African Earth Observation Community for Advanced Research on Water Scarcity and Food Security

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The EO AFRICA R&D Facility

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Acknowledgement

This presentation is based on the work of the EO AFRICA R&D Facility Consortium, with the support of the European Space Agency. Main contributors are:

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Matthias Schramm – TU Wien

Leaving out someone from this list is not negligence but amnesia…

EO AFRICA R&D Facility

- **EO AFRICA R&D Facility** is a flagship programme of the **EO AFRICA** Initiative with an overarching **long-term** (>10 years) goal of supporting an African-European collaboration to enable an **active research community** and **creative innovation processes** for a continuous development of **EO capabilities** in Africa.
- The facility aims to support **capacity development** through and for research.
- This approach **complements** other related programmes, such as GMES & Africa, and contributes to an active community of EO experts in Africa.
- The facility is implemented by a consortium of six partners in **3 years** based on ESA's experience of the **TIGER Initiative** that provided capacity building through research in Africa in the last 15 years.

More about the EO AFRICA initiative: https://eo4society.esa.int/eo-africa/

The EO AFRICA R&D Facility Consortium

The six consortium partners are:

- ITC Faculty of the University of Twente (NL)
  Lead partner
- CS Group (FR)
  ICT partner
- CS Romania (RO)
  ICT partner
- Serco (IT)
  Capacity development in EO technology
- VITO (BE)
  Capacity development in food security
- TU Wien (A)
  Capacity development in water scarcity

