WGClimate

The Joint CEOS/CGMS
Working Group on Climate

ECV Inventory

Questionnaire Guide

Reference ECO-WGCL-EOPS-TN-16-0022

Version 2.2

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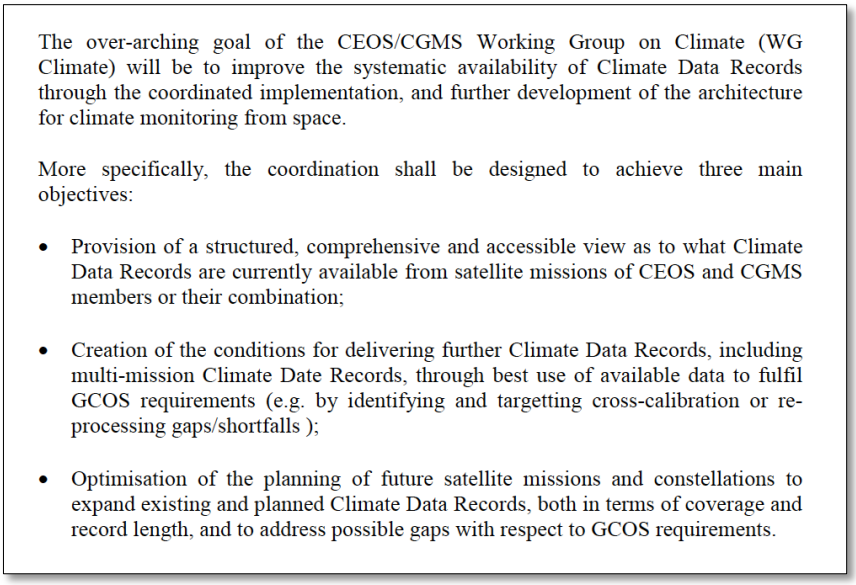
1 Introduction

1.1 Context

The overarching goal of the Joint CEOS/CGMS Working Group on Climate (WGClimate) is to improve the systematic availability of Climate Data Records (CDR) through the coordinated implementation and further development of the architecture for climate monitoring from space [RD-1]. The ECV Inventory forms the bedrock of the first objective of the WGClimate, and forms the fundamental tool with which the working group goes about meeting its two further main objectives, stated by the WGClimate Terms of Reference (see Figure 1).

The first objective declares that the working group shall provide a structured, comprehensive and accessible view as to what Climate Data Records (CDRs) are currently available and planned to become available from existing and committed satellite missions of CEOS and CGMS members or their combinations. This view establishes the ECV Inventory that can be populated by filling the related questionnaire which is described in detail in this document.



The over-arching goal of the CEOS/CGMS Working Group on Climate (WG Climate) will be to improve the systematic availability of Climate Data Records through the coordinated implementation, and further development of the architecture for climate monitoring from space.

More specifically, the coordination shall be designed to achieve three main objectives:

- Provision of a structured, comprehensive and accessible view as to what Climate Data Records are currently available from satellite missions of CEOS and CGMS members or their combination;
- Creation of the conditions for delivering further Climate Data Records, including multi-mission Climate Date Records, through best use of available data to fulfil GCOS requirements (e.g. by identifying and targetting cross-calibration or re-processing gaps/shortfalls);
- Optimisation of the planning of future satellite missions and constellations to expand existing and planned Climate Data Records, both in terms of coverage and record length, and to address possible gaps with respect to GCOS requirements.

Figure 1: Three Main Objectives of the Joint CEOS/CGMS Working Group on Climate

The second and third objectives require, amongst other things, the application of a gap analysis process to the ECV Inventory to identify gaps, shortfalls and improvement possibilities for both current and future CDRs. The applicable process for this gap analysis is described in [RD-2].

The ECV Inventory needs to be as complete as possible with a level of detail required for each description of an ECV data record being satisfactorily deep to allow identification of conditions which deter the meeting of GCOS target requirements as stated in [RD-3] and [RD-4].

1.2 Purpose

This document comprises a questionnaire guide intended for ECV data producers, and invokes the definition of the complete ECV Inventory. The ECV Inventory is a repository for the characteristics of two types of ECV data records:

- records that already exist (*current* component of the inventory);
- records that do not currently exist, but are planned to be produced as part of an already approved programme (*future* component of the inventory).

The questionnaire should only be filled out for a particular data record if all of the following 3 conditions are true:

- the data record is at the level of GCOS ECV products/TCDRs;
- the data record is the principal data source for the generation of a particular ECV product/TCDR;
- the geographical extent of the data record is amenable to satisfying the GCOS requirements for that ECV product (NB data records do not need to have global coverage, but there should be some indication as to how the data record contributes to global ECV products generation, e.g., in case of ECV products for a single geostationary orbit position indication should be given how it contributes to quasi global 'geo-ring' products).

This document is intended to guide a person that is answering the ECV Inventory questionnaire as presented by the WGClimate. Guidance on each question is in most cases self-contained and may be read independently of other sections on question guidance. The guidance provides for some questions example answers from existing ECV data records.

1.3 Document Overview

- Chapter 1 is this introduction, describing the purpose of the document, providing a document overview, document references, terminological definitions, acronyms and abbreviations.
- Chapter 2 describes the ECV Inventory, and its relationship to the WGClimate Questionnaire.
- Chapters 3 and 4 describe the two parts of the questionnaire addressing the status of the current data record holdings and the status of the planned (committed) data record generation activities, respectively.
- Annex A and B contain the GCOS-143 definitions for needs and climate monitoring principles of ECV data producers, respectively.
- Annex C contains the list of ECVs and associated ECV Products considered in the ambit of this ECV CDR Inventory, as well as a non-exhaustive list of physical quantities that may be provided in the TCDR entries.

1.4 References

[RD-1] Dowell, M., P. Lecomte, R. Husband, J. Schulz, T. Mohr, Y. Tahara, R. Eckman, E. Lindstrom, C. Wooldridge, S. Hilding, J. Bates, B. Ryan, J. Lafeuille, and S. Bojinski, 2013: Strategy Towards an Architecture for Climate Monitoring from Space. Pp. 39, available at: www.ceos.org; www.wmo.int/sat; http://www.cgms-info.org/

[RD-2] ECV Inventory: Gap Analysis Guidelines ECO-WGCL-EOPS-TN-16-0021, 28 pp, available at WGClimate web page (TBC).

[RD-3] GCOS-154, 2011: Systematic Observation Requirements for Satellite-Based Products for Climate, 2011 Update, December 2011, 139 pp.

[RD-4] GCOS-143, 2010: Guideline for the Generation of Datasets and Products Meeting GCOS Requirements, An update of the "Guideline for the Generation of Satellite-based Data-sets and Products meeting GCOS Requirements" (GCOS- 128, WMO/TD-No. 1488), including *in situ* datasets and amendments. May 2010, 12pp, available at: http://www.wmo.int/pages/prog/gcos/Publications/gcos-143.pdf

[RD-5] GCOS-82, 2003: The Second Report on the Adequacy of the Global Observing Systems for Climate in Support of the UNFCCC, 74 pp, available at:

http://www.wmo.int/pages/prog/gcos/Publications/gcos-82_2AR.pdf

[RD-6] CORE-CLIMAX System Maturity Matrix Instruction Manual, available at: http://www.eumetsat.int/website/home/Data/ClimateService/index.html.

[RD-7] CORE-CLIMAX European ECV CDR Capacity Assessment Report Deliverable D2.25, available at: http://www.eumetsat.int/website/home/Data/ClimateService/index.html.

[RD-8] Thompson A. and B. N. Taylor, 2008: Guide for the Use of the International System of Units (SI). NIST Special Publication 811, 78 pp, available at: http://physics.nist.gov/cuu/Units/bibliography.html.

[RD-9] Padilla, M., S. V. Stehman, J. Litago, and E. Chuvieco, 2014: Assessing the Temporal Stability of the Accuracy of a Time Series of Burned Area Products. Remote Sens. 2014, 6, 2050-2068; doi:10.3390/rs6032050.

1.5 Terminology

Essential Climate Variable

An Essential Climate Variable (ECV) is a geophysical variable that is associated with climate variation and change as well as the impact of climate change onto Earth. GCOS has defined a set of ECVs for three spheres, atmospheric, terrestrial and oceanic [RD-5].

ECV Product

Many GCOS ECVs are sub-divided into so called ECV Products, e.g., the water vapour ECV has 3 ECV products, total column water vapour, tropospheric and lower-stratospheric profiles of water vapour, and upper tropospheric humidity that describe different aspects of water vapour in the atmosphere. However, the definitions provided for ECV Products in [RD-5] are not always consistent for all ECVs. For some cases, e.g., the ECV Sea Ice there is only one ECV Product that covers 4 different variables for which requirements are provided. The ECV Inventory

Questionnaire calls each parameter for which requirements are provided an ECV Product. A consistent mapping is provided in Annex C :.

Fundamental Climate Data Record

A Fundamental Climate Data Record (FCDR) is a well-characterised, long-term data record, usually involving a series of instruments, with potentially changing measurement approaches, but with overlaps and calibrations sufficient to allow the generation of products that are accurate and stable, in both space and time, to support climate applications [RD-1]. FCDRs are typically calibrated radiances, backscatter of active instruments, or radio occultation bending angles. FCDRs also include the ancillary data used to calibrate them. The term FCDR has been adopted by GCOS and can be considered as an international consensus definition.

GCOS Requirements

A GCOS Requirement as used in this document refers to the quantitative requirements provided for the ECV Product in [RD-3]. They denote Horizontal Resolution, Vertical Resolution, Temporal Resolution, Accuracy and Stability.

