Digital Earth
AFRICA

DE Africa Quarterly Progress Report

July - September 2021

Contents

About Digital Earth Africa

Our vision

DE Africa will provide a routine, reliable and operational service, using Earth observations to deliver decision-ready products enabling policy makers, scientists, the private sector and civil society to address social, environmental and economic changes on the continent and develop an ecosystem for innovation across sectors.

Our mission

DE Africa will process openly accessible and freely available data to produce decision-ready products. Working closely with the AfriGEO community, DE Africa will be responsive to the information needs, challenges and priorities of the African continent. DE Africa will leverage and build on existing capacity to enable the use of Earth observations to address key challenges across the continent.

About this report

This Quarterly Progress Report provides a snapshot of DE Africa Phase II progress made between April and June 2021, as aligned with DE Africa's 2021 Annual Work Plan.

Open and Free Data
- Interoperability
- Privacy and Integrity

Operational Service
- Continental-scale
- Sustainable
- Domain expertise

Accountability and transparency
- Responsive to African priorities
- Agile, nimble and actions oriented

Diversity and inclusion
- Multi-sector perspectives
- Span data communities
- Foster collaboration

The governance of DE Africa is guided by several key principles

DE Africa outcomes - our work has impact

- **Countries are empowered**, with Earth observation data about land, water resources and human settlements enabling them to make evidence-based policy decisions.
- **Lives are improved**, through access to information that empowers governments, individuals and communities to make informed choices.
- **Development activities are more effective** through access to information that provides insights to better understand the root cause of issues and develop impactful solutions. Development of decision ready products, and analysis ready services to support African Union Agenda 2063 and the UN SDGs.
- **Digital transformation is advanced** through industry uptake and innovation using products and services from Digital Earth Africa. Increased economic development and job creation, through access to data for commercial products and services development.
- **Over $2bn of benefits to the African continent*** are possible through accelerated industry growth, improvements in agricultural productivity and the detection and prevention of unregulated mining.

Digital Earth Africa by the numbers

$2.3bn

Even under conservative assumptions, the impact of Earth Observation could be higher than **$2 billion** (USD) per year

Three key areas

$500 million
Earth Observation industry accelerated growth

$900 million
Agricultural productivity boost

**$900 million**
unregulated gold mining detection and prevention

*USD
*Source; World Economic Forum Report 'Unlocking the Potential of Earth Observation to Address Africa's Critical Challenges'

July - September 2021 highlights

Technical successes

- Water Observations from Space operational
- Provisional cropland extent map available for Eastern and Western Africa
- GeoMAD semi-annual available
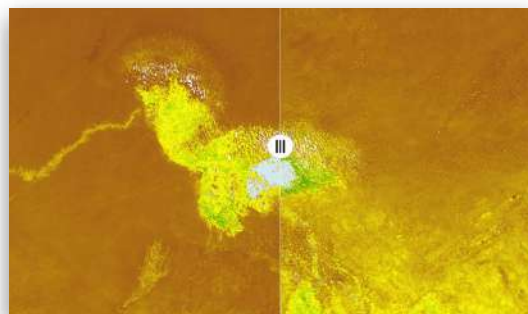
GeoMAD Semi-Annual 2020 comparison - Lake Chad

Strong partner support

- Governing Board met (GB-1)
- PMO host announced
- Partner awareness raising meetings
- Sustainment efforts underway
- DFAT engagement

PMO host Announcement

Growing user capacity and engagement

- Train the trainers program complete
- >1100 sandbox registered users
- Over 150 completions of the Sandbox training
- New use case development

Increasing engagement & awareness

- Excellent comms metrics
- Event participation, including RCRMD RIC conference
- Media mentions in interviews with AWS and on Podcasts

National Conference of the Nigerian Association of Geographers

DE Africa Video - French Release

In June, we were excited to launch our new DE Africa promotional video.

Now we are proud to launch the French version, as part of our continued effort to make DE Africa accessible to more people across the continent.

The new video is available on our YouTube channel at the following link:

Digital Earth Africa YouTube channel

Governance

The inaugural Governing Board meeting was held in July to connect and discuss program milestones. To learn more about the Governing Board see our website.

The DE Africa Governing Framework has been updated to reflect the move to a more distributed operational model. It includes definitions of the Program's core functions, terms of reference, principles and process.

The 9th Technical Advisory Committee (TAC) meeting was held on 23rd September. The meeting covered progress with the PMO transition, governance updates and strategic discussions to support the progress of Digital Earth Africa

A separate 'deep dive' on Climate Change was held 30th September, engaging with subject matter experts to discuss the valuable role of Earth observation in climate mitigation, adaptation and reporting.

The GEO trust fund financial steering committee continues to actively help deliver the DE Africa program.



Inaugural DE Africa Governing Board Meeting

DE Africa Sustainment Plan

Sustainment of DE Africa beyond the current round of funding is a high priority task for 2021.