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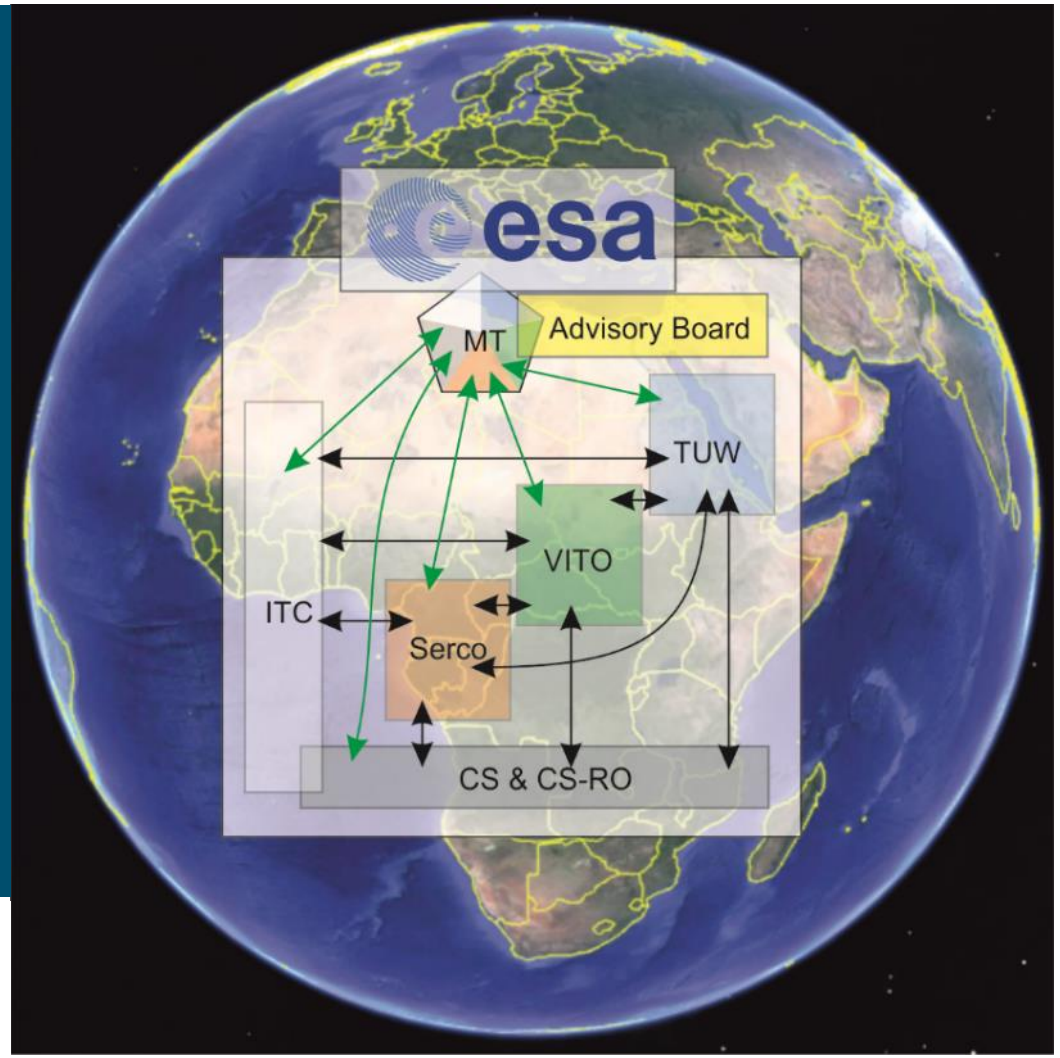
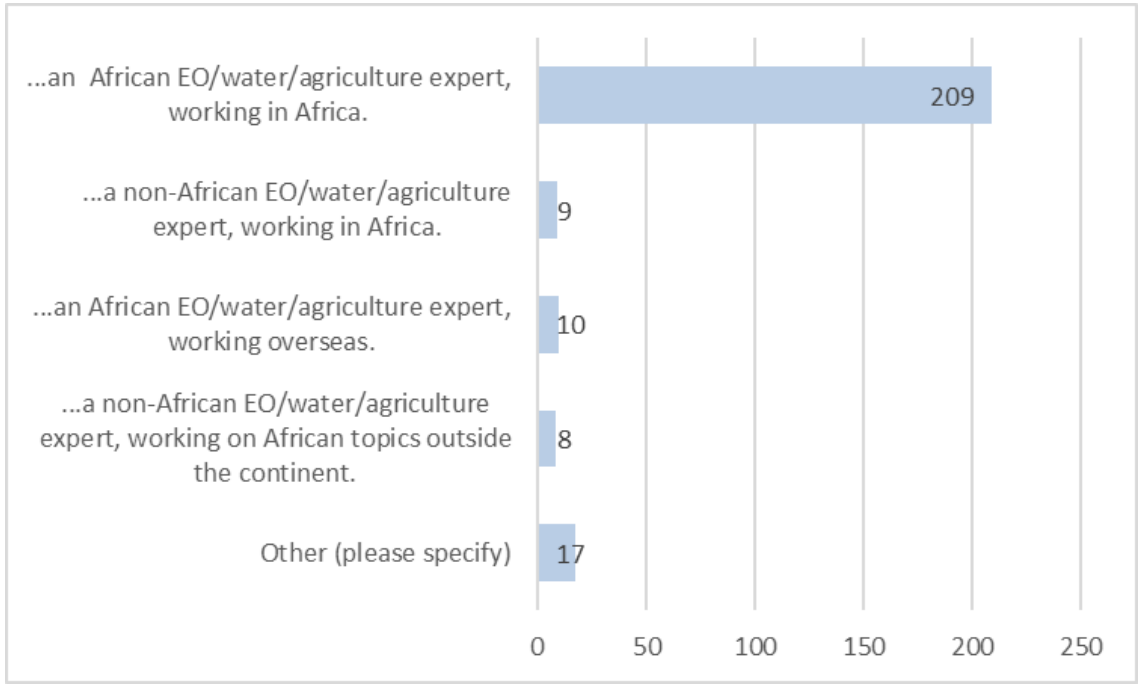
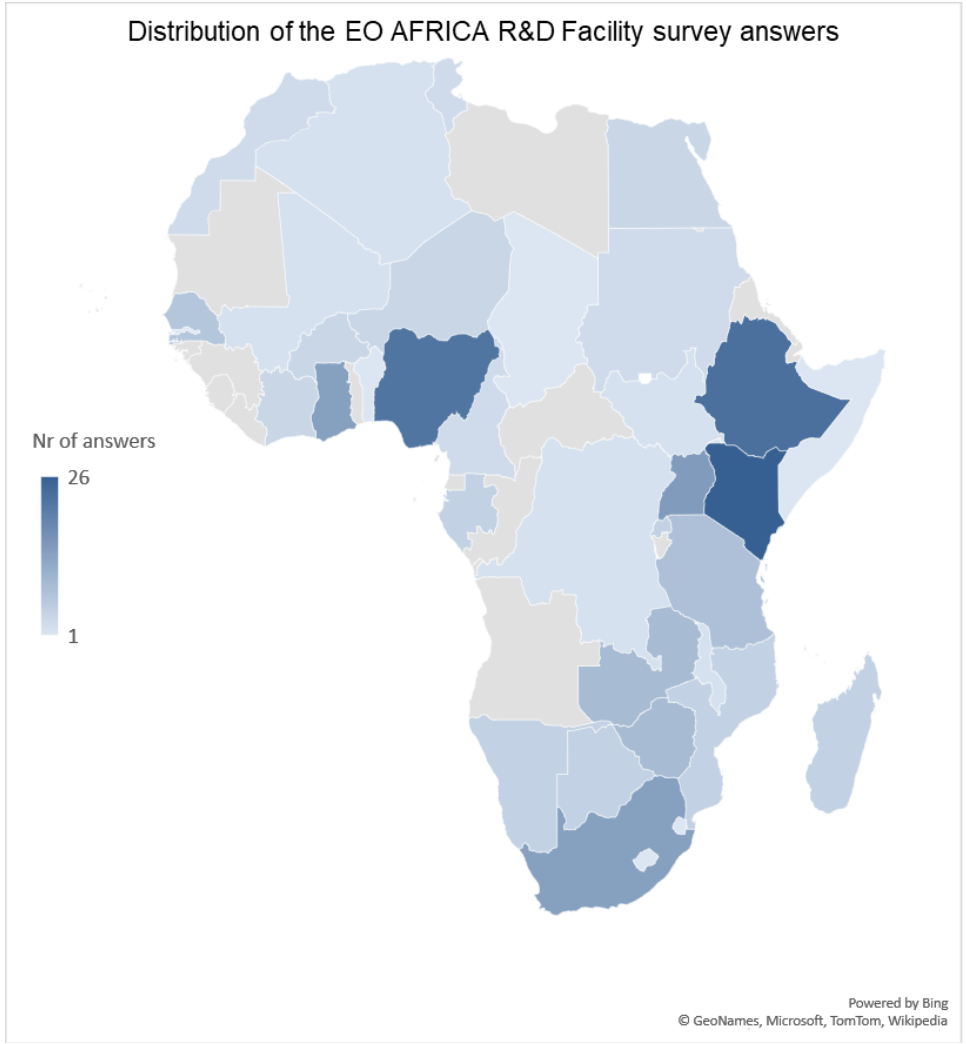


