 5.1 and 5.2 below.

***Table 5:*** *Overview of the Variable Attributes. 'X' indicate entries and 'O' indicate optional entries.*

| Variable Description Attributes | Section | Entry | Entry type | Req |
|---|---|---|---|---|
| VAR_NAME | 5.1.1 | Concatenated, underscore separated | Single entry | X |
| VAR_DESCRIPTION | 5.1.2 | Variable description | Single entry | X |
| VAR_NOTES | 5.1.3 | Variable notes/warnings | Single entry | O |
| VAR_DIMENSION | 5.1.4 | Number of dimensions that the dependent variables depend on | Single entry | X |
| VAR_SIZE | 5.1.5 | Number of nodes in each dimension | n semi-colon separated | X |
| VAR_DEPEND | 5.1.6 | List of variables that the dimensions depend on | n semi-colon separated | X |
| VAR_DATA_TYPE | 5.1.7 | Numeric data type | Single entry | X |
| VAR_UNITS | 5.1.8 | Variable units | Single entry | X |
| VAR_SI_CONVERSION | 5.1.9 | Conversion factor; SI unit | 3 semi-colon separated | X |
| VAR_VALID_MIN | 5.1.10 | Valid minimum or detection limit | Single entry | X |
| VAR_VALID_MAX | 5.1.11 | Valid maximum or saturation limit | Single entry | X |
| VAR_MONOTONE | 5.1.12 | Describes the monotonicity of the variable (3 options) | Single entry | X |
| VAR_AVG_TYPE | 5.1.13 | Variable averaging technique used | Single entry | X |
| VAR_FILL_VALUE | 5.1.14 | See section description | Single entry | X |
| | | | | |
| **Variable Visualisation Attributes** | **Section** | **Entry** | **Entry type** | **Req** |
| VIS_LABEL | 5.2.1 | Short string to facilitate the identification of the variable | Single entry | X |
| VIS_FORMAT | 5.2.2 | FORTRAN like format of the data | Single entry | X |
| VIS_PLOT_TYPE | 5.2.3 | Plot type to display the variable | Single entry | X |
| VIS_SCALE_TYPE | 5.2.4 | Plot scale type used to display the variable: scale type code; scale order code | 2 semi-colon separated | X |
| VIS_SCALE_MIN | 5.2.5 | Scale display minimum | Single entry | X |
| VIS_SCALE_MAX | 5.2.6 | Scale display maximum | Single entry | X |

## 5.1 Variable description attributes

### *5.1.1 VAR_NAME*

The **VAR_NAME** must be identical to one of the entries in section 4.2.7: **DATA_VARIABLES**.

***This entry consists of the variable identifier constructed using a variable name, the variable mode and the variable descriptor (not always relevant). See detailed description in section 4.2.7***

| | |
|---|---|
| Type: | STRING |
| Format: | Refer to section DATA_VARIABLES |
| Entry: | Up to 3 fields concatenated with an underscore character |
| Example: | VAR_NAME = O3.COLUMN_VERTICAL.SOLAR |

### *5.1.2 VAR_DESCRIPTION*

The Variable Attribute **VAR_DESCRIPTION** is a verbose description of the variable. This is a free format string that must be provided by the data originator to clearly identify the variable's meaning (preferably inline, or by reference to some easily available document), thus making the data file self-explanatory.

| | |
|---|---|
| Type: | STRING |
| Format: | Free format |
| Entry: | Single field |
| Example: | VAR_DESCRIPTION = In-situ ozone partial pressure measured by ECC ozonesondes. |

### *5.1.3 VAR_NOTES*

The optional Variable Attribute **VAR_NOTES** is character string containing specific comments about the variable's data elements. Used by the data originator to convey any additional information pertinent to the variable.

| | |
|---|---|
| Type: | STRING |
| Format: | Free format |
| Entry: | Single |
| Example: | VAR_NOTES = ... |

### *5.1.4 VAR_DIMENSION*

The Variable Attribute **VAR_DIMENSION** is the rank of the variable, defined as the number of independent dimensions required to identify one element of the data variable. If the dimension is given as 3, the VAR_SIZE (see Section 5.1.5) requires 3 elements.

