ECMWF Copernicus Procurement

Invitation to Tender

Copernicus Climate Change Service

Products and Services for additional ECVs in the Land and Ocean Domains

Volume II: Specification of Requirements

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1   Introduction

The Copernicus Climate Change Service (C3S), implemented by the European Centre for Medium-Range Weather Forecasts (ECMWF) on behalf of the European Union, develops and delivers authoritative, quality-assured information about the past, current and future states of the climate in Europe and worldwide. It aims to a) inform policy development to protect citizens from climate-related hazards such as high-impact weather events, b) improve the planning of adaptation practices for key human and societal activities, and c) promote the development of new applications and services for the benefit of society.

To support these goals, C3S provides reliable, open, and free access to a wide variety of datasets via its Climate Data Store (CDS), including Climate Data Records (CDRs) consistently derived from satellite observations, together with "Interim" extensions of those Climate Data Records (ICDRs) based on recent observations that can be used to monitor climate change.

C3S and its partners in Europe have made substantial progress in enhancing the capabilities for sustained generation of CDRs. The role of C3S is to facilitate the transition from research to operations by ensuring reliable access to the CDRs and all information needed to use them effectively. C3S relies on third parties for the development, production and updating of CDRs and ICDRs, together with technical documentation and specialist support as needed.

The CDRs and ICDRs currently available on the CDS include a range of Essential Climate Variables (ECV) products (see GCOS-245) in the following domains: atmospheric physics, atmospheric composition, the ocean, land hydrology, cryosphere, and land biosphere.

This Invitation to Tender (ITT) aims to expand the scope of climate information delivered in the aforementioned domains by incorporating the following additional ECVs:

- **Sea Surface Salinity,**
- **Permafrost,**
- **Above-Ground Biomass,**
- **Leaf Area Index (LAI),**
- **Fraction of Absorbed Photosynthetically Active Radiation (fAPAR)**
- **Surface Albedo.**

The last three ECVs (LAI, fAPAR and Surface Albedo) have already developed C3S services in recent years. Consequently, the main goals associated to these ECVs remain largely aligned with those outlined in previous related C3S ITTs references C3S2_313a to C3S2_313f:

- Ensuring continuity with existing services.
- Maintaining the highest possible quality for all ECV products, based on GCOS requirements and best practices.
- Achieving Full Operational Capacity for all ECV products currently available on the CDS.
- Providing access to additional ECV products if operational capability is sufficiently advanced.

Concerning the three new ECVs (Sea Surface Salinity, Permafrost and Above-Ground Biomass), the main objective is the implementation of an operational processing chain that leads to a clearly defined schedule of deliverables and services.

For all ECVs covered by this ITT, the operational capacity for CDR generation shall be assessed by applying the maturity model introduced by Bates and Privette (2012), addressing technical readiness of software, metadata, documentation, product validation, public access, and utility. In particular, Full Operational Capacity shall be achieved when each of the maturity levels have reached 5 or 6 (Bates et al., 2016).

IMPORTANT NOTE

This ITT invites Tenders for five distinct Lots, as described in Section 2.3. For each Lot, ECMWF intends to award a single Framework Agreement for a period of 30 months, which shall be implemented via a single Service Contract (unless multiple Lots are awarded to the same Tenderer) expected to commence in January 2026.

Tenderers are invited to submit their Tenders for any one of the Lots, or any combination of multiple Lots (with each submission to be done separately). Participation in multiple Lots in a non-lead capacity (e.g. as a subcontractor or supporting entity) is also permitted. Each bid should also include management and coordination tasks (WP0), as described in Section 2.5. The evaluation of bids will be conducted per Lot.

In case a Tenderer opts to submit Tenders for more than one Lot, it is mandatory that each Tender is presented as a separate submission, with its own set of documents, including but not limited to, technical proposals, pricing tables and any required supporting documents. Tenderers must ensure that the submissions for each Lot are independently viable and stand on their own merits. At the same time, Tenderers should indicate what synergies, including cost savings, can be achieved should more than one Lot be awarded to them.

Details on scope and technical requirements are described in Section 2.

2 Technical Requirements

This ITT pertains to the provision of operational services aimed at ensuring dependable access to high-quality, consistent, and globally homogeneous satellite climate data products via the CDS. The services shall include the following technical activities:

- Operation and maintenance of processing systems to generate CDR / ICDR datasets (unless these operations are supported by other initiatives).
- Implementation and/or improvement of operational production chain components as needed to achieve Full Operational Capacity, as defined in Section 1.
- Provision of access to datasets via the CDS.
- Quality assurance and validation of the resulting datasets.
- Provision of supporting documentation that describes the operational algorithms employed in dataset generation, outlines the results of quality assessments, and a user guide to assist users in the appropriate utilisation of the datasets.
- Maintenance of metadata describing CDR datasets and their associated documentation.
- Provision of user support services.
- Contribution to the European State of the Climate, contingent upon the maturity and latency of the ECV data, the upcoming C3S climate dashboard, or an alternative form of support for climate intelligence.

The Tenderer shall clarify ownership and use of licenses for all ECV products to be provided, including any pre-agreed arrangements with product owners related to interfaces, documentation, user support, user statistics, licenses, product identification/citation, etc.

The Tenderer shall also clarify any dependencies on third parties for any of the activities listed here, including processing, provision of input data, research and development, or any other elements needed to fulfil the requirements for this ITT.

2.1 Dataset Characteristics

All datasets shall meet the following criteria:

- **[req. 1]** Be of sufficient length, consistency, homogeneity, and continuity to represent past climate variability and change and have global or near-global coverage.
- **[req. 2]** Be derived primarily from satellite observations.
- **[req. 3]** Offer the best achievable spatial coverage and resolution for climate applications, while maintaining the necessary data quality for ECVs, considering the quality of available input observations.
- **[req. 4]** Incorporate meaningful estimates of uncertainty, encompassing both accuracy and precision.
- **[req. 5]** Include comprehensive metadata detailing data provenance to ensure full traceability of information.

Data Processing Level [req. 6]: Priority shall be given to higher level (level 3/4) ECV products that span at least 20 years. Proposals for lower-level and/or shorter data records must be justified based on well-identified user requirements.

Frequency of updates [req. 7]: ICDR datasets using newly acquired input data shall be updated at a predictable frequency. The Tenderer shall propose update frequencies that align with the dataset's temporal resolution and allow sufficient time for comprehensive quality control.

Reprocessing [req. 8]: Datasets shall be reprocessed when enhanced algorithms and/or newly available input data, such as data from newly launched satellites, enable significant improvements in product quality for end users in terms of long-term consistency, temporal/spatial resolution, accuracy, or precision. **The Tenderer shall include potential reprocessing options in their proposals.**

GCOS requirements [req. 9]: For each proposed CDR, the Tenderer shall include in the proposal a preliminary assessment against GCOS quality requirements as documented in GCOS-245.

Maturity levels [req. 10]: For each proposed CDR, the Tenderer shall include in its proposal a brief assessment of current maturity levels as described in the supplementary material of Bates and Privette (2012).

Moreover, all datasets shall be:

- **[req. 11]** Delivered using data formats, metadata and protocols as described in Section 3.4.
- **[req. 12]** Fully documented in line with deliverables detailed in Section 2.3.2.
- **[req. 13]** Backed up with specialised user support as described in Section 2.3.3.

2.2   Work to be undertaken

The Successful Tenderer under each Lot shall carry out the following tasks:

- **Operational System Resilience**: Maintain (or implement for new ECV products) a robust operational system with well-defined operating schedules and procedures. Address routine operation, strategy for delivering timely and frequent updates of ICDRs, swift responses to system failures, interruptions in input data, system upgrades to stay at the forefront of technological advancements (e.g., incorporating improved algorithms, new data sources), and reprocessing requirements.
- **Data Supplier Arrangements**: Establish and maintain necessary arrangements with input data suppliers to meet the operational production requirements, data delivery, and regular updates.
- **Product Specification Maintenance**: Maintain product specifications that align with target requirements for all CDRs and ICDRs to be delivered, using GCOS requirements as a baseline, but also ensuring that these specifications reflect C3S user needs, the availability and timeliness of input observations, current state of research (e.g., CCI outcomes), technical capabilities, etc.
- **Metadata Management**: Maintain metadata for data products using tools provided by ECMWF.
- **Product Generation and Data Handling**: Maintain and/or implement processes and systems for product generation and data management to facilitate the delivery of CDRs and ICDRs to C3S users through the CDS, taking advantage of existing capabilities to the fullest extent possible.

- **Scientific Quality Assurance**: Implement a systematic approach to ensure the highest scientific quality of data products. This includes input data quality control, routine monitoring of data production, and ongoing assessment of CDRs for continuity, accuracy, and stability.
- **Documentation**: Update, expand or establish links to informative documentation encompassing data products, quality assessments, and guides to users.
- **User Support**: Offer specialised user support for all products through the C3S Service Desk.
- **Climate Information**: Contribute to development of data information products for the annual European State of the Climate, the upcoming C3S climate dashboard and/or provide regular climate information related to ECV data products (see section 2.2.3).

2.2.1 Data production and access

The bulk of the work to be undertaken is concentrated in this task. The primary objective is to attain Full Operational Capacity of production chains for CDRs and ICDRs. The Successful Tenderer under each Lot shall ensure the timely generation and technical and scientific quality of ICDRs, and implement all processes or systems needed for generating (or brokering) new versions of quality controlled CDRs. The Successful Tenderer under each Lot shall ensure reliable and timely access to all data products and associated documentation through the CDS. Information on data integration and publishing mechanisms and expected interaction with the CDS technical team is given in section 3.4.

Deliverables shall include:

- **Dataset Registration (DR):** Accurate description of all product characteristics needed to integrate the dataset into the CDS. The Successful Tenderer shall maintain this information for the duration of the contract. A document template and/or access to Content Management Systems shall be provided by ECMWF.
- **ECV Data Product(s):** Provision of the associated data record to the ECV product.
- **Interim Climate Data Records (ICDRs**): These are CDRs that have been forward-processed in time using the associated baselined CDR algorithm and processing environment.

2.2.2 Documentation

The objective of this task is to provide high-quality, up-to-date and consistent documentation for all data products.

