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Facilitating African-European R&D Partnership in Earth Observation Through Collaborative Research: EO AFRICA R&D Research Calls

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EO AFRICA R&D Facility aims sustainable adoption of Earth Observation related technologies in Africa through an African-European R&D partnership

- EO AFRICA R&D Facility is the **flagship** of the **African Union – ESA** long-term strategy initiative of African Framework for Research Innovation, Communities and Applications in Earth Observation (**EO AFRICA**).
- The Facility supports **capacity development for research** by organizing tailor-made domain-specific open-access massive open online course, webinars, online training courses, and face-to-face courses.
- The Facility supports **capacity development through research** by enabling research projects co-developed by African and European research tandems.
- The Facility operates a cloud-based geospatial **computing infrastructure** to support capacity development and research activities.

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During 2022-2024*, the Facility launched two* research project calls to support African-European collaboration in developing innovative EO solutions

- The focus is the development of **open-source EO algorithms and applications** adapted to **African solutions to African challenges** by making full use of the **digital transformation** in Africa and the observation capabilities of the **ESA and 3rd party missions** through a modern **cloud-based** approach.

- The basic conditions of the calls to fund 15 research each round are:
  - Two Co-PIs representing a **collaborative partnership** of one African and one European research entity.
  - Co-PIs holding **PhD** or being **PhD candidates**.
  - Use of **interactive notebooks** or similar tools to develop algorithms and workflows.
  - **Open-access** research outputs (e.g. code, data, publications).
  - At least one **peer-reviewed publication**.
  - Project duration of **12 months**.
  - Balanced budget of max. **25,000 €**, excluding ICT resources.
  - Use of the **Innovation Lab** with co-located data infrastructure, which is provided for free.

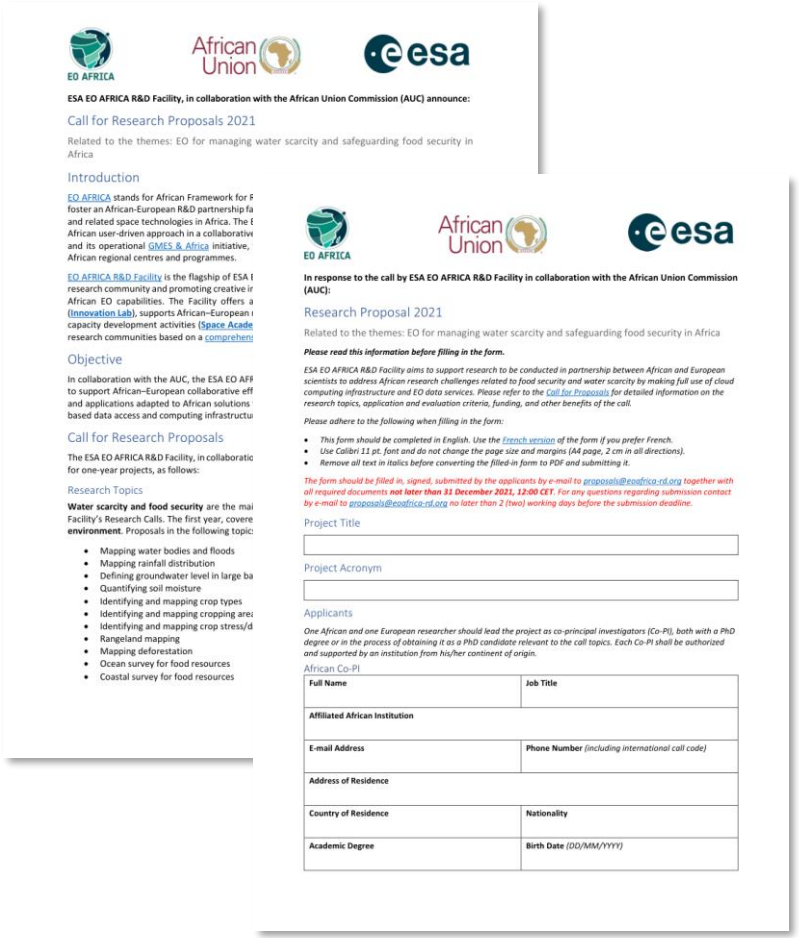
The research project calls aimed at addressing emerging research topics in food security and water scarcity in Africa

- The first call in 2021 focused on **mapping and monitoring the environment**, whereas the second call in 2022 focused on **modelling and monitoring of environmental processes**.

Coastal survey for food resources
Crop development and **yield forecast**
Defining **groundwater level** in large basins
EO support of **precision farming**
Forecasting **runoff and river discharge**
Forecasting **regional evapotranspiration**
Forecasting **hydrological stresses**
Forest and rangeland processes
Identifying and mapping **crop stress/drought/failure**
Identifying and mapping **crop types**
Identifying and mapping **cropping areas**
Irrigation demand estimation
Mapping **deforestation**
Mapping **rainfall distribution**
Mapping **water bodies and floods**
Ocean survey for food resources
Ocean/coastal processes related to food resources
Quantifying **soil moisture**
Rangeland mapping
(Other topics)

Bilingual research project calls were published to collect the proposals from African – European research tandems

- Preparation of the call, including the research proposal and collaboration agreement templates.
- Pre-announcement of the call.
- Publication of the call.
- Promotion of the call through various communication channels and scientific networks.
- Assistance to the researchers during the application period to answer their questions.
- Collection of the submitted research proposals.



EO AFRICA

African Union

esa

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 F
foster an African-European R&D partnership fa
and related space technologies in Africa. The
African user-driven approach in a collaborative
and its operational GMES & Africa initiative,
African regional centres and programmes.

EO AFRICA R&D Facility is the flagship of ESA
research community and promoting creative ir
African EO capabilities. The Facility offers a
(Innovation Lab), supports African–European
capacity development activities (Space Acade
research communities based on a comprehen

Objective

In collaboration with the AUC, the ESA EO AFR
to support African–European collaborative eff
and applications adapted to African solutions
based data access and computing infrastructu

Call for Research Proposals

The ESA EO AFRICA R&D Facility, in collaboratio
for one-year projects, as follows:

Research Topics

Water scarcity and food security are the mai
Facility's Research Calls. The first year, covere
environment. Proposals in the following topics

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

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African Union

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In response to the call by ESA EO AFRICA R&D Facility in collaboration with the African Union Commission (AUC):

Research Proposal 2021

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

Please read this information before filling in the form.

ESA EO AFRICA R&D Facility aims to support research to be conducted in partnership between African and European scientists to address African research challenges related to food security and water scarcity by making full use of cloud computing infrastructure and EO data services. Please refer to the Call for Proposals for detailed information on the research topics, application and evaluation criteria, funding, and other benefits of the call.