| | |
|---|---|
| Type: | INTEGER between 1 and 8 |
| Format: | Integer |
| Entry: | Single |
| Example: | VAR_DIMENSION = 3 |

### *5.1.5 VAR_SIZE*

The Variable Attribute **VAR_SIZE** is a semicolon separated character string containing the specific dimensionalities of the variable. In the following example, the dependent variable is reported for four independent dimensions (time, x, y, z) in a grid of 10*2*3*4 nodes. For a computed field, the VAR_SIZE specifies the number of nodes in the 4D time-space. For a set of measured data and for space coordinates that depend on the time, the VAR_SIZE is the number of data elements in the series. The total number of entries in VAR_SIZE must be equal to VAR_DIMENSION.

| | |
|---|---|
| Type: | INTEGER(s) |
| Format: | Integer |
| Entry: | Semicolon separated, one number per dimension |
| Example: | VAR_SIZE= 10; 2; 3; 4 |

### *5.1.6 VAR_DEPEND*

The Variable Attribute **VAR_DEPEND** is a list of semicolon-separated character strings that describes all independent variables on which the current variable depends. The number of independent variables listed must correspond to VAR_DIMENSION, and the order in which the variables are listed must correspond exactly to the order in which their sizes are given in VAR_SIZE.

***ATTENTION***

***Independent variables must have:*** ***VAR_DEPEND = INDEPENDENT,***
**Constants must have:** **VAR_DEPEND = CONSTANT**

| | |
|---|---|
| Type: | STRING |
| Format: | Free format |
| Entry: | Semicolon separated, one name per dimension |
| Example: | VAR_DEPEND = DATETIME; LONGITUDE; LATITUDE; ALTITUDE |

### *5.1.7 VAR_DATA_TYPE*

The Variable Attribute **VAR_DATA_TYPE** specifies the type of the variable.

Type: STRING
Options: Refer to Table 5.1.7
Entry: Single
Example: VAR_DATA_TYPE = INTEGER

***Table 5.1.7:*** *Variable type options.*

| ***DATA_VARIABLE_TYPE*** | **Comment** |
|---|---|
| REAL | *16 bit floating point* |
| DOUBLE | *32 bit floating point* |
| INTEGER | *16bit integers* |
| LONG | *32 bit integers* |
| STRING | *character string* |

### *5.1.8 VAR_UNITS*

The Variable Attribute **VAR_UNITS** specifies the units in which the data elements are stored in the current data file. The prefix is optional (not needed when reporting in a base unit). While the prefix is concatenated with the unit, multiple units are separated by spaces. Powers of units (signed integer) are concatenated with the unit. No brackets are to be used.

***ATTENTION***

***Units are case sensitive.***

*The list of accepted units for VAR_SI_CONVERSION has been slightly expanded with respect to SI.*

***NOTE***

***Project protocols/templates may restrict this to only one allowed unit and scale for each variable.***

Type: STRING
Options: Combination of Tables 5.1.8a and b
Entry: Case sensitive, single field
Example 1: VAR_UNITS = mPa … *for milli Pascal*
Example 2: VAR_UNITS = nm m-2 *for nanometre per square metre*

***Table 5.1.8a:*** *Allowed SI prefix to be used in VAR_UNITS in conjunction with the **Units** in Table 5.1.8b.*

| *VAR_UNITS (Base Unit Prefix)* | *Comment* |
|---|---|
| Y | yotta |
| Z | zetta |
| E | exa |
| P | peta |
| T | tera |
| G | giga |
| M | mega |
| k | kilo |
| h | hecto |
| da | deka |
| d | deci |
| c | centi |
| m | milli |
| u | micro (u is used as a substitute for the greek letter \'mu\') |
| n | nano |
| p | pico |
| f | femto |
| a | atto |
| z | zepto |
| y | yocto |