Deliverables shall include:

- **Dataset Documentation Package (DDP):**

  o **Algorithm Theoretical Basis Document (ATBD)**: Describes the physical and mathematical basis of algorithms and systems used to generate data products, e.g., data dependencies; use and source of auxiliary data; all aspects of data processing and quality control; calibration and bias adjustment; filtering, interpolation, transformation; uncertainty estimation, etc. It shall contain sufficient detail to be able to serve as a reference document for implementing the production systems, including **the choice of the Fundamental Data Record used as baseline reference for L3/L4 products, and ensure full traceability to the source.**

  o To avoid extra work, the ATBD, or parts of it, may incorporate or refer to **existing open-access peer-reviewed papers**, or existing consolidated documents (e.g., ESA-CCI equivalent ATBDs) on the condition that it comprehensively addresses all sections of the template that will be provided by ECMWF.

  o Product **Quality Assessment Report (PQAR):** Describes the approach to product quality assurance and methods used for product validation, as well as the assessments performed on the provided datasets, including any application-specific assessments if available. Dataset validation should follow best practices protocols where available.

- o Product **User Guide and Specification (PUGS):** This document shall be designed and written for non-specialist C3S users with varying backgrounds. It shall contain descriptions of all data products and the observing instruments used to produce them, and any information needed for traceability (e.g. algorithm name and version, processing level, etc.). It shall include the data specification, and any specific information and aspects to consider when using the data, including data format and file names, product content and attributes, quality indicator and flags, data masks and filtering (including information on gap filling strategy). **This document shall also include any known issues and limitations, data disclaimers and/or suitability for specific sectors/applications, as well as best practices to use the dataset for climate variability and trend analysis**.

- ● **Target Requirements - Gap Analysis Document (TR-GAD):** This document shall be delivered 6 months before the conclusion of the contract. It shall address gaps and limitations to data fitness-for-purpose and identify scientific research needs. The document shall explore opportunities for exploiting new observations, in particular from the Sentinel family of satellites. The document may for example highlight limitations in existing coverage, processing algorithms, or methods for estimating uncertainties. The TR-GAD is a crucial document that may be shared with data providers and research funding agencies to underscore the significance of ongoing research activities to maintain a state-of-the-art operational system.

Use of Confluence: All new documentation and updates shall be created in the Confluence-based documentation workspace dedicated to this project, prior to publication in the C3S Knowledge Base (CKB). ECMWF will provide guidelines to develop documentation in this reserved space.

ICDR documentation: Dedicated documentation for ICDRs is not required, except to register significant events and their impact on data quality, e.g. due to changes in satellite instruments, algorithms, or quality assurance methods. The associated documentation should be cumulative, preserving relevant content from prior versions whenever possible.

Re-use of existing documentation: Where feasible, ECV **contractors are encouraged to maximize and provide updates to existing documentation**, as long as they are available in the Confluence-based workspace.

Brokered datasets: In case of fully documented datasets provided by third parties, it is sufficient to provide links to those documents if appropriate. The Successful Tenderer shall ensure that those links are correct and accessible for the duration of the contract.

Templates: ECMWF will provide templates for each of the documents described in this section to the Successful Tenderer at the start of the contract.

2.2.3 User support and climate intelligence

The objective of this task is twofold: to provide specialised support to users of the delivered products and services, and to contribute to the overall C3S climate intelligence efforts.

User support: ECMWF has a well-established centralised User Support to provide multi-tiered technical support to all users of C3S data, products, tools and services. A service desk system is used for ticketing user requests and distributing these requests to specialists as needed. Dedicated staff at ECMWF promote and maintain self-help facilities (knowledge base (CKB), user forum, FAQs and tutorials etc.) and also provide individualised support on technical queries related to the CDS, data formats, data access etc. In addition, ECMWF staff members provide specialised scientific support to address questions related to its industrial contributions to C3S, e.g., in the areas of global reanalysis and seasonal forecasting.

All C3S contractors are expected to contribute to the delivery of multi-tiered technical support for the data and/or services they provide. The Successful Tenderer under each Lot shall provide expert (Level-2) support

through a) the Jira ticketing system with agreed KPIs (for example, 85% of Level-2 tickets should be resolved within 15-working days) and/or b) the user forum (http://copernicus-support.ecmwf.int/forum) by monitoring topics and providing responses.

Climate Intelligence: As part of its Climate Intelligence activities, C3S produces information and knowledge products based on the data stored in the CDS. Once the ECV demonstrates maturity as an indicator of long-term changes in climate, the Successful Tenderer under each Lot may contribute with products and interpretation derived from the appropriate dataset in the CDS for the annual European State of the Climate (ESoTC). Given the tight deadline imposed by contributions to the ESoTC, in cases where this is not feasible, the Tenderer shall propose an alternative form of contribution that showcases the long-term trends (if any) of the product or impact in climate, subject to agreement with ECMWF. The aspiration is to incorporate these contributions into a future ECV's dashboard providing climate information with recent data. The proposed update frequency for these products should align with the latest available information.

Other forms of climate intelligence (for instance, use cases demonstrating the value of the data records to specific economic sectors) may also be considered.

2.3 ECV Lots

The Successful Tenderer under each Lot shall provide access to datasets for each of the ECV Products listed in the sub-sections below, representing the minimum set of products expected within the Tenderer's proposal. The Successful Tenderers for these Lots shall, in accordance with the requirements described in Section 2.2 and 2.3, ensure consistency with the datasets currently available via the CDS if applicable. Reference definitions for these products can be found in the third column of Tables 1 to 5, and they adhere to the GCOS definition as specified in the 2022 GCOS ECVs Requirements document (GCOS-245). Nonetheless, proposals suggesting new products or technical solutions to replace any of the products in these tables may also be considered.

2.3.1 Lot 1: Sea Surface Salinity

In this Lot, the ECV Product indicated in Table 1 is the priority.

This Lot is composed of the WP0 subject to section 2.5 below and of a unique WP1 into which the Tenderers shall include all technical activities required for the implementation, generation, access, documentation, and support services as described in this ITT.

Tenderers shall propose an implementation plan for this Lot that contains a detailed specification of tasks, together with estimates of person-months required for each task.

Tenderers shall provide a self-assessment of current maturity levels for each proposed ECV product, based on the maturity matrix presented in Bates and Privette, (2012), together with a plan for increasing maturity levels in order to attain Full Operation Capacity for each product.

ECV	ECV product	Reference GCOS-245
Sea Surface Salinity	Sea Surface Salinity	Sect.4.3.1

Table 1: Priority ECV products required for the Sea Surface Salinity ECV

Priority must be given to monthly averaged L3 and/or L4 products enabling multi-decadal assessment of long-term climate variability and trends. The proposed products must benefit from scientific advances made in relevant research projects (e.g. the ESA-CCI Sea Surface Salinity project or other relevant projects in this context).

2.3.2   Lot 2: Permafrost

This Lot is composed of the WP0 subject to section 2.5 below and of a unique WP1 into which the Tenderers shall include all technical activities required for the implementation, generation, access, documentation, and support services as described in this ITT, for the ECV products listed in Table 2.

Tenderers shall propose an implementation plan for this Lot that contains a detailed specification of tasks, together with estimates of person-months required for each task.

Tenderers shall provide a self-assessment of current maturity levels for each proposed ECV product, based on the maturity matrix presented in Bates and Privette (2012), together with a plan for increasing maturity levels in order to attain Full Operation Capacity for each product.

ECV	ECV product	Reference GCOS-245
Permafrost	Permafrost Temperature	Sect.8.4.1
	Permafrost Extent	-
	Permafrost Active Layer Thickness	Sect.8.4.2

Table 2: List of ECV products required for the Permafrost ECV

Priority must be given to the production and delivery of multi-decadal L3 and/or L4 products to enable assessment of long-term climate variability and trends. The proposed products must benefit from the advances made in relevant research projects in the field (e.g. the ESA-CCI Permafrost, GlobPermafrost, DUE Permafrost or other relevant projects in this context).

2.3.3   Lot 3: Above-Ground Biomass

In this Lot, the ECV Product indicated in Table 3 is the priority.

This Lot is composed of the WP0 subject to section 2.5 below and of a unique WP1 into which the Tenderers shall include all technical activities required for the implementation, generation, access, documentation, and support services as described in this ITT.

Tenderers shall propose an implementation plan for this Lot that contains a detailed specification of tasks, together with estimates of person-months required for each task.

Tenderers shall provide a self-assessment of current maturity levels for each proposed ECV product, based on the maturity matrix presented in Bates and Privette, (2012), together with a plan for increasing maturity levels in order to attain Full Operation Capacity for each product.

ECV	ECV product	Reference GCOS-245
Above Ground Biomass	Above-Ground Biomass	Sect.9.1.1

Table 3: Priority ECV products required for the Above-Ground Biomass ECV

Priority must be given to the production and delivery of multi-decadal, L3 and/or L4 products enabling assessment of long-term climate variability and trends. The proposed products must benefit from the advances made in relevant research projects in the field (e.g. the ESA-CCI Biomass or other relevant projects in this context).

2.3.4   Lot 4: Surface Albedo

In this Lot, the ECV Product indicated in Table 4 is the priority.

This Lot is composed of the WP0 subject to section 2.5 below and of a unique WP1 into which the Tenderers shall include all technical activities required for the implementation, generation, access, documentation, and support services as described in this ITT.

Tenderers shall propose an implementation plan for this Lot that contains a detailed specification of tasks, together with estimates of person-months required for each task.

Tenderers shall provide a self-assessment of current maturity levels for each proposed ECV product, based on the maturity matrix presented in Bates and Privette, (2012), together with a plan for increasing maturity levels in order to attain Full Operation Capacity for each product.

ECV	ECV product	Reference GCOS-245
Albedo	Spectral and Broadband (visible, near infrared and shortwave) DHR & BHR with Associated Spectral Bidirectional Reflectance Distribution Function (BRDF) parameters	Sect.9.2.1

Table 4: Priority ECV products required for the Albedo ECV

Priority must be given to the production and delivery of multi-decadal, L3 and/or L4 products enabling assessment of long-term climate variability and trends.

2.3.5 Lot 5: Leaf Area Index (LAI) and fraction of Absorbed Photosynthetically Active Radiation (fAPAR)

In this Lot, the ECV Products listed in Table 5 are the priority.

This Lot is composed of the WP0 subject to section 2.5 below and of a unique WP1 into which the Tenderers shall include all technical activities required for generation, access, documentation, and support services as described in this ITT.

