ESA EO AFRICA R&D Facility, in collaboration with the African Union Commission (AUC) announce:

Call for Research Proposals 2021

Related to the themes: EO for managing water scarcity and safeguarding food security in Africa

Introduction

EO AFRICA stands for African Framework for Research, Innovation, Communities and Applications to foster an African-European R&D partnership facilitating the sustainable adoption of Earth Observation and related space technologies in Africa. The ESA initiative has a long-term (>10 years) vision with an African user-driven approach in a collaborative partnership with the African Union Commission (AUC) and its operational GMES & Africa initiative, taking into account requirements and capacities from African regional centres and programmes.

EO AFRICA R&D Facility is the flagship of ESA EO AFRICA with overarching goals of enabling an active research community and promoting creative innovation processes for the continuous development of African EO capabilities. The Facility offers a cloud computing infrastructure for the researchers (**Innovation Lab**), supports African–European research tandems, and delivers a range of collaborative capacity development activities (**Space Academy**) and initiatives between the African and European research communities based on a comprehensive review of African EO research challenges.

Objective

In collaboration with the AUC, the ESA EO AFRICA R&D Facility launches a call for research proposals to support African–European collaborative efforts to develop innovative, open-source EO algorithms and applications adapted to African solutions to African challenges by leveraging cutting-edge cloud-based data access and computing infrastructure.

Call for Research Proposals

The ESA EO AFRICA R&D Facility, in collaboration with AUC, will support **15 (fifteen)** research proposals for one-year projects, as follows:

Research Topics

Water scarcity and food security are the main themes for the recent phase of the EO AFRICA R&D Facility's Research Calls. The first year, covered by this call, focuses on **mapping and monitoring the environment**. Proposals in the following topics are encouraged to apply:

- Mapping water bodies and floods
- Mapping rainfall distribution
- Defining groundwater level in large basins
- Quantifying soil moisture
- Identifying and mapping crop types
- Identifying and mapping cropping areas
- Identifying and mapping crop stress/drought/failure
- Rangeland mapping
- Mapping deforestation
- Ocean survey for food resources
- Coastal survey for food resources

Application Criteria

Project proposals shall meet the following criteria:

- The project must be proposed by **two scientists representing a collaborative partnership of one African and one European research entity** (e.g., institute, laboratory, university). The co-principal investigators should possess a PhD degree relevant to the topics of the call or should be in the process of obtaining it as a PhD candidate.
- Project teams may include more researchers.
- Projects should be completed within **12 months**.
- Project proposals should **focus on one or more of the research topics** of the call.
- Each proposal is expected to have a research plan for the scientific cooperation of the African and European partner with the goal of developing an **innovative EO algorithm or workflow, preferably as an open-source interactive notebook** (e.g., Jupyter Notebook).
- The proposal should explain how the work will be shared among the partners, including the roles of project team members and their expected contributions.
- The proposed research can be linked to an ongoing (collaborative) project of the partners. Therefore, the proposal can present activities that would aim to expand further ongoing research work.
- Research plan should be accompanied by a detailed budget including anticipated cost items related to the research project.
- Proposed budget cannot include ICT resources for computing purposes (e.g., servers), as such resources will be provided by the Network of Resources of the ESA separately.
- Both partners have equal rights on the budget, so its allocation must be decided in a full agreement. Nevertheless, due to the governing regulations, the budget should be managed by the European partner.
- The **Innovation Lab** of the EO AFRICA R&D Facility **should be used for the development** of the algorithm/workflow, as well as other analyses and computations. Commercial use of the resources is not allowed.
- The developed algorithm/workflow **should utilize EO data from ESA missions**, such as Sentinel. Third-party data can be also utilized. The use of analysis-ready data and EO data services is encouraged.
- The developed algorithm/workflow and its application in the thematic context of the call **shall be published** at least in one international conference proceeding or in a peer-reviewed journal. Open-access publications are encouraged and will be supported by the Facility from an additional fund, thus open-access publication costs should not be included in the budget.

Funding and Benefits

The EO AFRICA R&D Facility will provide the selected projects with:

- A budget of up to **25,000 EUR** to cover research activities during the project period (max. 12 months), such as personnel costs, field work, data collection, bilateral visits, participation to scientific meetings, training activities, etc.
- **Free access** to cloud-based Virtual Research Environments (VREs) through the Innovation Lab of the Facility, which is an **interactive geospatial computing platform** with ready-to-use **EO software** and facilitated access to **EO data** (e.g., Sentinel and other ESA missions) through the host DIAS infrastructure. See Appendix for more information on VREs.
- Dedicated **user and technical support** for the use of VREs and development of geospatial computing workflows.

