Earth Observation for Drought Monitoring and Early Warning in South Africa

Geospatial services for enhanced Decision Making

9TH, 10TH APRIL 2024

Pretoria, South Africa

esa

ANIN
South Africa Drought Monitoring

EO AFRICA

National Incubators facilitating adoption of EO with national R&D partners

esa gmv vito AgroApps Hatfield

In collaboration with

water & sanitation
REPUBLIC OF SOUTH AFRICA

South African Weather Service

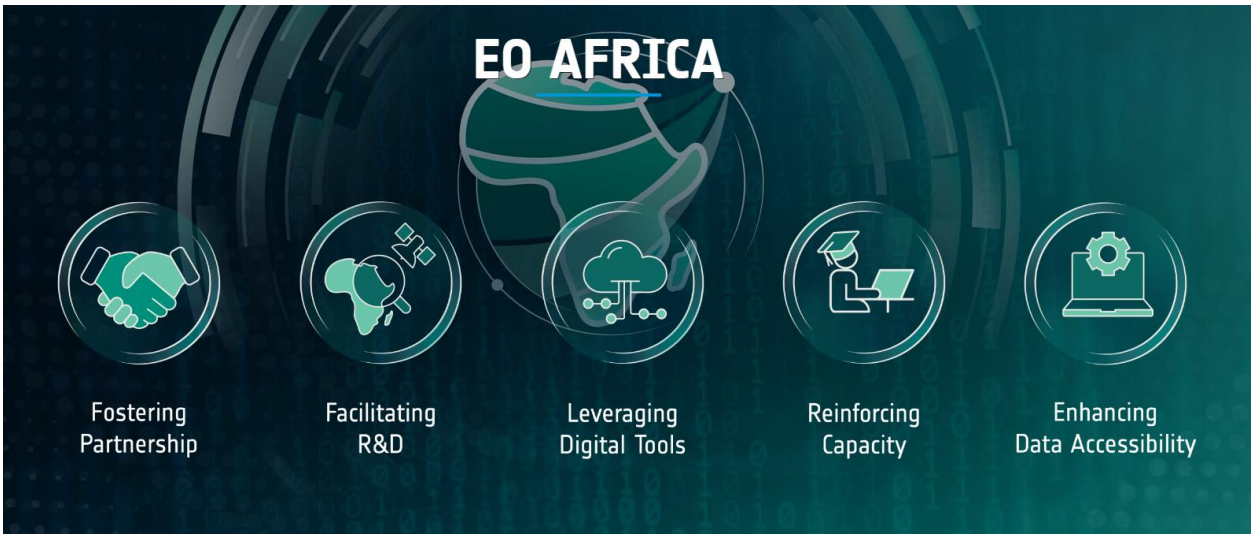
SANSA
SPACE AGENCY

INTRODUCTION

The event at the Innovation Hub in Pretoria, South Africa, represents a pivotal gathering aimed at bolstering the application and understanding of Earth Observation (EO) data in enhancing drought monitoring and decision-making. This initiative, focused on the development of a comprehensive drought early warning system, involves the collaboration of key stakeholders, including the Department of Water and Sanitation (DWS), the South African Weather Service (SAWS), and participants in the EO Africa programme. Through a series of presentations and discussions, the meeting intends to shed light on the current mandates for drought monitoring, the integration of EO technologies, and the role of Digital Earth South Africa in supporting these endeavors.

BACKGROUND

The objective of the ESA initiative EO AFRICA (African Framework for Research, Innovation, Communities and Applications) is to build an African-European R&D partnership to facilitate the sustainable adoption of Earth Observation and related space technology in Africa.