Please adhere to the following when filling in the form:

- *This form should be completed in English. Use the French version of the form if you prefer French.*
- *Use Calibri 11 pt. font and do not change the page size and margins (A4 page, 2 cm in all directions).*
- *Remove all text in italics before converting the filled-in form to PDF and submitting it.*

The form should be filled in, signed, submitted by the applicants by e-mail to proposals@eoafrica-rd.org together with all required documents ***not later than 31 December 2021, 12:00 CET****. For any questions regarding submission contact by e-mail to proposals@eoafrica-rd.org no later than 2 (two) working days before the submission deadline.*

Project Title

Project Acronym

Applicants

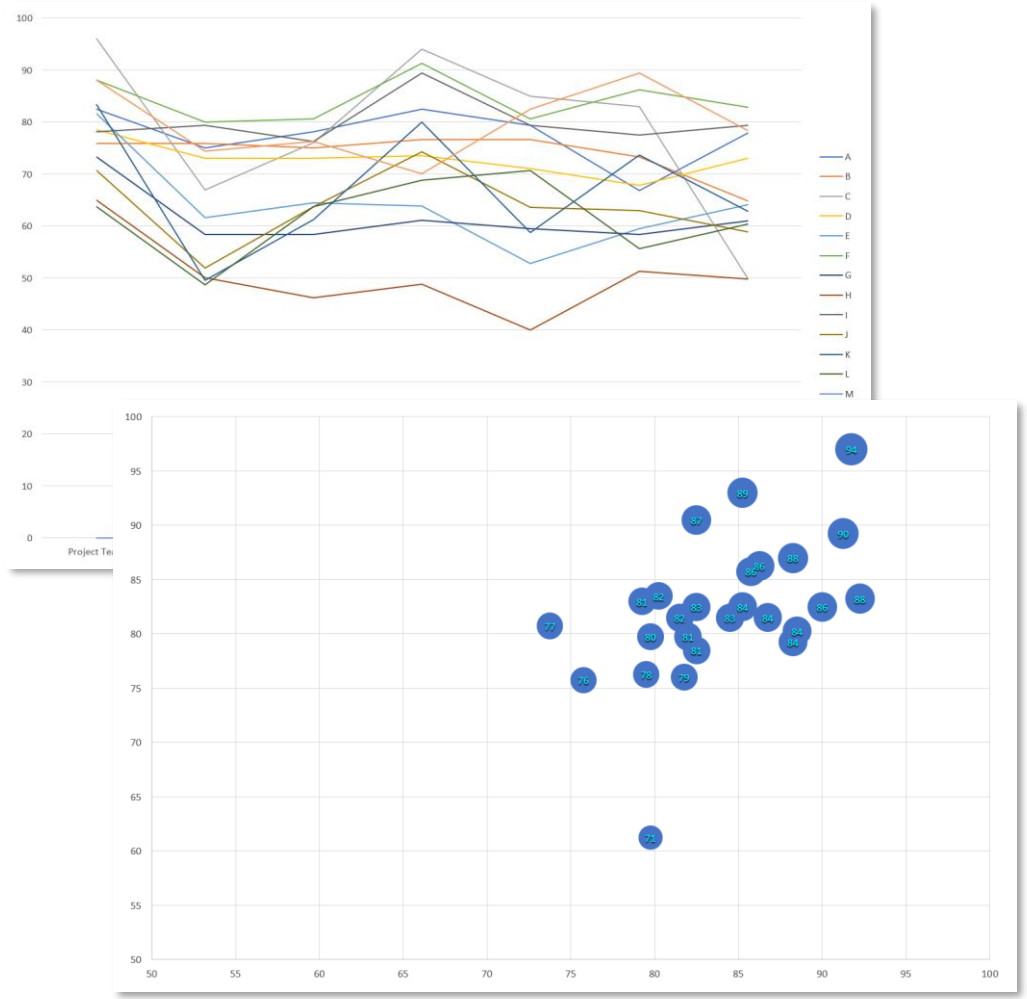
One African and one European researcher should lead the project as co-principal investigators (Co-PI), both with a PhD degree or in the process of obtaining it as a PhD candidate relevant to the call topics. Each Co-PI shall be authorized and supported by an institution from his/her continent of origin.

African Co-PI

Full Name	**Job Title**
Affiliated African Institution	
E-mail Address	**Phone Number** *(including international call code)*
Address of Residence	
Country of Residence	**Nationality**
Academic Degree	**Birth Date** *(DD/MM/YYYY)*

Collected proposals were reviewed and ranked by an expert evaluation committee for the final selection by AUC and ESA

- **Eligibility check** of the submitted research proposals.
- Establishment of the **Evaluation Committee** to review the submitted proposals.
- **Review** of the eligible research proposals by the Committee.
- **Shortlisting** of the eligible research proposals based on the results of the evaluation.
- **Pre-selection** of the research proposals for funding by the Committee, considering geographic balance.
- **Final selection** of the research proposals for funding by AUC and ESA.



An exhaustive evaluation process was conducted considering 33 criteria grouped under 6 categories

- Each proposal was evaluated by **2 reviewers for 33 criteria in 6 categories**.
- Final ranking was determined by using **weighted sum of the category scores** (0-100) and considering **suggestions of the reviewers** (not recommended, recommended, highly recommended).
  - Research Team: 15%
  - Proposed Work: 30%
  - Impact and Innovation: 25%
  - Use of EO Data: 10%
  - Computing Infrastructure: 15%
  - Budget: 5%
- If reviewer scores were **significantly different**:
  - **Consensus score** of two reviewers.
  - Evaluation by a **3rd reviewer.**

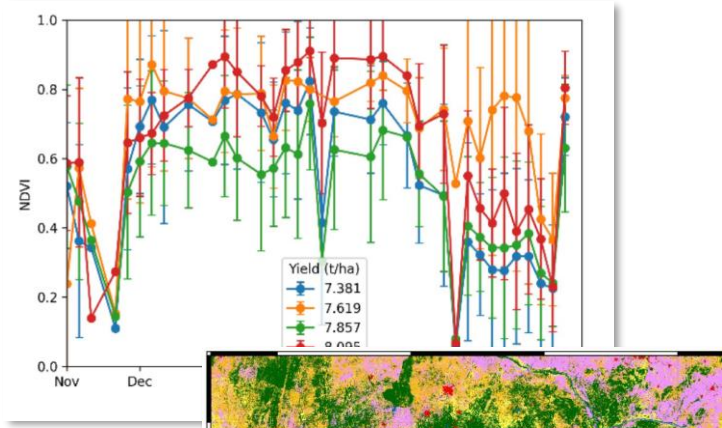
	Evaluation Criteria		Score
Eligibility	Eligible African Co-PI	Yes	
	Eligible African Research Institution	Yes	
	Authorized support of the African Institution	Yes	
	Eligible European Co-PI	Yes	
	Eligible European Research Institution	Yes	
	Authorized support of European Institution	Yes	
	Acceptance of the terms	Yes	
Project Team	Scientific background of the African Co-PI	Strong	
	Scientific background of the European Co-PI	Strong	
	Number of African team members	2	100
	Number of European team members	1	
	Background of the team members	Strong	
Proposed Work	Abstract reflecting the proposal	Yes	
	Study area	National	
	Problem statement and scientific background	Strong	
	Scientific and methodological approach	Strong	90
	Validation of the method and results	Strong	
	Feasible timeline	Yes	
	Balanced workload for the African partner	Strong	
Innovation and Impact	Innovation brought by the proposed approach	Sufficient	
	Potential impact in fostering use of EO in Africa	Strong	
	Relevance to the topics of the call	Yes	
	Relevance to the specific needs in Africa	Strong	
	Expected beneficiaries	Strong	80
	Support letter from the expected beneficiaries	No	
	Number of planned publications	2	
	Reference to Open Science principles	Strong	
	Reference to outreach activities	Weak	
Data	Use of ESA and 3rd Party Mission EO data	Strong	
	Use of non-ESA EO data		80
	Use of in-situ and ancillary data	Weak	
Computing	Innovation Lab compatible computing workflow	Yes	
	Use of desktop software	Yes	
	Use of progamming languages and packages	Sufficient	
	Use of interactive workflows	None	80
	Data storage required	1-5 TB	
	GPU required	No	
	Other special computing needs	Yes	
Budget	Budget outline	Strong	
	Proper allocation of budget	Strong	100
	Overall score	87	

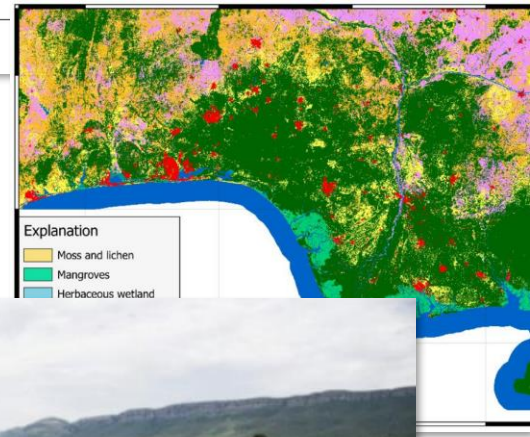
Each starting research project helped to grow the R&D community focusing of collaboration in EO science and research

- **Coordination meeting** with the applicants of the awarded research proposals.
- Clarification of **project timelines** and necessary **ICT resources** of the awarded proposals.
- Signature of **trilateral collaboration agreements** for the awarded research proposals.
- **Public announcement** of the awarded research proposals.
- **Kick-off meeting** with the research project teams.
- Setup of **virtual research environments** for the research project teams.