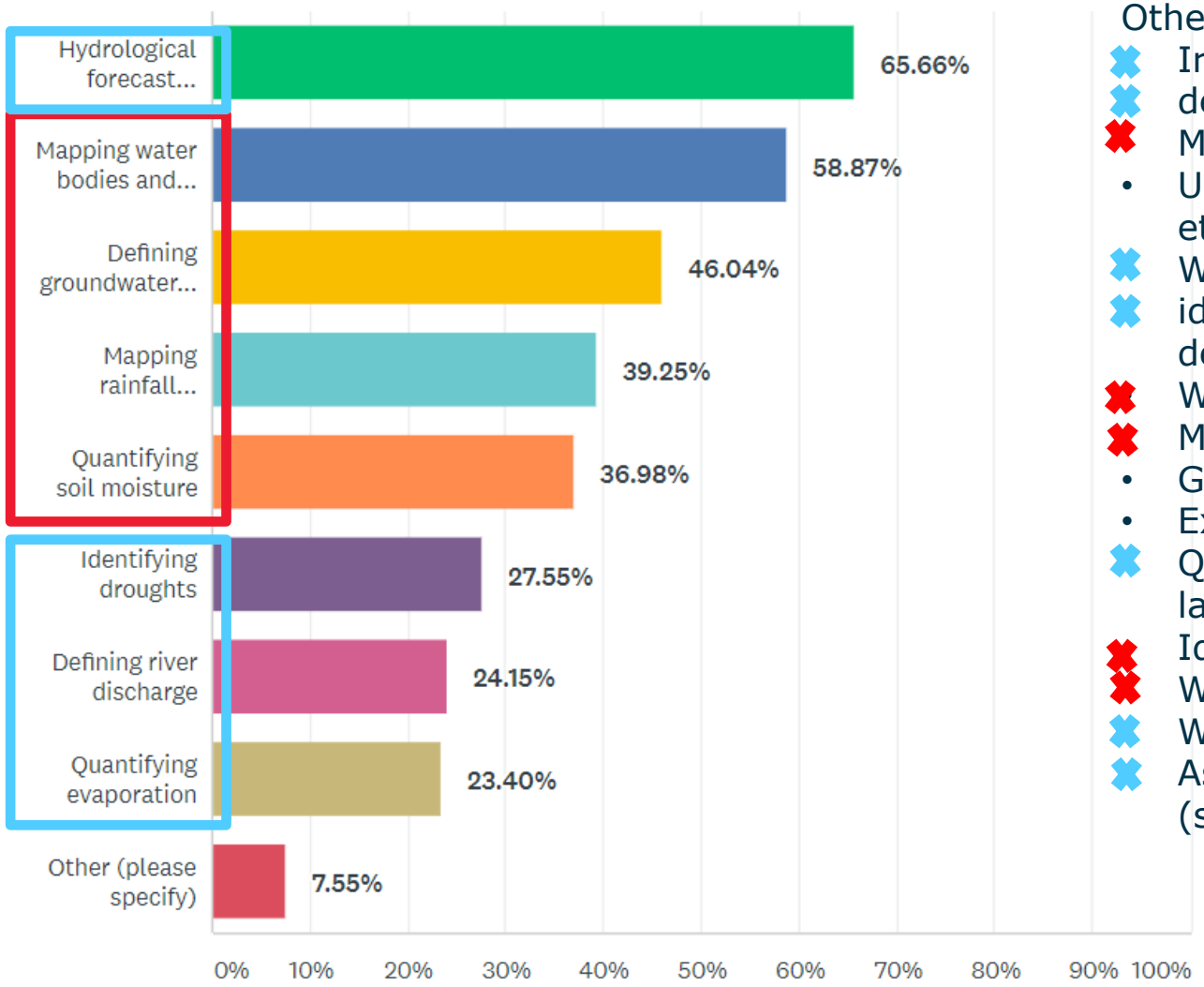
The EO AFRICA community survey

- A survey in English and French to map the EO Community in Africa
- More than 250 answers from professionals:





Q6: Identify the three most important water-related challenges in your region/country, in which EO could contribute to the solution.



