

Announcement of Opportunity

Invitation to Tender: UK Analysis-Ready Data Tests in Support of CEOS Standards

1. INTRODUCTION

On behalf of the UK Space Agency, the UK Joint GEO/CEOS Office is pleased to announce an invitation to tender with the primary aim of demonstrating the UK's ability to produce analysis ready data (ARD) to the Committee on Earth Observation Satellites' (CEOS) specified standards, and to showcase the quality of the data.

The UK Joint GEO/CEOS Office has the objective of the UK taking a leading role in Earth observation (EO) policy making and standard setting through CEOS and the Group on Earth Observations (GEO), promoting UK EO priorities, showcasing UK capabilities and expertise on a global stage and consolidating the UK's position as a world leader on addressing global societal issues.

CEOS is an international co-ordination mechanism, originally established under the aegis of the G7, and led by public sector space agencies which "ensures international coordination of civil space-based Earth observation programmes and promotes exchange of data to optimize societal benefit and inform decision making for securing a prosperous and sustainable future for humankind".

The development of [standards for ARD](#) has been driven by CEOS groups, particularly through the Land Surface Imaging Virtual Constellation (LSI-VC) group. This is defined as "satellite data that have been processed to a minimum set of requirements and organised into a form that allows immediate analysis without additional user effort and interoperability with other datasets both through time and space". What is particularly significant is the possibility to supply users, particularly non-experts, with data that are closer to true surface imagery: calibrated, atmosphere-corrected and angle-corrected. Such datasets, if sufficiently accurate and easy-to-use, could substantially increase usage and user satisfaction with satellite EO data. Currently ARD datasets are being tested on public datasets such as Landsat, Sentinel-1 and Sentinel-2 but there are also possibilities to deliver ARD from commercial data sets.

Successful delivery could accelerate growth therefore in UK and international EO imagery markets. These are known as CEOS Analysis Ready Data for Land ([CEOS on CARD4L specifications](#)): see Annex A.

The UK Space Agency, Defra and NERC co-fund the UK Joint GEO/CEOS Office, which is hosted by NCEO at the University of Leicester.

2. ARD CALL DESCRIPTION

The purpose of the current call is to foster a technical activity to demonstrate the UK's ability to produce ARD data to the specified standards and to showcase quality and usage of the data. There are three main objectives: 1) to provide an informed UK view as to the best CARD4L specifications by testing current versions; 2) to demonstrate UK capabilities, including quality of data, to CEOS through reports, (test) datasets and presentation slides; 3) to provide an acceleration to this internationally adoptable set of standards and to the usage of ARD by providing some examples of user engagement and inputs into the testing.

2.1 PROJECT ACTIVITIES

The activity will cover the three areas foreseen for CEOS CARD4L standards which are in the terrestrial domain:

- synthetic aperture radar backscatter coefficients,
- corrected optical surface reflectance,
- thermal infrared land surface temperatures.

Proposers may choose to bid for work addressing one, two or all of these areas. For each area, proposers should plan to produce sample ARD datasets in sample CARD4L-type formats or transform pre-existing UK data sets into sample CARD4L-type formats. The proposed studies should be performed for one or more interesting areas in the UK, and optionally for one selected area overseas such as in regions with CEOS activities for data cubes. Sampled areas would ideally illustrate the interoperability afforded by standardised methodologies and therefore the value of ARD in linking multiple sensors. Activities should provide some assessment of product quality.

Applicants will also be expected to work with a project-selected user to showcase the usefulness of the ARD data. Through discussion with them, the value for ARD data sets should be explored and demonstrated including the usefulness of the data, the data quality and the appropriateness of the CARD4L specifications. Studies should aim to indicate particularly the extent to which the specifications allow for product robustness and user applicability. Recommendations will be made for future improvements.

Test datasets should be made publically available unless a good commercial case is made for some data to be restricted.

Overall, the study envisages that the selected projects will:

1. Produce sample ARD data sets for a selected area in the UK and ideally a selected area relevant to a CEOS activity such as data cubes, e.g. East Africa.

2. Provide some initial verification, estimation or characterization of the quality of the proposer's ARD product(s) and suggest a roadmap for a quality stamp for the product(s).
3. Assess the suitability of a UK ARD product for the chosen parameter against the currently proposed CARD4L specification.
4. Describe use cases for ARD products and illustrate these with one key user. This could be performed with UK ARD data sets or another agency's ARD product.