Technical and scientific support were provided during the lifetime of the research projects by the Facility

- **Operation of the virtual research environments** during the lifetime of the research projects.
- **Technical support** on the virtual research environments during the lifetime of the research projects.
- Establishment of a **scientific discussion forum** for the research projects.
- Facilitation of the research project teams' **integration** into the EO AFRICA community.
- Publicity of the research projects through **social media and blog posts**.
- Evaluation of the **mid-term progress reports** of the research projects.
- Evaluation of the **final reports** of the research projects.





In total 30 research projects were funded and successfully completed in 3 years with collaborative open research code, open research data, and scientific publications

1st Call

Overall scores: max. 94 – min. 29

Min. average score shortlisted: 75

All "highly recommended"

12 African and 9 European countries

2nd Call

Overall scores: max. 98 – min. 47

Min. average score shortlisted: 56

All "highly recommended"

12 African and 9 European countries

https://eoafrica-rd.org/research/research-project-outputs/

Why to submit a proposal for the EO AFRICA R&D Facility?

Listen to awarded researchers, they will give you good reasons!

EO AFRICA

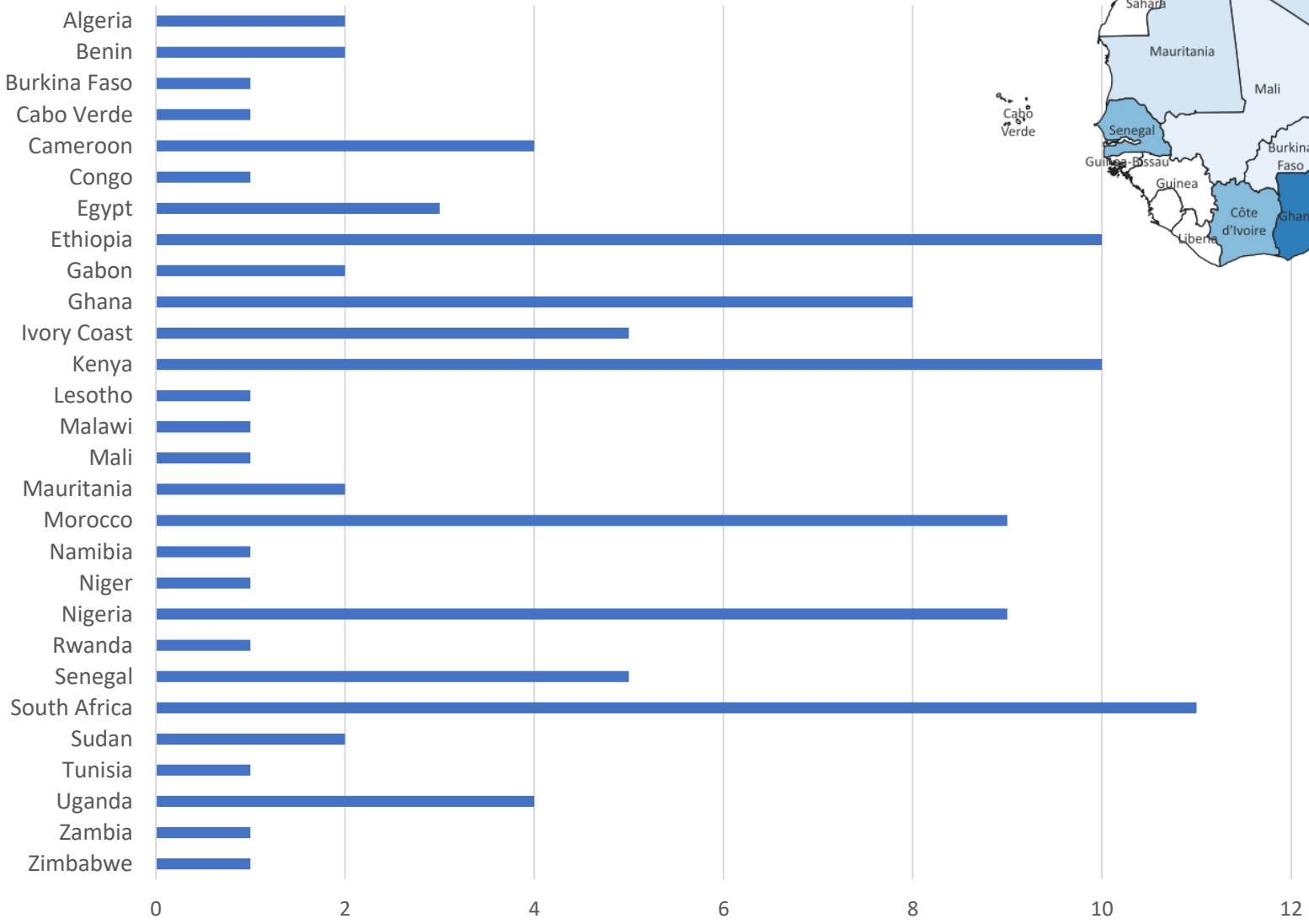
… or you can simply as them during the coffee breaks!

