

# ECMWF Copernicus Procurement

## Invitation to Tender



## Copernicus Climate Change Service

Provision of Additional Climate Projection  
Datasets for the Copernicus Climate Data Store

## Volume II: Specification of Requirements

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## 1 Introduction

Copernicus is the European Union's flagship Earth-observation programme created to achieve operational monitoring of the atmosphere, oceans, and continental surfaces. It aims to provide reliable, validated information services for a range of environmental and security applications. The Copernicus Climate Change Service (C3S) responds to environmental and societal challenges associated with climate change. The service gives access to information for monitoring and predicting climate change and thus helps support adaptation and mitigation. C3S produces and brokers a wide range of data and products describing the past, present and future of the climate system. This includes global and regional reanalyses, Essential Climate Variables (ECVs), near-term climate predictions, climate projections and a variety of sectoral climate information. The data are offered to users through the C3S Climate Data Store (CDS).

## 2 Context

The Copernicus Climate Data Store (CDS, <https://cds.climate.copernicus.eu>) is the C3S infrastructure underpinning user access to its wide range of climate data. The CDS catalogue includes a large set of climate projections created with Global and Regional Climate Models (GCMs and RCMs), as part of the World Climate Research Programme's (WCRP) Coupled Model Intercomparison Project (CMIP) and Coordinated Regional Downscaling Experiment (CORDEX).

CMIP and CORDEX archive the model-simulation data at nodes of the Earth System Grid Federation (ESGF). C3S performs additional quality control on these datasets, at these nodes, and a subset of the data which passes the quality control is provided to users via the CDS. The technical solution underpinning the data provision relies on two European ESGF nodes (operated by IPSL and DKRZ) which jointly provide continued and efficient access to the climate model data they host, as well as support to users of the CDS interface. This infrastructure is ensured by the C3S contract C3S2\_380, for which more details are available at <https://climate.copernicus.eu/c3s2380-operational-access-global-and-regional-climate-projections-and-predictions-esgf>.

The IPCC's 6th Assessment Report provides visualisation of regional-relevant climate change information based on CMIP and CORDEX simulations, through the IPCC Interactive Climate Atlas (IPCC-IA; <https://interactive-atlas.ipcc.ch/>). The Copernicus Interactive Climate Atlas is an emerging new tool for C3S - initially based on the IPCC-IA, it is now under development along C3S principles and priorities. This Atlas will evolve with addition of new data, indicators and visualisation in the coming years, to provide a tailored set of climate projection, observations and reanalysis information based on the datasets available in the CDS. This work is realised under the C3S contract C3S2\_381, for which more details are available at <https://confluence.ecmwf.int/display/CKB/Consolidation+of+the+IPCC+Interactive+Atlas+Dataset+in+the+CDS#ConsolidationoftheIPCCInteractiveAtlasDatasetintheCDS-Introduction>.

The climate-model content of the CDS catalogue includes climate projections from global (CMIP5 and CMIP6) and regional (CORDEX) models. Separate catalogue entries exist for climate projection data used for the IPCC-IA and for data used for the C3S decadal prediction prototypes (<https://climate.copernicus.eu/sectoral-applications-decadal-predictions>). Access to these datasets through the CDS is maintained by a dedicated contract (C3S2\_380, see above) and forms the first strand of C3S activities related to climate projections. A second strand of activities concentrates on the quality control, selection and addition of new data from climate model simulations to the CDS catalogue. This topic is dealt with in this ITT. A final strand consists in preparation and implementation of processing software, to offer users improved means of accessing and analysing climate model data near its source. The first and the third strands do not form part of this ITT, but set part of the context and constraints of its implementation.

### 3 Contract Summary

The climate projection data service in the CDS provides access to the ESGF-hosted data using technical solutions originally implemented during the first phase of the Copernicus Programme and subsequently updated and maintained in the present phase of Copernicus. This aspect is covered by contract C3S2\_380.

This ITT calls for the exploration and curation of additional climate projection datasets, hosted at ESGF, but not yet published in the CDS. Taking into account user requirements, as well as requirements stemming from the Copernicus Interactive Climate Atlas developments (simultaneously performed in another C3S contract, C3S2\_381), this contract will perform data quality control, preparation of associated documentation and handover of the newly selected climate projection datasets to C3S2\_380, for operational service.

