

2024 Call for Proposals

Space Instruments Program

Netherlands Space Office (NSO)

With this Call for Proposals the Netherlands Space Office (NSO) invites scientists and experts from the Dutch space field to submit proposals for the development of – technology for – future space instruments in the fields of Earth Observation, planetary research, and astronomy. In this Call for Proposals you'll find information about the aim of NSO's space instruments program, the conditions for application and how your proposal will be assessed.

1. NSO's Space Instruments Program

1.1 Background

Space instruments are at the core of the usefulness and benefits of space activities. Data (including observations, signals) from space instruments are useful for a variety of applications in many fields of science, society and economy. Examples abound, including Earth's climate change, astronomy, cosmology, planetary research, societal security, environment, biodiversity, Sustainable Development Goals, and many more.

The Netherlands have a long standing tradition in the development of space instruments, particularly in the optical domain, but upcoming microwave/radio domain as well. The Dutch space ecosystem, including science institutes and industry, comprises state-of-the-art research and development in both these fields. These organisations have a long history in collaboration in national and international consortia.

Current developments in space show that science and society are ever more depending on space instruments. New Space shows a trend towards smaller and cheaper spacecraft and therefore smaller instruments, combined with a more sustainable use of space. At the same time, breakthrough technologies enabling novel types of observations often require larger budgets, and may lead to more complex space projects, especially in science.

1.2 Objective

Within the context of the Dutch national space policy and funded by the Ministry of Education, Culture, and Science (OCW), the objective of the Space Instruments Program (IOP) is to maintain, strengthen, and broaden the position and expertise of the Netherlands in the field of space instrumentation, driven by the needs and requirements of the users. Therefore, this program supports the development of – technology for – future (scientific) space instruments that are of national scientific relevance and interest, and that are complementary to developments in other programmatic contexts such as those of European or other space agencies

1.3 Scope and boundaries

Space Instruments

The program addresses space instruments, which, in this context, are defined as systems operating on space platforms, that deliver (measured or generated) data to users. See Appendix C for a more detailed definition of space instruments as is understood for this Call. The program focusses on the hardware of space instruments

(‘upstream’, including relevant on-board software and instrument-critical data processing technologies), meaning that the development of – software for – applications with space data (‘downstream’) is not part of the program.

The program is open for technology developments on TRL 4 to 6. Please note that for lower TRL, other programs are better suited and available. Also note that the program is not open for higher development phases TRL 7 to 9, typically addressing the realisation (building, launch and operation) of the instrument.

Topics and user needs

The main focus of the program is on scientific space instruments, while taking into account the close synergy in space instrument *development* between science and industry, as well as taking into account the synergy that exists in the *use* of space instruments between scientific and other (societal, commercial) applications.

In general, the space instruments program is open for instrument developments that are in line with scientific priorities of the Dutch scientific community and the Dutch space policy, including the priorities indicated in the Long Term Space Agenda (LTR). The program is open for instrument developments in the fields of satellite Earth Observation, Planetary space research, and space-based astronomy/astrophysics, which are priorities of the national space policy for OCW.

In the national space policy, the maximization of the benefits of the use of space for science and society is one of the main goals. Space developments are more and more driven by needs from scientific and societal (end)users. The program will therefore strongly focus on space instruments for which clear user needs are available as much as possible, taking into account that, since the program aims at future instruments, these user needs may still require further specification, concretization and user commitment.

2. This Call for Proposals

Until 2025, NSO aims to support the development of one or more space instruments as under development on TRL 4-6 at Dutch organisations. Earlier in 2024, in preparation of this Call for Proposals, NSO issued a Call for Ideas to get an idea of current space instrument plans and developments in The Netherlands. The present Call for Proposals is open for Dutch space experts from science and industry, irrespective of submissions to the earlier Call for Ideas. Applicants are invited to submit proposals for the development of – technology for – future space instruments in the fields of satellite Earth Observation, planetary space research, and space-based astronomy. Proposals should be in line with the constraints provided in section 1.

2.1 Available budget

The ministry of Education, Culture and Science has provided funding for the Space Instruments Programme for the period 2023-2025. Within the duration of this programme, two funding rounds will be published. This Call for Proposal concerns the first funding round, for which the total budget is €2,37M.