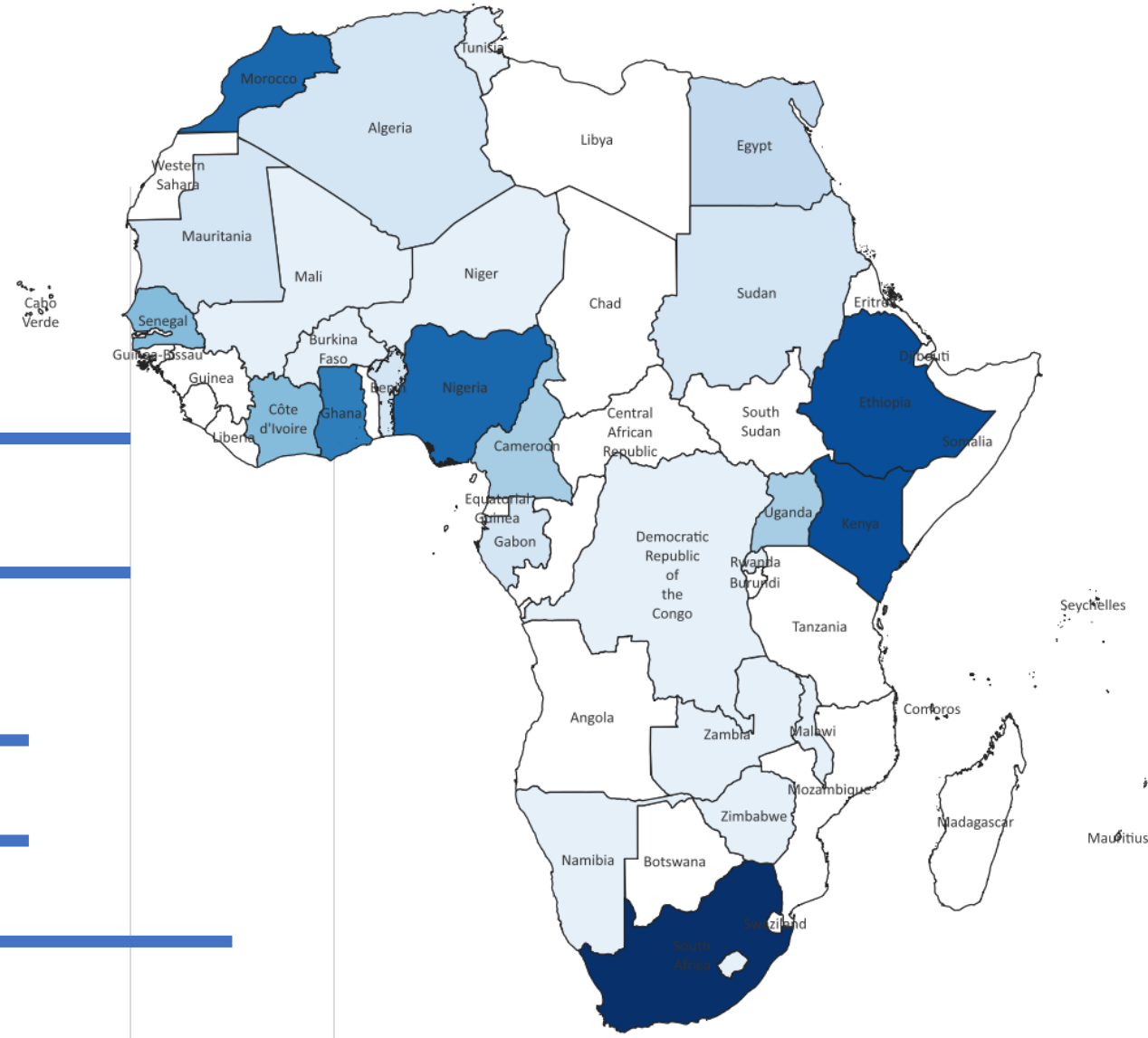
More than 100 project proposals were received from African and European co-investigators affiliated with public and private research institutions

- **80 unique African institutions** in **28 African** countries, in collaboration with **17 European** countries submitted proposals covering a wide range of topics such as crop monitoring, yield forecasting, climate change, flood mapping, livestock mapping, soil monitoring, lake monitoring, biodiversity, etc.

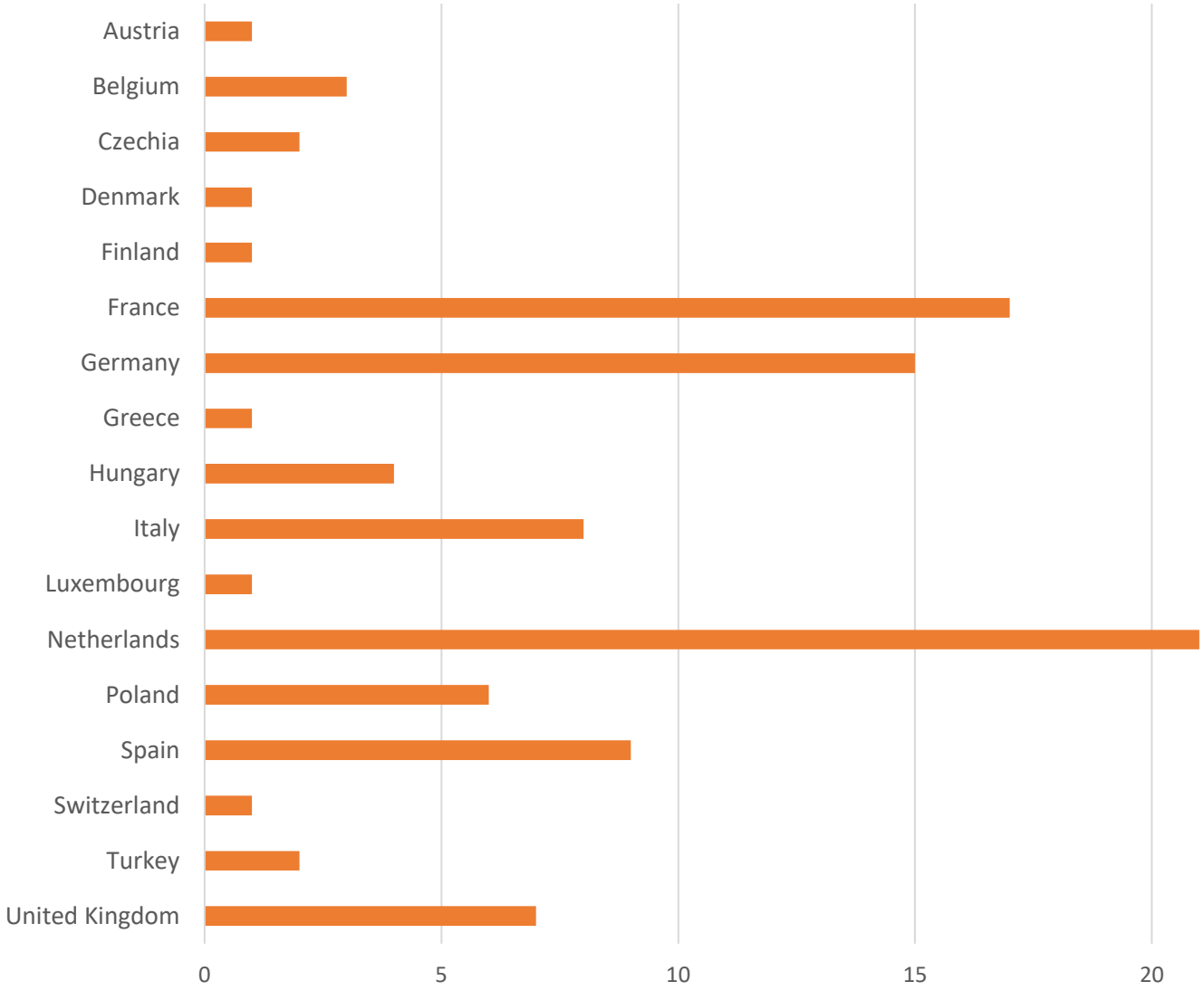
Addis Ababa University
African Union Development Agency
AGRHYMET
Agricultural Research Corporation
Agriculture Research Council
Alternatives Plus
Arba Minch University
Association Les Amis de Géospatialisation et de la Nature
Bahir Dar University
Bolgatanga Technical University
Cadi Ayyad University
Center for Earth Observation and Environmental Research
Centre de Suivi Ecologique
Centre Royal de Télédétection Spatiale
Centre Universitaire de Recherche de d'ápplication en Teledetection
Chouaib Doukkali University
Dedan Kimathi University of Technology
Egyptian Meteorological Authority
Engeo Consulting Services
Ethiopian Space Science and Geospatial Institute
Ethiopian Space Science and Technology Institute
Faculté des Sciences de Rabat
Hassan First University
Ibn Tofail University
Institut de l'Olivier
Institute of Space Research and Aerospace
Jimma University Institute of Technology
Kenya Forestry Research Institute
Kenya Water Institute
Kenyatta University
Koforidua Technical University
Kwame Nkrumah University of Science and Technology
Ladoke Akintola University of Technology
Lagos State University
Makerere University
Malawi University of Science and Technology
Mohammed VI Polytechnic University
Moi University
National Institute for Agricultural Research
National Institute of Agricultural Research & Rural Development
National School of Forest Engineers
National Space Research and Development Agency
National University of Lesotho
Nile Basin Initiative Secretariat
RCMRD
Simon Diedong Dombo University of Business and Integrated Development Studies
Sol Plaatje University
Tanta University
Technical University of Kenya
The Federal University of Technology
Univerity of Zambia
Universite Cheikh Anta Diop
University Ibn Khaldoun of Tiaret
University of Cape Town
University of Dschang
University of Environment and Sustainable Development
University of Free State
University of Ibadan
University of Namibia
University of Oran 1 Ahmed Ben Bella
University of Parakou
University of Pretoria
University of Rwanda
University of The Witwatersrand
University of Western Cape
University of Witwatersrand
University of Zimbabwe
University Omar Bongo
Université Assane SECK de Ziguinchor
Université Cheikh Anta Diop
Université de Maroua
Université de Ngaoundéré
Université de Nouakchott Al-Aasriya
Université des Sciences Sociales et de Gestion de Bamako
Université Felix Houphouët-Boigny
Université Marien Ngouabi
Université Thomas Sankara
Université Virtuelle de Côte d'Ivoire
Universtié d'Abomey Calavi
Wikite University