2.2 PROJECT BUDGET AND DELIVERABLES

The total budget available for the call is £12,500 per area or a maximum of £37,500 for all three areas. The call is released on 19th February 2019 **with a closing date of 27th February 2019 at 11am**. Proposal selection will take place soon after, in anticipation of projects starting from 1st March 2019.

Proposals may include a user of ARD data and a producer of UK ARD data as Partners with costs or be led by such. Alternative arrangements are possible but if not as Partners with costs then the proposal must state a) the commitment of a specific user to provide engagement and feedback; b) the way in which engagement with a producer of UK ARD data has been agreed and will be managed and maintained.

Deliverables:

D1: An interim short report explaining methodologies results and user feedback (due 31st March 2019).

D2: Accessible ARD datasets (due 31st May 2019).

D3: A report comprising a non-technical overview of the data, at least one use-case and user interfaces, alongside a description of ARD usefulness, value of the use-case and the broad context for ARD exploitation. The team should also deliver a technical annex to the main report which will be subject to external scrutiny (in confidence) (due 31st May 2019).

D4: Presentation slides suitable for international presentation by a UK CEOS representative demonstrating the key results (due 31st May 2019).

The GEO/CEOS Office and the UK Space Agency intend to iterate the report and slides with the project teams.

The bulk of the work (70%) will be initiated and completed in March 2019, with reports and any supplementary demonstration materials to showcase the ARD demonstration to be submitted to the GEO/CEOS Office by 31st May 2019. Kick-off meetings will be held by telecon in the first instance.

3. GUIDELINES FOR PREPARING AN APPLICATION

Applicants are required to submit their bid by email to the UK Joint GEO/CEOS Office coordinator Sophie Hebden, Sophie.hebden@nceo.ac.uk, including the application form in section 8 in a cover letter, by **11am on Wednesday 27th February 2019**.

Proposals comprising academic/public or industrial/public partnerships are particularly welcomed to demonstrate the potential usefulness of ARD in decision making.

The package should consist of:

- A cover letter
- The completed application form in section 8.
- A main proposal of no more than 4 pages of A4 (12 point, Arial)
- A 1 page statement of financial costs, giving hourly rates for personnel (ideally named), total hours and any meeting or other costs.
- 2 page Track Record for the project covering the lead and Partner organisations involved.
- A CV (no more than 2 pages) for each of the main team members.

In the cover letter please include:

- A brief statement of the project outline
- For commercial organisations, a clear statement of the GBER State Aid Category and of any industrial or other private investment offered (see Annex B); academic Partners will be funded in all cases at 80% of Full Economic Cost (FEC).
- A committing offer to University of Leicester, who will contractually administer the grant on behalf of the UK GEO/CEOS Office and the UK Space Agency.

The main proposal should deliver:

- A project outline, its benefits and innovative aspects, including any images to assist the description, and the key milestones.
- A description of the ARD use context and any partner users;
- A clear outline of the work that will be undertaken with the user and the types of feedback that will be given to the UK funders and to CEOS.

The financial proposal should:

- Be no more than 1 page
- Include a table of personnel costs including hourly rates and total hours.
- Indicate company contributions where appropriate
- Define all other costs by item, e.g. cost of meeting (number of people, number of meetings).

4. CONTRACTUAL INFORMATION

Award(s) will take the form of a contract between the University of Leicester and the project's lead organisation. The lead organisation will be expected to place contracts to flow down to any collaborating Partners.

The award will be made on a firm fixed price basis. The IP generated during the course of the project will belong to the originators. Any IPR will not pass to the Agency or the UK Joint GEO/CEOS Office.

All relevant costs, including any taxes on procurements, must be included within the total amount of the grant application.

Up to 70% of the payment will be made against the D1 deliverable in March 2019 described in the project outline. The remainder of the payment will be made on delivery of the final reports and materials with a deadline of 31st May 2019.

5. ASSESSMENT OF PROPOSALS

The review panel will consist of independent Agency-approved reviewers. Proposals will be evaluated against a) ability to produce or demonstrate UK ARD data;

6. PROJECT REPORTING

The final report of the work is due within two months of completion of the work: by 31st May 2019.

7. ELIGIBILITY

Bids are welcomed from a variety of organisations including academia, industry and government research institutes based in the UK.

8. APPLICATION FORM

The Application Form below should be completed and submitted with the Cover Letter.