Improvements are being sought to the procedure previously used for data selection for the CDS, targeting criteria to reflect metadata and documentation attributes, and criteria related to fitness for purpose of the data and its relevance to user applications. New data from CMIP6 GCM simulations are expected, as are the RCM datasets downscaling the CMIP6 GCMs which are currently under preparation by the CORDEX project.

### 4 Technical Specification

The following climate projection(prediction)-data entries are available in the CDS catalogue:

- CMIP5 global climate model data:
  - <https://cds.climate.copernicus.eu/cdsapp#!/dataset/projections-cmip5-monthly-single-levels>
  - <https://cds.climate.copernicus.eu/cdsapp#!/dataset/projections-cmip5-monthly-pressure-levels>
  - <https://cds.climate.copernicus.eu/cdsapp#!/dataset/projections-cmip5-daily-single-levels>
  - <https://cds.climate.copernicus.eu/cdsapp#!/dataset/projections-cmip5-daily-pressure-levels>
- CORDEX regional climate model data:
  - <https://cds.climate.copernicus.eu/cdsapp#!/dataset/projections-cordex-domains-single-levels>
- CMIP6 global climate model data:
  - <https://cds.climate.copernicus.eu/cdsapp#!/dataset/projections-cmip6>
- CMIP6 decadal prediction data used for the C3S decadal prototypes:
  - <https://cds.climate.copernicus.eu/cdsapp#!/dataset/projections-cmip6-decadal-prototype>
- Gridded climate projection datasets used for the IPCC Interactive Climate Atlas:
  - <https://cds.climate.copernicus.eu/cdsapp#!/dataset/projections-climate-atlas>

Most of these datasets will undergo some evolution in the coming years. This ITT deals primarily with the addition of new data to the climate projection portfolio of CDS, and in particular to the CMIP6 and CORDEX datasets.

In more detail, the proposed activity will include:

1. A revised quality control (QC) and selection procedure is to be developed. The present quality control procedures for the current CORDEX and CMIP6 datasets are briefly described [here<sup>1</sup>](#) and [here<sup>2</sup>](#), which primarily targeted the completeness and compliance of metadata. The updated procedure will also revisit the high-level selection criteria for inclusion of simulations in the CDS archive (addressing the selection of models, experiments, variables, etc). The updated QC and selection procedure will be applied

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<sup>1</sup> <https://confluence.ecmwf.int/display/CKB/CORDEX%3A+Regional+climate+projections#heading-QualitycontroloftheCDS-CORDEXsubset>

<sup>2</sup> <https://confluence.ecmwf.int/display/CKB/CMIP6%3A+Global+climate+projections#CMIP6:Globalclimateprojections-QualitycontroloftheCDS-CMIP6subset>

to the CMIP6 data in the existing CDS catalogue entry, and relevant data available on ESGF but not in the CDS (e.g., missing scenario-variable combinations for some models). This is expected to result in additional data being added to the CDS, as well as some data being removed. The new QC procedure will also be applied to new CMIP6 data under item 2, and new CORDEX data under item 4.

2. The addition of new CMIP6 data to the CDS, focussing on expanding the number of ensemble members designed to sample the effects of internal variability. Additional variables and scenarios are also to be considered, based on analysis of available data and of user requirements gathered in the C3S User Requirement Data Base (URDB) and other mechanisms. A summary of relevant user requirements will be provided at the beginning of the contract. The total CMIP6 data volume is expected to rise to around double the present data quantity (including both items 1 and 2).
3. Coordination with the C3S contract (C3S2\_381) implementing the Copernicus Interactive Climate Atlas in the realisation of its requirements for additional climate projection data sources for the Atlas and its quality control.
4. Preparation of existing CORDEX simulations which use CMIP6 boundary conditions for publication in the CDS. This task would include monitoring the availability of such new CORDEX simulations and evaluating them for alignment with the requirements of C3S, with a view to inclusion in the CDS once a critical mass of such data is available. As in the case of CMIP5 CORDEX at C3S, data for all 14 CORDEX domains is in scope. Information about the present status of CMIP6 CORDEX simulations can be found at [https://wcrp-cordex.github.io/simulation-status/CORDEX\\_CMIP6\\_status.html](https://wcrp-cordex.github.io/simulation-status/CORDEX_CMIP6_status.html). The new CMIP6 CORDEX data volume will be comparable to the CMIP5 CORDEX one available in the CDS.
5. Preparation of documentation and other related information for the data to be added to the CDS, to parallel that already available in the Overview and Documentation tabs of the relevant CDS catalogue entries. In addition, documentation of the (updated) quality control and selection criteria would be required (including the data tested, and which did or did not pass the quality control).
6. Coordination with the C3S2\_380 contract (which covers the infrastructure behind the climate projection datasets offered in the CDS and the storage of the data in C3S-dedicated ESGF nodes) in handing over the new datasets for operational use for C3S. This also includes technical documentation needed to maintain access to the new dataset.