- **Scientific support and advice** by senior researchers and experts of the EO AFRICA R&D Facility consortium.
- **Access** to the EO AFRICA Space Academy and its Digital Campus for capacity and knowledge development activities, such as **online courses, webinars, and face-to-face training events** on topics related to EO, cloud computing, food security, and water scarcity.
- Integration into the **EO AFRICA Network** for international scientific networking, collaboration, and visibility.

Proposal Submission

The call is announced on **15 November 2021** and will be open for submission for **9 (nine) weeks**. The deadline for submitting a full proposal is **16 January 2022, 23:59 CET**.

The proposal submission shall include:

- Research proposal fully completed in all parts according to the provided template (English or French), duly signed by the African and the European Co-PIs and authorized representatives of the African and European research institutions,
- Detailed CV of the African co-principal investigator,
- Detailed CV of the European co-principal investigator,
- Short resumes of other researchers of the team.

The following items are optional and will be considered as assets:

- Support letter(s) from the beneficiaries,
- Any other relevant document.

Proposals shall be submitted as a single PDF document together with all supportive documents (e.g., CVs, support letters) to ESA through EO AFRICA R&D Facility via e-mail to: proposals@eoafrica-rd.org.

Evaluation

Proposals will be evaluated by an expert committee with members delegated by ESA, AUC, EO AFRICA R&D Facility. The following criteria will be considered:

- Level of innovation of the EO application with relevance to the topics of the call
- Addressing the specific needs in Africa
- Scientific soundness and maturity
- Making innovative use of digital tools
- Impact for fostering the use of EO data and services in Africa
- Balanced cooperation of the partners
- Background of the African and European co-principal investigators
- Geographic representation of Africa

The applicants will be informed about the result of the selection in an e-mail, and the list of awarded projects will be published on the EO AFRICA R&D website on **31 January 2021**.

The scientific content and the exact distribution of the budget for each selected project will be finalized in agreement with the EO AFRICA R&D Facility and co-principal investigators during the Kick-off Workshop on **1 March 2022** and will be authorized by ESA.

Relevant Links

EO AFRICA R&D website: https://www.eoafrica-rd.org/
EO AFRICA website: https://eo4society.esa.int/eo-africa/

Important Dates

Open Call	15 November 2021
Submission of Proposals	16 January 2022, 23:59 CET
Communication of Selection Results	31 January 2022
Kick-off Workshop	1 March 2022
Presentation of Project Results	28 February 2023

Contact

Any questions relating to the call should be sent by e-mail to proposals@eoafrica-rd.org, **no later than 2 (two) working days** before the submission deadline.

Appendix

Virtual Research Environments (VREs)

Each research team will have access to one or more VREs with the following features:

- 4 vCPU with Intel x86-64 architecture
- 32 GB RAM
- 100 GB SSD local storage for temporary storage
- SSD network storage for permanent storage (min. 1 TB)
- Direct network access to EO Data available on the host DIAS platform.
- JupyterLab interface with terminal and remote desktop access
- Pre-installed scientific computing, EO data analysis, and machine learning packages for accessing EO data services, developing EO algorithms and workflows, and visualizing results in interactive notebooks (e.g., Python and R packages)
- Pre-installed scientific and EO desktop software for pre-processing and other needs (e.g., SNAP, QGIS, Visual Code, RStudio, etc.)

GPU-enabled VREs with the following features will be available for specific needs, which are explicitly indicated in the proposal and quantified in terms of hours necessary:

- 12 vCPU with Intel x86-64 architecture
- 117 GB RAM
- 128 GB SSD local storage for temporary storage
- SSD network storage for permanent storage (min. 1 TB)
- Direct network access to EO Data available on the host DIAS platform.
- JupyterLab interface with terminal and remote desktop access
- Pre-installed scientific computing, EO data analysis, and machine learning packages for accessing EO data services, developing GPU-accelerated EO algorithms and workflows, and visualizing results in interactive notebooks (e.g., Python and R packages)
- Pre-installed scientific and EO desktop software for pre-processing and other needs (e.g., SNAP, QGIS, Visual Code, RStudio, etc.)