

ECMWF Copernicus Procurement

Invitation to Tender



Copernicus Climate Change Service

Operational seasonal predictions

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 variability and 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

Since 2016, C3S has included a service component based on seasonal predictions, at first placing the focus on graphical products published on the C3S website. In 2018 the seasonal prediction component became operational and added to its content a data service through the C3S Climate Data Store (CDS, <https://cds.climate.copernicus.eu>).

C3S offers its users multi-system global ensemble climate predictions, updated each month, each extending for at least 6 months. At a predetermined date every month, a large set of data at a variety of temporal resolutions is published in the CDS, alongside a number of higher-value data products. Example graphical products are derived at C3S and published through its website for free and open access (https://climate.copernicus.eu/charts/packages/c3s_seasonal/). The data used as input to this service is produced by a number of institutions from around the world, all operators of state-of-the-art seasonal prediction systems; indeed, all current participants in the C3S multi-system are designed by WMO as Global Producing Centres of long-range forecasts. Once transferred to C3S, this data is further processed, archived and published in the CDS, for users to download. Like all CDS catalogue entries, the seasonal forecast data is accompanied by detailed documentation and its use is supported with expert advice. The operational procedures and schedule – with reliable timing, standardized and well documented formats – offer a valuable tool in decision-making supporting adaptation to climate variability and change.

3 Contract summary

This ITT covers the provision of high-quality seasonal prediction data to underpin the C3S operational service for the next three years.

The production of real-time predictions, to an operational schedule, and the associated support to the C3S seasonal prediction component and to C3S users constitute the core of the requirement. In addition, development activities with a clear path to enhancing the quality of the providers' operational seasonal predictions systems, proposed by Tenderers, will be considered.

To continue the current multi-system setup, several contributors will be selected. As in the current phase of the service, ECMWF will take ownership of the data products delivered by these contracts, create further data and graphical products, including multi-system combinations, and make them available to the public without charge.

Tenderers are encouraged to submit proposals that demonstrate their ability to deliver high-quality operational services with a strong foundation in science, research and development. The proposals will be evaluated on the basis of criteria related to scientific quality, documented expertise and ability to fulfil operational requirements. Technical requirements are described in the following sections. Section 5.1 describes details on timings and schedules expected in the Tenderer's response.

4 Technical specification

The providers selected under this procurement should have existing well-established seasonal forecasting systems, with a proven track record of operational seasonal forecast production and delivery, which can provide the required data (section 4.1) from 1 September 2025.

The tender includes a minimum required contribution – the provision of the operational forecast data - and optional development contributions.

The mandatory minimum contribution consists in:

- regular and timely supply of global seasonal forecasts – real time and retrospective forecasts (hindcasts) - produced to specified requirements and standards and transmitted according to agreed protocols (see sections 4.1-4.9);
- timely support to C3S seasonal prediction multi-system operations;
- provision of inputs to data and product documentation;
- maintenance of high-quality real-time forecast system and production procedures;
- contribution to C3S communication and outreach activities, related to seasonal predictions, initiated by ECMWF.

Optional development contributions will be considered on a case-by case basis. Tenderers are invited to propose one or several of the following activities, with a clear explanation of the role they are expected to play in the improvement of the C3S service to its users:

- developments – to initialisation datasets or techniques, ensemble generation, uncertainty quantification, or model components - geared towards improvements in forecast quality;
- investigation into upgrades to production schedule (e.g. increased frequency of initialisation of predictions), quantifying likely benefits of such approaches, to inform upgrades in product generation schedule;
- investigation into skill of predictions at time ranges beyond 6 months. With careful consideration of affordability, contributions to the design of an experiment aimed at extending the prediction horizon to multi-year timescales will be invited. The design will be coordinated by ECMWF, and will involve participants in C3S seasonal prediction service and the (separate) interannual-to-decadal prediction service. As a starting point, we anticipate interest in 16-month predictions with a modest-size ensemble (approx. 20 members), initialised in May and November each year.
- contributions to C3S examples and workflows using C3S climate prediction data, designed in line with ECMWF guidance, delivered as Jupyter Notebooks (see examples under development at <https://ecmwf-projects.github.io/c3s-seasonal-forecasts/intro.html>). This could include example products or post-processing techniques.

Generic model development is out of scope in this activity, as are developments of methodology without prospect of implementation in the time horizon of the proposal.