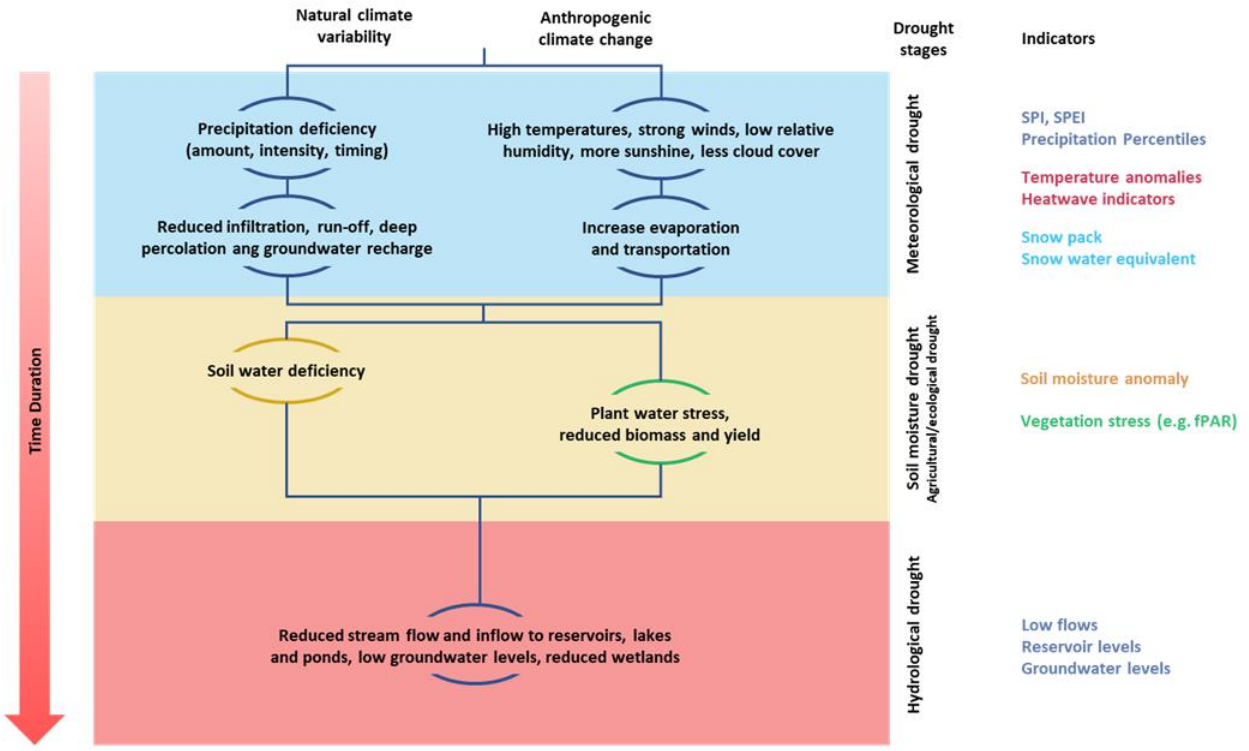


EO AFRICA follows a long-term vision (>10 years) for the emergent digital era in Africa. Starting from September 2022, 10 new projects are being kicked off, involving African developers, research groups and early adopters. This project is one of the four EO AFRICA 'National Incubators' projects that investigate how sustainable agriculture and/or drought monitoring at a national scale can be achieved in the African continent, by co-developing innovative EO-based solutions with African experts.

The ANIN South Africa Drought Monitoring Project aims to increase the awareness of EO data potential to support the operation of added-value services in the field of drought monitoring decision making. The project aims to build a drought early warning system that is based on the continuous calculation of a set of satellite-based indices and indicators.

EARTH OBSERVATION FOR DROUGHT MONITORING

Drought is a recurrent feature of all climates that results from a shortfall in precipitation over an extended period, its inadequate timing compared to the needs of the vegetation cover, or a negative water balance due to an increased potential evapotranspiration caused by high temperatures. These conditions may be exacerbated by strong winds, atmospheric blocking patterns and antecedent conditions in soil moisture, reservoirs, and aquifers among others. If this situation leads to an unusual and temporary deficit in water availability, it is termed a drought.



The European Space Agency (ESA)-funded ANIN project kicked-off on 13th of September 2022. The project aims to provide a Drought Early Warning system by calculating meteorological, agricultural, and hydrological indices based on satellite data.

WORKSHOP OBJECTIVES

The workshop held at the Innovation Hub in Pretoria, South Africa, is designed with the primary goal of enhancing the operational use and understanding of Earth Observation (EO) data in drought monitoring and decision-making processes. It aims to:

1. **Foster Awareness:** Increase awareness among stakeholders about the potential of EO data to support added-value services in the field of drought monitoring and decision making.
2. **Encourage Collaboration:** Promote collaboration among key stakeholders, including government bodies like the Department of Water and Sanitation (DWS) and the South African Weather Service (SAWS), as well as participants from the EO Africa program and other relevant entities.
3. **Strengthen Capacity:** Identify capacity gaps and needs in the access and use of EO data for drought monitoring, aiming to enhance technical and operational capabilities.
4. **Innovate Solutions:** Explore and develop innovative solutions for the integration of EO technologies in existing and future drought monitoring and early warning systems.
5. **Sustain Impact:** Develop strategies for sustaining the impact and uptake of EO services for drought monitoring beyond initial financial support, ensuring long-term viability and effectiveness.

SPECIFIC OBJECTIVES

Day 1 Specific Objectives:

- To provide a comprehensive overview of the EO Africa programme and its relevance to drought monitoring.
- To discuss the current mandates and efforts of DWS and SAWS in drought monitoring and the potential for EO integration.
- To facilitate group work focused on identifying the main users of EO-derived drought data, understanding their needs, and strategizing on collaboration and impact creation through the ANIN project.