Others:

- Irrigation water accounting
- degradation
- Mapping irrigated areas
- Use modern digital ICT equipment or Earth setlights, Drones etc
- Water accounting
- identifying/mapping/monitoring riverine/buffer zone degradation
- Water quality monitoring
- Marine Spatial Mapping
- GEOSPATIAL INTELLIGENCE
- Extreme events
- Quantifying accurate method for define pollution in rivers and lakes
- Identify marshy
- Wetland grass biomass
- Water use by agriculture, forestry and invasive plants
- Assessment of the spatio-temporal impacts of hydrology (surface, soil and climate - rainfall) on gully erosion

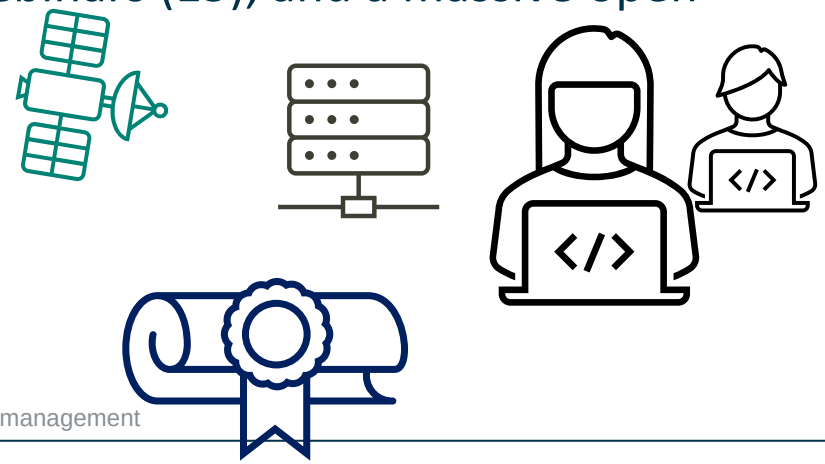
Survey of environment
Analysis of processes, effects

EO AFRICA R&D Facility 3-year Activities

1. Offering **technical and financial support for 30 research studies** to address African EO research challenges related to **water scarcity and food security**.
   - **2** consecutive calls for max. **12-month** projects of African **and** European research partners
   - **25k EUR** research budget (**750k EUR total**) + **ICT infrastructure** + technical/scientific support
   - The selection results of the proposals will be announced in **mid-February**.

2. Establishing a **digital capacity development platform** **(DIGITAL CAMPUS)** to provide domain-specific training through face-to-face courses (10), online courses (10), webinars (15), and a massive open online course **(SPACE ACADEMY)**