Thematic Climate Data Record

A Thematic Climate Data Record (TCDR) is the counterpart of the FCDR in geophysical space [RD-1]. It is closely connected to the ECVs but strictly covers one geophysical variable, whereas an ECV can encompass several variables. For instance, the ECV Cloud Properties includes at least five different geophysical variables, each of them constitutes a TCDR. The term TCDR has been taken up by many space agencies and can be considered as de facto standard.

1.6 Acronyms and Abbreviations

CCI	(ESA) Climate Change Initiative
CDR	Climate Data Record
CEOS	Committee on Earth Observation Satellites
CGMS	Coordination Group for Meteorological Satellites
ECV	Essential Climate Variable
ESA	European Space Agency
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
FCDR	Fundamental Climate Data Record
GCOS	Global Climate Observing System
GCMP	GCOS Climate Monitoring Principles
IPCC	Intergovernmental Panel on Climate Change
N/A	Not Applicable

NASA	National Aeronautics and Space Administration (USA)
NetCDF	Network Common Data Form
NOAA	National Oceanic and Atmospheric Administration (USA)
TCDR	Thematic Climate Data Record
WGClimate	The Joint CEOS/CGMS Working Group on Climate

2 Questionnaire Overview

As indicated above, the questionnaire is split into two parts, regarding the *current* (already generated) and *future* (to be generated) ECV data records. The two parts are nevertheless strongly connected due to the fact that most of the information required to characterise the climate data records in the context of this ECV Inventory is common to both already existing and planned data records. However, differences in the expected depth and extent of knowledge between the two intrinsically distinct realities result not only in a smaller number of questions being asked with respect to *future* data records but also in a different phrasing or level of detail when compared to *current* data records.

The answers to both sets of questions are used to analyse to what degree the past, current and future observing system will fulfil GCOS needs for ECV data records and how compliant the current and future planned ECV data records are with principles, requirements and guidelines provided by GCOS. The questions on *future* data records also support the analysis on the sustainability of the ECV data record production.

The following tables present the questions of the CEOS/CGMS WGClimate Questionnaire. The first table contains the set of questions concerning the *current* component of the ECV Inventory, and the second table the *future* component. In order to help the responders navigating between the two questionnaires, the connection between a question in one questionnaire and its counterpart in the other questionnaire – when applicable - is emphasised through a common *subject*.

Both sets of questions are addressing specific categories important to understand the circumstances under which the data record was produced, specific features of the data record, how the data record is documented and how it can be accessed as well as for which applications it can be used. The categories on both parts of the questionnaire are: Stewardship, Generation Process, Record Characteristics, Documentation, Accessibility, and Applications.

Guidance is provided herein for each question of the ECV questionnaire, and takes the following form per question. Each question guide section in section 3 is self-contained, and may be read independently of other question guide sections if so desired. Most of the questions in chapter 4, addressing the *future* data records, point to the corresponding questions in section 3.

The set of questions need to be answered at the level of a single physical quantity. For instance the GCOS ECV Earth Radiation Budget contains ECV Products such as the longwave radiation budget at the surface or the top of atmosphere. The budget is computed from individual upward and downward radiation flux components that are regarded as the physical quantity. Filling the questionnaire correctly for the example means to register each component individually regardless of whether it is provided in single or multi-parameter data sets. This is needed to address compliance with GCOS numerical requirements as provided in [RD-3] as each individual component may have at least different accuracy and maybe also spatiotemporal resolution. The online questionnaire is supporting such entries to avoid overheads in providing the same information multiple times.

Table 1: Questionnaire for the *current* component of the ECV Inventory.

Area	Subject index	Subject	Question number *current*	Question
STEWARDSHIP	1	Responder name	1	Who is the individual populating the questionnaire?
	2	Responder e-mail	2	Please state the e-mail address of the individual populating the questionnaire.
	3	Data Record identifier	3	What is the Data Record Identifier of the TCDR? In case this TCDR is part of a "family" of products, please provide the TCDR family name.
	4	Responsible organisation	4	What is the name of the organisation with overall responsibility for the data record?
	5	Collection organisation	5	Which organisational entity is responsible for collecting the satellite observations?
	6	Calibration organisation	6	Which organisational entity is responsible for calibrating the satellite observations?
	7	FCDR organisation	7	Which organisational entity is responsible for generating and maintaining the FCDR (i.e. correcting, geolocating and applying calibration parameters to the satellite observations)?
	8	Inter-calibration organisation	8	Which organisational entity is responsible for inter-calibrating the satellite observations?
	9	TCDR organisation	9	Which organisational entity is responsible for generating and maintaining the TCDR (i.e. conversion of the FCDR to geophysical parameters)?
	10	GCOS-requirements organisation	10	Which organisational entity is responsible for checking if the resultant TCDR(s) meet the relevant GCOS requirements, and identifying any required processing updates?
	11	Peer-review organisation	11	Which organisational entity is responsible for organising the peer review of the data record? Please describe the status of the peer-review.
	12	Archiving organisation	12	Which organisational entity is responsible for collating, archiving and maintaining the resultant

Area	Subject index	Subject	Question number *current*	Question
				climate data records (e.g. archiving observations, FCDRs, TCDRs and all ancillary information such as processing configurations used in their generation, comparison with GCOS requirements, peer reviews, external reference data, etc)?
	13	User-service organisation	13	Which organisational entity is responsible for servicing user requests for the data record?
	14	User-feedback organisation	14	Which organisational entity is responsible for responding to user feedback on the use of this data record?
	15	Maintenance and user support commitment	15	Until when are firm commitments in place to continue to maintain and provide user support for this data record?
GENERATION PROCESS	16	Assessment body	16	If the data record has been produced in conjunction with any external domain-specific generation and assessment body, then please identify the external domain-specific bodies engaged in the generation of the data record.
	17	Quality Assurance Process	17	Please describe the quality assurance process which has been implemented for the data record generation process. If it has been done in conjunction with a relevant international coordination body, then please indicate which international organisation or coordination body covered this aspect for the data record considered.
	18	GCOS-requirements compliance assessment	18	If the compliance status of the TCDR with the GCOS requirements has been assessed, then please provide a link to the document describing the results of the assessment.
	19	GCOS-guidelines peer-review compliance assessment	19	If the degree of compliance with the GCOS guidelines has been assessed through a peer-review process, then please provide links to the documents describing the results of the assessment.
	20	Quantitative maturity index assessment	20	If a quantitative maturity index assessment has been performed for the data record, then please provide a link to the document describing the results of this

Area	Subject index	Subject	Question number *current*	Question
				assessment.
RECORD CHARACTERISTICS	21	ECV and ECV Product	21	To which ECV does the data record contribute? Which ECV Product is addressed by the data record?
	22	Physical quantity	22	Which physical quantity does the data record provide?
	23	SI units	23	What are the SI units of the data record?
	24	Satellite/sensor combination	24	Which satellite/sensor combination is used to generate the data record? For each pair satellite/sensor, please specify the level of data used, as well as the corresponding period of time of data usage (start- and end-date).
	25	Inter-calibration satellite/sensor combination	25	Against which satellite/instrument combination has the data record been inter-calibrated? For each pair satellite/sensor, please specify the level of data used, as well as the corresponding period of time of data usage (start- and end-date).
	26	Ground-base network calibration	26	If this data record is utilising a ground-based network for calibration purposes, then please specify the network and provide a link to the source.
	27	Geographical coverage	27	What is the geographical coverage of the TCDR? If not global, please specify the geographical extent. Please specify which domains (land, inland water, ocean, ice) are covered by the TCDR.
	28	Horizontal Resolution	28	What is the horizontal resolution of the TCDR (in km)?
	29	Vertical Resolution	29	What is the vertical resolution of the TCDR (in km)?
	30	Temporal resolution	30	What is the temporal resolution of the TCDR (in days)?
	31	Accuracy	31	What is the accuracy of the TCDR?
	32	Stability	32	What is the stability of the TCDR?

Area	Subject index	Subject	Question number *current*	Question
	33	Start-date	33	What is the start-date of the continuous data record?
	34	End-date	34	What is the end-date of the continuous data record?
DOCUMENTATION	36	CDR-generation documentation (link)	35	Please provide the links to the documents describing all the steps taken in the generation of FCDRs and TCDRs, including algorithms used, on-board calibration, specific FCDRs used, version management system used, and characteristics and outcomes of validation activities.
	37	Data documentation (link)	36	Please provide link(s) to documentation provided with the data record.
	38	Scientific-review process (link)	37	Please provide link to a document describing the scientific review process related to FCDR/TCDR construction (including algorithm selection), FCDR/TCDR quality and applications.
ACCESSIBILITY	39	Access point	38	Please provide information on the access point (e.g. contact e-mail) for access to data records.
	40	Access conditions	39	What are the data-access conditions? Please state whether access is made through an ordering system and if registration is required.
	41	Data record (link)	40	Please provide link(s) to the data record.
	42	FCDR availability	41	In case the FCDRs are also available to the user community, please provide a link to that data record.
	43	Data format and metadata standard	42	What formats are available for the data record and what standard has been used for the metadata?
	44	Dissemination mechanisms	43	What dissemination mechanisms are available for the data record?
	45	Release date	44	When was the data record released to the user community (year)?

Area	Subject index	Subject	Question number *current*	Question
APPLICATIONS	46	Climate applications	45	What specific climate applications does this data record support?

Table 2: Questionnaire for the *future* component of the ECV Inventory.