Day 2 Specific Objectives:

- To delve into the technical specifics of data processing algorithms and visualization techniques essential for effective drought monitoring.
- To demonstrate the application and impact of EO data through practical examples and use cases, including a focus on the Berg Oliphants region.
- To engage participants in technical discussions aimed at refining the next steps and strategies for implementing the insights and solutions identified during the workshop.

ANIN is funded by the European Space Agency under its EO Africa
- African Framework for Research, Innovation, Communities and Applications – initiative

TARGET AUDIENCE

The target audience for this workshop is strategically divided to cater to both decision-makers and technical professionals, ensuring a comprehensive approach to enhancing drought monitoring and management capabilities. The first quarter of the first day is specifically tailored for decision-makers, aiming to provide them with an overview of Earth Observation (EO) data's potential and its application in drought monitoring decision-making processes. This session is designed to empower policymakers, government officials, and leaders in relevant organizations with the knowledge needed to make informed decisions. The remainder of the workshop is dedicated to technical experts, including scientists, engineers, and technical staff involved in the fields of EO data processing, data visualization, and the development of drought monitoring systems. This structure ensures that the workshop addresses the needs of both policy formulation and technical execution, facilitating a holistic approach to improving drought resilience and response strategies.

SUMMARY OF DAY 1

The event at the Innovation Hub in Pretoria, South Africa, represents a pivotal gathering aimed at bolstering the application and understanding of Earth Observation (EO) data in enhancing drought monitoring and decision-making. This initiative, focused on the development of a comprehensive drought early warning system, involves the collaboration of key stakeholders, including the Department of Water and Sanitation (DWS), the South African Weather Service (SAWS), and participants in the EO Africa programme. Through a series of presentations and discussions, the meeting intends to shed light on the current mandates for drought monitoring, the integration of EO technologies, and the role of Digital Earth South Africa in supporting these endeavors.

The day's agenda is structured to facilitate a deep dive into the potential of EO data, with sessions dedicated to understanding the practical use of drought indicators, identifying the main users of EO-derived data, and addressing the capacity gaps in accessing and utilizing this information. Group work sessions aim to foster collaboration and strategize on creating impactful solutions through the ANIN project. By focusing on practical steps for collaboration, strategies for impact creation, and sustainability of services, the meeting seeks to lay the groundwork for a robust response mechanism to drought conditions, ultimately contributing to more effective environmental management and disaster mitigation efforts in South Africa.

SUMMARY OF DAY 2

The second day of the event at the Innovation Hub in Pretoria, South Africa, continues to advance the dialogue and development efforts around leveraging Earth Observation (EO) data for drought monitoring and decision-making. With a focus on the technical aspects of data processing and visualization, the day is poised to build upon the foundational discussions and outcomes of the previous sessions. Starting with a recap of Day-1, the agenda quickly shifts towards an in-depth examination of algorithms essential for processing EO data, setting a technical tone for the day. This emphasis on the technical intricacies underscores the event's commitment to enhancing the analytical capabilities essential for interpreting complex environmental data.

Following a morning dedicated to data processing techniques, the afternoon sessions delve into the practical applications and visualization of EO data, highlighting the importance of making this information accessible and interpretable for decision-makers. The presentation on Digital Earth South Africa's web platform and a specific use case involving the Berg Oliphants region illustrate the tangible benefits and potential impacts of these technologies on local and regional drought monitoring efforts. The day concludes with a technical discussion aimed at synthesizing the insights gained and outlining the next steps, ensuring that the momentum generated by the meeting translates into actionable strategies for improving drought resilience and response through the innovative use of EO data.

ANIN is funded by the European Space Agency under its EO Africa
- African Framework for Research, Innovation, Communities and Applications – initiative