   Target: > 2,000 participants

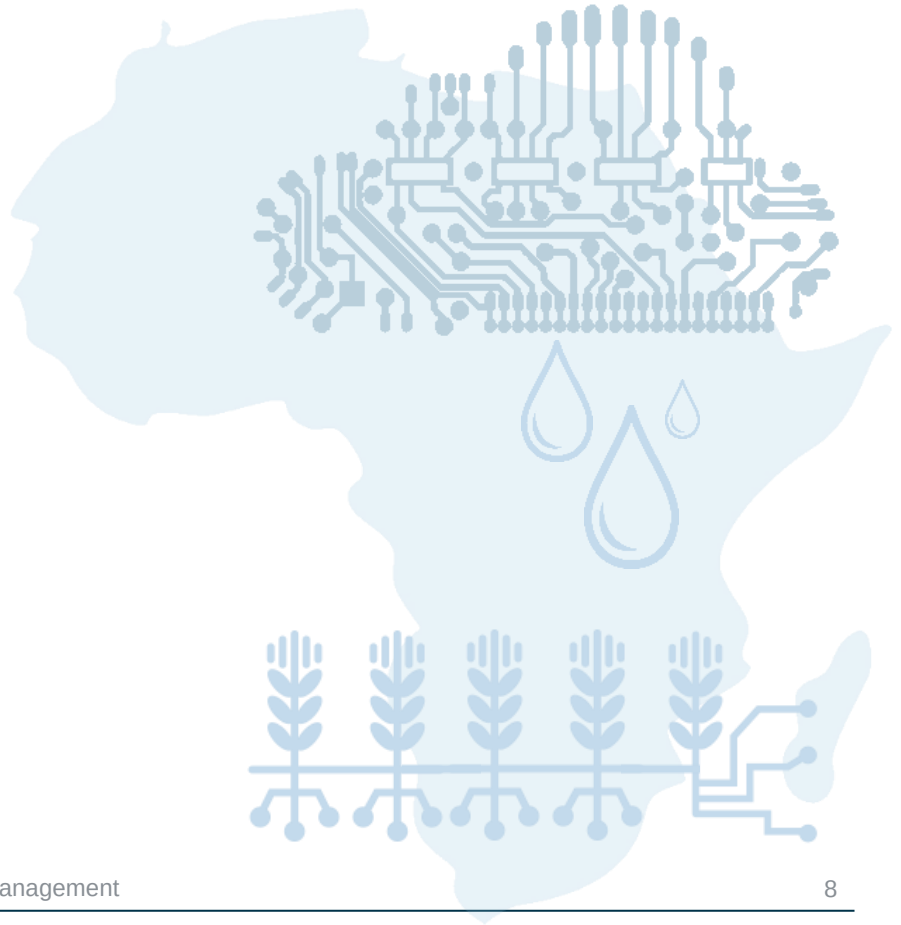


For more information: http://www.eoafrica-rd.org

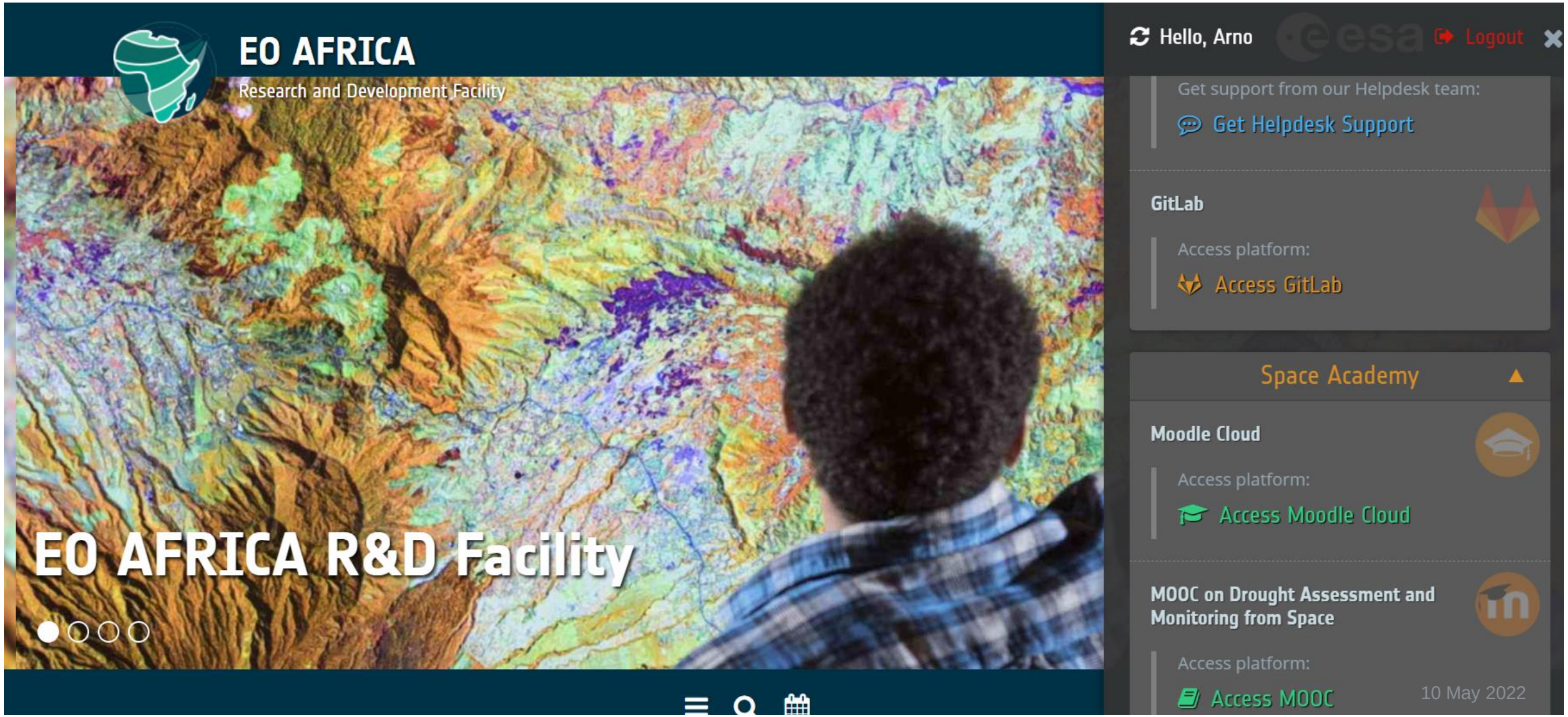
EO AFRICA R&D Facility 3-year Activities

3. Providing a **cloud-based EO data analysis environment** to support researchers in accessing and utilizing EO data to produce **high-level products** and develop **innovative EO applications**. **(INNOVATION LAB)**

The EO AFRICA Innovation Lab aims to simplify access to **data and products** (in-situ and EO) and use of **open-source code** (algorithms, models, tools) to obtain information relevant for **SDGs**, as well as to develop original algorithms and applications **adapted to African** solutions.