Tenderers shall propose an implementation plan for this Lot that contains a detailed specification of tasks, together with estimates of person-months required for each task.

Tenderers shall provide a self-assessment of current maturity levels for each proposed ECV product, based on the maturity matrix presented in Bates and Privette, (2012), together with a plan for increasing maturity levels in order to attain Full Operation Capacity for each product.

ECV	ECV product	Reference GCOS-245
Leaf Area Index	Leaf Area Index	Sect.9.8.1
Fraction of Absorbed Photosynthetically Active Radiation	Fraction of Absorbed Photosynthetically Active Radiation	Sect.9.5.1

Table 5: Priority ECV products required for the fraction of Absorbed Photosynthetically Active Radiation ECV

Priority must be given to the production and delivery of multi-decadal, L3 and/or L4 products enabling assessment of long-term climate variability and trends.

2.4 Schedule of technical deliverables

For each Lot Tenderers shall propose a coordinated schedule of deliverables that incorporates new versions of data products and their temporal extensions, based upon advances in algorithms and newly available input observations. The Successful Tenderer(s) shall prepare and deliver all technical/scientific deliverables listed in Table 6, in accordance with the indicated naming convention.

Deliverable name	Deliverable ID	Contents / Purpose	Primary Audience	Release schedule	Attached to

Dataset Registration (DR)	WP1-DR-ECV-[SENSOR/SATELLITE/algorithm]-[version]	To specify all the information needed about the dataset to enable its integration into the CDS	ECMWF	Per major product release (including reprocessing)	Dataset
ECV Data Product - Climate Data Record (CDR)	WP1-CDR-ECV-[SENSOR/SATELLITE/algorithm]-[version]	The CDR associated to this ECV.	Dataset users	Per major product release (including reprocessing)	Dataset
Interim Climate Data Record (ICDR)	WP1-ICDR-ECV-[SENSOR/SATELLITE/algorithm]-[version]	Temporal extension of a CDR, using the baseline algorithm of the associated CDR	Dataset users	Ongoing (tenderer should specify the frequency of delivery)	Dataset
Dataset Documentation Package (DDP)	WP1-DDP-ECV-[SENSOR/SATELLITE/algorithm]-[version]	ATBD: To describe the algorithms used to generate the ECVs in sufficient detail to allow informed users to understand the applicability of the resulting products for their needs. Note that for brokered datasets the delivery of associated documents may simply be a link to the source documentation. PQAR: To describe the results of the quality assessment. PUGS: A user guide for the dataset allowing users to understand the essential characteristics of the data, its applicability and how to access it. Can reference the ATBD and PQAR for more details	Dataset users	Per major product release (including reprocessing)	Dataset
Target Requirements / Gap Analysis Document	WP1-TR-GAD-ECV	To provide an overview of the target requirements for an ECV, the current state of performance in meeting those requirements, and a roadmap of future actions to improve performance	Dataset users, data providers and funding agencies	Once, 6 months before the end of the contract	Individual ECVs
User Support	WP1-US-ECV	Specialised user support via the C3S Service Desk – To respond to user support queries requiring expertise specific to the ECV products provided	Dataset Users	Ongoing, reported quarterly in the Quarterly Implementation Report (QIR)	
Climate Intelligence	WP1-CI-ECV	Specific data summary extracts, commentary and interpretation from selected datasets chosen to be represented in the European State of the Climate report or in a future ECV's dashboard.	Dataset Users	Q1 for the ESOTC or To-Be-Defined for other type of contribution	Dataset

Table 6 - List of technical deliverables for each Lot

2.5   WP0: Management and coordination

For each Lot, all management and coordination activities for the services must be included in a single Work Package (WP0). This shall cover the management and coordination activities related to all technical Work Packages included in the Tender.

The following activities shall be listed and as needed briefly described in the Tenderer's proposal:

- **Day-to-day service management and coordination** including the planning and monitoring of all Work Packages activities and corresponding resources.

- **Contractual obligations** as described in the ITT Volume V Framework Agreement, especially in its Clause 2.3 "Reporting and Planning" and Annex 5 "Report content".

- **Meetings** (classified as tasks and listed in a separate table as part of the proposal):

  o   ECMWF and the Successful Tenderer will organise a <u>Kick-Off Meeting</u> during the first month of the contract's implementation, where representatives of the different ECV Lots will be present.

  o   ECMWF and the Successful Tenderer will organise quarterly <u>Progress Review Meetings</u> (teleconferences) linked to Payment Milestones (see also section 3.9 below).

  o   ECMWF will organise a maximum of two ad-hoc <u>cross-CDR meetings</u> per year (cf. Section 3.3).

  o   ECMWF will organise annual <u>C3S General Assemblies</u>. The Successful Tenderer under each Lot is required to participate in these meetings. In addition, should a Successful Tenderer be awarded multiple Lots, the appointed representative for each technical WP (i.e. Lot) may be required.

  o   The Successful Tenderer will organise annual in-person <u>Service Readiness Review meetings</u>, where at least a representative per ECV will be required. The main purpose is to conduct a thorough review of the status of every ECV component of the operational system. The meeting also aims to identify any potential issues and make decisions about moving forward based on the findings, lessons learnt, and recommendations presented.

  o   ECMWF will host regular <u>ad-hoc teleconference meetings</u> to discuss this C3S service provision and other topics. The Project Manager appointed by the Successful Tenderer, as well as a representative of the technical WP (or Lot) under discussion, will be present in such meetings.

  The Tenderer can propose additional project meetings, whose added value must be precisely substantiated, as part of their Tender.

- **Quality assurance and control (see also sections 3.2 and 3.5 below)**: the final quality check of the deliverables should be made by the prime contractor (contents, use of ECMWF reporting templates for deliverables and reports (Microsoft Word), format, deliverable numbering and naming, typing mistakes, etc.).

- **Communication management** (incl. external and internal communication) shall result into a proactive and dynamic communication towards and between all parties involved in the contract. Furthermore, unless otherwise agreed, any external communication activity about the activities subject of the contract will need to be agreed with the ECMWF Copernicus Communication team in advance. This includes, but not exhaustively, communication planning, branding and visual style, media outreach, website and social media activity, externally facing text and graphical content and events (see also ITT Volume V Clause 2.4.6 of the Framework Agreement).

- **Risk Management**: The proposal shall include a risk register that describes identified risks for each WP, along with a mitigation strategy for each of the identified risks. This mitigation strategy shall be composed by both preventive and corrective measures. The risk register shall be updated regularly

by the Successful Tenderer, and any update (related to new risks, likelihood or impact) shall be reported during the Progress Review Meetings as well as be part of the Quarterly and Annual Implementation Reports.

● **Sub-contractor management**: A list of sub-contractors describing their contribution and key personnel shall be provided, as well as back-up names for all key positions in the contract. The Tenderer shall describe how the Framework Agreement, in particular ITT Volume V Clause 2.9, has been flowed down to all its sub-contractors, if any. This management includes conflict resolution (i.e. the Successful Tenderer shall be responsible for settling disagreements, although advice/approval from ECMWF may be sought on the subject).

● **Management of personal data** and how this meets the requirements of Clause 2.8 and Annex 6 "Personal Data Protection" of the Framework Agreement (cf. ITT Volume V).

The table hereinafter provides the Tenderers with the complete list of deliverables and milestones, as well as the corresponding schedule and due dates, concerning WP0:

Deliverable / Milestone ID	Resp.	Nature	Deliverable / Milestone title	Due date
List of deliverables				
WP0-QIR-YYYYQQ	Tenderer	Report	Quarterly Implementation Report YYYYQQ *YYYYQQ being here the previous quarter (e.g. 2025Q3)*	Quarterly on 15/04, 15/07 and 15/10
WP0-AIR1-YYYY	Tenderer	Report / Other	Annual Implementation Report for year YYYY – Part 1 *including both:* · *the Quarterly Implementation Report YYYYQ4 and* · *the requested preliminary financial information for year YYYY* *YYYY being here the Year n-1*	Annually on 15/01
WP0-AIR2-YYYY	Tenderer	Report	Annual Implementation Report for year YYYY – Part 2 *YYYY being here the Year n-1*	Annually on 28/02
WP0-FIR	Tenderer	Report	Final Implementation Report	Not later than 60 days after the end of contract and once all other activities duly performed
WP0-AIP-YYYY	Tenderer	Report	Annual Implementation Plan for year YYYY *YYYY being here the Year n+1*	Annually on 30/09
WP0-FIN-YYYY[2]	Tenderer	Other	Copy of Prime Contractor's general financial statements and audit report for year YYYY *YYYY being the Year n-1*	Annually, not later than on 15/12[1]
WP0-KOM	Tenderer	Presentation and MoM	Kick-Off Meeting	Not later than 30 days after the start of contract
WP0-PRMxx	Tenderer	Presentation and MoM	Progress Review Meeting #xx *xx being the iteration number of the PRM*	Circa every 3 months[1]

WP0-SRR-YYYY	Tenderer	Presentation and MoM	System Readiness Review YYYY *YYYY being here the concerned year*	Annually
WP0-INS[2]	Tenderer	Report	Evidence/declaration about the insurance coverage	Deliverable to be sent in accordance with Clause 2.1.9.4
List of milestones				
WP0-XCDR-YYYY-xx	Tenderer	Attendance	Cross-CDR meeting YYYY #xx *YYYY being here the concerned year* *xx being the iteration number of the X-CDR for the concerned year*	Not later than on 15/06 and 15/12[1] (circa every 6 months)
WP0-C3SGA-YYYY	Tenderer	Attendance	C3S General Assembly YYYY *YYYY being here the concerned year*	Annually, not later than on 15/12[1]

Table 7: WP0 deliverables and milestones

[1] These due dates are indicated to frame the corresponding deliverables and milestones schedule only, consequently the following shall be considered by the Tenderer:

- the general financial statements shall be sent by the Successful Tenderer as soon as available,
- the schedule of the Progress Review Meetings shall be aligned with the different Payment Milestones during the contract negotiation (i.e. each Payment Milestone shall have at least one corresponding Progress Review Meeting),
- the cross-CDR meetings may take place at different dates depending on the respective availabilities of all concerned parties during the concerned semester, if any,
- the SRR may take place on different annual due dates as agreed between parties during the contract negotiation, and
- depending on the year, the C3S General Assembly may take place at a different period of the year.

[2] There should be no price associated to those specific deliverables.