AGENDA

Date: Tuesday 9th April 2024 **Venue:** Innovation Hub, Pretoria, South Africa			
Time		**Session**	**Responsible**
8:30	9:00	Registration & welcome coffee	All
9:00	9:15	Introductions & Presentation of the program meeting objectives	All, GMV
9:15	9:30	Overview of EO Africa programme	ESA
9:30	9:45	Earth Observation for Decision Makers	Hatfield
9:45	10:15	Introduction to ANIN	GMV
10:15	10:30	DWS and SAWS mandate for drought monitoring and early warning, current situation and forward looking (integration of EO)	DWS, SAWS
10:30	10:45	Digital Earth South Africa, South African Infrastructure for EO services in support of Drought Monitoring and Warning	SANSA
10:40	11:00	Health Break / Networking	All
11:00	11:45	Group work to identify: Breakout-session Questions to address (10 minutes) 4 to 5 groups Q1. Who is using EO data in your organization? 5-7 min Q2. To which extent do you think EO has potential to improve drought monitoring? Q3. What prevents you to use EO, what are the limitations (capacity, infrastructure, financial)? Which data approach(es) does your department use for drought monitoring?: In-situ data, Satellite data, Both Q4. Think of strategies on how to create impact through collaboration around ANIN/DESA drought services?. How people is accessing the data? Q5. What are the capacity gaps for the effective uptake of the ANIN system and its services?, Q6. What do you think are the next steps for the uptake of services and sustain them beyond financial support of ESA? Q7. Do you see added value in the ANIN services proposed?	Facilitators: Hatfield, GMV, DWS
11:45	12:30	Presentation and discussion of group work – group reporter	All
12:30	13:00	Discussions and way forward	GMV
13:00	14:00	Lunch Break	All
14:00	15:30	Technical Session: Drought Indicators	DWS, SAWS
15:30	15:45	Health Break / Networking	All
15:45	16:45	Technical Session: Input data sources	Vito, GMV. Tim online
16:45	17:00	Closure of Day 1 and Logistics	GMV
END OF DAY 1			

Date: Wednesday 10th April 2024 Venue: Innovation Hub, Pretoria, South Africa			
Time		**Session**	**Responsible**
8:30	9:00	Registration & welcome coffee	All
9:00	9:30	Recap of Day-1	GMV
9:30	11:00	Technical Session: Data Processing - algorithms	Vito, GMV
11:00	11:30	Health Break / Networking	All
11:30	13:00	Technical Session: Data visualization, interpretation	GMV, DWS,
13:00	14:00	Lunch Break	All
14:00	15:00	Digital Earth South Africa, web platform	SANSA
15:00	16:00	Use case - Berg Oliphants	DWS, GMV
16:00	16:15	Health Break / Networking	All
16:15	17:15	Technical discussion and next steps	All
END OF DAY 2			

ANIN is funded by the European Space Agency under its EO Africa
- African Framework for Research, Innovation, Communities and Applications – initiative

VENUE

The Innovation Hub | 1 Mark Shuttleworth Street 0087 | Pretoria | South Africa Tel: +27 12 844 0000 | Fax: +27 12 844 1107 | www.theinnovationhub.com

In collaboration with

ANIN is funded by the European Space Agency under its EO Africa
- African Framework for Research, Innovation, Communities and Applications – initiative

DIRECTIONS FROM JOHANNESBURG
Take N1 highway towards Polokwane (Pietersburg). Take the Lynnwood road / CSIR off ramp. At traffic light, turn right into Lynnwood road on the bridge over N1 highway, and immediately keep to left hand lane. Turn left into Meiring Naude road. Follow road, go over 4 traffic lights, at 5th traffic light, turn left into Hotel street by the Sasol Petrol Station, follow road, go over N1 highway, you will reach boom gates and be directed to The Innovation Hub precinct.

DIRECTIONS FROM PRETORIA (CBD) Take N4 highway towards Witbank. Take the round-about towards Johannesburg N1 highway, travel in a southern direction; take the Lynnwood road turn off. At the traffic light, turn left into Meiring Naude road. Follow road, 3rd traffic light, turn left into Hotel street by the Sasol Petrol Station, follow road, go over N1 highway, you will reach boom gates and be directed to The Innovation Hub precinct.

DIRECTIONS FROM POLOKWANE / PIETERSBURG
Travel in a southern direction towards Johannesburg on the N1 highway; take the Lynnwood road turn off. At the traffic light, turn left into Meiring Naude road. Follow road, 3rd traffic light, turn left into Hotel street by the Sasol Petrol Station, follow road, go over N1 highway, you will reach boom gates and be directed to The Innovation Hub precinct.

DIRECTIONS FROM WITBANK
Take N4 highway, travel towards Pretoria. Take Watermeyer turn off. At traffic light, turn right into Watermeyer road on the bridge over N4 highway, and immediately keep to left hand lane. Turn left into Cussonia Avenue; follow the road until you reach Meiring Naude, then turn left. At the 2nd traffic light (Hotel street) turn right by the Sasol Petrol Station, follow road, go over N1 highway, you will reach boom gates and be directed to The Innovation Hub precinct.

NOTE: *Should you have missed the Watermeyer turn off. Continue towards Pretoria and take the Johannesburg N1 highway, travel in a southern direction; take the Lynnwood road turn off. At the traffic light, turn left into Meiring Naude road. Follow road, 3rd traffic light, turn left into Hotel street by the Sasol Petrol Station, follow road, go over N1 highway, you will reach boom gates and be directed to The Innovation Hub precinct.*

---------- FOR INFORMATION CONTACT ----------

Jesús Ortuño – jortuno@gmv.com
Juan Suárez – jusuarez@gmv.com