Preliminary list of work packages (WPs) and timetable of major milestones are proposed below. These work packages and milestones are indicative at this stage and the bidders are free to propose a more refined work package list and timetable.

#### Work packages:

- WP0: management and coordination. This work package will include activities related to the coordination with contracts C3S2\_380 and C3S2\_381 (items 3 and 6 above). Other details of this work package are specified below.
- WP1: revised quality control and selection procedure and its application to update the current CMIP6 data (item 1 above).
- WP2: preparation and publication of new climate projection datasets, including the application of the quality control (items 1, 2, 4 and 5 above).

#### Milestones:

- Overhaul of the data quality control and selection procedures in agreement with C3S vision, M6
- Updated CMIP6 CDS entry including the new quality control procedure, and additional ensemble members, scenarios and variables, M12
- Publication of CORDEX (downscaling CMIP6 GCMs) CDS entry, M24

Support is also required for related C3S activities, including the C3S Evaluation and Quality Control (EQC) function, user support, communication and outreach. While these activities are relevant to this contract they are expected to be minimal, consideration should be given to allowing resources for such aspects.

The contract management activities shall be included in a separate work package; the structure and content expected from this work package are described in the next section.

## 5 General Requirements

### 5.1 Implementation Schedule

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 July 2024. The Tenderer shall provide a detailed implementation plan of the proposed activities.

### 5.2 Deliverables and Milestones

Tenderers shall provide the list of deliverables and milestones (cf. ITT Volume IIIA “Pricing and deliverables”, Excel spreadsheet “Deliverables List”) for each work package.

All deliverables and milestones must be consistent with the technical requirements specified in section 4 of this ITT Volume II. A deliverable is a substantial, tangible or intangible good or service produced as a result of the contract. Deliverables are subject to acceptance by ECMWF. All material must be produced in English and be submitted in electronic format, via the online Repository portal.

Each Deliverable shall have an associated resource allocation (person-months and financial budget). The total of these allocated resources shall amount to the requested budget associated with payroll.

Milestones indicate a significant moment in time in the implementation of the contract and should be designed as markers of demonstrable progress in service development and/or quality of service delivery (they should not duplicate deliverables). All material must be produced in English and be submitted in electronic format, via the online Repository portal. Even if they don't have resources allocated they are still subject to approval by the relevant ECMWF officer.

The following contract management obligations shall be briefly described in the bid:

- Plans for the mandatory reporting on implementation and forward planning.
- Meetings (classified as tasks and listed in a separate table as part of the proposal):
  - ECMWF will host quarterly teleconference meetings to discuss C3S service provision, service evolution and other topics.
  - Tenderers can propose additional contract internal meetings (e.g. kick-off meeting, regular meetings to monitor contract performance) as part of their response. Most such meetings should be held by remote participation.
  - ECMWF will organise annual C3S General Assemblies. The successful Tenderer is expected to attend these meetings with maximum 3 team members covering the topics that are part of this ITT.
- A check on the quality of the deliverables should be made by the prime contractor before submission to ECMWF (to cover contents, use of relevant ECMWF reporting templates, format, deliverable numbering and naming, punctuation, spelling and grammar, etc).
- Resource planning and tracking using the appropriate tools.
- Implementation of checks, controls and risk management tools for both the prime contractor and subcontractors.
- Subcontractor management, including conflict resolution (e.g. the prime contractor is responsible

- for settling disagreements, although advice/approval from ECMWF may be sought on the subject).
- A list of subcontractors 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 Clause 2.9 has been flowed down to all their subcontractors.
  - Management of personal data and how this meets the requirements of Clause 2.8 and Annex 6 of the Volume V Framework Agreement.

The mandatory reporting requirements are listed below.