$\Rightarrow$ Note that the price associated with fulfilling WP0 requirements shall not exceed 10% of the total price of the Tender (see also spreadsheet "Costs Instruction Sheet" part of ITT Volume IIIA where is stated that: *"As a guidance, for WP0 we require 7-10% effort (person months) of the effort allocated to the entire Framework Agreement."*).

3   General requirements

3.1   Implementation schedule

For each Lot ECMWF intends to award a single Framework Agreement for a period of maximum 30 months, which shall be implemented via a single Service Contract expected to commence in January 2026. Tenderers shall provide a detailed implementation plan of proposed activities for the full period of the contract.

3.2   Deliverables and milestones

Tenderers shall submit the list of deliverables and milestones (cf. ITT Volume IIIA "Pricing and deliverables", Excel spreadsheet "Deliverables List") for the WP(s) they are bidding for. All deliverables and milestones must be consistent with the activities and objectives described in Section 2 of this ITT Volume II:

- A deliverable is a substantial, tangible or intangible good or service produced as a result of a project (see also the deliverable definition in this ITT Volume V Clause 1.2 and Clause 3.2). In other words, a

deliverable is a verifiable outcome produced in response to the specific objectives of the contract and is subject to approval by both ECMWF's Technical Officer (TO) and Contract Management Officer (CMO) before being considered as contractually approved. All document deliverables shall be periodically updated and versioned as described in Tables 4 and 5 above.

● Milestones should be designed as markers of demonstrable progress in service development and/or quality of service delivery during the contract implementation (see also the milestone definition in this ITT Volume V Clause 1.2). They should not duplicate deliverables.

The following shall apply to the deliverables and milestones:

● The deliverables and milestones should be consistent with and meet the technical requirements specified in Section 2 of this ITT Volume II;
● All contract deliverables shall be produced in English;
● The quality of reports shall be equivalent to the standard of peer-reviewed publications and practice;
● Regarding the format of the deliverables, unless otherwise specified in the contract, or requested by ECMWF during the contract implementation:
   o For the WP0, the deliverables shall be made available to ECMWF in electronic format (PDF/Microsoft Word/Microsoft Excel/HTML or compatible, while all other formats - if any - must be agreed during the contract negotiation), via the Copernicus Deliverables Repository portal.
   o For the other WPs, the deliverables shall be made available to ECMWF in electronic format (PDF/Microsoft Word/Microsoft Excel/HTML or compatible, while all other formats - if any - must be agreed during the contract negotiation) via the platform agreed between parties for the other WPs deliverables and milestones. Furthermore, when necessary, the Successful Tenderer shall make the outputs of their work available on a server accessible by ECMWF using standard protocols such as FTP or https. The data formats to be used shall be agreed during the contract negotiation. ECMWF will only accept data in formats that follow internationally recognised standards. Such standards must be open (i.e. non-proprietary), managed by a recognised international standardisation body (e.g. ISO, WMO, OGC, etc.), or any de-facto standard. Open-source software should also exist that can read and write files of these standards. Serialisation formats (e.g. NetCDF) should be supported by standard schemas and conventions.

The following shall apply in ITT Volume IIIA "Pricing and deliverables" (cf. Excel spreadsheet "Deliverables List"):

● Deliverables and milestones shall respectively follow the referencing system used in Sections 2.5 and 2.6 of this ITT Volume II. Any additional deliverables and milestones shall follow the same referencing system.
● Each deliverable shall have an associated resource allocation and price (cf. column I "Nb of PM allocated" and column J "Estimated price"), while the only resource types to be considered are "payroll" and "professional fees" (the total of these allocated resources and prices shall therefore amount to the total price associated with payroll and professional fees in Volume IIIA spreadsheet "Costs and Prices").
● Milestones shall not attract the budget under Volume IIIA in the Excel spreadsheet "Deliverables list".

Tenderers shall provide a due date for each proposed deliverable and milestone (in accordance with those indicated in Section 2 for each WP):

● ECV-related Copernicus services are running in operational mode and timely delivery of services is essential. **The Tenderer shall therefore ensure that the proposed due dates for all deliverables and milestones are realistic and achievable**, i.e. the Tenderer shall also consider dependencies*, the source of original data and assess the risk accordingly.
● **It is advised to schedule the submission/completion of the last deliverables and/or milestones associated to a Payment Milestone not later than 15 days before the expected date of completion**

of the said Payment Milestone (a PM is deemed completed when all associated deliverables and milestones have either been respectively submitted by the contractor and completed by the concerned parties or cancelled).

(*) Please note that any dependencies on input data, whose origin must be specified, shall be detailed by the Tenderer, and also accounted for in the risk register (cf. ITT Volume IIIB Section 5.6).

3.3   ECV Cross-CDR Working Group

ECMWF has a well-established ECV Cross-Climate Data Records (X-CDR) Working Group whose main purposes are the following ones:

- To ensure that all ECV contractors are fully informed of C3S developments and requirements.
- To share information among the different ECV thematic hubs and contractors (e.g. issues faced, and solutions proposed, procedures and processes).
- To identify common requirements and technical specifications for ECV product generation.
- To share expertise and lessons-learnt regarding the ECVs to avoid duplication of work.

A maximum of two ad-hoc X-CDR sessions will occur annually, each lasting approximately 1,5 hours. The contract Service Manager and Technical Leads of each technical WP (or Lot) are expected to participate in those respective meetings.

3.4   Data Access via the CDS

The CDS has been designed as a distributed system that provides access to datasets and tools through a unified web interface. A general description of the design and functionality can be found in Raoult et al. (2017). The Successful Tenderer shall provide the data in a way that is compatible with the working practice of the CDS, but this is not limited to the data format and standard but also covers metadata and documentation.

3.4.1   Dataset registration

Dataset suppliers to the CDS shall provide a comprehensive description of their datasets at least two months prior to delivery, using a dataset registration process established by ECMWF. The corresponding deliverable (DR) is part of the list of deliverables for each Lot. The Successful Tenderer will be required to submit details of the products to be generated, including the temporal scope, input data to be used and summary metadata for the products, as well as to maintain details of the scientific documentation related to the products. Exact details of the registration process, which serves to collect all CDS relevant information (to define metadata, landing page user forms and necessary adaptors), will be provided to the preferred Tenderer during negotiation.

3.4.2   Access methods

Data access to CDRs, ICDRs and documentation can be implemented in the CDS distributed infrastructure either by:

(a) **Push mode:** uploading datasets to a designated ECMWF CDS server.

(b) **Pull mode:** providing datasets via web services.

ECMWF has a strong preference for push mode. In case pull mode is implemented, the Successful Tenderer shall ensure that the data products are stored in one or more EU members countries. The contractor is responsible for storing the data for at least 6 years after the contract has come to an end.

Tenderers are encouraged to distribute the data in non-proprietary file format (NetCDF, csv, shape files, etc.) provided through a web service and accessible by simple commands like wget. The "*ECMWF metadata*

recommendations for NetCDF" document, available at https://confluence.ecmwf.int/x/9IsjDQ, provides recommendations for encoding the datasets in NetCDF. Requests for access to those web services will originate from the CDS, as part of a workflow run on behalf of an end-user. ECMWF will therefore need to have the necessary credentials to invoke these services. ECMWF will not provide information on the end user's identity when invoking the web services, nevertheless it will collect usage statistics for all aspects of C3S.

3.4.3 Publication of Data Catalogue Entries

The main result of the data integration and data publication processes is a Data Catalogue Entry. Data suppliers shall contribute to those processes. A Data Catalogue Entry is a hypertext document providing access to a collection of data or datasets. Typically, the entry has its own Digital Object Identifier (DOI) and citation (which can differ from the DOIs and citations associated with the underlying data or datasets).

More information on the **Data Integration** and **Data Publication Processes**, as well as on the **Deprecation and Replacement of datasets in** the CDS is available at Appendix 1 (Dataset integration in the Catalogue).

3.5 Evaluation and quality control framework

C3S has established an Evaluation and Quality Control (EQC) framework for all its products and services to ensure that users are served well and that this will continue to be the case as their needs evolve. A clear distinction is made between *quality assurance* and *quality assessment* to address these two very different categories of user requirements.

Quality assurance serves to inform users that data, metadata and documentation comply with a well-defined set of verifiable technical requirements. It provides evidence that this compliance has been checked independently from the producers. Each requirement is formulated as a verifiable statement about data records, metadata, documentation, or all three combined. Evaluators verify each statement and enter the result with commentary attached in a database. The outcomes are being published along with the dataset on the CDS. The ECV contractor shall be aware of the EQC quality assurance requirements which will be made available as guideline.

The purpose of quality assessments is to provide science-based information about accuracy, uncertainties, strengths and weaknesses of a dataset in the context of real use cases. Taken together, the outcomes of these activities provide the key information needed to determine fitness for purpose. The ECV contractor will have access to EQC content prior to public release.

3.6 Communication

The Successful Tenderer under each Lot shall support ECMWF in its communication activities for the C3S services, where they are related to the activities described in this ITT, especially in what regards the contributions to the European State of the Climate report. Additional activities such as C3S website news items, C3S brochures and flyers, may be discussed on a case-by-case basis during the contract implementation.

All communication activity must be agreed with the ECMWF Copernicus Communication team in advance. This includes, but not exhaustively, communication planning, branding and visual style, media outreach, website and social media activity, externally facing written and graphic content and events. Such agreed communication activity would also need to be evaluated and reported on, once complete, so that success measures and KPIs can be provided to the European Commission.

3.7 Data and IPR

It is a condition of EU funding for C3S that ownership of any datasets developed with C3S funding passes

from the suppliers to the European Union via ECMWF. Ownership will pass from the date of creation of the datasets. Suppliers will be granted a non-exclusive licence to use the datasets which they have provided to C3S for any purpose.

All software and products used by the Successful Tenderer to produce the C3S datasets will remain the property of the Successful Tenderer, except for those components which are acquired or created specifically for C3S purposes, with C3S funding, and which are separable and useable in isolation from the rest of the Successful Tenderer's production system. The identity and ownership of such exceptional components will be passed to the European Union via ECMWF annually. The Successful Tenderer will be granted a non-exclusive licence to use them for any purpose.

A distinction ought to be made between:

- those datasets (or relating documentation) specifically created as a result of this ITT, which, as Deliverables, will be fully owned by the EU, and
- pre-existing datasets (or documentation), which are simply brokered / made accessible as part of the services.