Website: https://www.eoafrica-rd.org/



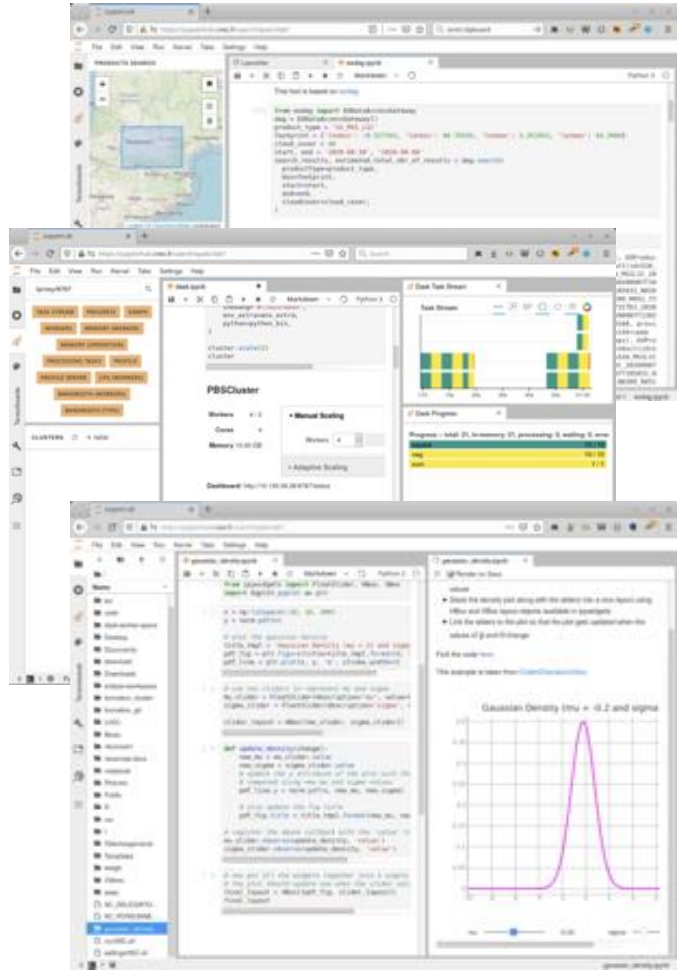
EO AFRICA Innovation Lab on the DIAS

- The **virtual research environment** (VRE) allows users to develop, test, run and optimize their research code **making full use** of the **Copernicus CreoDIAS Infrastructure**.
- **Co-located data and computing** services for fast data exploitation and analysis facilitate studies involving multi-spectral spatiotemporal **big data** and **machine learning** methods.
- The research environment designed for **easy data and code sharing** and adapted to **low bandwidth access** will enable active collaboration of African – European research tandems.
- Access is provided to all **research project teams** and selected **participants of the capacity development** activities.

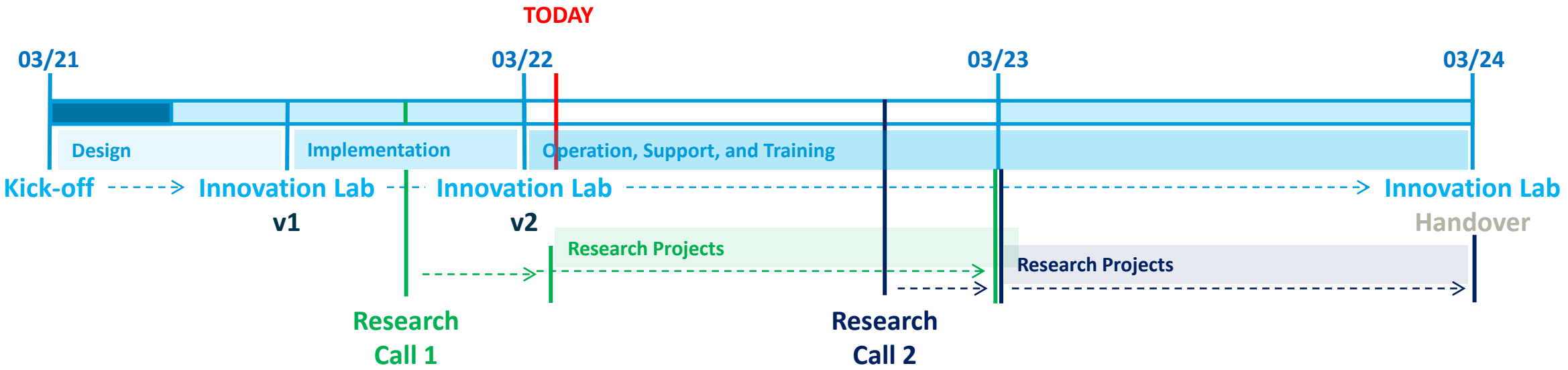
DIAS: https://www.copernicus.eu/en/access-data/dias

EO AFRICA Innovation Lab Key Features

- 30 research projects will have **tailor-made VREs** based on their research needs and will receive **dedicated technical and scientific support.**
- **Helpdesk** addresses issues by a ticketing system and an online support (chat) solution to respond requests in a timely fashion.
- An **introductory** prerequisite **training** module on the Innovation Lab and cloud-based analysis tools will be available soon (**"First Steps in the Cloud"**).
- Use of the lab: support of R&D activities in the Facility:
  - The Innovation Lab was first used on a Hackathon at the AfricaGIS conference.
  - Webinars were held
  - Online and F2F courses started



EO AFRICA R&D Facility Research Timeline



Research Projects

- **In collaboration with the African Union Commission**
- **62 proposals** were received
  - **23 African** and **16 European** countries
- Each proposal was evaluated by **2 reviewers**
  - Assessment of **40 criteria in 6 categories**
  - Final **score by weighted sum** + **Suggestion**
    - Research Team: **15%**
    - Proposed Work: **30%**
    - Impact and Innovation: **25%**
    - Use of EO Data: **10%**
    - Computing Infrastructure: **15%**
    - Budget: **5%**