***Table 5.1.8b:*** *Allowed base units to be used in VAR_UNITS.*

| VAR_UNITS (Base Unit) | Comment | VAR_SI_CONVERSION | Flag |
|---|---|---|---|
| % | *Percent or Relative Humidity* | 0; 0.01; DIMENSIONLESS | |
| A | *ampere* | | base |
| C | *coulomb* | 0;1; s A | base |
| cd | *candela* | | base |
| d | *day* | 0; 86400; s | base |
| deg | *angular degree* | 0; 1.74533E-2; rad | base |
| degC | *degree Celsius* | 273.15 ; 1 ; K | |
| DIMENSIONLESS | *If dimensionless or no specific unit* | 0;1;DIMENSIONLESS | base |
| DU | *dobson unit* | 0; 2.69E20; molec m-2 | |
| g | *gram* | | base |
| Gal | *Galileo, cm s-2* | 0, 10-2, m s-2 | base |
| h | *hour* | 0; 3600; s | base |
| Hz | *hertz* | 0; 1; s-1 | base |
| J | *joule* | 0; 1; m2 kg s-2 | base |
| K | *kelvin* | | base |
| L | *liter* | 0; 10-3; m3 | base |
| lm | *lumen* | 0; 1; cd sr | base |
| lx | *lux* | 0; 1; cd sr m-2 | base |
| m | *metre* | | base |
| min | *minute* | 0; 60; s | base |
| MJD2000 | *Modified Julian Day 2000* | 0; 86400; s | base |
| mol | *mole* | | base |
| molec | *molecule* | 0; 1; molec | base |
| N | *newton* | 0; 1; m kg s-2 | base |
| NONE | *Text entries only, otherwise use DIMENSIONLESS* | NONE | |
| Pa | *pascal* | 0; 1; kg m-1 s-2 | base |
| photons | | 0; 1; photons | base |
| ppbv | *parts per billion (volume)* | 0; 10-9; ppv | |
| ppmv | *parts per million (volume)* | 0; 10-6; ppv | |
| pptv | *parts per trillion (volume)* | 0; 10-12; ppv | |
| ppv | *parts per volume* | 0; 1; ppv | base |
| psu | *practical salinity unit* | ?? | base |
| rad | *radian* | 0; 1; DIMENSIONLESS | base |
| s | *second* | | base |
| sr | *steradian* | 0; 1; DIMENSIONLESS | base |
| V | *volt* | 0; 1; m2 kg s-3 A-1 | base |
| W | *watt* | 0; 1; m2 kg s-3 | base |

### *5.1.9 VAR_SI_CONVERSION*

The Variable Attribute **VAR_SI_CONVERSION** is the conversion factor between the units used for the given data element and the corresponding SI unit. If the measurement unit is identical to the SI unit, the conversion factor is 1 and the constant offset is 0.

In VAR_SI_CONVERION, unit divisions should be factored out to have the shortest possible units string. This means that VAR_UNIT = nm m-2 shall have VAR_SI_CONVERSION = 0; 1.0E-9; m-1 This parameter is intended to facilitate calculations by automated tools, using different data files as input. For plot axis labelling, please refer to the VIS_LABEL metadata variables in section 5.2.1.

*ATTENTION*

*For consistency in the prefixes in VAR_UNITS, kilogram (kg) has been replaced by the gram (g) for consistency with the prefixes in VAR_UNITS.*

| | |
|---|---|
| Type: | STRING |
| Format: | Offset; Conversion factor; SI unit |
| Entry: | Single field with 3 semi-colon separated entries |
| Example: | VAR_SI_CONVERSION = 0; 1.0E-3; Pa *for mPa* |

### *5.1.10 VAR_VALID_MIN*

The Variable Attribute **VAR_VALID_MIN** indicates the valid minimum or detection limit of the data element.

*ATTENTION*

***The number must be specified in the appropriate VAR_UNITS reported in section 5.1.8.***

| | |
|---|---|
| Type: | REAL/DOUBLE/INTEGER/LONG |
| Format: | Number |
| Entry: | Single |
| Example: | VALID_MIN = 10.0 |

### *5.1.11 VAR_VALID_MAX*

The Variable Attribute **VAR_VALID_MAX** indicates the valid maximum or saturation limit of the data element.

*ATTENTION*

***The number must be specified in the appropriate VAR_UNITS reported in section 5.1.8.***

Type: REAL/DOUBLE/INTEGER/LONG
Format: Number
Entry: Single
Example: VAR_VALID_MAX = 100

### *5.1.12 VAR_MONOTONE*

The Variable Attribute **VAR_MONOTONE** indicates if the data element increases or decreases monotonically with respect to DATETIME.