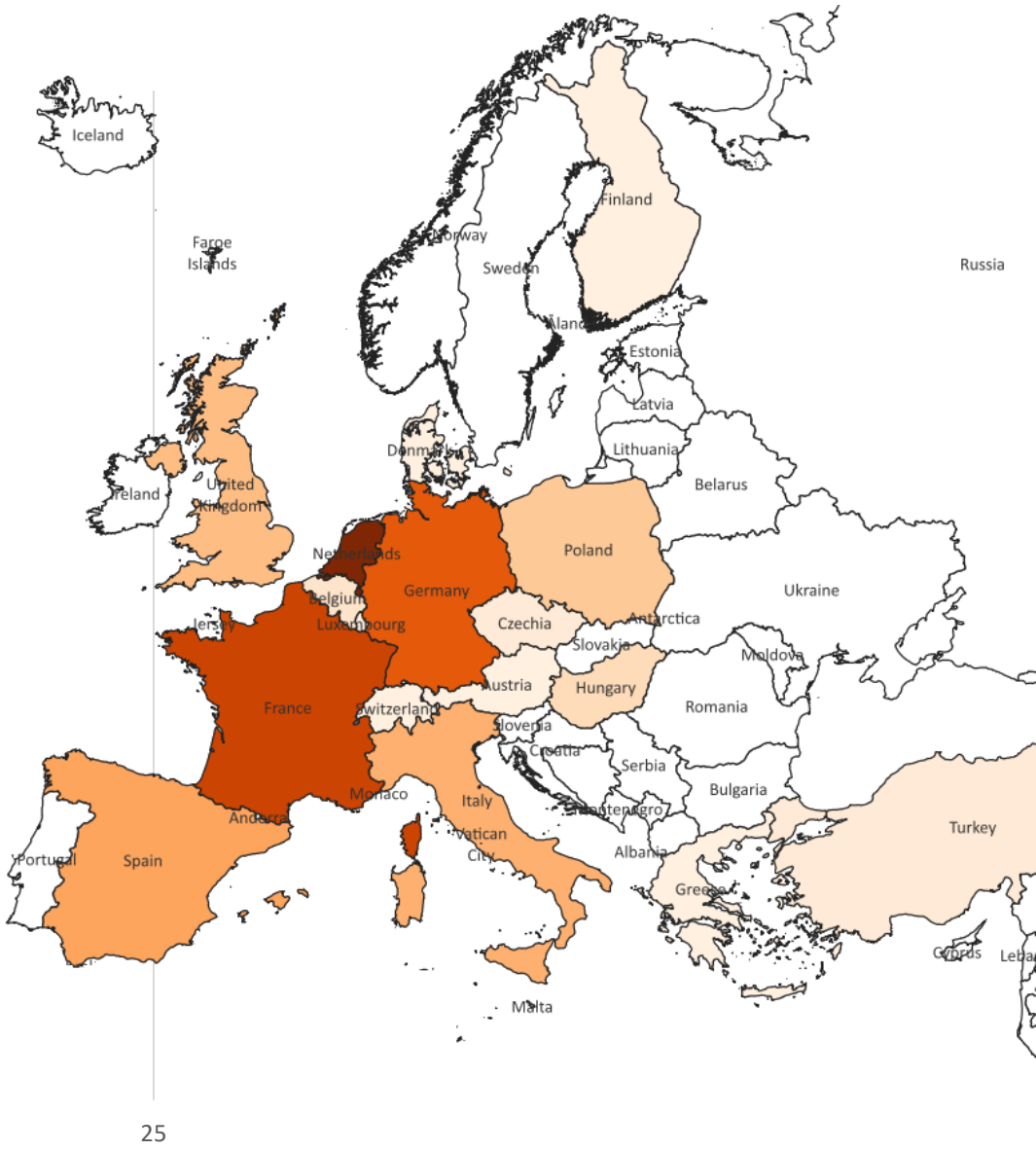
Distribution of the African countries



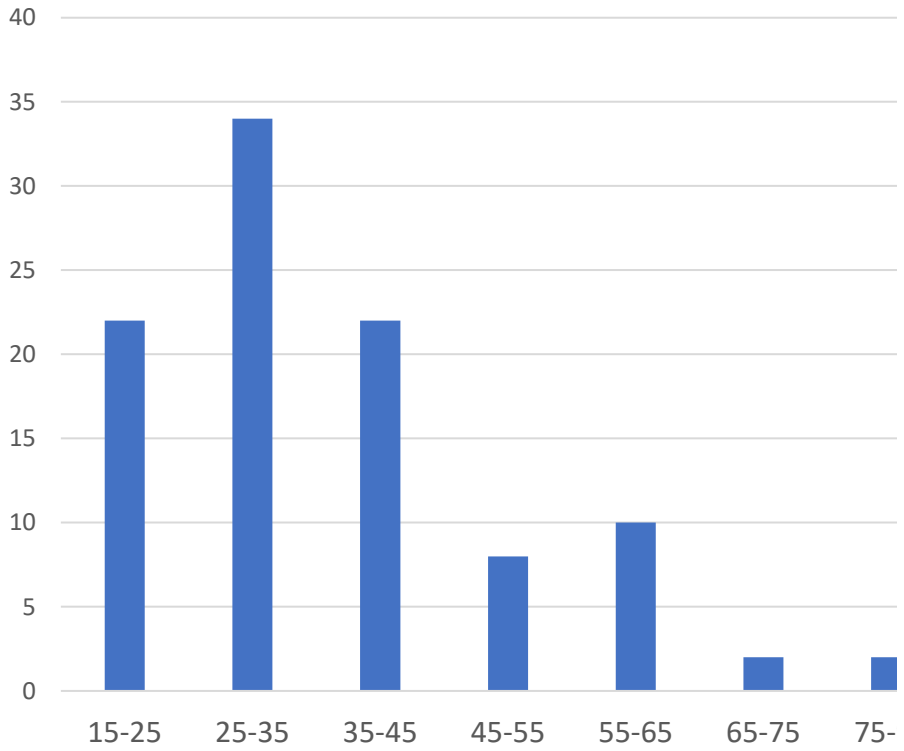


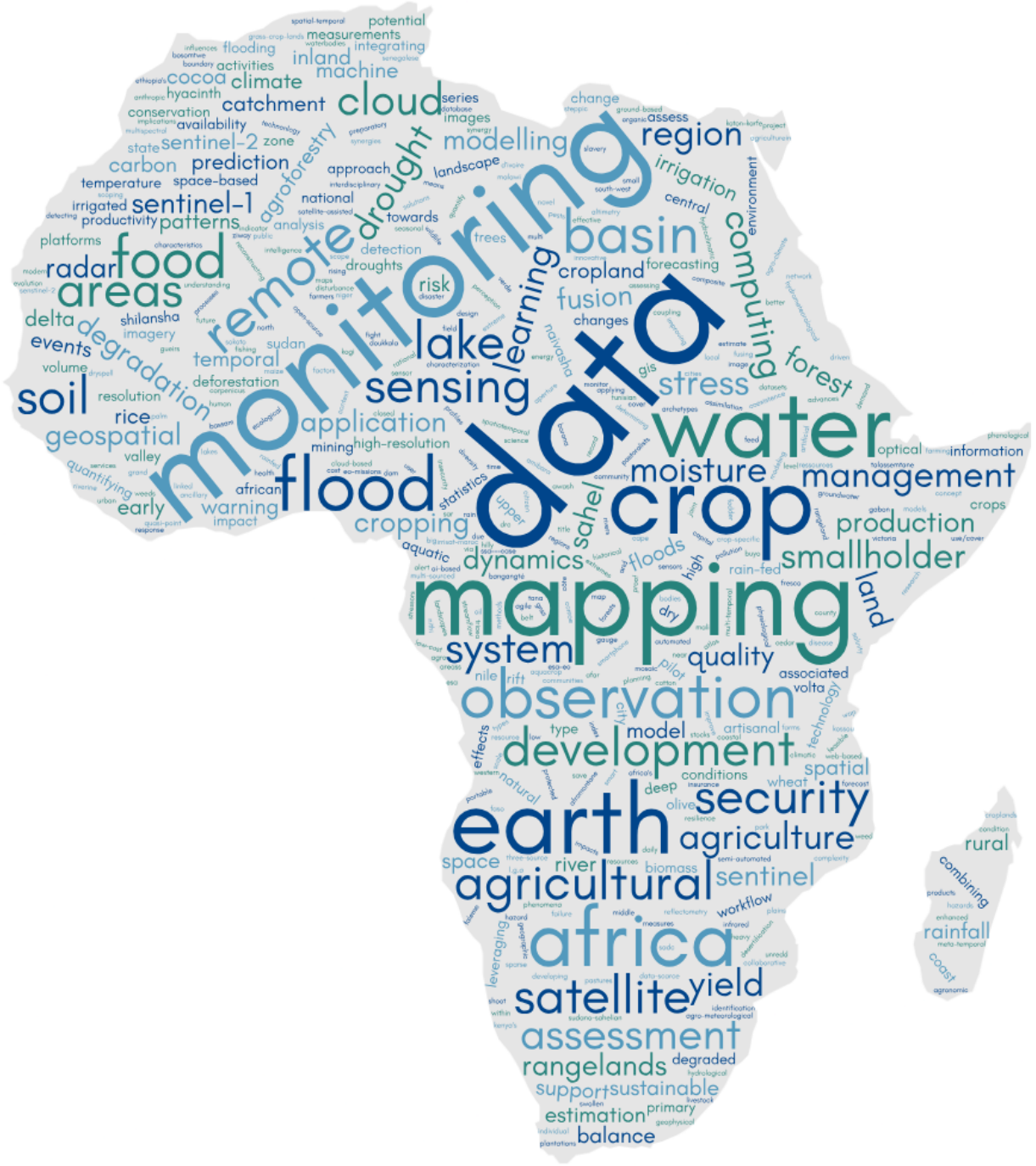
Distribution of the European countries



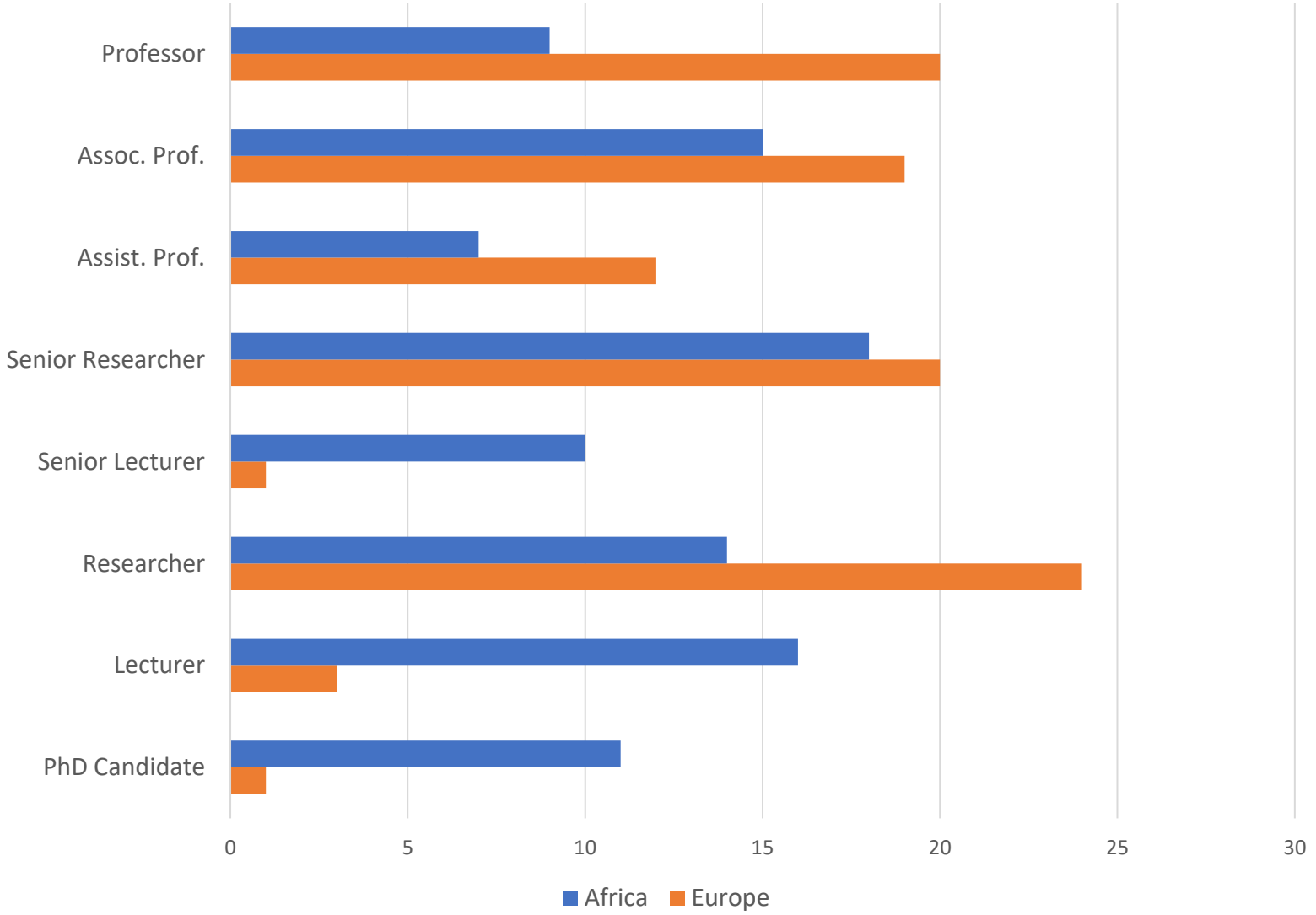


Overview of the proposal topics

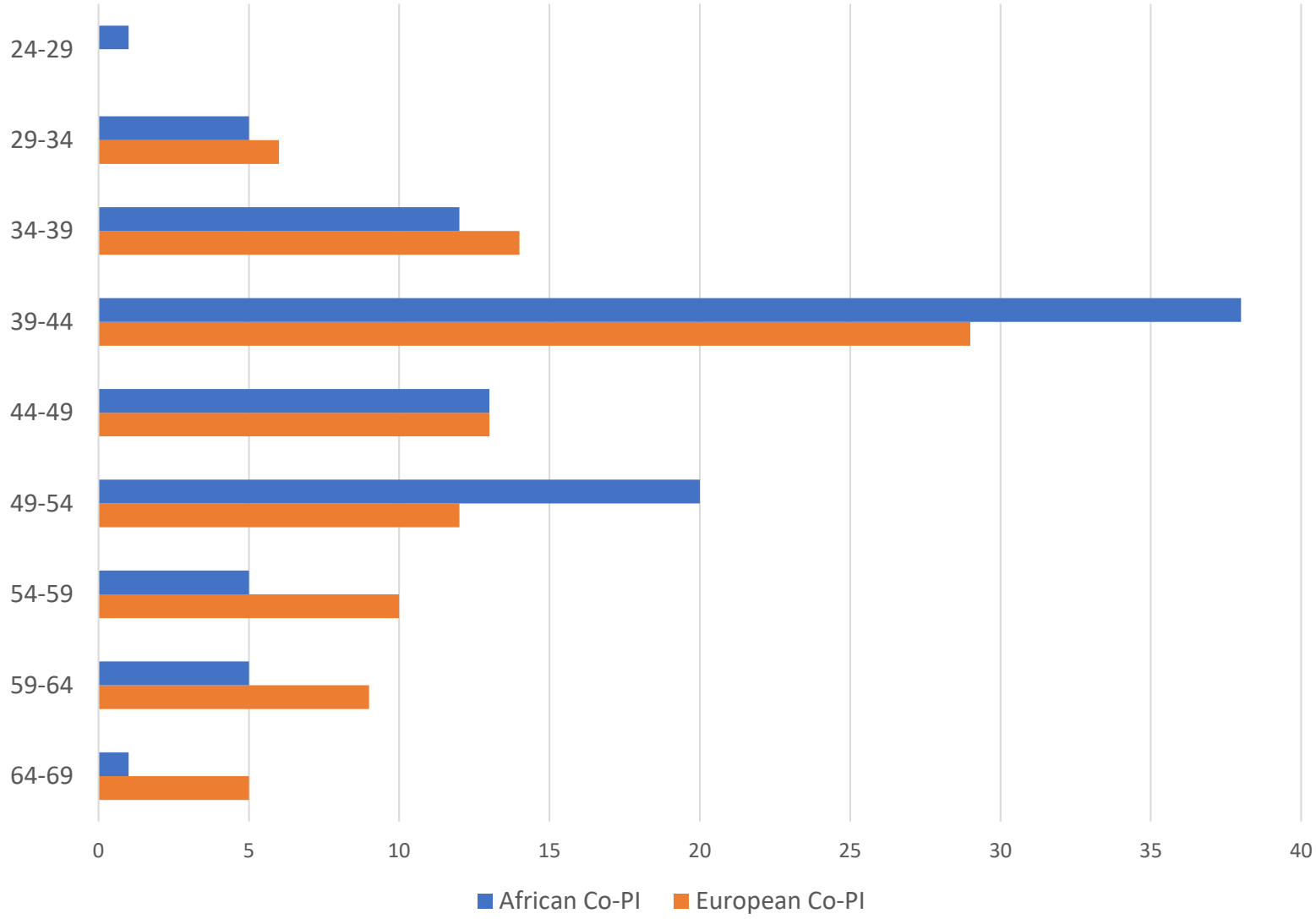


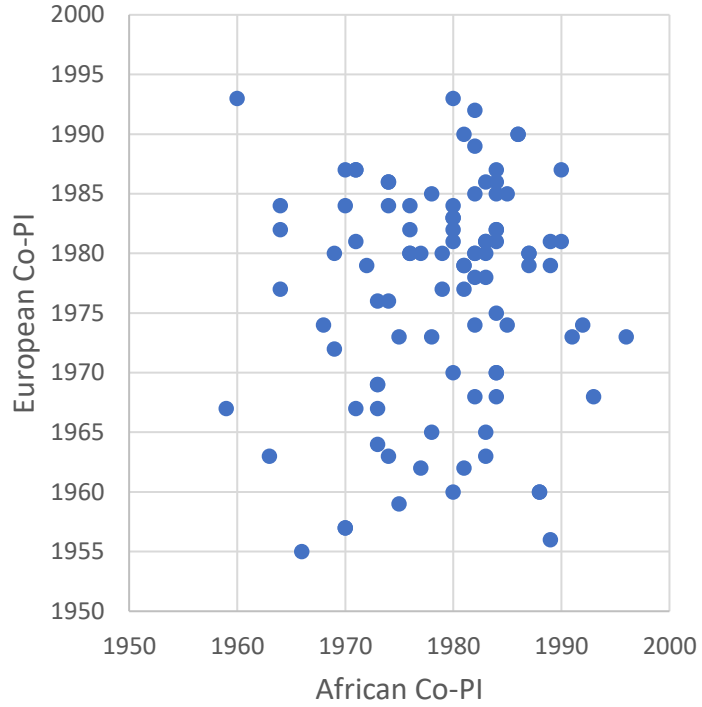


Distribution of the profiles of the co-applicants

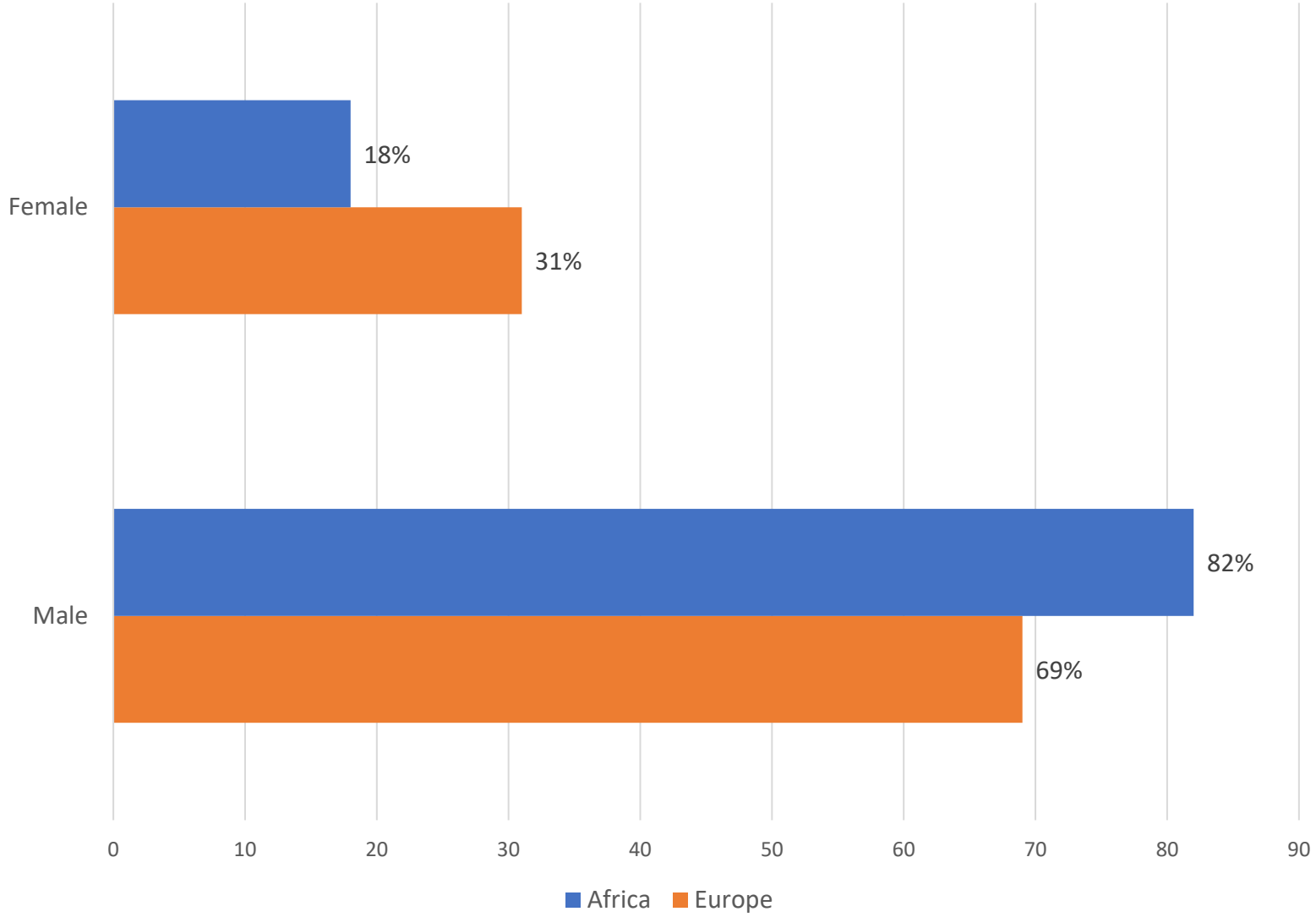