Area	Subject index	Subject	Question number *future*	Question
STEWARDSHIP	1	Responder name	1	Who is the individual populating the questionnaire?
	2	Responder e-mail	2	Please state the e-mail address of the individual populating the questionnaire.
	4	Responsible organization	3	What is the name of the organisation with overall responsibility for the planned data record?
	5	Collection organisation	4	Which organisational entity will be responsible for collecting the satellite observations?
	6	Calibration organisation	5	Which organisational entity will be responsible for calibrating the satellite observations?
	7	FCDR organisation	6	Which organisational entity will be responsible for generating and maintaining the FCDR (i.e. correcting, geolocating and applying calibration parameters to the satellite observations)?
	8	Inter-calibration organisation	7	Which organisational entity will be responsible for inter-calibrating the satellite observations?
	9	TCDR organisation	8	Which organisational entity will be responsible for generating and maintaining the TCDR (i.e. conversion of the FCDR to geophysical parameters)?
	10	GCOS-requirements organisation	9	Which organisational entity will be responsible for checking if the resultant TCDR(s) meet the relevant GCOS requirements, and identifying any required

Area	Subject index	Subject	Question number *future*	Question
				processing updates?
	11	Peer-review organisation	10	Which organisational entity will be responsible for organising the peer review of the data record?
	12	Archiving organisation	11	Which organisational entity will be responsible for collating, archiving and maintaining the resultant climate data records (e.g. archiving observations, FCDRs, TCDRs and all ancillary information such as processing configurations used in their generation, comparison with GCOS requirements, peer reviews, external reference data, etc)?
	13	User-service organisation	12	Which organisational entity will be responsible for servicing user requests for the data record?
	14	User-feedback organisation	13	Which organisational entity will be responsible for responding to user feedback on the use of the data record?
RECORD CHARACTERISTICS	21	ECV and ECV Product	14	To which ECV will the data record contribute? Which ECV Product will be addressed by the data record?
	22	Physical quantity	15	Which physical quantity will the data record provide?
	24	Satellite/sensor combination	16	Which satellite/sensor combination will be used to generate the data record? For each pair satellite/sensor, please specify the intended level of data to be used, as well as the corresponding planned period of time of data usage (start- and end-date).
	27	Geographical coverage	17	What is the geographical coverage of the planned TCDR? If not global, please specify the geographical extent. Please specify which domains (land, inland water, ocean, and ice) will be covered by the TCDR.
	28	Horizontal Resolution	18	What is the anticipated horizontal resolution of the TCDR (in km)?
	29	Vertical Resolution	19	What is the anticipated vertical resolution of the

Area	Subject index	Subject	Question number *future*	Question
				TCDR (in km)?
	30	Temporal resolution	20	What is the anticipated temporal resolution of the TCDR (in days)?
	31	Accuracy	21	What is the anticipated accuracy of the TCDR?
	32	Stability	22	What is the anticipated stability of the TCDR?
	33	Start-date	23	What will be the start-date of the continuous data record?
	34	End-date	24	What will be the end-date of the continuous data record?
	35	TCDR heritage	25	If the TCDR is a new release/extension of an existing TCDR, for which existing TCDR is the planned one an extension or a new version/release?
ACCESSIBILITY	40	Access conditions	26	What are the planned data-access conditions?
	42	FCDR availability	27	Will FCDRs as well as TCDRs be available to the user community?
	45	Release date	28	What is the planned date for releasing the data record to the user community (year)?
APPLICATIONS	46	Climate applications	29	What specific climate applications will this new data record support?

3 Questionnaire Guide (*current*)

3.1 Stewardship

3.1.1 Question #1 (Responder name)

Question

Who is the individual populating the questionnaire?

Description

This question is asking for the name of the individual responding to the questionnaire. This individual should be the point of contact for the ECV Inventory entry. Following submission of the entry, a WGClimate representative may wish to liaise with this individual, in order to refine their submitted entry to the ECV Inventory, for example to ensure completeness of information of the entry. The point of contact should therefore be an individual capable of responding to questions from WGClimate, and relaying particularly specialised questions from WGClimate to a suitable expert.

For instance, programme manager overseeing resources, human and otherwise, for the production of the ECV data product, or a science lead overseeing the scientific development at a high level across, would be suitable points of contact. Moreover, the point of contact should be affiliated to the organisation with overall responsibility for the data record.

Stage

Stewardship – Generation Process – Record Characteristics – Documentation – Accessibility - Applications

3.1.2 Question #2 (Responder e-mail)

Question

Please state the e-mail address of the individual populating the questionnaire.

Description

This question asks for the institutional e-mail address of the responder, whose name was given as answer to the previous question (section 3.1.1).

Stage

Stewardship – Generation Process – Record Characteristics – Documentation – Accessibility - Applications

3.1.3 Question #3 (Data record identifier)

Question

What is the Data Record Identifier of the TCDR? In case this TCDR is part of a "family" of products, please provide the TDCR family name.

Description

This question is asking for the data set identifier of the ECV data record. The identifier must be unique, in relation to any other ECV data record.

An ideal answer to the first part of this question is a digital object identifier (doi) or a similar reference. However, if those are not available, valid answers could also be comparable references as used in the process of data archiving. A third variant would be a specifically constructed identifier that is uniquely identifying any data record, e.g. as used by ESA CCI. The provided Identifier shall not change over time and shall always be connected with a specific version of the data records.

As additional information, the name of a so called TCDR family might be provided. A TCDR family refers to a specific packaging of individual ECV data records that are derived with one algorithm package or from the same series of input data.

Stage

Stewardship – Generation Process – Record Characteristics – Documentation – Accessibility - Applications

Examples

Identifiers:

Doi:

CM-SAF data record of atmospheric specific humidity, associated with the ECV Product Total Column Water Vapour: doi:10.5676/EUM_SAF_CM/HTW_SSMI/V001

NASA data record associated with the ECV Product Total Column Water Vapour: doi:10.5067/MEASURES/GSSTF/DATA301

Archive related identifier:

EUMETSAT data record of spectral land-surface black- and white-sky albedo: EO:EUM:DAT:MFG:MSA1

Other identifiers:

ESA-CCI data record associated with the Sea Ice Concentration GCOS Product of the ECV Sea Ice: (1) Southern Hemisphere : ESACCI-SEAICE-L4-SICONC-AMSR-SH25kmEASE2_2002-2011-fv01.11. Generated 24th November 2014.

(2) Northern Hemisphere : ESACCI-SEAICE-L4-SICONC-AMSR-NH25kmEASE2_2002-2011-fv01.11. Generated 16th May 2014.

NOAA data record associated with the ECV Product Upper-Air Temperature: UAT_3Layer_MW_UAH.

TCDR Family Examples:

- ISCPP: This is the family name for a set of cloud property ECV products (http://isccp.giss.nasa.gov/ica.html).
- HOAPS: This is the family name for a set of ocean surface related ECV products (www.cmsaf.eu).
- SI_SIC_AMSR: This is the family name for sea ice ECV products derived for Northern and Southern Hemisphere.

3.1.4 Question #4 (Responsible organisation)

Question

What is the name of organisation with overall responsibility for the data record?

Description

The Responsible organisation should be one with the overall responsibility for the generation and distribution of the data product. The overall responsibility is most often with the agency providing the funding for specific activities to generate the data record. This is often reflected in so called ownership of the result of a data record production.

For instance, the data records produced under the auspices of the ESA CCI are owned by ESA and thus the overall responsibility is with ESA. Similarly, for data records produced under the NOAA Climate Data Record Programme, the NASA Measures Programme, or as part of the EUMETSAT Satellite Application Facility Network, the respective agencies carry the overall responsibility.

Stage

Stewardship – Generation Process – Record Characteristics – Documentation – Accessibility – Applications

3.1.5 Question #5 (Collection organisation)

Question

Which organisational entity is responsible for collecting the satellite observations?

Description

The organisation named should be responsible for the data stewardship of the original satellite data used to create the data record. This question is associated with GCOS-143 [RD-4] GCMP #3.

In most cases, this is the satellite agency operating the spacecraft and/or the instruments on board the satellite. In some cases, it can also be a specific data centre that is tasked to collect and archive the original data and serve them to users. If more than one party are involved in collecting the observations, then all parties should be named by stating full name(s) and acronym(s).

Stage

Stewardship – Generation Process – Record Characteristics – Documentation – Accessibility – Applications

3.1.6 Question #6 (Calibration organisation)

Question

Which organisational entity is responsible for calibrating the satellite observations?

Description

The answer to this question is in most cases the name of the space agency operating the satellite and/or instrument that provides for instance pre-launch or on-board calibration during the lifetime of the instrument(s). However, in case that a specific re-calibration of the instrument data leading to a FCDR has been performed, another agency may take the responsibility of providing an updated calibration of the individual instruments. If several entities are involved they should all be mentioned in the answer by stating full name(s) and acronym(s).

This question is associated with GCOS-143 [RD-4] guidance #2 which reads that the GCOS Steering Committee recommends that data producers pay attention to the "Application of appropriate calibration/validation activities". It is also associated with the GCOS-143 [RD-20] GCMP #15 which reads that "On-board calibration adequate for climate system observations should be ensured and associated instrument characteristics monitored."

This question should not be confused with question #8 (section 3.1.68), which focuses exclusively on the inter-calibration of different instruments.

Stage

Stewardship – Generation Process – Record Characteristics – Documentation – Accessibility – Applications

3.1.7 Question #7 (FCDR organisation)

Question

Which organisational entity is responsible for generating and maintaining the FCDR (i.e. correcting, geolocating and applying calibration parameters to the satellite observations)?

Description

This question relates solely to the generation of FCDRs within the ECV data record generation process. The answer is the name the organisation that provides the data record used as input to the scheme that produces the geophysical variable.

It is possible that FCDR data are produced as part of the application of a retrieval scheme by applying available corrections and calibrations provided by several organisations. In such a case, the answer to this question should be "none" with a comment on how the quality of the input data is achieved.

This question focuses purely on the FCDR generation aspect associated with GCOS-143 [RD-4] guidance #1 which reads that ECV data producers should pay attention to providing a "Full description of all steps taken in the generation of FCDRs and ECV products, including algorithms used, specific FCDRs used, and characteristics and outcomes of validation activities".