Title of Project	
Lead organisation	
User organization (if any)	
Grant request for lead	£
Grant request for user	£
Address of lead organisation	
Lead contact name and email	
GMBER State Aid category (see Annex B)	
Total grant funding requested	£
Project area/areas (delete as required)	Radar backscatter coefficients/corrected surface reflectance/land surface temperatures

ANNEX A

CEOS CARD4L Specifications

- Surface Reflectance

Applies to: Data collected with multispectral sensors operating in the VIS/NIR/SWIR wavelengths. These typically operate with ground sample distance and resolution in the order 10- 100m however the Specification is not inherently limited to this resolution. Please refer to:

<https://drive.google.com/drive/folders/1MNLjBhF1OaHJmGSzFdoe--IXPyAuk7e4>

- Radar Backscatter

Applies to: Data collected by synthetic aperture radar. Please refer to:

https://drive.google.com/file/d/1OLUR2QIMLxTraap2TOPtuHulcd_3FuSi/view

- Surface Temperature

Applies to: Data collected with multispectral sensors operating in the thermal infra-red (TIR) wavelengths. These typically operate with ground sample distance and resolution in the order 10-100m however the Specification is not inherently limited to this resolution. At present, surface temperature measurements tend to be provided as either surface brightness temperature (SBT), or, as land surface temperatures (LST) requiring the SBT to be modified according to the emissivity of the target. This specification identifies the Surface Brightness Temperature (SBT) as being the minimum or Threshold requirement for analysis ready land surface data, and the Land Surface Temperature (LST) as being the desired or Target level of analysis ready data. User experience and the ability of providers to undertake the necessary corrections will determine if this approach is the right balance, or whether future revisions of this Product Family Specification see changes in approach. For example, surface brightness temperature may be determined to be less than analysis-ready, or to be a separate product to land surface temperature. However, both SBT and LST are land measurements, requiring atmospheric corrections. Please refer to:

<https://drive.google.com/drive/folders/1MNLjBhF1OaHJmGSzFdoe--IXPyAuk7e4>

ANNEX B

State Aid intervention levels

Bidders should ensure their proposal is compliant with the relevant State Aid legislation. European regulations allows State Aid to companies for technology R&D activities via the General Block Exemption Regulations (GBER), with intervention rates (i.e. maximum % grant offered) depending on the type of activity, the type of organisation, and the size of the company as follows:

- **'fundamental research'** means experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any direct commercial application or use in view;
- **'industrial research'** means the planned research or critical investigation aimed at the acquisition of new knowledge and skills for developing new products, processes or services or for bringing about a significant improvement in existing products, processes or services. It comprises the creation of components parts of complex systems, and may include the construction of prototypes in a laboratory environment or in an environment with simulated interfaces to existing systems as well as of pilot lines, when necessary for the industrial research and notably for generic technology validation;
- **'experimental development'** means acquiring, combining, shaping and using existing scientific, technological, business and other relevant knowledge and skills with the aim of developing new or improved products, processes or services. This may also include, for example, activities aiming at the conceptual definition, planning and documentation of new products, processes or services; Experimental development may comprise prototyping, demonstrating, piloting, testing and validation of new or improved products, processes or services in environments representative of real life operating conditions where the primary objective is to make further technical improvements on products, processes or services that are not substantially set. This may include the development of a commercially usable prototype or pilot which is necessarily the final commercial product and which is too expensive to produce for it to be used only for demonstration and validation purposes. Experimental development does not include routine or periodic changes made to existing products, production lines, manufacturing processes, services and other operations in progress, even if those changes may represent improvements;
- **'feasibility study'** means the evaluation and analysis of the potential of a project, which aims at supporting the process of decision-making by objectively and rationally uncovering its strengths and weaknesses, opportunities and threats, as well as identifying the resources required to carry it through and ultimately its prospects for success.

Figure 1. EC definition of the various company types



Anything above the limits for a medium sized company is designated as a large company. Academic Partners will be funded in all cases at 80% of Full Economic Cost (FEC). Table 1 summarizes the GBER State Aid categories and maximum allowable intervention rates.

Table 1. GBER State Aid categories and maximum allowable intervention rates

State Aid Category	Intervention rate		
	SME	ME	LE
Fundamental Research	100%	100%	100%
Feasibility study	70%	60%	50%
Industrial research	70%	60%	50%
Industrial research projects involving collaboration/ dissemination ¹	80%	75%	65%
Experimental development	45%	35%	25%
Experimental development projects involving collaboration/dissemination ¹	60%	50%	40%

Note: Collaborations between businesses and research organisations where the research organisation bears at least 10% of the costs & have the right to publish their own research, or business to business collaborations which involve more than one member state of the EU/ EEA or involve at least one SME, provided that no one business partner carries more than 70% of the project costs. Procurement/supplier relationships do not qualify.