Such brokered datasets (or documentation) will continue to be owned by their original owner. The Successful Tenderer will licence the relevant brokered data/documentation to ECMWF/EU or will procure on behalf of ECMWF a licence directly from the owner. Such licence will ensure the best available terms of accessibility and redistribution, bearing in mind the purpose of the Copernicus Programme and the free and open terms of accessibility and redistribution, established for Copernicus products in the Copernicus Data Regulation (see respective definition in Volume V Clause 1.2). At a minimum, the Successful Tenderer shall grant, or procure on behalf of ECMWF, the right for the brokered datasets (or documentation) to be made available via the Climate Data Store (CDS) on terms consistent with any applicable specifications of ECMWF and the Copernicus Data Regulation. The Successful Tenderer will be responsible to provide the license terms to ECMWF in a suitable format in order for ECMWF to make the brokered datasets (or documentation) available via the CDS. The Successful Tenderer will inform ECMWF of any updates to such terms. In this case, ECMWF is procuring a service, rather than the datasets (or the documentation) themselves.

The proposal shall thus provide a clear distinction between both cases by setting the nature of:

- the datasets (or relating documentation) specifically created as a result of this ITT to "Dataset" or "Report",
- the brokered datasets (or relating documentation) made accessible as part of the service to "Brokerage Dataset" or "Brokered Report".

Please note that, in both cases, the Tenderer shall warrant that it has all necessary rights to either pass on ownership to the ECMWF/EU or, alternatively, that it has all necessary rights to grant the required license to ECMWF and the EU in respect of brokered datasets (or documentation), as described above. Please refer to the ITT Volume V (Framework Agreement) for further details of the license required.

The source datasets of each ECV product and associated IPR shall, in addition, be detailed as follows in the proposal (we suggest using a landscape layout for this table):

ECV Product and version	Temporal Resolution	Spatial coverage / resolution	CDR / ICDR	Deliverable ID	Delivery Date	Temporal coverage*	Source / Brokered	Description of IPR on the source dataset (e.g. licensing)
…	…	…	…	…	…	…	Brokered from xxx / Produced in house based on datasets from xxx	…

*Full temporal coverage of the product after delivery

Foreseen Assets, Background IPR, Improvements and Brokerage Datasets (as defined in the ITT Volume V Clause 3) shall also be described in the proposal.

Detailed contractual terms, including terms to give effect to the arrangements described above, are set out in the ITT Volume V.

3.8   Key Performance Indicators (KPIs)

The Successful Tenderer under each Lot shall report to ECMWF on a set of Key Performance Indicators (KPIs) suitable for monitoring the following aspects of the service performance:

- Data and service quality (accuracy, stability, coverage, maturity).
- User support.
- Contract management.

The tables below provide examples of KPIs that may be used by the Tenderers, along with examples of performance targets, frequency of delivery and explanations, to build their Tenders. Note that KPI.D1, KPI.D2, KPI.U1 and KPI.C1 in the tables below must be part of the proposal and therefore of the contract as well. The Tenderers may propose additional KPIs suitable for their specific ECVs but shall limit them to the sole KPIs whose reporting may help to optimize the performance of the contract in case of deviation per comparison with the performance targets.

- List of **data and service quality KPIs**:

KPI #	KPI Title	Performance Target and Unit of Measure	Frequency of Delivery	Explanations / Comments
KPI.D1	Self-assessment of the operational system's maturity		Once per year	Include a maturity matrix, as in the supplementary material of Bates, J. J. and Privette, J. L., (2012), to enable self-assessment of the service's operational capability.
KPI.D2	System Quality Assessment & Reliability	Percentage fixed within one week (guideline 100%)	Quarterly	Report the occurrences of production system failures and subsequent fixed made
KPI.D3.1	*Accuracy* ECV Product #1 in latest Quarter	According to Target Requirements (TRs)	Per major product release	TRs can evolve over time
KPI.D3.2	*Stability* ECV Product #1 in latest Quarter	According to Target Requirements (TRs)	Per major product release	TRs can evolve over time
KPI.D4.1	….	….	….	….

KPI.D4.2	….	….	….	….

- List of **user support KPIs**:

KPI #	KPI Title	Performance Target and Unit of Measure	Frequency of Delivery	Explanations / Comments
KPI.U1	User Support ticket response during last quarter	85% within 15 working days	Quarterly	Resolve user issue
KPI.Ux	….	….	….	….

- List of **contract management KPIs**:

KPI #	KPI Title	Performance Target and Unit of Measure	Frequency of Delivery	Explanations / Comments
KPI.C1	Deliverables and milestones respectively submitted for review and completed on due time during last quarter	100%	Quarterly	Due dates are the deadlines (inclusive) indicated in the list of deliverables and milestones for the deliverables to be submitted by the contractor for review by ECMWF and for the milestones to be completed
KPI.Cx	….	….	….	….

All KPIs shall be labelled and numbered as indicated in the tables above.

During the contract implementation, all KPIs shall be duly reported by the contractor in the Quarterly Implementation Reports (QIR) in accordance with their frequency of delivery.

For the sake of clarity, the Tenderers shall provide preliminary versions of the completed tables as part of their Tender.

3.9   Payment Plan

Tenderers can propose a Payment Plan in ITT Volume IIIA "Pricing and deliverables" (cf. Excel spreadsheet "Payment Plan preparation"):

- The Payment Milestones should relate to the deliverables and milestones delivered during the corresponding Payment Milestone period (e.g. the payment covering the period January-June would only relate to the deliverables and milestones whose due dates are part of the same period).
- It is recommended to have Payment Milestones, and therefore payments, with an anticipated date of completion every 6 months.
- The due dates of the quarterly Progress Review Meetings shall be adapted to synchronise with the anticipated date of completion of each Payment Milestone.

- In case of request for a payment at contract signature, please note that this should be duly substantiated (e.g. in terms of necessary investment prior to implementation or during first weeks/months for ensuring the initial set up of the project). It is necessary to relate this payment to activities and prices subject to other Payment Milestones.

4 Tender Format and Content

General guidelines for the Tender are described in Volume IIIB of this ITT. This section describes specific requirements to prepare the proposal for this particular Tender, along with guidelines for minimum content expected to be included in the proposal, additional to the content described in the general guidelines of Volume IIIB. This is not an exhaustive description and additional information may be necessary depending on the Tenderer's response.

4.1 Page Limits

As a guideline, it is expected that individual sections of the Tenderer's response do not exceed the page limits listed below. These are advisory limits and should be followed wherever possible, to avoid excessive or wordy responses.

Section	Page Limit
Executive Summary	2
Track Record	2 (for general) and 2 (per entity)
Quality of Resources to be Deployed	2 (excluding Table 1 in Volume IIIB and CVs with a maximum length of 2 pages each)
Technical Solution Proposed	20 (Table 2 in Volume IIIB, the section on references, publications, patents and any background IP is excluded from the page limit and has no page limit)
Management and Implementation	6 (excluding Table 4 and Table 5 in Volume IIIB) + 2 per each Work Package description (Table 3 in Volume IIIB)
Pricing Table	No limitation

Table 8: Page limits

4.2 Specific additional instructions for the Tenderer's response

The following is a guide to the minimum content expected to be included in each section, additional to the content described in the general guidelines of Volume IIIB. This is not an exhaustive description and additional information may be necessary depending on the Tenderer's response.

4.2.1 Executive Summary

The Tenderer shall provide an executive summary of the proposal, describing the objectives, team and service level.

4.2.2 Track Record

The Tenderer shall demonstrate for itself and for any proposed Sub-contractors that they have experience with relevant projects in the public or private sector at national or international level. ECMWF may ask for evidence of performance in the form of certificates issued or countersigned by the competent authority.

4.2.3 Quality of Resources to be deployed

The Tenderer shall propose a team providing the skills required for providing operational services that meet the technical requirements set out in Section 2. The team shall include a Service Manager with at least 5 years of experience in management of large-scale projects. The Tenderer shall describe the experience of the

Service Manager and the technical project team in performing activities related to the various aspects of this Tender.

4.2.4 Technical Solution Proposed

The Tenderer shall give a short background to the proposed solution to demonstrate understanding of the state-of-the-art in the C3S context and hence justify their proposed solution. The description of the technical solution shall include:

- A review of the current provision of (I)CDRs within the CDS and their performance against requirements (e.g. from existing TR-GADs and/or with reference to GCOS requirements, GCOS-IP 2022).
- For each ECV product, a brief assessment of the maturity of the operational system, following the model proposed in the supplementary material of Bates and Privette (2012).
- Identify those CDRs which are meeting requirements (or are close) and propose to continue the time series as-is.
- Identify those CDRs where the Tenderers can make significant improvements and propose updates to the processing (or where new data is available).
- Identify those CDRs that should not continue to be developed for justified reasons (e.g. no data source, poor performance, complete state-of-the-art data set already available in the CDS).
- Identify those products that can be consolidated (e.g. where several different products are provided for one ECV).

The Tenderer shall present an analysis of fitness for purpose of each CDR (in terms of quality, uniqueness, etc.) and present options in line with the available budget. Where brokered ECV products are proposed as part of the technical solution, their inclusion shall be justified, and the agreement of the third-party supplier shall be detailed.

This section shall also provide a statement of compliance for each requirement formulated throughout this document, describing how the proposed solution maps to the requirements.

Additionally, **where equivalent data products are also available through other Copernicus services or major research programmes, the Tenderer should detail the differences that justifies the production in C3S.**

4.2.5 Management and Implementation

As part of the general project management description, and in addition to the guidance provided in Volume IIIB, the Tenderers shall consider the elements described in section 2.6 above.

Furthermore, should any sub-contractors be proposed in the Tender, in order to ensure a comprehensive and realistic proposal, it is a mandatory requirement for the Tenderer to actively involve all such Sub-contractors in the development of the proposal. This involvement should include, but is not limited to, collaborative planning, clear communication of project timelines, and agreement on deliverables and deadlines. The Tenderer must provide documented evidence of this collaboration, demonstrating that each sub-contractor has been consulted and has agreed to their respective roles, responsibilities, and deadlines as outlined in the proposal. This requirement is instituted to promote a cohesive and feasible project plan, reflecting a true and committed partnership among all participating entities.