Stage

Stewardship – Generation Process – Record Characteristics – Documentation – Accessibility – Applications

3.1.8 Question #8 (Inter-calibration organisation)

Question

Which organisational entity is responsible for inter-calibrating the satellite observations?

Description

Inter-calibration is a process that homogenises a series of similar satellite instruments over time minimising the systematic differences between the instruments. This step is most often required prior to the application of a retrieval scheme to derive a geophysical variable from a radiance record. The answer to this question is the name of the organisation that performs the inter-calibration and provides the resulting data record.

This question is associated with GCOS-143 [RD-4] guidance #2 which reads that data producers pay attention to the "Application of appropriate calibration/validation activities". Given the required overlapping multiple missions for multi-mission Cal/Val, this question also relates to GCOS-143 [RD-4] GCMP #2 which states the principle that "a suitable period of overlap for new and old observing systems is required". This principle also relates to the sustainability of the ECV processing chain to generate future versions of the ECV data product; GCOS-143 [RD-4] GCMP #2.

This question should not be confused with question #6 (section 3.1.6), which focuses exclusively on the calibration of individual instruments.

Stage

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3.1.9 Question #9 (TCDR organisation)

Question

Which organisational entity is responsible for generating and maintaining the TCDR (i.e. conversion of the FCDR to geophysical parameters)?

Description

The answer to this question is the name of the organisation that performs the generation of the ECV data record in geophysical space.

This question relates to GCOS-143 [RD-4] guidance #1, with a focus on how those FCDRs are used as intermediaries in the production of the ECV data products (TCDRs). The answer is the name of one or several organisations that generate the data record considered. Please state full name(s) and acronym(s).

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3.1.10 Question #10 (GCOS requirements organisation)

Question

Which organisational entity is responsible for checking if the resultant TCDR(s) meet the relevant GCOS requirements, and identifying any required processing updates?

Description

The response should indicate the organisation(s) responsible for assessing the compliance of the data record with GCOS principles, requirements, and guidelines as stated in GCOS-143 [RD-4] and GCOS-154 [RD-3] (GCOS-143 Guidelines 3 and 12, GCMP-4: Annex II of GCOS-143). A systematic assessment with respect to the GCOS criteria is seen as means to systematically increase the quality of provided data records.

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3.1.11 Question #11 (Peer-review organisation)

Question

Which organisational entity is responsible for organising the peer review of the data record? Please describe the status of the peer review.

Description

This question refers to the organisation responsible for performing the review process for the data record laid out in the answer to Question #35. The review process is part of a formal quality assurance and is most often organised by organisations that fund the respective data record generation activity. If there is no standing organisation responsible for a peer review, e.g., in cases only scientific documents are submitted to peer review journals, the status of publications should be reported.

This question reflects the need for scientific review as expressed by the GCOS Steering Committee in GCOS-143 [RD-4] guidance #5 which reads “Information on the scientific review process related to FCDR/product construction (including algorithm selection), FCDR/product quality and applications [with footnote].

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Example

One example is the EUMETSAT ASCAT L1 Release 2 data record where the answer for the organisation would be “EUMETSAT” as a so called Delivery Readiness Review (DRR) is organised prior the publication of the data record. As documents related to the review process, e.g., Organisational Notes and Review Reports are not public, the status would be described as “The data record has successfully passed a DRR with 3 external reviewers and was subsequently published”.

Another example of information provided as a response to this question, concerning a EUMETSAT data record of spectral land-surface black- and white-sky albedo associated with the ECV Product Broadband Black-sky Albedo, released at a time when no DRRs were performed, is presented below. In this case it is not possible to name an organisation responsible for the independent peer-review process, but instead, peer-reviewed articles are referenced as source of evidence for a peer review:

Pinty, B., Roveda, F., Verstraete, M.M., Gobron, N., Govaerts, Y., Martonchik, J.V., Diner, D.J., and Kahn, R.A. (2000) Surface albedo retrieval from Meteosat: Part 1: Theory, Journal of Geophysical Research, 105, 18099-18112.

Pinty, B., Roveda, F., Verstraete, M.M., Gobron, N., Govaerts, Y., Martonchik, J.V., Diner, D.J., and Kahn, R.A. (2000) Surface albedo retrieval from Meteosat: Part 2: Applications, Journal of Geophysical Research, 105, 18113-18134.

Pinty, B., R. E. Dickinson, et al. (2004). Intercomparison of Surface Albedo Products from Various Optical Sensors. CEOS-IVOS Workshop on the Intercomparison of Large Scale Optical Sensors, Noordwijk, the Netherlands.

Govaerts, Y. M., A. Lattanzio, B. Pinty, and J. Schmetz (2004), Consistent surface albedo retrieval from two adjacent geostationary satellites, Geophys. Res. Let., 31, L15201, doi:10.1029/2004GL020418.

Lattanzio, A., Y. Govaerts, et al. (2006). Consistency of surface anisotropy characterization with Meteosat observations. Advanced Space Research, doi:10.1016/j.asr.2006.02.049.

3.1.12 Question #12 (Archiving organisation)

Question

Which organisational entity is responsible for collating, archiving and maintaining the resultant climate data records (e.g. archiving observations, FCDRs, TCDRs and all ancillary information such as processing configurations used in their generation, comparison with GCOS requirements, peer reviews, external reference data, etc)?

Description

The answer to this question should contain a list of organisations responsible for archiving the different elements of the used and resulting data and information during the process to generate the ECV data record.

This question focuses on the preservation aspect associated with GCOS-143 [RD-4] guidance #1 which suggests that ECV data producers should pay attention to providing a “Full description of all steps taken in the generation of FCDRs and ECV products, including algorithms used, specific FCDRs used, and characteristics and outcomes of validation activities”.

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Example

Just assume that a University X is contracted by NASA to produce a TCDR based on a FCDR created by NASA based on observations from ESA and NASA, which is then submitted to a NASA Data Centre for archiving. The list to be created to answer this question could look like:

- NASA and ESA for archiving observations
- NASA for FCDR
- NASA for TCDR
- University X for ancillary information, processing configuration, versioning approach, etc.

Please provide as much information as available.

3.1.13 Question #13 (User-service organisation)

Question

Which organisational entity is responsible for servicing user requests for the data record?

Description

Please provide the name of the organisation that is responsible for serving the data to users, e.g., by providing a catalogue, an ordering functionality, a user help desk or any other form of support such as a scientific support for usage of the data record.

This question relates to GCOS-143 [RD-4] guidance #8 which calls for “arrangements for access to the FCDRs, products and all documentation”.

Stage

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3.1.14 Question #14 (User-feedback organisation)

Question

Which organisational entity is responsible for responding to user feedback on the use of the data record?

Description

The answer should provide the name of an organisation that collects the user feedback and systematically evaluates it. In case this is not done by the same organisation, please mention all organisations involved.

This question relates to the GCOS-143 [RD-4] guideline #10, establishing the need for “a facility for user feedback”. User feedback provides a systematic mean to learn about the spectrum of applications for which the data record is used, to learn about eventual deficiencies of the data record and to guide future improvements. In an ideal case, the feedback mechanism consists of

periodic activities that ensure systematic consideration of the data record and leads to reliable planning for the future.

Stage

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3.1.15 Question #15 (Maintenance and user support commitment)

Question

Until when are firm commitments in place to continue to maintain and provide user support for this data record?

Description

This question addresses the sustainability of services around the produced ECV data record. The answer can be a specific date until the contractual arrangements are in place or "indefinite" if this is not the case.

This question relates to GCOS-143 [RD-4] guidance #8 which calls for "arrangements for access to the FCDRs, products and all documentation".

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3.2 Generation Process

3.2.1 Question #16 (Assessment body)

Question

If the data record has been produced in conjunction with any external domain-specific generation and assessment body then please identify the external domain-specific bodies engaged in the generation of the data record.

Description

The answer should identify the external domain-specific generation and assessment body involved in the generation of the data record. Please spell out the name of the body. If the question is not answered it is assumed that no external domain-specific body was involved in the production of the data record.

For instance, GCOS panels as well as WCRP core projects (CLIVAR, GEWEX, SPARC and CliC), Grand Challenges and other organisations can act as facilitators for the generation of ECV data records and as domain-specific assessment bodies. For instance, GEWEX has performed a number of assessments with participation by many data providers (see http://www.gewex.org/panels/gewex-data-and-assessments-panel/gdap-assessments/ for more details).

The answer should not include international coordination internal to the ECV data record production, such as cooperating contracted bodies involved in a specific programme or project but rather should include domain-specific bodies, for example supporting independent validation of ECV data products.

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3.2.2 Question #17 (Quality assurance process)

Question

Please describe the quality assurance process which has been implemented for the data record generation process. If it has been done in conjunction with a relevant international coordination body, then please indicate which international organisation or coordination body covered this aspect for the data record considered.

Description

The response should focus on a short description of the process that is used to assure the quality of the data record generation process. In addition, the answer to this question should indicate if an international organisation or coordination body covers quality assurance aspects for the specific data record considered.

For instance, the generation process may start with an analysis of the user requirements to avoid the generation of a data record that fails satisfying relevant user requirements. Furthermore, the data record generation process may also contain elements of software implementation control and a data record scientific quality evaluation part.

The quality assurance aspect related to this would be a series of reviews that provide control by internal and/or external bodies, such as Steering Groups or similar. The international dimension of quality assurance is reached when the quality assurance process is for instance certified by a quality assurance organisation such as ISO.

If the question is not answered it is assumed that no quality assurance process is in place.

This question relates to GCOS-143 [RD-4] GCMP #4 which reads that “the quality and homogeneity of data should be regularly assessed as a part of routine operations.”

Stage

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3.2.3 Question #18 (GCOS-requirements compliance assessment)

Question

If the compliance status of the TCDR with the GCOS requirements has been assessed, then please provide a link to the document describing the results of the assessment.