Deliverable #	Title	Due
D382.0.1.1-YYYY.QQ	Quarterly Implementation Report QQ YYYY (QQ YYYY being the previous quarter)	On 15/04, 15/07 and 15/10
D382.0.1.2-YYYY	Annual Implementation Report Part 1 YYYY (YYYY being the Year n-1) This includes: 1) Quarterly implementation Report for the previous quarter Q4 YYYY 2) Preliminary financial form YYYY (YYYY being the Year n-1)	Annually on 15/01
D382.0.1.3-YYYY	Annual Implementation Report Part 2 YYYY (YYYY being the Year n-1)	Annually on 28/02
D382.0.1.4	Final report	60 days after end of contract
D382.0.2.1-YYYY	Annual Implementation Plan YYYY (YYYY being the Year n+1)	Annually on 30/09
D382.0.3.1-YYYY	Copy of prime contractor's general financial statements and audit report YYYY (YYYY being the Year n-1)	Annually (no-cost associated)

Milestone #	Title	Means of verification	Due
M382.0.1.1.QX	Progress review meetings with ECMWF	Minutes of meeting	Quarterly
M382.0.1.2	Kick-off meeting	Minutes of meeting	By M1

Tenderers shall complete the relevant table in Volume IIIA as part of their bid, which includes the details of deliverables and milestones for all work packages and the schedules for each work package.

### 5.3 Key performance indicators

The successful Tenderers shall report to ECMWF on a set of Key Performance Indicators (KPIs) suitable for monitoring various aspects of service performance.

The table below provides the template to be used by the Tenderer to describe the KPIs, relevant for this ITT, together with performance targets, delivery schedules and explanations, as needed.

All KPIs shall be periodically updated as described in the tables. Tenderers shall provide preliminary versions of the completed tables as part of their bid.

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.

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

KPI	KPI Title	Performance Target and Unit of Measure	Frequency of Delivery	Explanations / Comments
KPI_1				
KPI_2				

## 5.4 Communication

The successful Tenderer shall support ECMWF in its communication activities for the C3S services, where they are related to the activities described in this ITT. 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.

## 5.5 Data and IPR

It is a condition of EU funding for Copernicus that ownership of any datasets/software developed with Copernicus funding passes from the suppliers to the European Union via ECMWF. Ownership will pass from the date of creation of the datasets/software. Suppliers will be granted a non-exclusive licence to use the datasets/software which they have provided to Copernicus for any purpose.

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

## 5.6 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).
- The frequency of Progress Review Meetings might 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 subject to other Payment Milestones.

## 6 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.

## 6.1 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.

<b>Section</b>	<b>Page Limit</b>
<i>Executive Summary</i>	2
<i>Track Record</i>	2 (for general) and 2 (per entity)
<i>Quality of Resources to be Deployed</i>	2 (excluding Table 1 in Volume IIIB and CVs with a maximum length of 2 pages each)
<i>Technical Solution Proposed</i>	2 + 3 per Work Package (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)
<i>Management and Implementation</i>	6 (excluding Table 4 and Table 5 in Volume IIIB) + 2 per each Work Package description (Table 3 in Volume IIIB)
<i>Pricing Table</i>	No limitation

*Table 1: Page limits*

## 6.2 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.

### 6.2.1 Executive Summary

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

### 6.2.2 Track Record

The Tenderer shall demonstrate for itself and for any proposed subcontractors that they have experience with relevant projects in the public or private sector at national or international level. Particularly, experience on managing ESGF nodes is of importance. ECMWF may ask for evidence of performance in the form of certificates issued or countersigned by the competent authority.

### 6.2.3 Quality of Resources to be deployed

The Tenderer shall propose a team that meets at least the following requirements:

- A senior team member with more than 5 years of experience in managing activities related to this ITT (referred to as Principal Investigator). This person will be the point of contact on technical matters.
- A team member with experience of managing projects and contracts of this type and size (referred to as Service Manager). This person will be the main point of contact for administrative matters.
- Team members with demonstrated experience in performing activities related to the various aspects of this ITT particularly on managing ESGF data and compute nodes and the underlying netcdf climate projection datasets.

These team members shall be involved in the activities of this ITT at a minimum level of 10% of their total working time.

#### 6.2.4 Technical Solution Proposed

The Tenderer is expected to provide a short background to the proposed technical solution, to facilitate understanding of the solution proposed, as well as a clear and detailed description of the proposed technical solution and its organisation into work packages.

#### 6.2.5 Management and Implementation

As part of the general project management description, and in addition to the guidance provided in Volume IIIB, Tenderers shall consider the elements described in section 5.2 above.