The available budget will be allocated across two categories: large projects with a maximum budget of €700k each, and smaller feasibility studies up to a maximum of €50k each.

2.2 Submission deadline

The deadline for submitting proposals is February 27th 2025, 12.00 CET.

2.3 Conditions for applicants

2.3.1. Who can apply:

Proposals can be submitted by applicants affiliated with Dutch universities, scientific institutes, research institutes, and industry. In the latter case (industry), the consortium is required to include at least one main/lead partner from academia (universities, scientific/research institutes). NSO encourages ideas to be submitted by consortia rather than by individual applicants.

The main applicant submits the proposal to NSO. During the assessment process, NSO will communicate with the main applicant. After a proposal has been awarded funding, the main applicant will become the project leader and will be responsible for the whole project (scientific, technological, financial, management), and will be single point of contact for NSO.

2.3.2. What can be applied for:

You can submit a proposal in one of the following categories:

1. Large projects

For an application in this category, a maximum of €700k can be applied for. These projects comprise technology development activities on TRL 4-6.

2. Feasibility studies

For an application in this category, a maximum of €50k can be applied for. These studies may comprise study activities on TRL 2-4 to address feasibility of an instrument concept.

For both categories, funding requests may include only those costs that are vital to successfully carry out the project. This should be motivated clearly in the proposal and will be part of the eligibility assessment by NSO.

Funding requests cannot include costs for which funding from other national or EU funding sources has been or will be received, nor costs made before the kick-off of the project.

Funding requests may include costs for personnel, equipment, and outsourcing to third parties.

In case VAT can be offset these costs are not fundable.

The subsidy can only be used for non-economic activities.

The maximum project duration is 5 years.

2.3.3. Which instruments are eligible:

Space instruments included in the proposal, should aim at scientific use, or a combination of scientific and other (societal, commercial) use. A description of the intended users of the instruments needs to be included.

2.3.4. For which development status is this call:

The current technological development status of the submitted ideas, in terms of Technological Readiness Level (TRL), should be at least TRL 3. The submitted idea should also indicate the expected increased TRL after the work, which can be maximally TRL 6 under this program. In addition, the current Scientific Readiness Level (SRL) and Application Readiness Level (ARL) associated with the proposed space instrument development should be indicated. In line with the TRL increase, the SRL should reach 4-6 and the ARL should reach 3-5, and the applicants should indicate what activities are to be done, by themselves or others, to reach these SRL and ARL levels.

See Appendix A for a definition of TRL, SRL, and ARL.

2.3.6. Application form and planning

Ideas should be submitted by using the application form in Appendix B.

Application forms should be send by email to: adminNSO@spaceoffice.nl

Timeline:

8 November 2024	Publication Call for Proposals
27 February 2025, 12:00 CET	Deadline for proposal submission
Feb – May 2025	Assessment of proposals
May 2025	Decision NSO

2.4 Assessment procedure of the proposal

2.4.1 Category 1: Large projects

For proposals submitted in the category ‘large projects’, the assessment procedure will consist of the following steps:

2.4.1.1 Eligibility of the proposal

NSO will assess whether the submitted proposals fit within the objectives and scope of the IOP (see 1.2 and 1.3) and whether the proposal fulfils the administrative and financial requirements. Please bear in mind that, if necessary, NSO may approach you within two weeks after the submission deadline to submit any possible additions or corrections in order to satisfy the conditions for submission.

2.4.1.2 Policy assessment by NSO

NSO will assess the submitted proposals taking into account the policy criteria in section 2.5.1.

2.4.1.3 Scientific peer review by external referees

NSO will request input from a minimum of two external referees on the scientific criteria in section 2.5.2.

2.4.1.4 Final assessment and decision taking

Based on the policy assessment and scientific assessments, NSO will prepare a final assessment of all proposals, and advice on the ranking for funding. For the ranking advice, programmatic (budgetary) and policy considerations will be taken into account in order to ensure an effective and efficient budget allocation preventing parallel funding of too similar or competing developments.

The director of NSO will take a decision about which proposals will be awarded funding.

2.4.2 Category 2: Feasibility studies

Proposals submitted in the category ‘feasibility study’ will undergo a light review procedure by NSO to assess whether they are sufficiently in line with the current space and science policies.