Description

The response should point to a description of the compliance assessment to GCOS requirements. The description should contain the method used to assess compliance and the actual result for the data record. This could be a link to a document provided by the data provider, a web site address or a link to the result of an international activity to assess the compliance.

If the question is not answered it is assumed that the compliance with GCOS requirements has not been assessed.

This question is related to GCOS-143 [RD-20] guideline #3 suggesting a "Statement of expected accuracy, stability and resolution (time, space) of the product, including, where possible, a comparison with the GCOS requirements".

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3.2.4 Question #19 (GCOS-guidelines peer-review compliance assessment)

Question

If the degree of compliance with the GCOS guidelines has been assessed though a peer-review process, then please provide links to the documents describing the results of the assessment.

Description

The answer to this question is related to the previous question but not restricted to numerical requirements stated in [RD-3]. Instead it is considering a peer review of the adherence to the GCOS-143 guideline #12 [RD-4] and eventually also the GCOS Climate Monitoring Principles. The answer shall point to relevant documentation that contains process and results of such an assessment. If the question is not answered it is assumed that the compliance with the GCOS guidelines has not been assessed.

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3.2.5 Question #20 (Quantitative maturity index assessment)

Question

If a quantitative maturity index assessment has been performed for the data record, then please provide a link to document describing the results of this assessment.

Description

If a quantitative maturity index assessment has been performed for the data record, information should be provided on what Maturity Matrix approach has been used, e.g., the one developed by the EU CORE-CLIMAX project [RD-6] or NOAA, and on who performed the assessment (the data provider or an independent body). In addition, the answer should point to a resource that describes the maturity assessment results for the data record.

If the question is not answered it is assumed that no maturity index assessment has been performed.

This question relates to GCOS-143 [RD-4] guideline #11, where it is recommended that data producers pay attention to the need for the "Application of a quantitative maturity index if possible".

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Example

[RD-7] contains a large scale maturity assessment of many data records produced in Europe. This is the kind of document that should be referenced here.

3.3 Record Characteristics

3.3.1 Question #21 (ECV and ECV Product)

Question:

To which ECV does the data record contribute? Which ECV Product is addressed by the data record?

Description

Following the definitions provided in Section 1, the response to the first question must be one of the GCOS ECVs as defined in [RD-3]. The answer to the second question must be an ECV Product as defined in Section 1 and described in Annex C of this document. After selection of the ECV, the online questionnaire offers possible answers for the ECV Products.

Annex-C provides the currently known relations of ECV and ECV Product.

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3.3.2 Question #22 (Physical quantity)

Question

Which physical quantity does the data record provide?

Description

The answer to this question should provide the specific physical quantity that is contained in the ECV data record. This should be exactly one physical quantity as some data record characteristics only apply to this specific physical quantity.

For instance if the selection at Question #21 is the GCOS ECV Earth Radiation Budget with the ECV Product longwave radiation budget at the surface here the responder can select upward longwave radiation flux at surface, downward longwave flux at the surface or longwave budget at the surface.

In addition to the ECVs and the ECV Products, Annex-C also provides the physical quantities associated with the ECVs and ECV Products. Annex C may not be perfect in listing all possible physical quantities associated with a specific ECV and ECV Product. The online questionnaire therefore offers a field “other” where additional physical quantities can be registered.

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3.3.3 Question #23 (SI Units)

Question

What are the SI units of the data record?

Description

The answer should be the SI unit used for the physical quantity. In addition to pure SI units, all derived units and prefixes for the SI units are allowed. Eventually also some non SI units are accepted for the use with the SI unit system. If in doubt please consult [RD-8].

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3.3.4 Question #24 (Satellite/sensor combination)

Question

Which satellite/sensor combination is used to generate the data record? For each pair satellite/sensor, please specify the level of data used, as well as the corresponding period of time of data usage (start- and end-date).

Description

The answer to this question is related to GCOS-143 [RD-4] guideline #1, and GCMP-3: Annex II of GCOS-143 [RD-4] and consists of a table that depicts all input data to the schemes producing the geophysical variable. This needs to include the name of the satellite, the name of the instrument aboard the satellite, the temporal coverage of the part of the data record covered by a specific satellite, and the specific data level, e.g., Level-1b or Level-1c.

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3.3.5 Question #25 (Inter-calibration satellite/sensor combination)

Question

Against which satellite/instrument combination has the data record been inter-calibrated? For each pair satellite/sensor, please specify the level of data used, as well as the corresponding period of time of data usage (start- and end-date).

Description

Inter-calibration is a means to homogenise a satellite data record vs. either an existing reference or a specific satellite within the data record. It changes the data record by applying a systematic correction averaged over some space and time. The correction is towards the true value if a reference can be used. Otherwise a validation exercise may show what the best approach is. Inter-calibration is most effectively applied at Level-1 (radiances) but can also be applied at the level of a geophysical product with the disadvantage that the uncertainty resulting from the inter-calibration is more difficult to assess.

The answer to this question should consist of a list of specific satellites and instruments aboard those satellites and potentially associated satellite products used for achieving homogeneity. This should not contain the usage of ground-based instrumentation as this is covered in the following question.

This question is associated with GCOS-143 [RD-4] guidance #2 which recommends that data producers pay attention to the “Application of appropriate calibration/validation activities”. It similarly relates to GCOS-143 [RD-4] GCMP #2 which states the principle that “a suitable period of overlap for new and old observing systems is required”.

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3.3.6 Question #26 (Ground-based network calibration)

Question

If this data record is utilising a ground-based network for calibration purposes, then please specify the network and provide a link to the source.

Description

This question is addressing the use of ground-based networks for the purpose of vicarious sensor calibration. The expected answer should provide a specification of the data used including the name of the network, specific sites used, and temporal extension, further providing a link to the source. It should also state if the data record depends on this vicarious calibration and cannot be produced without it.

If the question is not answered it is assumed that no ground-based network has been utilised for calibration purposes.

This question is associated with GCOS-143 [RD-4] guidance #2 which recommends that data producers pay attention to the "Application of appropriate calibration/validation activities".

Stage

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3.3.7 Question #27 (Geographical coverage)

Question

What is the geographical coverage of the TCDR? If not global, please specify the geographical extent. Please specify which domains (land, inland water, ocean, ice) are covered by the TCDR.

Description

The geographical coverage of the data product can be given as "global", which would represent 0-360° in longitude and South to North Pole in latitude. For global data records covering only one or several specific domain(s) (ocean, land, inland water, ice), this should be added to the answer.

Data records which are not global as defined here should specify the geographical coverage using latitude/longitude coordinates. This question relates to GCOS-143 [RD-4] guidance #6 that suggests that data records should global coverage where possible.

Stage

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3.3.8 Question #28 (Horizontal resolution)

Question

What is the horizontal resolution of the TCDR (in km)?

Description

Horizontal resolution as defined by GCOS is rather horizontal sampling of the data record. It has two dimensions which can be oriented North-South and East-West in case of a data record that is mapped to a geographical grid using a specific projection. Alternatively, the two dimensions can also characterise along- and cross-track sampling of a specific sensor, e.g., if the data record is delivered as a Level-2 product. In addition to the quantitative sampling, the answer should indicate in a comment field to what type of sampling the numbers apply.

The sampling should be given km to allow comparison to GCOS requirement. If the data record is build on equidistant degrees latitude and longitude, then please convert the spacing at the Equator into km. If horizontal sampling does not apply to the data record, select N/A.

This question relates to GCOS-143 [RD-4] guidance #3, the need for ECV data product characteristics to enable comparison to the GCOS-154 [RD-3] target requirements.

Stage

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3.3.9 Question #29 (Vertical resolution)

Question

What is the vertical resolution of the TCDR (in km)?

Description

Vertical resolution as defined by GCOS refers to vertical sampling in the data record. The answer can be a fixed vertical sampling. If the vertical sampling is not constant throughout the profile, then please state the coarsest sampling with an additional comment that describes the vertical characteristic. The sampling should be given in km to allow comparison to the GCOS requirement. If the sampling is in pressure units, please convert into km using the hydrostatic assumption. If vertical sampling does not apply to the data record, select N/A.

This question relates to GCOS-143 [RD-4] guidance 3, the need for ECV data product characteristics to enable comparison to the GCOS-154 [RD-3] target requirements.

Stage

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3.3.10 Question #30 (Temporal resolution)

Question

What is the temporal resolution of the TCDR (in days)?

Description

Temporal Resolution as GCOS defines it is rather temporal sampling of the data record. The answer should provide the frequency with which a value is provided for the same location.

This question relates to GCOS-143 [RD-4] guidance 3, the need for ECV data product characteristics to enable comparison to the GCOS-154 [RD-3] target requirements.

Stage

Stewardship – Generation Process – **Record Characteristics** – Documentation – Accessibility – Applications

3.3.11 Question #31 (Accuracy)

Question

What is the accuracy of the TCDR?

Description

Accuracy as defined by GCOS can be understood as uncertainty arising from systematic and random effects in the measurements and the methods applied to compute the geophysical variable. Uncertainty estimates can be established by theoretical means, comparison to reference data or both.

This question relates to GCOS-143 [RD-4] guidance #3, the need for ECV data product characteristics to enable comparison to the GCOS-154 [RD-3] target requirements. To answer the question the responder needs to familiarise with the specific meaning of the GCOS definition associated with the data record considered to help to enable comparability to the GCOS requirement. The comment field shall be used to explain what the provided numerical value represents, e.g., uncertainty estimate provided with the product, systematic and/or random deviations obtained from comparison to reference measurements, etc.

Stage

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3.3.12 Question #32 (Stability)

Question

What is the stability of the TCDR?