Type: STRING
Options: Refer to Table 5.1.12
Entry: Single
Example: VAR_MONOTONE = INCREASE

***Table 5.1.12:*** *VAR_MONOTONE categories.*

| VAR_MONOTONE | Comment |
|---|---|
| INCREASE | *Increasing time series* |
| DECREASE | *Decreasing time series* |
| FALSE | *Neither monotonically increasing or decreasing* |

### *5.1.13 VAR_AVG_TYPE*

The Variable Attribute **VAR_AVG_TYPE** is the averaging 'technique' used in generating the given data element.

Type: STRING
Format: Refer to Table 5.1.13
Entry: Single
Example: VAR_AVG_TYPE = STANDARD

***Table 5.1.13:*** *VAR_AVG_TYPE Averaging techniques.*

| VAR_AVG_TYPE (Applied Averaging Method) | Comment |
|---|---|
| ANGLE.COSINE | Cosine of the average of the arc-cosines of the values |
| ANGLE.DEGREES | Direction average over 360 deg (i.e., average of 5 and 355 is 0 instead of 180) |
| ANGLE.HOUR | Direction average over local times (hours) (i.e., average of 2 and 22 is 0 instead of 12) |
| ANGLE.RADIANS | Direction average over 2 pi |
| CLEAN | Procedure for computing the mean after eliminating all data above or below a certain standard deviation |
| DECIBEL | 10 times the logarithm of the average of the anti-logarithms of the (values/10) |
| LOG | Logarithm of the average of the anti-logarithms of the values |
| NONE | No averaging used |
| RMS | Square root of the average of the squares of the values |
| WEIGHTED | |
| ZONAL.WEIGHTED | |
| GLOBAL.WEIGHTED | |
| STANDARD | Simple arithmetic mean |

### *5.1.14 VAR_FILL_VALUE*

The Variable Attribute **VAR_FILL_VALUE** is the number or string inserted if the element is known to be '*erroneous*' or missing. The VAR_FILL_VALUE may be different for each variable in a file, but must be constant for all occurrences within a given variable. For variables with numeric **VAR_DATA_TYPE** the **VAR_FILL_VALUE** is negative and consists of nines**.** In absolute value it must be 2 orders of magnitude larger than the largest absolute value in the real data. If the **VAR_DATA_TYPE** is of type floating point, then the fractional data of the fill value must be zeroes to the same number of digits as the measurement data. For string variables the VAR_FILL_VALUE is "ZZZZZZZZZZ" (i.e.10 times a "Z").

***ATTENTION***

**Consideration must be given to the actual format of the VAR_FILL_VALUE to avoid erroneous formatting in section 5.2.2**

Type: REAL/DOUBLE/INTEGER/LONG/STRING
Format: Fixed entry
Entry: Single field
Example1: *for a dataset range* [-82.5428 : 4.2396]…
… *the* `VAR_FILL_VALUE = -9999.0000`
Example2: *for a dataset range* [-1.4E-1 : 2.6E1]…
… *the* `VAR_FILL VALUE = -9.0E3`

## 5.2 Variable visualisation attributes

The following metadata entries are defined to facilitate the visualisation of the data content in tables or figures.

### *5.2.1 VIS_LABEL*

The Variable Attribute **VIS_LABEL** is a short (and concise) character string containing the variable name and unit used to label an axis or a table column.

***ATTENTION***

***The unit must correspond to the appropriate VAR_UNITS reported in section 5.1.8.***

Type: STRING
Format: Free format text
Entry: Single field
Example: VIS_LABEL = O3 (ppm)

### *5.2.2 VIS_FORMAT*

The Variable Attribute **VIS_FORMAT** defines the output format of the data elements to the screen and/or to tables. The values must be chosen to ensure that the specification does not result in truncation of fill values (please refer to VAR_FILL_VALUE in section 5.1.14).