Distribution of the ages of the co-applicants

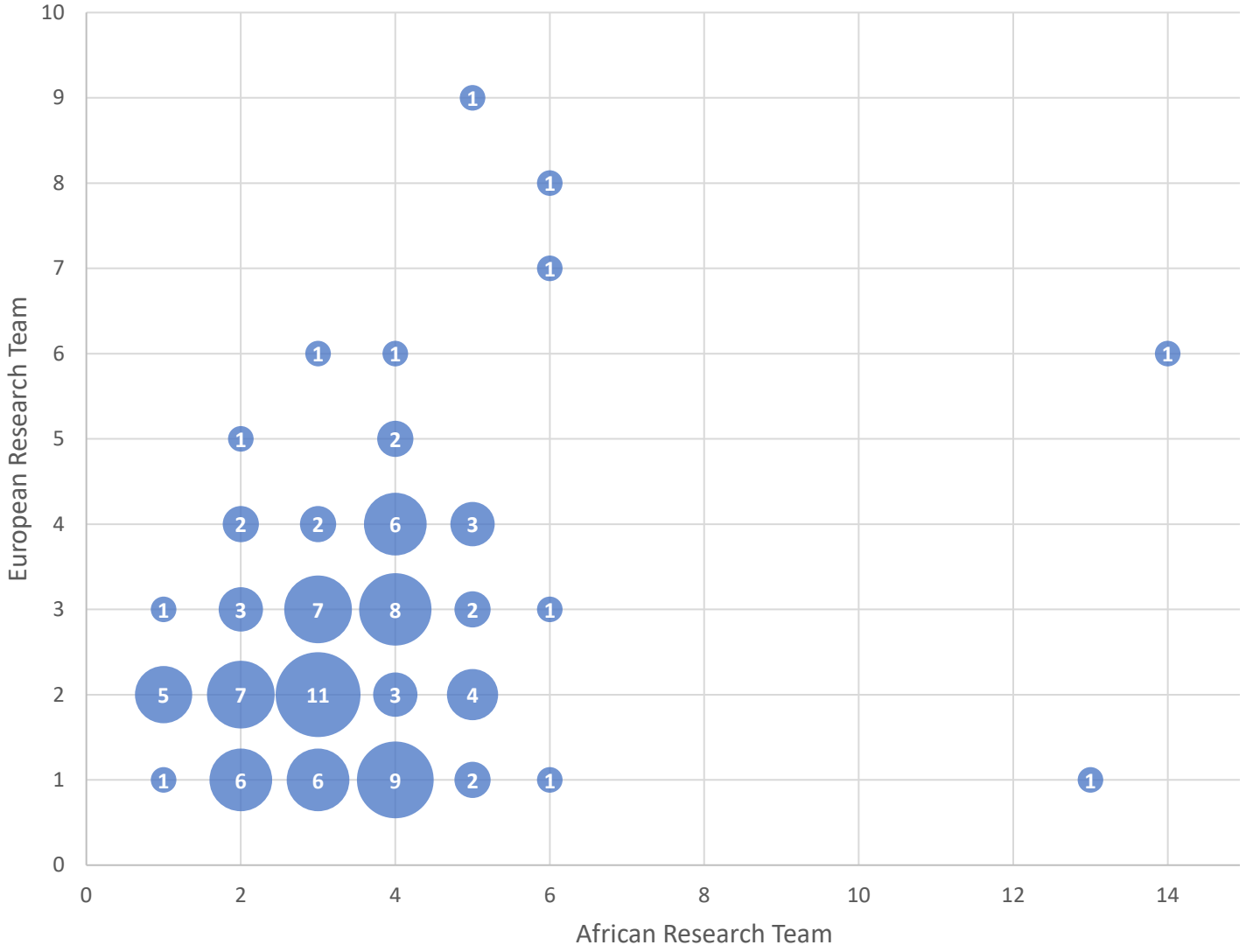


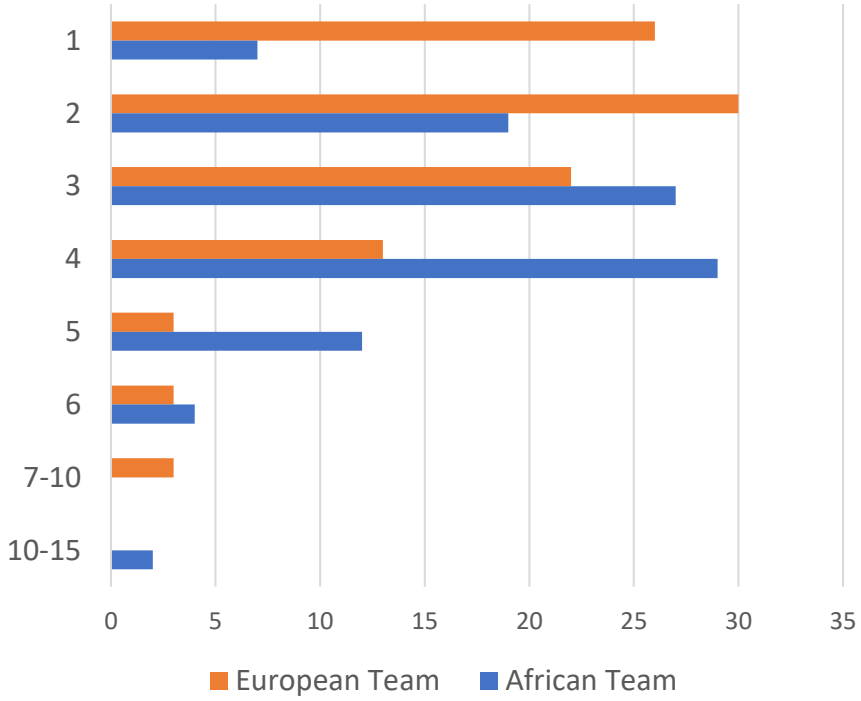


Gender balance of the co-applicants



Distribution of the sizes of the research teams





As a community we learned lessons while running the projects calls and the research projects

- The calls enabled new connections to be formed between African and European research groups, which didn't work together previously.
- The call enabled African researchers to learn how to use cloud-computing infrastructure for geo-information science and EO purposes.
- Estimating computing resources needed to perform proposed research activities is challenging.
- Although provided funding was limited, it was sufficient to perform a wide range of activities. However, transfer of the funds to African partners were challenging.
- A significant number of African project team members participated capacity development activities. But more is required.
- Publishing open-source research code and open-access data seem to be at their infancy.
- Small funding can initiate strong collaboration between African and European research groups. This doesn't need to be limited to research activities but can also cover training and capacity development.

We will be happy to have your questions, feedback, and comments!

Dr. Serkan Girgin

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