Description

Stability may be thought of as the extent to which the accuracy remains constant with time. Over time periods of interest for climate, the relevant component of total uncertainty is expected to be its systematic component as measured over the averaging period. Stability is therefore measured by the maximum excursion of the difference between a true value and the short-term average measured value of a variable under identical conditions over a decade. The smaller the maximum excursion is, the greater the stability of the data record. An example on how stability can be computed for a data record is given in [RD-9].

This question relates to GCOS-143 [RD-4] guidance #3, the need for ECV data product characteristics to enable comparison to the GCOS-154 [RD-3] target requirements. The stability should be provided as change over a decade as defined in GCOS-154 [RD-3] to enable comparison with the GCOS requirement. In addition, the response may describe how stability is influenced by random and systematic effects over time or point to a publication. This information is related to GMCP #20 [RD-4] which states that effective monitoring systems for climate should adhere to the principle that “random errors and time-dependent biases in satellite observations and derived products should be identified.”

Stage

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3.3.13 Question #33 (Start date)

Question

What is the start-date of the continuous data record?

Description

The start-date of the data record, together with the end-date, is used to establish the temporal length and temporal location of the ECV data record. In case of a temporal sampling longer than daily, please indicate the earliest date covered.

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3.3.14 Question #34 (End date)

Question

What is the end-date of the continuous data record?

Description

The end date of the ECV data product, together with the start date, is used to establish the temporal length and temporal location of the ECV data product. In case of a temporal sampling longer than daily, please indicate the last date covered.

Stage

Stewardship – Generation Process – **Record Characteristics** – Documentation – Accessibility – Applications

3.4 Documentation

3.4.1 Question #35 (CDR-generation documentation (link))

Question

Please provide the links to the documents describing all the steps taken in the generation of FCDRs and TCDRs, including algorithms used, on-board calibration, specific FCDRs used, version management system used and characteristics and outcomes of validation activities.

Description

The response should point to a detailed description of how the data record is produced. This description shall contain:

- The end-to-end process chain either as a flow diagram or a traceability chain that details every step of the data record generation. The process description provided here need not delve into the details of particular stages in the ECV processing chain, but rather provide a detailed description of the processing from a higher level perspective, therefore providing a 'joined-up' description of the process from the input data to the resulting data record. If such a description is not available the process shall be outlined in the comment field;
- Information on the specific FCDR used as input or if it is created as part of the TCDR generation;
- Information on the version management system used for the data record. This should not be mixed but can contain version management related to the software, formats, etc. used to generate the data record;
- Information on the characteristics and outcomes of validation activities. Characteristics are the description of geographical and temporal coverage of validation, comparison with specific reference data and/or ground-based networks to validate values and uncertainty estimates, how stability and homogeneity of the data record are assessed, etc.

This description of the end-to-end processing chain relates to GCOS-143 [RD-4] guidance #1 which reads that ECV data producers should pay attention to provide a "Full description of all steps taken in the generation of FCDRs and ECV products, including algorithms used, specific FCDRs used, and characteristics and outcomes of validation activities".

Stage

Stewardship – Generation Process – Record Characteristics – **Documentation** – Accessibility – Applications

3.4.2 Question #36 (Data documentation (link))

Question

Please provide link(s) to documentation provided with the data record.

Description

The answer to this question should be one or several links to documents or web content that contains the documentation for the data record. Standard elements expected consist of content as in a Product User Guide, Validation Report, and Algorithm Theoretical Baseline Document.

This question relates to GCOS-143 [RD-4] guideline #8 which calls for "arrangements for access to the FCDRs, products and all documentation".

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3.4.3 Question #37 (Scientific review process)

Question

Please provide link to a document describing the scientific review process related to FCDR/TCDR construction (including algorithm selection), FCDR/TCDR quality and applications.

Description

The answer to this question should point to a detailed description of the scientific review process underlying the production of the data record. This shall include process description for:

- Review of the scientific method used to generate the data record (including the algorithm selection process);
- Review of the quality of the input data;
- Review of the quality of the resulting data record;
- Review of the documentation of the data record.

Such a review process should involve independent reviewers external to the data record providers who assess the quality of the documentation and the quality of the data record as demonstrated by the documentation or by analysis of data samples. The minimum expected is the publication of peer-reviewed articles that is initiated by the data record producer.

The question pertains to GCOS-143 [RD-4] guidance #5 which recommends that ECV data producers pay attention to "Information on the scientific review process related to FCDR/product construction (including algorithm selection), FCDR/product quality and applications".

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Stewardship – Generation Process – Record Characteristics – **Documentation** – Accessibility – Applications

3.5 Accessibility

3.5.1 Question #38 (Access point)

Question

Please provide information on the access point (e.g. contact e-mail) for access to data records.

Description

This question relates to GCOS-143 [RD-4] guidance #8 which calls for "arrangements for access to the FCDRs, products and all documentation". The e-mail address provided should be service oriented, e.g., an institutional help desk, but can be also an individual, e.g. in the case that the data record is originating from a research project.

Stage

Stewardship – Generation Process – Record Characteristics – Documentation – **Accessibility** – Applications

3.5.2 Question #39 (Data access)

Question

What are the data access conditions? Please state whether access is made through an ordering system and if registration is required.

Description

The answer to this question should contain a choice of:

1	Open Access
2	Constrained Access
3	Very Constrained Access

Open Access means that the access is free of all restrictions on access (e.g., access tolls) and free of many restrictions on use (e.g. certain copyright and license restrictions).

Constrained Access means that access is not free of restrictions (e.g., access fees may be charged) or other restrictions on copyright, licensing, redistributions, etc. may exist.

Very Constrained Access means that many restrictions are part of the access and that data is potentially only provided after a certain process that involves the review of the usages proposed.

In case of access restrictions, the responder should provide the restrictions that apply to the data record or point to web resources where this information can be found.

As additional information it should be noted whether the data are available using an ordering system and if registration is needed or not.

This question relates to GCOS-143 [RD-4] guideline #8 which calls for “arrangements for access to the FCDRs, products and all documentation”.

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Stewardship – Generation Process – Record Characteristics – Documentation – **Accessibility** – Applications

3.5.3 Question #40 (Data record (link))

Question

Please provide link(s) to the data record.

Description

The answer to this question should be one or several links to from which the data record can be accessed, e.g., a doi related landing page, a data set catalogue, an ordering system, etc.

This question relates to GCOS-143 [RD-4] guidance #8 which calls for “arrangements for access to the FCDRs, products and all documentation”.

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Stewardship – Generation Process – Record Characteristics – Documentation – **Accessibility** – Applications

3.5.4 Question #41 (FCDR availability)

Question

In case the FCDRs are also available to the user community, please provide a link to that data record.

Description

TCDRs are often but not always based on carefully elaborated re- and inter-calibrated FCDRs. Sometimes those are provided to the TCDR producer, but corrections to input data are sometimes also made within the TCDR generation system without making available the corrected input data as an FCDR. In addition, the question is addressing the general availability of the data record considered.

If the FCDR is available, then the answer should point to the location where the FCDR is available. If the question is not answered it is assumed that no FCDR is available.

This question relates to GCOS-143 [RD-4] guideline #8 which calls for “arrangements for access to the FCDRs, products and all documentation”.

Stage

Stewardship – Generation Process – Record Characteristics – Documentation – **Accessibility** – Applications

3.5.5 Question #42 (Data format and metadata standard)

Question

What formats are available for the data record and what standard has been used for the metadata?

Description

Please provide a list of formats in which the data record is available. In addition, state what standard has been used for the metadata, e.g., Climate Forecast or similar.

This question relates to GCOS-143 [RD-4] guidance #8 which calls for “arrangements for access to the FCDRs, products and all documentation”.

Stage

Stewardship – Generation Process – Record Characteristics – Documentation – **Accessibility** – Applications

3.5.6 Question #43 (Dissemination mechanisms)

Question

What dissemination mechanisms are available for the data record?

Description

Please describe the technical dissemination mechanism by which the data record is made available. An overall description of the technical architecture of the data access is not expected.

This can include any dissemination via the internet, via satellite, on media, etc. In addition to the technical specification, a connection to an international dissemination method such as obs4mips can be provided if applicable.

This question relates to GCOS-143 [RD-4] guidance #8 which calls for "arrangements for access to the FCDRs, products and all documentation".

Stage

Stewardship – Generation Process – Record Characteristics – Documentation – **Accessibility** – Applications

3.5.7 Question #44 (Release date)

Question

When was the data record released to the user community (year)?

Description

Please provide the year in which the data record was made officially available.

This question reflects to GCOS-143 [RD-4] guidance #9, which recommends that data producers pay attention to "timeliness of data release to the user community to enable monitoring activities".

Stage

Stewardship – Generation Process – Record Characteristics – Documentation – **Accessibility** – Applications

3.6 Applications

3.6.1 Question #45 (Climate applications)

Question

What specific climate applications does this data record support?

Description

Please briefly describe the climate applications associated with the data record, including peer reviewed references. The description of climate applications for which the data record is useful should be supported with information pertaining to user needs as expressed by GCOS-143 [RD-4] GCMP #5 which reads "consideration of the needs for environmental and climate-monitoring products and assessments, such as IPCC assessments, should be integrated into national, regional and global observing priorities."

Stage

Stewardship – Generation Process – Record Characteristics – Documentation – Accessibility – **Applications**

4 Questionnaire Guide (*future*)

4.1 Stewardship

4.1.1 Question #1 (Responder name)

Question

Who is the individual populating the questionnaire?

Please follow guidance provided in section 3.1.1.

Stage

Stewardship – Record Characteristics – Accessibility – Applications

4.1.2 Question #2 (Responder e-mail)

Question

Please state the e-mail address of the individual populating the questionnaire.

Please follow guidance provided in section 3.1.2.

Stage

Stewardship – Record Characteristics – Accessibility – Applications

4.1.3 Question #3 (Responsible organisation)

Question

What is the name of the organisation with overall responsibility for the planned data record?