5 Additional information

5.1 References

- GCOS-245: The 2022 GCOS ECVs Requirements. Available at: https://library.wmo.int/idurl/4/58111

- Bates, J. J. and Privette, J. L., (2012), A maturity model for assessing the completeness of climate data records, *Eos Trans. AGU*, 93(44), 441. https://doi.org/10.1029/2012EO440006

- J.J. Bates, J.L. Privette, E.J. Kearns, W. Glance, X. Zhao, (2016), Sustained production of multidecadal climate records: lessons from the NOAA climate Data Record Program, Bull. Am. Meteorol. Soc., 97 (2016), pp. 1573-1581, 10.1175/BAMS-D-15-00015.1. https://doi.org/10.1175/BAMS-D-15-00015.1

- Raoult, B., C. Bergeron, A. López Alós, J-N. Thépaut, D. Dee, 2017: Climate service develops user-friendly data store. ECMWF Newsletter No. 151, 22-27. Available at https://www.ecmwf.int/sites/default/files/elibrary/2017/17181-newsletter-no-151-spring-2017.pdf

5.2   Appendix 1: Dataset integration in the Catalogue

Tenderers should refer to the separate document attached. Note that the document may include links to other ECMWF and/or web resources, some of which may not be publicly available. This document is provided to facilitate Tenderers' understanding of the data integration process and to facilitate the assessment and costing of resources which Tenderers should allocate in their response for any such activities. Full access to ECMWF internal resources shall be provided to the Successful Tenderer at the start of the contract.

5.3   Acronyms

ATBD	Algorithm Theoretical Basis Document
CCI	Climate Change Initiative
CDR	Climate Data Record
CDS	Climate Data Store
CKB	Copernicus Knowledge Base
C3S	Copernicus Climate Change Service
DDP	Dataset Documentation Package
DOI	Digital Object Identifier
DR	Dataset Registration
ECMWF	European Centre for Medium-Range Weather Forecasts
ECV	Essential Climate Variable
EQC	Evaluation and Quality Control
ESA	European Space Agency
ESOTC	European State of The Climate
EU	European Union
FAQ	Frequently Asked Questions
fAPAR	Fraction of Absorbed Photosynthetically Active Radiation
FTP	File Transfer Protocol
GCOS	Global Climate Observing System
GCOS-IP	GCOS Implementation Plan
HTML	Hyper Text Markup Language
ICDR	Interim Climate Data Record
IPR	Intellectual Property Rights
ISO	International Organization for Standardization
ITT	Invitation to tender
KPI	Key Performance Indicator
LAI	Leaf Area Index
MoM	Minutes of Meeting
NetCDF	Network Common Data Form
OGC	Open Geospatial Consortium

PDF	Portable Document Format
PQAR	Product Quality Assessment Report
PUGS	Product User Guide and Specification
QIR	Quarterly Implementation Report
SRR	System Readiness Review
TR-GAD	Target Requirement – Gap Analysis Document
WMO	World Meteorological Organisation
WP	Work Package
X-CDR	Cross-Climate Data Records

C3S2_313g Volume II

Appendix 1

Dataset integration in the Catalogue: pre-publication, publication and post-publication

Copernicus Contractors

Exported on 07/15/2025

Table of Contents

About this page

Scope	This page describes the main steps needed to integrate data in the Catalogue. It **does not describe** what is needed to integrate documentation, the role of the technical officers and other aspects that are very important for a successful integration but that are the scope of other wiki pages.
Intended audience	*Copernicus data providers.*
Outline	*The focus of this page is on what the data provider needs to supply to the CADS team and how to do it.*
Disclaimer	*The information in this page is not guaranteed to describe exactly the actual processes which are subject to change from time to time.* *But, the CADS team intends to keep the information in this page as close as possible of the actual practices.*

1 **Provider's role: summary**

List of the expected contributions

> The provider is expected to work closely with CDS team and the technical officer in order to resolve any issues that come up during the various stages of the publication process and afterwards. Communication is preferred through Jira ticket.
> The steps below are laid out in chronological order and contain the main contributions.

1. Registers the Dataset: Applies only to ECV datasets - Dataset registration[1] (*Integration process*)

2. Supplies the Information document: Information document template[2] (*Integration process*)

3. Supplies manifest file (See more about manifests below at *Manifest and pseudo-manifest files. Integration process.*)

4. Help the CDS team member to reply to the reviewer's and Editorial Board's comments (*Review process*)

5. Provide previous existent DOIs, licences and citations associated with each part of the data (see below: *DOI, citation and licence. Review process.*)

6. After entry published in the CDS Catalogue, the data provider should keep the manifest's filename and path exactly the same for the whole duration of the contract, even when the contents of the manifest is changed. (post-publication *processes: automatic updates*)

7. The data provider is expected to help the CDS team on keeping the entry working as expected when the data provider has the knowledge and the resources to do it (post-publication *processes: Maintenance)*

8. Follows CDS procedures for deprecating data (see below: *Versions, deprecation of entries, replacement of data. Post-publication processes: Maintenance*)

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1 https://confluence.ecmwf.int/display/COPCO/Dataset+registration
2 https://confluence.ecmwf.int/display/COPCO/Dataset+Information+Document+Templates

2 **How to start the integration of your data in the Catalogue**

JIRA ticket, Information document and manifest file

Provider's role	Description
JIRA When asked by the CDS management the provider is expected to register the dataset[3] and create a JIRA ticket on the ECMWF Contractors Portal (COPCO[4]) - Data Ingestion	All information concerning the creation, modification, merging, updating, deprecation, additions of of data or documentation, DOIs, Citations, etc, is supposed to be managed through the JIRA ticket.
Manifest Have a pseudo-manifest file (or a manifest file) prepared.	This is the central piece of information needed by the CDS. So important that we have a whole section about it at the bottom of this page.
Information document Attach to the JIRA ticket an "Information document" filled in with the information associated to the data that you are delivering for publication in the CDS Catalogue. The template for the information document can be found here: Information document template[5].	The information document is the starting point for the integration process. In order to arrive at an agreed draft entry to submit for review, additional inputs may be required. The document contains fields and tables that should be completed with the information relevant for your data. Guidelines are provide along those fields and tables intending to help you to understand exactly which information is required and in which format.

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3 https://confluence.ecmwf.int/display/COPSRV/Dataset+registration
4 https://jira.ecmwf.int/plugins/servlet/desk/category/cds-data-ingestion
5 https://confluence.ecmwf.int/display/COPCO/Dataset+Information+Document+Templates

3 **Main processes in which you are expected to participate**

Pre-publication process

The aim of this step is to check and agree on the main inputs for the subsequent publication process. In the case of URL based datasets, this covers the following aspects:

- path and filename conventions,
- the size of the files,
- the number of variables per file,
- where the data will be stored,
- manifest file
- for more details on these points please refer to Guidelines for preparing a URL based dataset for the CADS[6]

The CDS team expects to have access to the information in the list above as soon as possible through a JIRA ticket and at least 2 month before the actual delivery of the data.
Please consult How to start the integration process above in this page.

For data for which the contents and the container is still modifiable, the CDS team expects to interact with the provider in order to influence the way the data is stored making it more suitable for the needs of the Catalogue and the needs of the Toolbox.

Publication process

The process that goes from the initial trigger of the integration of your data, to the publication of the Catalogue entry in the public Catalogue, is referred as the "publication process".
The publication process has two processes in sequence: the integration process and the review process.
Your role in these two processes is summarised below.

Provider's role	Process	Description

---

[6] https://confluence.ecmwf.int/display/COPCO/Guidelines+for+preparing+a+URL+based+dataset+for+the+CADS

Creates JIRA ticket Supplies the Information document Supplies manifest file Replies to CDS team queries	**Integration process** (analogous to creating a draft of a paper to be submitted to a scientific journal)	Inputs	JIRA ticket and Information document
		Outputs	Draft Catalogue entry judged to be good enough to be submitted to review by the CDS team, the technical officer and the data provider
		Work	Based on the manifest file and the Information Document, a CDS team member (or associated) creates one or more possible drafts for the future entry in the Catalogue. When agreed that the draft is good enough to be submitted for publication this process ends.
Help the CDS team member to reply to the reviewer's and Editorial Board's comments.	**Review process** (analogous to the review process of a paper submitted to a scientific journal)	Inputs	Draft entry
		Outputs	Modified entry reviewed and approved by the Editorial Board published in the public CDS Catalogue
		Work	A CDS team member (or associated) runs an internal review process to guarantee that the entry respects the CDS expectations.

Post-publication processes

These are the two main processes where you may be asked to participate:

Provider's role	Process	Description

Keep the manifest's filename and path exactly the same. Contents of the manifest is expected to change. But new additions to the contents, other than time extensions, should be discussed with the CDS team. See more about manifests below at *Manifest and pseudo-manifest files*.	**Automatic updates** (Updates date and time related widgets in the download form. This allows the automatic release of time extensions of data. Does not work for other widget's updates like new variables. new versions etc.)	Inputs	Entry already published in the Catalogue Manifest file or equivalent Update frequency agreed EC-Flow suite implemented
		Outputs	Entry updated with new dates
		Work	EC-Flow suite will read the manifest file and run CDS scripts able to recreate the download form.
Notify the CDS team via the ECMWF Contractors Portal (COPCO[7]) when: • download form not providing the expected data • documentation tab not providing the expected documentation • mismatch between data and documentation Provide a Known issues table: See below	**Maintenance** (new programmed versions, new documentation, deprecating data, unexpected issues with the data and the documentation, licences, etc)	Inputs	Published entry Request for modification of the published entry
		Outputs	Modified entry
		Work	A CDS team member (or associated) modifies the entry as requested. The CDS team evaluates when the required modification needs agreement from the Editorial Board.

Known-Issues guidance

---

[7] https://jira.ecmwf.int/plugins/servlet/desk/site/copco

3.1 Known-Issues guidance

Issue detection date	Status	Which data are impacted	Description	
2022-02-15	Closed	Version: 21.03 Period: whole period Variable: all variables	The filenames have been changed to include the version in them. Example: name before the change: "NGCD_TN_type1_20191130.nc[8]" name after the change: "NGCD_TN_type1_version_21.03_20191130.nc[9]".	No action required

Issue detection date	Status	Which data are impacted	Description	Guidance to users
2022-04-01	Ongoing	For some of the years there were a few days impacted by the sparse availability of satellite data.	In most of the impacted days the problematic regions have missing values but, in other of those days, the problematic regions have the value 0. GPCP data has been corrected for these data gaps but the correction has been made by rewriting the files without modifying the version. The previous version of the files can be made available to users on request only.	Redownload the data.