Any proposals for a subset of development activities listed above (or similar) must rank these in the order of preference, informed by internal institutional priorities at the providers' institutions and resource availability. The selection of the topics to be included will be made at the contract negotiation, with the potential for review part-way through the contract. The selection will be based on convergence of priorities (among providers and ECMWF), capabilities, user requirements and value for money. To allow efficient negotiations and minimise the complexity of any future adjustments, each development activity should be formulated, as far as possible, as a self-contained module, preferably organised in a separate Work package (WP).

The following sections describe specific requirements from several perspectives: data, service and quality.

4.1 Specified data stream

A comprehensive set of model output variables with daily (or in some cases sub-daily) temporal resolution is required; the list is available at <https://confluence.ecmwf.int/display/COPSRV/List+of+requested+variables>. Unavoidable deviations from this list will need to be agreed with the ECMWF team. For example, fields may need to be substituted for the nearest model equivalent (e.g. 1.5m temperature instead of 2m temperature).

Additional fields may be requested during the evolution of the service, but will not be mandatory during the period covered by this contract.

Data are to be supplied on a 1x1 degree grid or finer, or on the original model grid; the choice should be proposed by the Tenderer and will be agreed in the contract with each Successful Tenderer.

4.2 Real-time data delivery requirements

The data is to be delivered to ECMWF reliably according to an operational schedule, initially, by 12Z on the 6th day of each month, for product release on the 10th day of the month. Real-time data may be produced in “burst mode” (e.g., forecasts initialized on the 1st day of the month) or using a lagged-average technique.

4.3 Re-forecast (hindcast) data delivery requirements

A comprehensive set of re-forecasts are required for each model to be used in the C3S seasonal forecast service. Re-forecasts must be made with an identical model version, and in as similar a way as possible to the real-time forecasts. Re-forecasts may be produced as a fixed set, when a new forecast system configuration is introduced, or may be produced in a continuous fashion. In all cases, re-forecast data must be supplied at least five weeks in advance of the corresponding real-time forecasts.

4.4 Forecast/re-forecast length

Forecasts and re-forecasts must cover at least 6 full calendar months from the nominal start date for all ensemble members (see 4.7). In the case of lagged-start ensembles, the effective time coverage of the products must be at least 6 months.

4.5 Re-forecast period

In this phase of the service, the reference period for C3S seasonal forecast product calibration will be brought closer to real time. To achieve this, we require a re-forecast period of 30 years, to 2024. Deviations from this requirement, still suitable for the purposes of C3S, could be proposed for consideration during negotiations.

4.6 Model resolution

Ideally, the horizontal grid resolution of the atmosphere model used should be around 50km or better, preferably with comparable resolution in the ocean component. It is also desirable for the models to have stratosphere-resolving vertical resolution. However, coarser resolution models are acceptable, provided that the forecasting system quality can be assessed as comparable with state-of-the-art systems (see 4.8).

4.7 Ensemble size

The minimum requirement for real-time forecasts is around 50 members; the target for re-forecasts is 25-50 members. Some flexibility will be allowed if justified as necessary by the Tenderer. The ensemble size for each system version must in any case be agreed with the operators of the C3S seasonal forecast component, and be stable over time.

4.8 Forecasting system quality

The quality of existing seasonal forecasting systems will be used to discriminate between Tenderers that otherwise meet the requirements to be a provider. The two primary performance indicators to be assessed will be ENSO (El Niño Southern Oscillation) forecast skill and the quality of the model climate. Available information about other indicators will be assessed and weighted according to its assessed statistical significance.

4.9 Additional requirements for data

4.9.1 Data transfer and data formats

Providers will make the output of their work available to ECMWF, who will then act as a “data supplier” to the C3S Climate Data Store (CDS). It is from the CDS that the data will be made available to users.

The preferred transfer solution is for data suppliers to upload their data to a designated server at ECMWF, via the ECMWF Production Data Store (ECPDS) system. The data providers will also provide a corresponding checksum file (SHA256) for each data file uploaded, to verify that the files have been uploaded without corruption. If necessary, alternatives to this transfer system can be proposed. In order to ensure that the operational service deadlines are met, additional support may be needed from the data providers (for example, they may need to produce a ‘manifest’ of all files produced over a given period). All these aspects can be discussed in detail during the negotiation phase.

The data files themselves must be encoded in netCDF4-classic and follow the C3S-specific standard available from: <https://confluence.ecmwf.int/display/COPSRV/Guide+to+NetCDF+encoding+for+C3S+providers>.

Software will be made available by ECMWF to check conformance to this standard (see next section).

This approach is a continuation of the practices established during the current phase of the service.