2.5 Criteria

2.5.1. Policy criteria

1. User needs and policy connection

The proposal follows on clearly identified scientific and/or societal user needs, and is well-connected to the national space policy (the LTR, Long-Term Space Agenda) and/or the national scientific policy (like the NWA and/or existing science strategies). The instrument’s field of application is in astronomy, earth and environmental sciences, or planetary science.

2. Programmatic framework

The proposal addresses concrete programmatic and funding opportunities for full development of the instrument (TRL 7-9) and its subsequent exploitation.

3. Collaboration between NL parties

The consortium brings together existing scientific and technological heritage and expertise. In the development of the technology or instrument capability, Dutch parties collaborate on the basis of added value.

2.5.2. Scientific criteria

1. Technological and scientific quality

This includes the quality of the observation concepts, technological approach and technological capabilities and heritage of the consortium. It also addresses the quality of the goals, approach and methodology, and clarity of the proposal.

2. Scientific and/or societal usefulness & needs

This addresses the extent to which the proposal addresses scientific and/or societal needs as reflected in current scientific/societal challenges in Space and/or Earth science and the usefulness of the proposal in the context of ongoing scientific research in the relevant research field(s). This criterium also addresses the level of readiness of the (scientific) user community to take up the instrument and exploit the results of the mission.

3. Innovation and uniqueness in the context of (international) scientific programs

This addresses the extent to which the proposal is innovative and unique with respect to other (international) projects .

4. Timeliness and feasibility

This addresses the extent to which the proposal is timely and complementary in the context of (international) scientific (space) programs. This criterium also addresses the feasibility of the proposal including the maturity of the proposed technology and the appropriateness of the proposed activities and work planning.

2.6 Obligations for grant recipients

Grant recipients are obliged to carry out the project in line with the proposal and during the specified period.

In case the funded activities cannot be carried out according to the granted proposal, the grant recipient should inform NSO immediately.

For essential changes to the proposed project (not being part of normal work) the grant recipient should send a request to NSO and NSO has to approve of the changes. This is not required for changes affecting the subsidized costs for less than 25%.

All activities and results of the project should be publicly available. In scientific and other publications the grant recipient is obliged to include a reference to the grant.

Outsourcing to third parties should be based on transparent and market-conform contracts.

During the project, progress milestones should include meetings for which NSO shall be invited.

To finish the project the grant recipient is obliged to deliver a final report, a financial report, and an accountancy declaration.

Subsidies will be granted in line with the legal conditions as specified in the *Kaderregeling subsidies OCW* , see: [wetten.nl- Regeling- Kaderregeling subsidies OCW, SZW en VWS- BWBR0037603 \(overheid.nl\)](https://wetten.nl/-/Regeling-Kaderregeling-subsidies-OCW,-SZW-en-VWS-BWBR0037603-overheid.nl)

Contact

For questions or more information related to this Call for Ideas or the Space Instrument Program please contact Jolien Diekema: j.diekema@spaceoffice.nl

Appendix A: Definition of TRL, SRL, ARL

TRL 1: Basic principle
TRL 2: Application formulated
TRL 3: Proof-of-concept
TRL 4: Functional verification
TRL 5: Breadboards (reduced scale) verification in relevant environment
TRL 6: Models (full scale) demonstration in relevant environment
TRL 7: Model demonstration for operational environment
TRL 8: Flight qualified
TRL 9: Flight proven

SRL 1: Initial scientific idea
SRL 2: Consolidation of scientific ideas
SRL 3: Scientific and observation requirements
SRL 4: Proof-of-concept
SRL 5: End-to-end performance simulations
SRL 6: Consolidated science and products
SRL 7: Demonstrated science
SRL 8: Validated and mature science
SRL 9: Science impact quantification

ARL 1: Basic research (baseline ideas)
ARL 2: Application concept (invention)
ARL 3: Proof of application concept (viability established)
ARL 4: Initial integration and verification (prototype/plan)
ARL 5: Validation in relevant environment (potential determined)
ARL 6: Demonstration in relevant environment (potential demonstrated)
ARL 7: Application prototype in partner's decision making (functionality demonstrated)
ARL 8: Application completed and qualified (functionality proven)
ARL 9: Approved, operational deployment and use in decision making (sustained use)

Appendix B: Application form

Proposals should be limited to 30 pages (A4). The proposal should include the following sections:

1. Title
2. Main applicant, contact details
3. Description of the instrument, including
 - a. Background
 - b. Proposed technology and competitiveness of technology
 - c. Application and users
4. Consortium (role, expertise, indication of tasks of all consortium members)
5. Description of the proposed work (technical, scientific, user needs/involvement/commitment)
 - a. Work defined in work packages
 - b. Planning of work packages
6. Indication of the development phase: TRL, SRL, and ARL (current level, to-be-increased level, substantiation)
7. Financial plan
 - a. Budget per work package, with a distinction between labour and materials
 - b. Total costs and requested budget from NSO
8. Programmatic context (agency, program(s), follow-on funding opportunities), including
 - a. Proposed flight opportunities
 - b. Roadmap towards a complete instrument with critical technology development deadlines
 - c. Possible follow-on funding opportunities
 - d. (if applicable) other current projects/studies for the technology
9. Own assessment of policy and science criteria

Appendix C: Definition ‘Space instrument’

Disclaimer

It is not the intention of this document to provide an unambiguous, comprehensive, and conclusive definition of a space instrument. Such a definition is very difficult to formulate, and would probably not be very useful in practice. Instead, a description of a space instrument is provided that will be useful in many, if not most, situations, although in specific cases additional explanations or considerations may be needed.

This document

This document contains a description of a space instrument (or satellite instrument) as it is used in the context of NSO’s Space Instruments Program. To this end, space instruments are regarded as measuring devices deployed on spacecraft that collect data that contribute to the solution of scientific, societal, or commercial questions and applications, irrespective of the measurement principle or spectral domain. Measurement principles may be based on those used by instruments with a Dutch heritage, but may also involve completely new and innovative concepts. Instruments may operate in the typical spectral domain between Far-IR and X-ray or in the microwave and radio parts, but they may also utilize other principles beyond measuring radiation. Depending on the specific situation, instruments may be complete systems (like antenna, detector, front- and back-end electronics) including data processing till data level 1 (L1), or partial systems (sub-systems) that are performance critical.

Instrument

The figure below presents a schematic overview of the elements involved in the description of a space instrument. Three elements are key to this description:

1. the **instrument** and the associated technologies;
2. the **data** collected by the instrument and delivered to the processing chain;
3. the **user** of the data.

Ad.1 The **instrument**¹ (and the associated technologies) is the system delivering the data ultimately destined for use by the users (the red part in the figure). Depending on the measurement principle, the type of observable, and the specific technological realization, the instrument consists of parts (sub-systems) such as antennas, telescopes, receivers, detectors, transmitters, registration devices, optics, read-out electronics, etc.

Technologies that are necessary or essential (instrument critical) to realize the instrument for its task to deliver data of the required quality for the user (performance critical) are also regarded as part of the instrument. Such technologies can include:

- hardware technologies in the fields of optics, electronics, mechanics, photonics, etc.;
- (ground)systems/methods for verification, testing, and/or calibration that are not part of the basic development process, but have to be developed anew/unique/specifically for the instrument in question;
- (supporting) data processing technologies that are instrument critical (from the sensor to L1).

(Sub-)systems that are considered not to be part of the instrument² include support systems (e.g., thermal, power, electric, computing, ...), platform systems (e.g., bus, construction/panels, AOCS, TM/TC, solar panels, HK, ...), launch systems, ground systems (e.g., EGSE, AIT, testing, validation, ...) and the associated technologies for all

¹ In the space sector sometimes the term *payload* is used when referring to an instrument deployed on a satellite platform. The distinction between payload and platform is often clear, but not always. Sometimes the satellite itself is the payload, and payload and platform have many (sub-)systems in common. Also, in small satellites like cubesats the platform-payload distinction is often less relevant. Therefore, we will not use the term payload here to refer to a space instrument.

² It is not possible to make a clear distinction in all cases between instrument-systems and support/platform-systems. Think of, e.g., cooling. There can be cooling systems for the satellite as a whole, or – miniaturized – cooling systems for – the core of the – sensor. The latter is regarded as part of the instrument, the former not. But if both types of cooling systems are integrated, the distinction blurs.

these systems. Although these non-instrument systems ('peripheral' systems) also deliver data, these are regarded as derived/supporting data and not instrument data delivered to the users.