---

8 http://NGCD_TN_type1_20191130.nc
9 http://NGCD_TN_type1_version_21.03_20191130.nc

4 Preparing your data and delivering manifests

Preparing and structuring your data

The CDS can serve data that is stored in various ways, therefore the prepartion guidelines differ depending on your use-case. The currently operational options are:

1. URL datasets
   a. Datasets served as a series of files each with their own unique URLs
   b. This is the most common option for project data providers
   c. Guidelines for preparing a URL based dataset for the CADS[10]
   d. You MUST provide a manifest as described in the following section

2. MARS datasets
   a. Datasets stored on a MARS archive
   b. This is generally only used for internal ECMWF datasets (e.g. ERA5, SEAS5, EFAS and GLOFAS)
   c. The MARS and GRIB standards mean that preparation requirements are enforced by the infrastructure

3. ESGF WPS server
   a. Dataset stored on a ESGF WPS server which are accessible via Rooki
   b. Such datasets require an intake inventory which fully describes the dataset to be exposed
   c. Preparation requirements are deteremined by rooki requirements
   d. Please contact the CDS team if you believe your dataset is compatible

4. Observation databases
   a. For small in size, but high in complexity datasets
   b. This is currently a bespoke set up for people producing insitu observations under a C3S contract
      i. If you are working on such a contract and require further details on preperation guidelines, please contact the CDS Team or your techinical officer.

Manifest and pseudo-manifest files for URL datasets

4.1 Content of the Manifest

The manifest should contain the path and the file name for every file that the CDS catalogue is supposed to provide to the users. **Nothing more nothing else.** No empty lines, no comments.
For instance:

First ten lines of a manifest file for a dataset accessible through URL addresses

---

10 https://confluence.ecmwf.int/display/COPCO/Guidelines+for+preparing+a+URL+based+dataset+for+the+CADS

head ./Integration_of_satellite-earth-radiation-budget/manifest_c3s_312b_lot1_erb_c3s_icdr_latest.txt
http://gws-access.ceda.ac.uk/public/cds_c3s_cloud/c3s_312b_lot1/data/erb/c3s/icdr/r01/monthly/
2017/01/C3S-312bL1-L3C-MONTHLY-ERB-SLSTR_ORAC_Sentinel-3a_201701_fv3.1.nc
http://gws-access.ceda.ac.uk/public/cds_c3s_cloud/c3s_312b_lot1/data/erb/c3s/icdr/r01/monthly/
2017/02/C3S-312bL1-L3C-MONTHLY-ERB-SLSTR_ORAC_Sentinel-3a_201702_fv3.1.nc
http://gws-access.ceda.ac.uk/public/cds_c3s_cloud/c3s_312b_lot1/data/erb/c3s/icdr/r01/monthly/
2017/03/C3S-312bL1-L3C-MONTHLY-ERB-SLSTR_ORAC_Sentinel-3a_201703_fv3.1.nc
http://gws-access.ceda.ac.uk/public/cds_c3s_cloud/c3s_312b_lot1/data/erb/c3s/icdr/r01/monthly/
2017/04/C3S-312bL1-L3C-MONTHLY-ERB-SLSTR_ORAC_Sentinel-3a_201704_fv3.1.nc
http://gws-access.ceda.ac.uk/public/cds_c3s_cloud/c3s_312b_lot1/data/erb/c3s/icdr/r01/monthly/
2017/05/C3S-312bL1-L3C-MONTHLY-ERB-SLSTR_ORAC_Sentinel-3a_201705_fv3.1.nc
http://gws-access.ceda.ac.uk/public/cds_c3s_cloud/c3s_312b_lot1/data/erb/c3s/icdr/r01/monthly/
2017/06/C3S-312bL1-L3C-MONTHLY-ERB-SLSTR_ORAC_Sentinel-3a_201706_fv3.1.nc
http://gws-access.ceda.ac.uk/public/cds_c3s_cloud/c3s_312b_lot1/data/erb/c3s/icdr/r01/monthly/
2017/07/C3S-312bL1-L3C-MONTHLY-ERB-SLSTR_ORAC_Sentinel-3a_201707_fv3.1.nc
http://gws-access.ceda.ac.uk/public/cds_c3s_cloud/c3s_312b_lot1/data/erb/c3s/icdr/r01/monthly/
2017/08/C3S-312bL1-L3C-MONTHLY-ERB-SLSTR_ORAC_Sentinel-3a_201708_fv3.1.nc
http://gws-access.ceda.ac.uk/public/cds_c3s_cloud/c3s_312b_lot1/data/erb/c3s/icdr/r01/monthly/
2017/09/C3S-312bL1-L3C-MONTHLY-ERB-SLSTR_ORAC_Sentinel-3a_201709_fv3.1.nc
http://gws-access.ceda.ac.uk/public/cds_c3s_cloud/c3s_312b_lot1/data/erb/c3s/icdr/r01/monthly/
2017/10/C3S-312bL1-L3C-MONTHLY-ERB-SLSTR_ORAC_Sentinel-3a_201710_fv3.1.nc

4.2 **Pseudo-manifest**

Dataset suppliers to the CDS shall provide a comprehensive description of their data at least two months prior to delivery, using a data registration process established by ECMWF.
For the CDS team this means the delivery of a pseudo-manifest file.

A pseudo-manifest is a manifest file with expected path and filenames for the expected data to be created. Note that the pseudo-manifest should be as close as possible of the final delivery but the CDS team understands that modifications may be needed.
If a pseudo-manifest is provided, then a Catalogue entry can be created and its design agreed and tested. Filenames and paths can be checked to see if they allow a good building of the download form.

4.3 **Name of the manifest and updates of the contents of the manifest**

The manifest should be named "manifest_<Contract tag>_<ECV_name_tag or SIS_name_tag>_<optional_tag>_yyyymmdd.txt" where yyyymmdd is the date where this manifest was created.
It is expected that the providers replace the strings <...> in the manifest filename with the actual names for the dataset they are providing.

When a new manifest file is added to the the providers site, that manifest should also be copied to "manifest_<Contract tag>_<ECV_name|SIS_name>_<optional_tag>_**latest**.txt".
Remove the date and leave just the string "latest".

This convention is central for the CDS computers to find and access the correct manifest.

Manifests for datasets stored in MARS (mars.list files)

To construct catalogue entries based on MARS datasets the CDS need a mars.list file which describes the contents to be exposed. If this needs to be regularly updated then please contact the CDS team to ensure the regular updates are in place.

Example mars.list (from UERRA)

```
class=ur,expver=prod,levtype=sol,origin=eswi,stream=oper,type=an,param=260199/260360,
levelist=1/2/3,time=00:00:00/06:00:00/12:00:00/18:00:00,date=1961-01-01/1961-01-02/19
61-01-03/1961-01-04/1961-01-05/1961-01-06/1961-01-07/1961-01-08/1961-01-09/1961-01-10
/1961-01-11/1961-01-12/1961-01-13/1961-01-14/1961-01-15/1961-01-16/1961-01-17/1961-01
-18/1961-01-19/1961-01-20/1961-01-21/1961-01-22/1961-01-23/1961-01-24/1961-01-25/1961
-01-26/1961-01-27/1961-01-28/1961-01-29/1961-01-30/1961-01-31
class=ur,expver=prod,levtype=sol,origin=eswi,stream=oper,type=an,param=260199/260360,
levelist=1/2/3,time=00:00:00/06:00:00/12:00:00/18:00:00,date=1961-02-01/1961-02-02/19
61-02-03/1961-02-04/1961-02-05/1961-02-06/1961-02-07/1961-02-08/1961-02-09/1961-02-10
/1961-02-11/1961-02-12/1961-02-13/1961-02-14/1961-02-15/1961-02-16/1961-02-17/1961-02
-18/1961-02-19/1961-02-20/1961-02-21/1961-02-22/1961-02-23/1961-02-24/1961-02-25/1961
-02-26/1961-02-27/1961-02-28
class=ur,expver=prod,levtype=sol,origin=eswi,stream=oper,type=an,param=260199/260360,
levelist=1/2/3,time=00:00:00/06:00:00/12:00:00/18:00:00,date=1961-03-01/1961-03-02/19
61-03-03/1961-03-04/1961-03-05/1961-03-06/1961-03-07/1961-03-08/1961-03-09/1961-03-10
/1961-03-11/1961-03-12/1961-03-13/1961-03-14/1961-03-15/1961-03-16/1961-03-17/1961-03
-18/1961-03-19/1961-03-20/1961-03-21/1961-03-22/1961-03-23/1961-03-24/1961-03-25/1961
-03-26/1961-03-27/1961-03-28/1961-03-29/1961-03-30/1961-03-31
```

Manifests for ESGF-WPS datasets (intake.yaml inventories)

To construct catalogue entries based on ESGF-WPS datasets the CDS need an intake.yaml file which describes the contents to be exposed, and any additional post-processing funcitonality. If this needs to be regularly updated then please contact the CDS team to ensure the regular updates are in place.