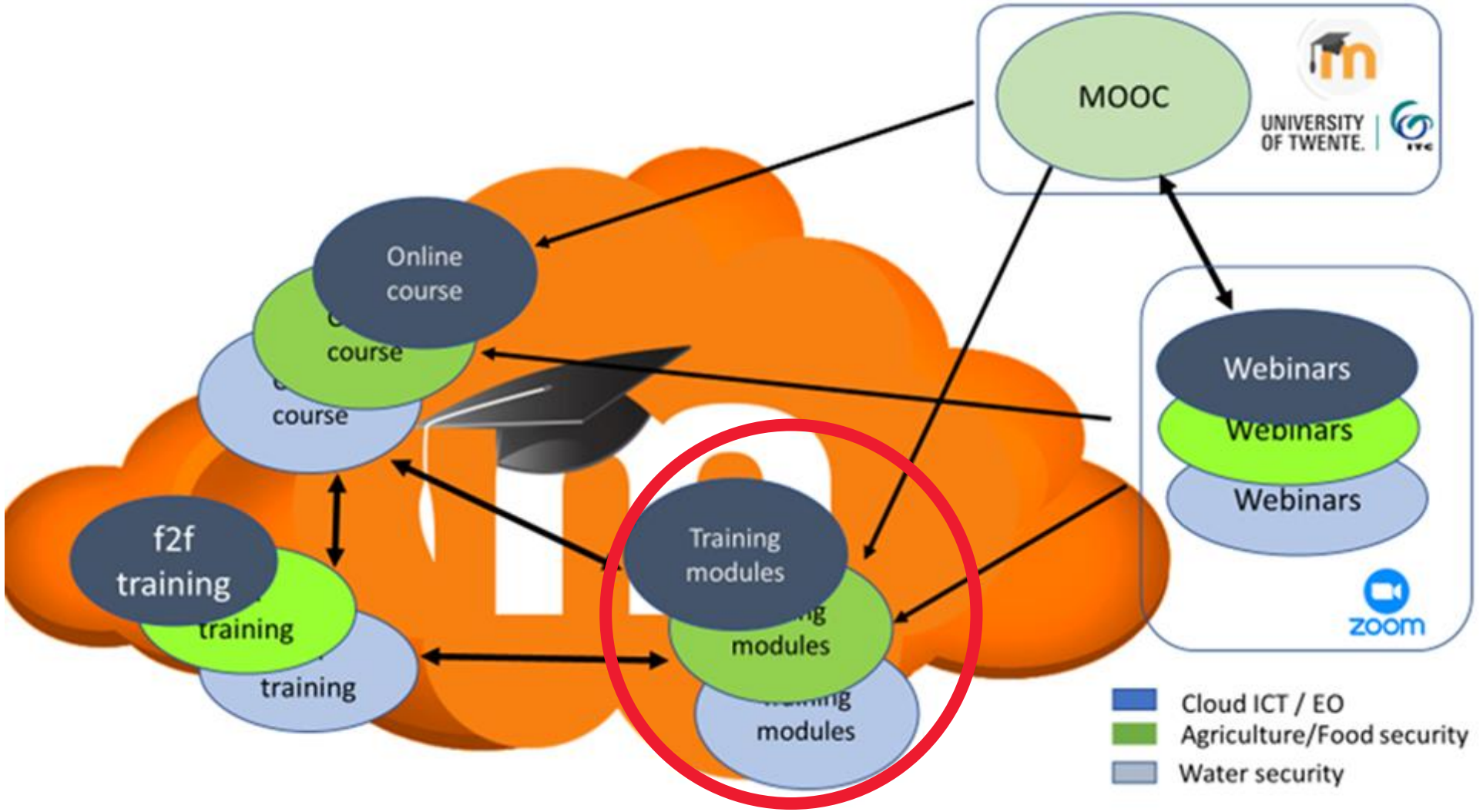
- **Selection results:**
- 15 proposals were selected for funding
  - Top 14 + 16th (Geographical representation)
    (Min. score: 82)
  - **12 African** and **9 European** countries
  - **Female-Female**, **Female-Male** Co-PIs
  - **2** proposals in **French**
    (13%, was 15% in submitted proposals)

ESA EO AFRICA R&D Facility Research Call

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

- **Water scarcity and food security** focusing on **mapping and monitoring the environment**.
- Proposed by **two scientists representing a collaborative partnership of one African and one European research entity** (e.g., institute, laboratory, university).
- ICT background: **Innovation Lab.**
- The Facility provides CD actions: **Space Academy**. The present course is the first big event of it.
- The results of the selection will be announced in mid-February, the **projects start in May.**
- **Next Call** in September 2022.