4.9.2 Quality control, support and documentation

Quality control procedures (including automatic procedures) are expected to be put in place to check the quality of forecast data before transmission to ECMWF. The precise methods will be discussed as part of the negotiations. In the case of ECMWF detecting possible problems with the data, providers are expected to give timely support to resolve problems quickly, and at the latest 24 hours before the product release date.

Each forecasting system version needs to be documented, at a level which defines how the data were produced, and allows users to understand version changes. This documentation will also be essential to comply with the traceability requirements imposed by ECMWF. The data providers will be responsible for making this documentation available as required.

5 General requirements

5.1 Implementation schedule

ECMWF intends to award several Framework Agreements for a period of maximum 35 months and with an end date not later than 30 June 2028. Each Framework Agreement will be implemented via a single Service Contract expected to commence in Q3 or Q4 2025.

Successful Tenderers are expected to provide a detailed time plan and schedule as part of the tender response. The proposed time plan and schedule should address the main tasks, inputs, outputs, as well as any appropriate intermediate review steps, milestones and deliverables. Regular progress meetings will be held with ECMWF during the contract to assess contract status and update risk assessments.

5.2 Work Package 0 (WPO) – Management and coordination

This work package includes overall responsibility for day-to-day service management and coordination. The following contract management aspects shall be considered and as needed briefly described in the proposal:

- **Contractual obligations** as described in the ITT Volume V Clause 2.3 and Annex 5 on reporting and planning.
- **Meetings** (classified as tasks and listed in a separate table as part of the proposal):
 - ECMWF will host teleconference meetings to discuss C3S service provision, service evolution and other topics. The frequency of such meetings is expected to be 2 months.
 - ECMWF and the Successful Tenderer will organise Progress Review Meetings (PRMs) every six months (linked to Payment Milestones, unless agreed otherwise) online, unless otherwise agreed.
 - ECMWF will organise annual C3S General Assemblies. The Successful Tenderer is required to attend these meetings in person, with a maximum of 2 team members covering the various topics that are part of this ITT.
 - The C3S seasonal forecast providers are expected to participate in a technical working group – which will also include ECMWF and relevant collaborators – aimed at discussing issues related to forecast production and product generation. These discussions will be convened at regular intervals, and most of them will take place by remote participation. In-person meetings organised for this sole purpose are not anticipated to take place more than once a year.
- **Quality assurance and control:** the quality of reports and deliverables shall be equivalent to the standard of peer-reviewed publications and practice. The final quality check of the deliverables (on contents, use of ECMWF reporting templates for deliverables and reports (Microsoft Word), format, deliverable numbering and naming, spelling, etc.) should be made by the prime contractor; all reports in this contract shall be in English. Unless otherwise specified the specific contract deliverables shall be made available to ECMWF in editable electronic format.
- **Communication management** (incl. external and internal communication). Any external communication activity related to this contract 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 text and graphical content and events. Agreed activity would also need to be evaluated and reported on once complete so that success measures and KPIs could be provided to the European Commission (cf. ITT Volume V Clause 2.4.6 of the Framework Agreement).
- **Resource planning** and tracking using the appropriate tools.
- **Risk management:** The proposal shall include a risk register that describes identified risks for each work package, along with a mitigation strategy for each of the identified risks. This mitigation strategy shall comprise 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 part of the quarterly and annual implementation reports.
- **Sub-contractor management** (including conflict resolution). The prime contractor is responsible for settling disagreements, although advice/approval from ECMWF may be sought on the subject. 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 their sub-contractors.
- **Management of personal data** and how this meets the requirements of Clause 2.8 and Annex 6 of the Framework Agreement (cf. ITT Volume V).
- **List of minimum deliverables and milestones** required as part of WPO, covering the contractual and financial reporting obligations towards ECMWF in line with the Clauses/Terms and Conditions of the Framework Agreement (cf. ITT Volume V Clause 2.3 and Annex 5):