Example intake.yaml (from CMIP6)

```
- path: CMIP/NUIST/NESM3/historical/r1i1p1f1/Amon/evspsbl/gn/v20190705
  ds_id: c3s-cmip6.CMIP.NUIST.NESM3.historical.r1i1p1f1.Amon.evspsbl.gn.v20190705
  var_id: evspsbl
  array_dims: time lat lon
  array_shape: 1980 96 192
  time: 1850-01-16T12:00:00 2014-12-16T12:00:00
  latitude: -88.57 88.57
  longitude: 0.00 358.12
- path: ScenarioMIP/CNRM-CERFACS/CNRM-CM6-1-HR/ssp245/r1i1p1f2/Amon/pr/gr/v20191202
  ds_id: c3s-cmip6.ScenarioMIP.CNRM-CERFACS.CNRM-CM6-1-
HR.ssp245.r1i1p1f2.Amon.pr.gr.v20191202
  var_id: pr
  array_dims: time lat lon
  array_shape: 1032 360 720
```

```
    time: 2015-01-16T12:00:00 2100-12-16T12:00:00
    latitude: -89.62 89.62
    longitude: 0.00 359.50
-   path: CMIP/CNRM-CERFACS/CNRM-CM6-1/historical/r1i1p1f2/Amon/tas/gr/v20180917
    ds_id: c3s-cmip6.CMIP.CNRM-CERFACS.CNRM-CM6-1.historical.r1i1p1f2.Amon.tas.gr.v2018
0917
    var_id: tas
    array_dims: time lat lon
    array_shape: 1980 128 256
    time: 1850-01-16T12:00:00 2014-12-16T12:00:00
    level: 2.00 2.00
    latitude: -88.93 88.93
    longitude: 0.00 358.59
```

5 Deprecation of data, versions, DOI, citation, acknowledgement and licence

Versions, deprecation of entries, replacement of data

Amount of data to deprecate	Provider's role	CDS team
Large amount of data	• Provide old and new data in the same updated manifest file • Keep old and new data • Remove deprecated data and corresponding lines from the manifest at the end of the deprecation period	• Deprecate the whole entry and create a new one. The deprecated entry will not be searchable in the CDS, but API request will continue to work. (This prevents new users to find and download deprecated data, allowing at the same time scientific traceability and reproducibility), Example: Deprecated SST[11]. New entry with corrected data: Corrected SST[12] • Remove the deprecated data after 1 to 3 year deprecation period
Small amount of data	• Create new files with a different version tag for the corrected data • Include those files in the manifest • Manifest should contain both old and new versions • Remove deprecated data and corresponding entries in the manifest at the end of the deprecation period	• Deprecate the version of the data corresponding to the wrong data • Modify overview to explain the deprecation or use a new widget called "Known issues" under the Documentation tab • Modify the download form making clear the deprecated version of the data. (When the CDS will have the tools to do it: the deprecated data will only be accessible through the API). • Remove the deprecated data after 1 to 3 year deprecation period
No data will be replaced	• Provide information to fill in the Known-issues table following the guidance provided below	• Add the Know-Issues table to the documentation tab • Decide if further action are needed concerning user support

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11 https://cds-test.climate.copernicus.eu/cdsapp#!/dataset/satellite-sst-esa-cci?tab=overview
12 https://cds.climate.copernicus.eu/cdsapp#!/dataset/satellite-sea-surface-temperature?tab=overview

DOI, citation, licence and acknowledgement

DOI

Type of data in the CDS Catalogue entry	Provider's role	CDS team
Data **without** DOI issued before the publication in the CDS Catalogue	• No active role	• Provides a DOI to the Catalogue entry (which can be see as a DOI for the data themselves) Example: https://cds.climate.copernicus.eu/cdsapp#!/dataset/cems-glofas-reforecast?tab=overview

Data **with** DOIs issued before publication in the CDS Catalogue	• Provides a mapping between the data and the previous DOIs	• Create a DOI box allowing for multiple DOIs.
		• DOI's box will show
		  • all the DOIs supplied by the data provider (with a clear association to which data they refer to)
		  • the DOI of the Catalogue entry itself
		
		Example:
		https://cds-test.climate.copernicus.eu/cdsapp#!/dataset/satellite-total-column-water-vapour?tab=overview
		https://cds-dev.copernicus-climate.eu/cdsapp#!/dataset/satellite-cloud-properties?tab=overview

Mixing of data **with and without** DOIs issued before the publication in the CDS Catalogue	• Provides a mapping between the data and the DOIs	• Create a DOI box allowing for multiple DOIs.
		• DOI's box will show
		  • all the DOIs supplied by the data provider (with a clear association to which data they refer to)
		  • the DOI of the Catalogue entry itself
		  • data with no DOI attribute will be associated with the string: "no specific DOI"
		Example:
		https://cds-dev.copernicus-climate.eu/cdsapp#!/dataset/satellite-surface-radiation-budget?tab=overview

Citations

Citations are like file formats, there are a few available, no one better than all the others in all situations.

The "Citation" link in the Catalogue entry **does not say how** people should cite the data, that depends on the journal, site and publisher where the data will be cited.

The "Citation" link in the Catalogue entry **is the Catalogue citing** the contents that it is exposing.

In this way it also shows how to cite the data, but that is just an example of how to cite the data and contents from where **people can extract all information** required to cite the data using other formats in other places.

Type of data in the CDS Catalogue entry	Provider's role	CDS team
Data **without** citation issued before the publication in the CDS Catalogue	• Interact with the CDS team on this. Most probably you will be asked for the names of the authors of the data.	• Interact with the provider and create a Citation following the Catalogue citation format

Data **with** citation issued before publication in the CDS Catalogue	• Provides those citations to the CDS team	• Create a Citation box allowing for multiple citations.
		• Citation's box will show
		   • all the Citations supplied by the data provider (with a clear association to which data they refer to)
		   • the Citation of the Catalogue entry itself
		
		Example:
		https://cds-test.climate.copernicus.eu/cdsapp#!/dataset/satellite-total-column-water-vapour?tab=overview
		https://cds-dev.copernicus-climate.eu/cdsapp#!/dataset/satellite-cloud-properties?tab=overview

Mixing of data **with and without** citations issued before the publication in the CDS Catalogue	• Provides those citations to the CDS team	• Create a Citation box allowing for multiple citations.
		• Citation's box will show
		   • all the Citations supplied by the data provider (with a clear association to which data they refer to)
		   • the Citation of the Catalogue entry itself
		Example:
		https://cds-dev.copernicus-climate.eu/cdsapp#!/dataset/satellite-surface-radiation-budget?tab=overview

Licence

Provider's role	CDS team
Provide all licences related to the data and a mapping between the licences and the parts of the data they are related to	For datasets with multiple licences use a "Origin" button in the download form making related to the name of the licence Example: https://cds-dev.copernicus-climate.eu/cdsapp#!/dataset/satellite-surface-radiation-budget?tab=form

Acknowledgement

Provider's role	CDS team
No active role but may want to have a look at: How to acknowledge and cite a Climate Data Store (CDS) catalogue entry and the data published as part of it[13] https://cds-test.climate.copernicus.eu/cdsapp#!/dataset/satellite-total-column-water-vapour?tab=overview	For datasets with multiple licences use a "Origin" button in the download form making related to the name of the licence Example: https://cds-dev.copernicus-climate.eu/cdsapp#!/dataset/satellite-surface-radiation-budget?tab=form

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13 https://confluence.ecmwf.int/display/CKB/How+to+acknowledge+and+cite+a+Climate+Data+Store+%28CDS%29+catalogue+entry+and+the+data+published+as+part+of+it

6 **See** Publishing under FAIR principles[14] **for general principles.**

Publishing under FAIR principles

Production Section

Exported on 07/15/2025

Table of Contents

Search

1 Core interpretation of the FAIR principles

The core principles of the FAIR guidelines have not changed since they were first published in 2016 (*), and have since been widely adopted by the scientific community as a way to improve the quality and usability of research data. However, the principles are intended to be flexible and adaptable, and different organizations and communities may have different interpretations and implementations of the principles. It's also possible that the principles may be updated or refined over time as the field of data science and technology evolves.
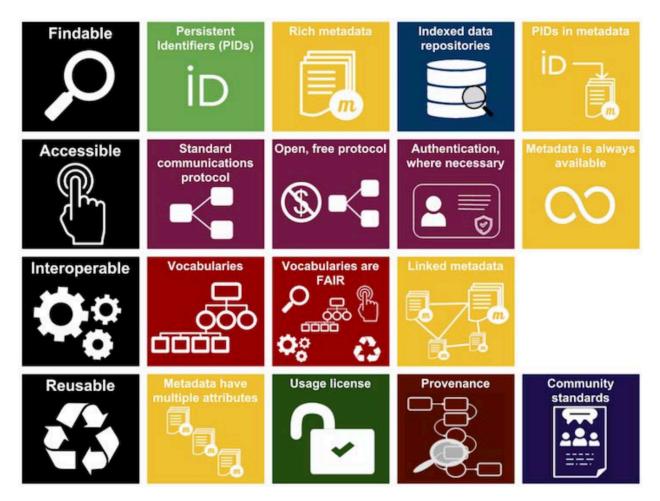
FAIR principles are a set of guidelines for making data more Findable, Accessible, Interoperable, and Reusable:

1. Is the data Findable?
    Can the data be easily discovered by those who need it, using relevant keywords and metadata?

2. Is the data Accessible?
    Can the data be accessed, read, and understood by a machine or a human? Is it available in a widely used, open format?

3. Is the data Interoperable?
    Can the data be easily integrated with other data sources, using common standards and formats?

4. Is the data Reusable?
    Can the data be used and reused for multiple purposes, without significant effort or additional licensing restrictions?

If the data meets all of these criteria, it can be considered "FAIR." It's important to note, however, that the FAIR principles are guidelines rather than strict rules, and different organizations and communities may have different interpretations and implementations of the principles.

(*) Wilkinson, M., Dumontier, M., Aalbersberg, I. *et al.* The FAIR Guiding Principles for scientific data management and stewardship. *Sci Data* **3**, 160018 (2016). https://doi.org/10.1038/sdata.2016.18

Source : Australian National Data Service (ANDS)
Entire FAIR resources graphic is licensed under a Creative Commons Attribution 4.0 International License

2 ECMWF data: Extending the FAIR principles to all our data

At the ECMWF, we are committed to making our data as useful and accessible as possible. That's why we aim to publish all our data in accordance with the FAIR principles.

Our data is carefully curated and described using relevant metadata, that provides detailed information about the variables and parameters included in the data. For each variable, we provide a clear definition, specify the units, and include any relevant notes or caveats that users should be aware of, ensuring that the data can be used accurately and reliably.

We use DOIs (Digital Object Identifiers) to provide persistent, stable links to our data, allowing users to easily find and access the data they need. We also use open, standardized formats for our data and provide API (Application Programming Interface) access, allowing users to easily integrate our data with other systems and applications.

And we provide clear licensing information, enabling users to freely reuse and repurpose the data for their own purposes.

By following the FAIR principles, we are helping to make our data more valuable and useful for a wide range of users, from meteorologists and researchers to policymakers and the general public. We are proud to be part of the growing community of organizations that are working to make data more FAIR (*).

(*) OGC FAIR Climate Services: ECMWF is co-chair for the OGC Climate Resilience Domain Working Group[1]

- Decommissioning plan of ECMWF public datasets service[2]

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1 https://www.ogc.org/blog/4460
2 https://confluence.ecmwf.int/display/PS/Decommissioning+plan+of+ECMWF+public+datasets+service