Capacity Building Actions – Space Academy

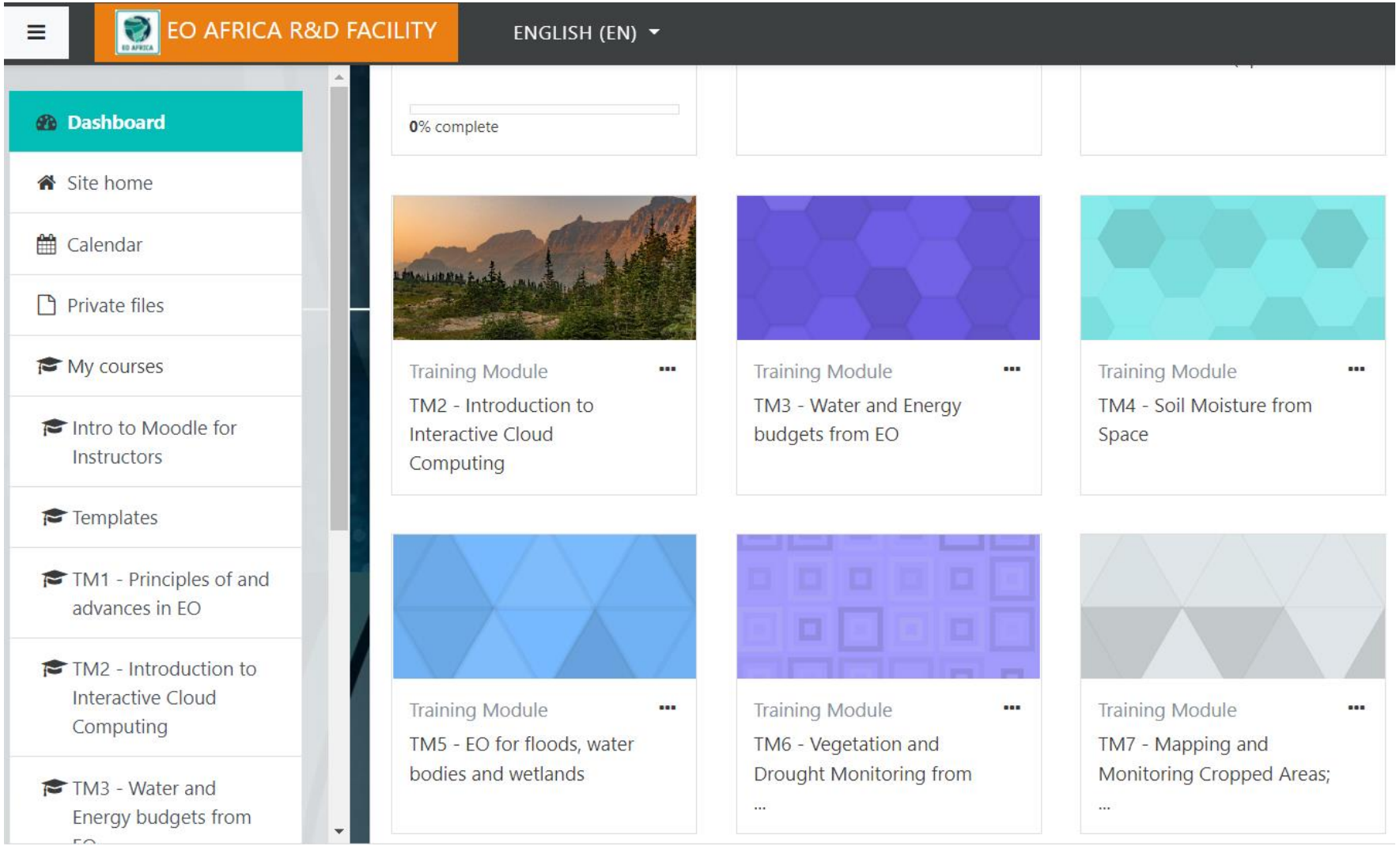


Training Modules-MOOC- Online Courses…

	TRAINING MODULES
1	Introduction to Interactive Cloud Computing
2	Principles of and advances in EO (optical and SAR),
3	Water and Energy budgets from EO
4	Soil Moisture from Space
5	EO for floods, water bodies and wetlands
6	Drought monitoring from space
7	Crop monitoring and yield forecasting from space
8	Identifying/ mapping cropping areas/ area suitability

- MOOC on Drought Assessment and Monitoring from Space – Already running, but you can join any time!
- Online Courses based on the Training Modules - 10 over a two-year period.
- F2F trainings - 10 over a two-year period – Two were held (due to Covid: via the Internet) and the third one is just after the present conference (in Accra)

Moodle Cloud Environment



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EO AFRICA
R&D Facility


Pan-African
technologies
including
development
online
closely
Association
Facility
Environment
creative
uptake
leverage
following
PCAC
Coordination
African-European
innovation
modern
principal
laboratory
regional
University
solutions
foster
build
calls
part
partnership
offering
African
research
space
identify
AARSE
exchanged
source
tools
initiative
address
sourcing
AfriLabs
driven
essential
invited
letters
courses
Related
open
main
activities
digital
GMES
application
particular
Remote
Committee
science
cloud
computing
project
goal
crowd
centres
fact
Policy
consult
institutions
national
overarching
algorithms
benefits
Campus
fully
initiatives
new
user
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capabilities
Advisory
general
sustainable
support
Africa
active
Setup
align
networks
drones
hubs
Facilitate
learning/training
adapted
Develop
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continuous
agencies
exchange
knowhow
English-French
sensing
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cooperation
open-source
engage
Establish
enabling
ensure
collaboration
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Academy
challenges
training
programmes
researchers
European
AfriGEO
processes
international
Engage
implement
objectives
bi-lingual
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range
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engaged