| WP0 Deliverables | | | |
|------------------|--|---|--|
| # | Nature | Title | Due |
| D0.Y.Z-yyyyQx | Report | Quarterly Implementation Report YYYYQQ <i>YYYYQQ being here the previous quarter (e.g. 2025Q3)</i> | Quarterly on 15/04, 15/07 and 15/10 <i>(only at the above dates since QIR for Q4 will be part of the AIR Part 1)</i> |
| D0.Y.Z-yyyy | Report / Other | Annual Implementation Report Part 1 for year YYYY <i>including both:</i> <ul style="list-style-type: none"> • the Quarterly Implementation Report YYYYQ4 and • the requested preliminary financial information for year YYYY <i>YYYY being here the year n-1</i> | Annually on 15/01 |
| D0.Y.Z-yyyy | Report | Annual Implementation Report Part 2 for year YYYY <i>YYYY being here the year n-1</i> | Annually on 28/02 |
| D0.Y.Z | Report | Final Implementation Report | Not later than 60 days after the end of contract and once all other activities duly performed |
| D0.Y.Z-yyyy | Report | Annual Implementation Plan for year YYYY <i>YYYY being here the year n+1</i> | Annually on 30/09 |
| D0.Y.Z-yyyy | Other | Copy of Prime Contractor's general financial statements and audit report for year YYYY <i>YYYY being here the year n-1</i> | Annually, not later than on 15/12 ⁽¹⁾ (no associated cost) |
| D0.Y.Z | Presentation/ Minutes of Meeting | Progress Review Meeting No. xx / Payment Milestone SC1- PMx <i>xx being here the iteration number of the PRM</i> | ~ Every 6 months ⁽²⁾ |

| WP0 Milestones | | | |
|----------------|--|--------------------------|---|
| # | Title | Means of verification | Due |
| M0.Y.Z | Updated KPIs (list, targets, etc.) after review with ECMWF | Report | One year after start of contract |
| M0.Y.Z | C3S General Assembly YYYY <i>YYYY being here the concerned year</i> | Attendance | Annually, not later than on 15/12 ⁽³⁾ |

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

⁽¹⁾ the general financial statements shall be sent by the Successful Tenderer as soon as available,

⁽²⁾ the schedule of the PRMs shall be aligned with the different Payment Milestones,

⁽³⁾ generally, every year, ECMWF organises a C3S General Assembly which includes the contractors. Attendance at the C3S General Assembly is not mandatory; the necessity and details of such participation will be agreed upon with the preferred Tenderers during negotiations.

ECMWF will provide the templates for reports and plans at the beginning of the contract. Reporting documents should be short and factual, following the guidance which will be provided by ECMWF during negotiations with the Successful Tenderers.

Contract management and coordination is expected to amount to no more than 7% of the planned use of the resources.

5.3 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 WP. All deliverables and milestones must be consistent with the activities and objectives described in section 4 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 and Contract Management Officer before being considered as contractually approved. All document deliverables shall be periodically updated and versioned.
- 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 applies to deliverables and milestones:

- The deliverables and milestones should be consistent with and meet the technical requirements specified in section 4 of this ITT Volume II;
- All contract deliverables shall be produced in English, unless otherwise specified;
- Unless otherwise specified in the contract, or requested by ECMWF during the contract implementation, the final version of each deliverable shall be made available to ECMWF without any comments and tracked changes in electronic format (Microsoft Word/Microsoft Excel/HTML or compatible, PDF in case of signed version, while all other formats – if any – must be agreed during the contract negotiation) via the Copernicus Deliverables Repository portal.

Requirements related to delivery of data have been described above (e.g. section 4.9).

The following applies in ITT Volume IIIA “Pricing and deliverables” (cf. Excel spreadsheet “Deliverables List”):

- Deliverables and milestones shall have a unique identifier reference ID.
- Each deliverable shall have an associated resource allocation and price (cf. column I “No. of PM allocated” and column J “Estimated price”), while the only resource type to be considered is “payroll” (the total of these allocated resources and prices shall therefore amount to the total price associated with payroll in Volume IIIA spreadsheet “Costs and Prices”).
- Milestones shall not attract a budget under Volume IIIA in the Excel spreadsheet “Deliverables list”.

The Tenderers shall propose a due date for each proposed deliverable and milestone. The Tenderers shall ensure that the proposed due dates of deliverables and milestones are realistic and achievable.

Note that any dependency 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).

5.4 User support

ECMWF has established a centralised Support Portal to provide multi-tiered technical support to all users of C3S data, products, tools and services. This is used for ticketing user requests and distributing these requests to specialists as needed. Dedicated staff at ECMWF provides basic support in the form of self-help facilities (FAQs, knowledge bases, tutorials etc.) as well as individualised support on technical queries related to the CDS, data formats, data access etc. In addition, ECMWF staff will provide specialised scientific support to

address questions related to its contributions to C3S, e.g. in the design and implementation of seasonal forecast products.

ECMWF contractors are expected to also contribute, occasionally, to the delivery of technical support for the data and/or services they provide. Such specialised user support takes the form of direct response to individual user queries referred via the Support Portal facility, as well as contributions to lists of Frequently Asked Questions (FAQs), user guides and knowledge bases.

