Continuously Open Research Announcement

soliciting for proposals for using

Sounding Rocket

ESA-CORA-SR
1 INTRODUCTION

ESA’s “Science in Space Environment” (SciSpacE) programme – which is part of ESA’s overall European Exploration Envelope (E3P) programme – includes scientific activities on research platforms such as ground-based space analogues (e.g. bedrest studies, research on Antarctic stations, radiation facilities, drop tower, sounding rockets, parabolic flights), as well as an ambitious research programme on-board the International Space Station (ISS).

The SciSpacE programme activities cover science in the domains of Human Research, Biology (including Astrobiology) and Physical Sciences, with an emphasis on scientific excellence, space research- and exploration-relevance, innovation and timely delivery. Its research results will advance Europe’s knowledge base, support its economy and help prepare future human and robotic space exploration. In addition to gaining fundamental knowledge, the research carried out within ESA's SciSpacE programme is helping to deliver solutions to problems back on Earth, e.g. developing innovative materials to manufacture products, removing pollutants from water, improving engine efficiency, testing new medical techniques and support equipment for the elderly and disabled.

To further enhance and promote ESA’s strong non-ISS research programme, ESA’s Continuously Open Research Announcement scheme has been expanded to offer dedicated opportunities for research on ESA’s non-ISS research platforms.

This document provides an overview on the research opportunity offered within this Continuously Open Research Announcement as well as on the sequence of events starting from submission of the research proposal to selection and implementation of successful proposals.

2 OBJECTIVE OF THIS OPPORTUNITY

Sounding rockets are a unique mission platform for providing truly excellent levels of microgravity, with very low residual acceleration (~10⁻⁵ g), for studying phenomena with a longer timescales (typically 3 to 13 minutes) than ground or airplane platforms. Physical science and biology science experiments can be conducted on board this platform. Sounding Rockets constitute a completely independent European access to microgravity conditions and have significantly contributed to microgravity science research, resulting in many publications in scientific journals. Sounding rockets are currently the only accessible microgravity platform for experiments, which are difficult to execute in human environments for safety reasons (e.g.: hazardous materials).

Within ESA’s SciSpacE programme it is therefore planned to maintain the level of on average 1 sounding rocket mission per year, which experience has shown matches the requirements of the scientific community.

Through this Continuously Open Research Announcement for proposals making use of Sounding Rockets, ESA will provide scientists with an opportunity to conduct research necessary to advance knowledge relevant to the effects of space in the area of Life and Physical Sciences, as well as contributing to safe and sustainable space exploration with
human crews – an overview of key questions to be addressed with this opportunity can be found in Annex 1, exception made, of course, for human physiology experiments. Scientists are strongly invited to address one (or more) of the topics outlined in Annex 1 of this document with their proposed experiments.

3 THE FACILITIES TARGETED WITH THIS OPPORTUNITY

ESA uses a range of Sounding Rocket facilities, the complete list is presented in table 1. Detailed information about the characteristics of these facilities are available from the respective websites:

<table>
<thead>
<tr>
<th>Facility</th>
<th>Website</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESA</td>
<td><a href="http://www.esa.int/Our_Activities/Human_Spaceflight/Research/European_user_guide_to_low_gravity_platforms">www.esa.int/Our_Activities/Human_Spaceflight/Research/European_user_guide_to_low_gravity_platforms</a></td>
<td>ESA’s Human Space Flight and Exploration site</td>
</tr>
<tr>
<td>TEXUS and MiniTEXUS</td>
<td><a href="http://www.sscspace.com/texus-54-55">www.sscspace.com/texus-54-55</a></td>
<td>German rocket programmes at ESRANGE for DLR and ESA microgravity research programmes</td>
</tr>
<tr>
<td>MASER</td>
<td><a href="http://www.sscspace.com/maser-13/">www.sscspace.com/maser-13/</a></td>
<td>Swedish Space Corporation rocket programme at ESRANGE for ESA microgravity research programmes</td>
</tr>
<tr>
<td>MAXUS</td>
<td><a href="http://www.sscspace.com/maxus-9/">www.sscspace.com/maxus-9/</a></td>
<td>German-Swedish rocket programme at ESRANGE for ESA microgravity research programmes</td>
</tr>
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</table>

ESA procures the flight opportunity from the Programmes listed above. However, these Programmes have their own set of safety, interface and operational requirements that need to be met and part of their contract with ESA is to provide technical assistance to science teams for facilitating their research activities.
4 APPLICATION PROCESS

4.1. Who can apply
Scientists from the member states participating to ESA’s SciSpacE programme may apply to the programme. Participating countries are Austria, Belgium, Czech Republic, Denmark, France, Germany, Greece, Hungary, Ireland, Italy, Luxemburg, The Netherlands, Norway, Poland, Portugal, Romania, Slovenia, Spain, Sweden, Switzerland, United Kingdom, Canada. Scientists from other ESA member states may participate in proposals as team members.