Please follow guidance provided in section 3.1.4

Stage

Stewardship – Record Characteristics – Accessibility – Applications

4.1.4 Question #4 (Collection organisation)

Question

Which organisational entity will be responsible for collecting the satellite observations?

Please follow guidance provided in section 3.1.5.

Stage

Stewardship – Record Characteristics – Accessibility – Applications

4.1.5 Question #5 (Calibration organisation)

Question

Which organisational entity will be responsible for calibrating the satellite observations?

Please follow guidance provided in section 3.1.6.

Stage

Stewardship – Record Characteristics – Accessibility – Applications

4.1.6 Question #6 (FCDR organisation)

Question

Which organisational entity will be responsible for generating and maintaining the FCDR (i.e. correcting, geolocating and applying calibration parameters to the satellite observations)?

Please follow guidance provided in section 3.1.7.

Stage

Stewardship – Record Characteristics – Accessibility – Applications

4.1.7 Question #7 (Inter-calibration organisation)

Question

Which organisational entity will be responsible for inter-calibrating the satellite observations?

Please follow guidance provided in section 3.1.8.

Stage

Stewardship – Record Characteristics – Accessibility – Applications

4.1.8 Question #8 (TCDR organisation)

Question

Which organisational entity will be responsible for generating and maintaining the TCDR (i.e. conversion of the FCDR to geophysical parameters)?

Please follow guidance provided in section 3.1.9.

Stage

Stewardship – Record Characteristics – Accessibility – Applications

4.1.9 Question #9 (GCOS requirements assessments organisation)

Question

Which organisational entity will be responsible for checking if the resultant TCDRs meet the relevant GCOS requirements, and identifying any required processing updates?

Please follow guidance provided in section 3.1.10.

Stage

Stewardship – Record Characteristics – Accessibility – Applications

4.1.10 Question #10 (Peer-review organisation)

Question

Which organisational entity will be responsible for organizing the peer review of the data record?

Please follow guidance provided in section 3.1.11 (regarding the explanation concerning the first part of the *current* counterpart question).

Stage

Stewardship – Record Characteristics – Accessibility – Applications

4.1.11 Question #11 (Archiving organisation)

Question

Which organisational entity will be responsible for collating, archiving and maintaining the resultant climate data records (e.g. archiving observations, FCDRs, TCDRs and all ancillary information such as processing configurations used in their generation, comparison with GCOS requirements, peer reviews, external reference data, etc)?

Please follow guidance provided in section 3.1.12.

Stage

Stewardship – Record Characteristics – Accessibility – Applications

4.1.12 Question #12 (User service organisation)

Question

Which organisational entity will be responsible for servicing user requests for the data record?

Please follow guidance provided in section 3.1.13.

Stage

Stewardship – Record Characteristics – Accessibility – Applications

4.1.13 Question #13 (User feedback organisation)

Question

Which organisational entity will be responsible for responding to user feedback on the use of the data record?

Please follow guidance provided in section 3.1.14.

Stage

Stewardship – Record Characteristics – Accessibility – Applications

4.2 Record Characteristics

4.2.1 Question #14 (Essential Climate Variable (ECV))

Question

To which ECV will the data record contribute? Which ECV Product will be addressed by the data record?

Please follow guidance provided in section 3.3.1.

Stage

Stewardship – **Record Characteristics** – Accessibility – Applications

4.2.2 Question #15 (Physical quantity)

Question

Which physical quantity will the data record provide?

Please follow guidance provided in section 3.3.2.

Stage

Stewardship – **Record Characteristics** – Accessibility – Applications

4.2.3 Question #16 (Satellite/sensor combination)

Question

Which satellite/sensor combination will be used to generate the data record? For each pair satellite/sensor, please specify the intended level of data to be used, as well as the corresponding planned period of time of data usage (start- and end-date).

Please follow guidance provided in section **Error! Reference source not found.**.

Stage

Stewardship – **Record Characteristics** – Accessibility – Applications

4.2.4 Question #17 (Geographical coverage)

Question

What is the geographical coverage of the planned TCDR? If not global, please specify the geographical extent. Please specify which domains (land, inland water, ocean, and ice) will be covered by the TCDR.

Please follow guidance provided in section 3.3.7.

Stage

Stewardship – **Record Characteristics** – Accessibility – Applications

4.2.5 Question #18 (Horizontal resolution)

Question

What is the anticipated horizontal resolution of the TCDR (in km)?

Please follow guidance provided in section 3.3.8

Stage

Stewardship – **Record Characteristics** – Accessibility – Applications

4.2.6 Question #19 (Vertical resolution)

Question

What is the anticipated vertical resolution of the TCDR (in km)?

Please follow guidance provided in section 3.3.9.

Stage

Stewardship – **Record Characteristics** – Accessibility – Applications

4.2.7 Question #20 (Temporal resolution)

Question

What is the anticipated temporal resolution of the TCDR (in days)?

Please follow guidance provided in section 3.3.10.

Stage

Stewardship – **Record Characteristics** – Accessibility – Applications

4.2.8 Question #21 (Accuracy)

Question

What is the anticipated accuracy of the TCDR?

Please follow guidance provided in section 0.

Stage

Stewardship – **Record Characteristics** – Accessibility – Applications

4.2.9 Question #22 (Stability)

Question

What is the anticipated stability of the TCDR?

Please follow guidance provided in section 3.3.12.

Stage

Stewardship – **Record Characteristics** – Accessibility – Applications

4.2.10 Question #23 (Start date)

Question

What is the planned start-date of the continuous data record?

Please follow guidance provided in section 0.

Stage

Stewardship – **Record Characteristics** – Accessibility – Applications

4.2.11 Question #24 (End date)

Question

What is the planned end-date of the continuous data record?

Please follow guidance provided in section 3.3.14.

Stage

Stewardship – **Record Characteristics** – Accessibility – Applications

4.2.12 Question #25 (TCDR Heritage)

Question

If the TCDR is a new release/extension of an existing TCDR, for which existing TCDR is the planned one an extension or a new version/release?

Description

If applicable, please indicate for which TCDR the planned TCDR will provide an extension or new version/release. In addition, please indicate what is triggering the planned TCDR.

Please also provide the ECV Inventory data record number to identify the heritage data record. In case that the heritage data record is not part of the ECV Inventory please add it using the Questionnaire for existing (*current*) data records.

If the question is not answered it is assumed that the planned TCDR has no relation to an existing TCDR.

Stage

Stewardship – **Record Characteristics** – Accessibility – Applications

4.3 Accessibility

4.3.1 Question #26 (Access conditions)

Question

What are the planned data-access conditions?

Please follow guidance provided in section 3.5.2 (regarding the explanation concerning the first part of the *current* counterpart question).

Stage

Stewardship – Record Characteristics – **Accessibility** – Applications

4.3.2 Question #27 (FCDR availability)

Question

Will FCDRs as well as TCDRs be available to the user community?

Please follow guidance provided in section 0 (regarding the explanation concerning the first part of the *current* counterpart question).

Stage

Stewardship – Record Characteristics – **Accessibility** – Applications

4.3.3 Question #28 (Release date)

Question

What is the planned date for releasing the data record to the user community (year)?

Please follow guidance provided in section 3.5.7.

Stage

Stewardship – Record Characteristics – **Accessibility** – Applications

4.4 Applications

4.4.1 Question #29 (Climate applications)

Question

What specific climate applications will this new data record support?

Please follow guidance provided in section 3.6.1.

Stage

Stewardship – Record Characteristics – Accessibility – **Applications**

Annex A : GCOS-143 Guidelines

The GCOS Steering Committee recommends that data producers pay particular attention to the following 12 guidelines, towards ensuring full documentation, transparency and scientific stewardship in the generation and update of FCDRs and ECV data products. The GCOS-143 [RD-4] expression of these guidelines is stated here verbatim:

1. Full description of all steps taken in the generation of FCDRs and ECV products, including algorithms used, specific FCDRs used, and characteristics and outcomes of validation activities
2. Application of appropriate calibration/validation activities
3. Statement of expected accuracy, stability and resolution (time, space) of the product, including, where possible, a comparison with the GCOS requirements
4. Assessment of long-term stability and homogeneity of the product
5. Information on the scientific review process related to FCDR/product construction (including algorithm selection), FCDR/product quality and applications
6. Global coverage of FCDRs and products where possible
7. Version management of FCDRs and products, particularly in connection with improved algorithms and reprocessing
8. Arrangements for access to the FCDRs, products and all documentation
9. Timeliness of data release to the user community to enable monitoring activities
10. Facility for user feedback
11. Application of a quantitative maturity index if possible
12. Publication of a summary (a webpage or a peer-reviewed article) documenting point-by-point the extent to which this guideline has been followed

Annex B : GCOS Climate Monitoring Principles

GCOS-143 [RD-4] states that effective monitoring systems for climate should adhere to the following principles, here stated verbatim:

1. The impact of new systems or changes to existing systems should be assessed prior to implementation.
2. A suitable period of overlap for new and old observing systems is required.
3. The details and history of local conditions, instruments, operating procedures, data processing algorithms and other factors pertinent to interpreting data (i.e., metadata) should be documented and treated with the same care as the data themselves.
4. The quality and homogeneity of data should be regularly assessed as a part of routine operations.
5. Consideration of the needs for environmental and climate-monitoring products and assessments, such as IPCC assessments, should be integrated into national, regional and global observing priorities.
6. Operation of historically-uninterrupted stations and observing systems should be maintained.
7. High priority for additional observations should be focused on data-poor regions, poorly-observed parameters, regions sensitive to change, and key measurements with inadequate temporal resolution.
8. Long-term requirements, including appropriate sampling frequencies, should be specified to network designers, operators and instrument engineers at the outset of system design and implementation.
9. The conversion of research observing systems to long-term operations in a carefully-planned manner should be promoted.
10. Data management systems that facilitate access, use and interpretation of data and products should be included as essential elements of climate monitoring systems.