As part of the bid, Tenderers shall specify the service levels for user support on portal tickets (for example, 90% of Tier-2 requests resolved within five working days), with sufficient flexibility to be improved depending on user requirements.

5.5 Other related C3S activities

In addition to data quality checks described in previous sections, the Successful Tenderers may be required to provide material for quality assurance reports which form part of the C3S Evaluation and Quality Control (EQC) output and to review EQC material produced independently. An example of such quality information is available at https://cds.climate.copernicus.eu/datasets/seasonal-original-pressure-levels?tab=quality_assurance_tab.

Outreach activities related to seasonal predictions may be organised during the period of the contract; in such instances, the Successful Tenderers may be approached by ECMWF for support in developing and delivering content, if appropriate (e.g. the event takes place in the Successful Tenderer's country). Similarly, ECMWF may require from the Successful Tenderers small contributions to training material on seasonal climate predictions for the Copernicus User Learning Services or to communication pieces.

5.6 Data and IPR

It is a condition of EU funding for Copernicus that ownership of any datasets 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 Tenderers to produce the Copernicus datasets/software will remain the property of the Successful Tenderers, 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 systems. The identity and ownership of such exceptional components will be passed to the European Union via ECMWF annually. The Successful Tenderers will be granted a non-exclusive licence to use them for any purpose.

5.7 Key performance indicators

Contractors shall report to ECMWF on a set of Key Performance Indicators (KPIs) suitable for monitoring various aspect of service performance, including (but not limited to):

- Data quality
- Service delivery
- Contract management
- User support

The KPIs defined by the Tenderer are subject to review by ECMWF and may be updated during the contract as necessary.

5.8 Payment plan

The Tenderer can propose a draft 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.
- Given the total duration of the contract, it is recommended to abide by a circa 6-month interval between Payment Milestones (and associated payments). Any other plan can be submitted by the Tenderer but shall be duly substantiated.
- In case of request for a payment at contract signature, please note that this should be appropriately substantiated by the Tenderer (e.g. in terms of necessary investment that would be necessary prior to or during first weeks/months of implementation for ensuring the initial set up of the project). It is necessary to relate this payment to activities included in other Payment Milestones.

The frequency of PRMs might be adapted to synchronise with the anticipated date of completion of each Payment Milestone (i.e. with one PRM ca. 15 days before each PM anticipated date of completion).

6 Tender format and content

General guidelines for the Tender are described in Volume IIIB. 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.

| <i>Section</i> | <i>Page Limit</i> |
|--|--|
| <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> | 30 (Table 2 in Volume IIIB, the section on references, publications, patents and any pre-existing IPR are excluded from the page limit and have no page limit) |
| <i>Management and Implementation</i> | 10 (excluding Table 3, Table 5 and Table 6 in Volume IIIB) + 2 per each Work package description (Table 4 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. 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 encompassing the skills required for providing operational services that meet the technical requirements set out in section 4. The team shall include a Service Manager with at least 5 years of experience with similar-scale projects. The main role of the Service Manager, in this instance, is leadership and coordination of the technical content of the contract. Additionally, the Service Manager could take responsibility for contract management tasks; in such case, their experience both on technical and contract management matters should be described and will be separately assessed as part of the evaluation process. Alternatively, a separate Contract Manager can be appointed. The tenderer shall describe the experience of the whole project team in performing activities related to the various aspects of this Tender.

6.2.4 Technical solution proposed

The Tenderer shall give a short background to the proposed solution to demonstrate understanding of that solution and of the C3S context. This section shall also include information on any third party suppliers that are used as part of the technical solution, and a statement of compliance for each requirement formulated throughout this document, describing how the proposed solution maps to the requirements.

6.2.4.1 Existing capabilities

Tenderers should present information outlining the strength of their present capabilities in the following form:

- A brief description of the scientific heritage of their forecasting model and initialization system, describing the current level of maturity.
- Publications or internal documentation describing forecast performance and model climate of the present forecasting system.

6.2.4.2 Planned development of forecasting system

Tenderers should describe any plan to maintain or update existing capabilities during the course of the contract. If any scientific developments are seen as necessary during this period, these could also be described for context, even when they do not qualify for funding under this contract (see in- and out-of-scope topics in section 4).

6.2.4.3 Computing and data handling resources

Tenderers should provide information about the computer systems expected to be used to run the forecasting systems, and the capabilities of those systems to meet the requirements of the contract, in terms of CPU and I/O, data storage and data transmission.

The estimate of the cost associated to computing needs to be accompanied by information on the elements included in this cost, in as much detail as possible.

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.