Type: STRING
Format: FORTRAN-*like* format (refer to Table 5.2.2).
Entry: Single field
Example: VIS_FORMAT = F8.3

***Table 5.2.2:*** *Allowed FORTRAN like format types for VIS_FORMAT.*

| VIS_FORMAT (Format Type Code) | Comment |
|---|---|
| Ad | Strings (STRING) |
| Fd.d | Floating point (REAL/DOUBLE) |
| Ed.d | Exponentials (REAL/DOUBLE/INTEGER/LONG) |
| Id | Integer (INTEGER/LONG) |
| Id.d | Integer with leading zeroes (INTEGER/LONG) |

### *5.2.3 VIS_PLOT_TYPE*

The Variable Attribute **VIS_PLOT_TYPE** defines the type of graph to be displayed when plotting the given variable.

Type: STRING
Format: Refer to Table 5.2.3
Entry: Single
Example: VIS_PLOT_TYPE = TIMESERIES

***Table 5.2.3:*** *Available plot types for VIS_PLOT_TYPE.*

| ***VIS_PLOT_TYPE (Plot Type Code)*** | ***Comment*** |
|---|---|
| XY | *2D* |
| XY.PROFILE | *profile* |
| XY.TIMESERIES | *timeseries* |
| XYZ | *3D* |
| XYZ.COLOUR | |
| XYZ.CONTOUR | |
| FALSE | *None* |

### *5.2.4 VIS_SCALE_TYPE*

The Variable Attribute **VIS_SCALE_TYPE** indicates the default scale type when plotting the data element.

Type: STRING
Options: Scale type code; scale order code (refer to Tables 5.2.4a and b)
Entry: 2 semicolon separated fields
Example 1: VIS_SCALE_TYPE = LOG; INCREASE
Example 2: VIS_SCALE_TYPE = FALSE; FALSE *if no suitable scale is available*

***Table5.2.4a:*** *Available scale type code options for plotting.*

| ***VIS_SCALE_TYPE (Scale Type Code)*** | ***Comment*** |
|---|---|
| LINEAR | *Linear* |
| LOG | *Logarithm* |
| FALSE | |

***Table5.2.4b:*** *Available scale order code options for plotting.*

| ***VIS_SCALE_TYPE (Scale Order Code)*** | ***Scale Order*** |
|---|---|
| INCREASE | *Ascending order* |
| DECREASE | *Descending order* |
| FALSE | |

### 5.2.5 *VIS_SCALE_MIN*

The Variable Attribute **VIS_SCALE_MIN** indicates the default scale minimum when plotting the data element. The number must be specified in the appropriate VAR_UNITS.

| | |
|---|---|
| Type: | REAL/DOUBLE/INTEGER/LONG |
| Format: | *Number* |
| Entry: | Single field |
| Example: | VIS_SCALE_MIN = 0 |

### 5.2.6 *VIS_SCALE_MAX*

The Variable Attribute **VIS_SCALE_MAX** indicates the default scale maximum when plotting the data element. The number must be specified in the appropriate VAR_UNITS.

| | |
|---|---|
| Type: | REAL/DOUBLE/INTEGER/LONG |
| Format: | *Number* |
| Entry: | Single field |
| Example: | VIS_SCALE_MAX = 100 |

# 6 References

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ABSTRACT

These Metadata Guidelines describe a generalised metadata standard based on the Envisat Cal/Val system (Bojkov et al., 2002). The definitions have been carefully chosen to allow new campaign data types to be included, while keeping as much as possible of the original definitions. This is a living document, and modification should be expected to both data definitions, reporting routines and file formats. In particular, trial data ingestion from three pilot campaigns (DAISEX, ESAG02 and LARA) will provide valuable input on user requirements, and may result in extensive modifications or additions to the system and to these guidelines. The CDB consists of a central clearing house for data transfer files, a relational database index, web interfaces for data providers, data users and administrators, Metadata Guidelines and other documentation, software products for creation and quality control of data transfer files, and a group of support personnel at NILU (working under contract for ESA).

NORWEGIAN TITLE

Retningslinjer for metadata for ESAs kampanje database (CDB)

| KEYWORDS | | |
|---|---|---|
| CDB | ESA | METADATA |

ABSTRACT (in Norwegian)

| | | |
|---|---|---|
| ** Classification* | *A* | *Unclassified (can be ordered from NILU)* |
| | *B* | *Restricted distribution* |
| | *C* | *Classified (not to be distributed)* |