Furthermore, operators of satellite systems for monitoring climate need to:

(a) Take steps to make radiance calibration, calibration-monitoring and satellite-to-satellite cross-calibration of the full operational constellation a part of the operational satellite system; and

(b) Take steps to sample the Earth system in such a way that climate-relevant (diurnal, seasonal, and long-term inter-annual) changes can be resolved.

Thus satellite systems for climate monitoring should adhere to the following specific principles:

11. Constant sampling within the diurnal cycle (minimizing the effects of orbital decay and orbit drift) should be maintained.
12. A suitable period of overlap for new and old satellite systems should be ensured for a period adequate to determine inter-satellite biases and maintain the homogeneity and consistency of time-series observations.
13. Continuity of satellite measurements (i.e. elimination of gaps in the long-term record) through appropriate launch and orbital strategies should be ensured.

14. Rigorous pre-launch instrument characterization and calibration, including radiance confirmation against an international radiance scale provided by a national metrology institute, should be ensured.
15. On-board calibration adequate for climate system observations should be ensured and associated instrument characteristics monitored.
16. Operational production of priority climate products should be sustained and peer-reviewed new products should be introduced as appropriate.
17. Data systems needed to facilitate user access to climate products, metadata and raw data, including key data for delayed-mode analysis, should be established and maintained.
18. Use of functioning baseline instruments that meet the calibration and stability requirements stated above should be maintained for as long as possible, even when these exist on de-commissioned satellites.
19. Complementary in situ baseline observations for satellite measurements should be maintained through appropriate activities and cooperation.
20. Random errors and time-dependent biases in satellite observations and derived products should be identified.

Annex C : List of ECVs, ECV products and physical quantities

Table C.1: Atmospheric ECVs, ECV Products, and Physical Quantities

ECV		ECV Product		Physical Quantity
A.1	Surface Wind Speed and Direction	A.1.1	Surface Wind Speed and Direction	Wind speed over land surface (horizontal)
				Wind speed over ocean surface (horizontal)
				Wind vector over land surface (horizontal)
				Wind vector over sea surface (horizontal)
A.2	Precipitation	A.2.1	Precipitation	Precipitation (liquid and solid)
				Liquid precipitation
				Solid precipitation
A.3	Upper-air Temperature	A.3.1	Tropospheric Temperature	Tropospheric Temperature
		A.3.2	Stratospheric Temperature	Stratospheric Temperature
		A.3.3	Deep Atmospheric Temperature	Deep Atmospheric Temperature
A.4	Upper-air Wind	A.4.1	Upper-air Wind Speed and Direction	Upper-air Wind Speed and Direction
A.5	Water Vapour	A.5.1	Total Column Water Vapour	Total Column Water Vapour
		A.5.2	Tropospheric and Lower-stratospheric Profiles of Water Vapour	Tropospheric and Lower-stratospheric Profiles of Water Vapour
		A.5.3	Upper Tropospheric Humidity	Upper Tropospheric Humidity
A.6	Cloud Properties	A.6.1	Cloud Amount (CA)	Cloud Amount
				High-clouds Amount
				Mid-level-clouds Amount

ECV		ECV Product		Physical Quantity
				Low-clouds Amount
		A.6.2	Cloud Top Pressure (CTP)	Cloud Top Pressure
		A.6.3	Cloud Top Temperature (CTT)	Cloud Top Temperature
		A.6.4	Cloud Optical Depth (COD)	Cloud Optical Depth (liquid and ice)
				Cloud Optical Depth (liquid)
				Cloud Optical Depth (ice)
		A.6.5	Cloud Water Path (liquid and ice) (CWP)	Cloud Water Path (liquid and ice)
				Cloud Water Path (liquid)
				Cloud Water Path (ice)
		A.6.6	Cloud Effective Particle Radius (liquid and ice) (CRE)	Cloud Effective Particle Radius (liquid)
				Cloud Effective Particle Radius (ice)
		A.7.1	Top-of-Atmosphere ERB Longwave	Upward Longwave Radiation at TOA
		A.7.2	Top-of-Atmosphere ERB Shortwave (reflected)	Top-of-Atmosphere ERB Shortwave
				Downward Shortwave Radiation at TOA
				Upward Shortwave Radiation at TOA
		A.7.3	Surface ERB Longwave	Surface ERB Longwave
				Downward Longwave Radiation at Surface
				Upward Longwave Radiation at Surface
		A.7.4	Surface ERB Shortwave	Surface ERB Shortwave
				Downward Shortwave Radiation at Surface
				Upward Shortwave Radiation at Surface
		A.7.5	Total Solar Irradiance	Total Solar Irradiance

ECV		ECV Product		Physical Quantity
		A.7.6	Solar Spectral Irradiance	Solar Spectral Irradiance
A.8	Carbon Dioxide, Methane and other Greenhouse Gases	A.8.1	Tropospheric CO_2 Column	Tropospheric CO_2 Column
		A.8.2	Tropospheric CO_2	Tropospheric CO_2
		A.8.3	Tropospheric CH_4 Column	Tropospheric CH_4 Column
		A.8.4	Tropospheric CH_4	Tropospheric CH_4
		A.8.5	Stratospheric CH_4	Stratospheric CH_4
A.9	Ozone	A.9.1	Total Ozone	Total Ozone
		A.9.2	Tropospheric Ozone	Tropospheric Ozone
		A.9.3	Ozone Profile in Upper Troposphere and Lower Stratosphere	Ozone Profile in Upper Troposphere and Lower Stratosphere
		A.9.4	Ozone Profile in Upper Stratosphere and Mesosphere	Ozone Profile in Upper Stratosphere and Mesosphere
A.10	Aerosol Properties	A.10.1	Aerosol Optical Depth	Aerosol Optical Depth
		A.10.2	Single-scattering Albedo	Single-scattering Albedo
		A.10.3	Aerosol-layer Height	Aerosol-layer Height
		A.10.4	Aerosol-extinction Coefficient Profile	Aerosol-extinction Coefficient Profile
A.11	Precursors supporting the Ozone and Aerosol ECVs	A.11.1	NO_2 Tropospheric Column	NO_2 Tropospheric Column
		A.11.2	SO_2, HCHO Tropospheric Columns	SO_2 Tropospheric Column
				HCHO Tropospheric Column
		A.11.3	CO Tropospheric Column	CO Tropospheric Column
		A.11.4	CO Tropospheric Profile	CO Tropospheric Profile

Table C2: Oceanic ECVs, ECV Products, and Physical Quantities

ECV		ECV Product		Physical Quantity
O.1	Sea Surface Temperature	O.1.1	Sea Surface Temperature	Sea Surface Temperature
O.2	Sea Surface Salinity	O.2.1	Sea Surface Salinity	Sea Surface Salinity
O.3	Sea Level	O.3.1	Global Mean Sea Level	Sea-level anomaly
		O.3.2	Regional Sea Level	Sea-level anomaly
O.4	Sea State	O.4.1	Wave Height	Significant Wave Height
				Wave direction
				Wavelength
				Wave Period
O.5	Sea Ice	O.5.1	Sea Ice Concentration	Sea Ice Concentration
		O.5.2	Sea Ice Extent/Edge	Sea Ice Extent/Edge
		O.5.3	Sea Ice Thickness	Sea Ice Thickness
		O.5.4	Sea Ice Drift	Sea Ice Drift
O.6	Ocean Colour	O.6.1	Water Leaving Radiance	Water Leaving Radiance
		O.6.2	Chlorophyll-a Concentration	Chlorophyll-a Concentration

Table C3: Terrestrial ECVs, ECV Products, and Physical Quantities

ECV		ECV Product		Physical Quantity
T.1	Lakes	T.1.1	Areas of GTN-L Lakes	Lake area
		T.1.2	Level of GTN-L Lakes	Lake level
T.2	Snow Cover	T.2.1	Snow Areal Extent	Snow Areal Extent
		T.2.2	Snow Water Equivalent	Snow Water Equivalent
T.3	Glaciers and Ice Caps	T.3.1	2D Vector Outlines, Delineating Glacier Area	Glacier Area (outlines)
		T.3.2	Elevation Data	Glacier elevation change
				Glacier topography
T.4	Ice Sheets	T.4.1	Surface Elevation Change	Surface Elevation Change
		T.4.2	Ice Velocity	Ice Velocity
		T.4.3	Mass Change	Mass Change
T.5	Albedo	T.5.1	Black-sky Albedo	Spectral land-surface black-sky albedo
				Broadband land-surface black-sky albedo
		T.5.2	White-sky Albedo	Spectral land-surface white-sky albedo
				Broadband land-surface white-sky albedo
T.6	Land Cover	T.6.1	Maps of Land-cover Type	Maps of Land-cover Type
		T.6.2	High-resolution map of land-cover change	High-resolution map of land-cover change
T.7	FAPAR	T.7.1	FAPAR	FAPAR
T.8	LAI	T.8.1	LAI	LAI
T.9	Above-Ground Biomass	T.9.1	Gridded Above-Ground Biomass (dry weight of woody matter (tons/ha))	Gridded Above-Ground Biomass (dry weight of woody matter (tons/ha))

ECV		ECV Product		Physical Quantity
T.10	Fire Disturbance	T.10.1	Burnt Area	Burnt Area
		T.10.2	Active Fire Maps	Active Fire Maps
		T.10.3	Fire Radiative Power (polar-orbiting platform)	Fire Radiative Power
		T.10.4	Fire Radiative Power (geostationary platform)	Fire Radiative Power
T.11	Soil Moisture	T.11.1	Volumetric Soil Moisture	Volumetric Soil Moisture
T.12	Land-Surface Temperature	T.12.1	Land-Surface Temperature	Land-Surface Temperature