4.2 Preparing and submitting the proposal
The document "ESA-CORA-SR submission template" shall be used for submission of the proposal. The proposal shall include a clear description of proposed experiment as well as information on the total funding requested. It is highly recommended to coordinate beforehand with the facility to be used for the proposed project for suitability, feasibility and availability of the facility, a list of local points of contacts is provided in the Annex.

The proposals shall be submitted electronically as one single file to:

cora-sr@esa.int

An acknowledgement of receipt will be sent to the submitting proposer upon receipt and confirmation of completeness of the proposal.

4.3 Evaluation of proposals
ESA will make use of independent experts for the evaluation of proposals. The proposal coordinator will receive information on the outcome of the review, typically within 2 months.

The evaluation criteria that will be applied for evaluation of the proposals are:

- Significance (30%): Does this study address an important problem? If the aims of the application are achieved, how will scientific knowledge or technology be advanced? What will be the effect of these studies on the concepts, methods, or products that drive this field?
- Approach (25%): Are the conceptual framework, design, methods, and analyses adequately developed, well integrated, and appropriate to the aims of the project? Does a flight proposal build upon a successful foundation of ground studies? Is the proposed approach likely to yield the desired results? Does the applicant acknowledge potential problem areas and consider alternative tactics?
- Innovation (20%): Does the project employ novel concepts, approaches, or methods? Are the aims original and innovative? Does the project challenge existing paradigms or develop new methodologies or technologies?
- Personnel (15%): Does the scientific team have the appropriate level of experience, are sufficient & appropriate personnel dedicated to the project. Is there evidence of the science team's satisfactory productivity?
- Environment (10%): Does the scientific environment in which the work will be performed contribute to the probability of success? Do the proposed experiments take advantage of the
scientific environment or employ useful collaborative arrangements? Is there evidence of institutional support?

5 IMPLEMENTATION OF THE SELECTED PROPOSALS

After positive selection of peer-reviewed proposal, the scientific coordinator of the experiment will be notified and he/she will be required to confirm the availability of resources and of the selected facility.

In the case of a successful proposal, ESA’s Payload Development Manager overseeing the progress of the engineering team will coordinate the launch and operations planning, whereas the ESA Project Scientist is the contact point at ESA for the Science Teams.

Please take note that the acceptance of a proposal is not a guarantee for a flight opportunity. Implementation will be subject to a technical feasibility review carried out by the facility operators after selection.

6 DATA RIGHTS

6.1 General

The general data policies of ESA’s Directorate for Human and Robotic Exploration Programmes will apply to all data resulting from the experiments in the context of this Continuously Open Research Announcement.

Final results of the study shall be made available by the scientific teams to the scientific community through publication in appropriate journals or other established channels as soon as practicable and consistent with good scientific practice. In the event such reports or publications are copyrighted, ESA shall have a royalty-free right under the copyright to reproduce, distribute, and use such copyrighted work for its own purposes.

6.2 The Erasmus Experiment Archive (EEA)

The EEA covers both physical and life sciences, and can be found at the following URL: http://eea.spaceflight.esa.int The EEA is an ESA service to the international scientific community. Abstracts, from all European microgravity experiments performed to date are collected in this database. Experimenters sponsored by ESA have the obligation to provide these abstracts themselves. Special emphasis is placed on the completeness of the list of references of articles where the experiment results can be found.

Scientists in Europe who have performed experiments, be it in orbiting or ground-based facilities are encouraged to either provide an abstract on each of their experiments, or to
provide information enabling the updating of their existing abstracts, in particular the list of articles published.

ANNEX 1: SCISPACE ROADMAPS

The Science Department of ESA’s Human Spaceflight and Exploration Directorate recently undertook an extensive exercise to create a new strategy, focusing on a set of newly defined goals to help to positively shape the future research programme of the Directorate and maximize research potential.

**Human Research**
- The Human body under space conditions: adaptations and countermeasures
  - Understanding human physiological processes.
  - Exploration-related health risks and their prevention.
  - Health and ageing issues on Earth.

**Biology**
- Astrobiology
  - Chemical and biological effects of exposure to space radiation and vacuum.
  - Origins, limits and signs of life in the Universe.

**Physical Sciences**
- Ultra-precise cold atom sensors, quantum information and high energy particles
  - Boundaries of relativity and quantum physics.
  - Advanced navigation and communication.

**Psychological and neurosensory adaptations to reduced gravity, isolation and confinement**
- Impact of spaceflight on psychological, sensorimotor and neuro-behavioural performance.
- Selection, training and support methodologies for crew on long-duration missions.

**Cosmic radiation risks for Human Exploration of the Solar System**

**Excellent curiosity-driven research**
- Energy storage, fire safety, cardiovascular fluid physics, hibernation and torpor

**Figure 1. ESA Roadmaps**

Figure 1 gives a graphical overview of ESA’s Science Roadmap questions, the detailed roadmaps can be found at: [“https://www.esa.int/Our_Activities/Human_Spaceflight/Research/Research_Announcements”](https://www.esa.int/Our_Activities/Human_Spaceflight/Research/Research_Announcements) on ESA’s Research Announcement website. Submitting proposers are strongly invited to address one of the topics outlined above with their research proposal.