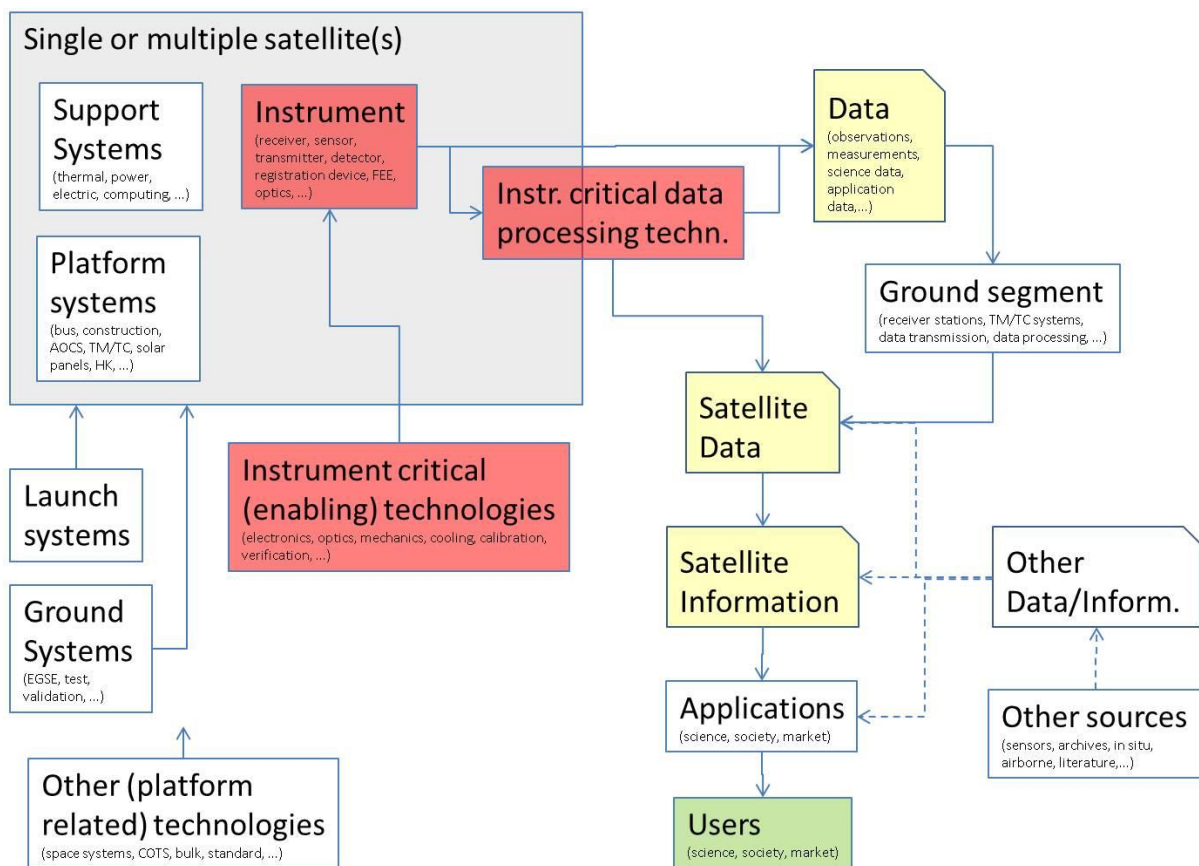
Ad.2 **Data** is to be understood as observations or measurements, sometimes referred to as science data, application data, instrument data, etc. (the yellow part in the figure). Data is collected by the instrument and processed through the ground segment to be delivered to the users (from raw data to information products). The typical/standard data processing systems for this step do **not** belong to the instrument.

Ad.3 There may be different categories of **users**: scientific, societal, government/institutional, commercial (the green part in the figure). Users make use of applications/products/services in which satellite data is often blended with data from other sources. Technology for applications is **not** part of the instrument.

Instrument criterium

In order to determine whether an instrument technology is part of a space instrument, the following criteria apply:

- the technology has to adhere to what is described under point 1 above; and
- the instrument system and technology must be directly performance-critical for the establishment of the instrument-data meant for the user with the required quality.



List of abbreviations

ARL	Application Readiness Level
IOP	Space Instrument Program
LTR	Long Term Space Agenda
NSO	Netherlands Space Office
OCW	Ministry of Education, Culture and Science
SRL	Scientific Readiness Level
TRL	Technology Readiness Level