Work is now underway on a future funding strategy. DE Africa has contracted DevGlobal to evaluate the broad funding landscape relevant to DE Africa's short-and long-term goals; provide detailed profiles for targeted funding organizations aligned to DE Africa offerings and value propositions and advise the team on their strategic approach to build sustainable, local funding sources

Through GEO, we have established contact with the Sustainable Markets Initiative (SMI) which is a digital hub connecting impactful sustainable projects with the SMI investor community. DE Africa is due to be featured in the first round of 20 projects to be showcased the second half of 2021.

Timeline to fundraising intelligence
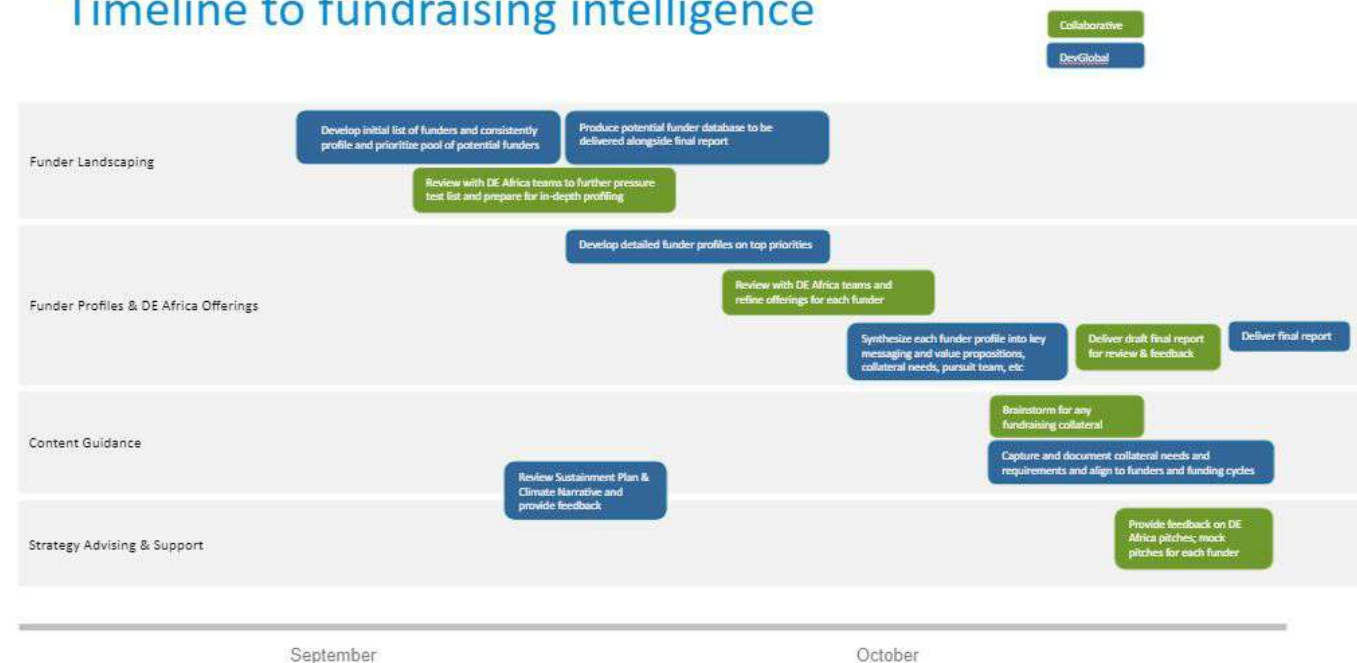
Program Delivery Transition

It was announced in August that the South African National Space Agency (SANSA) will host the DE Africa Program Management Office. This marks a significant milestone in establishing Africa-based infrastructure for Digital Earth Africa.

Support from DE Africa Implementing Partners has also gone from strength to strength this quarter, hosting events (both virtual and in person), on social media and running awareness raising sessions with potential DE Africa users across the region. .

This quarter we held a range of successful awareness raising sessions with our Implementing Partners. These events were held in both English and French, with more than 80 participants in total. New countries engaged included Rwanda, Benin and Burkina Faso.

These meetings have led to significant discussion on further areas of collaboration around use cases, aligned programs and capacity development.

Snapshots from DE Africa awareness raising sessions!

Implementing GEDSI

DE Africa is committed to ensuring our work promotes gender equality, and the inclusion of youth and people with disabilities. Our Gender Equality, Disability, and Social Inclusion (GEDSI) strategy outlines how we will have an impact in GEDSI areas. We have completed a 2021 update of our GEDSI strategy for approval by the Governing Board, to include a greater focus on linguistic diversity.

Our GEDSI Collaborative Working Group is now established and the group's Terms of Reference are endorsed by the Technical Advisory Committee.

We successfully delivered a GEDSI-specific module for the train-the-trainers program to ensure our diversity and inclusion principles are incorporated into all aspects of our training program.

We are continuing our involvement in the Group on Earth Observations' (GEO) Equity, Inclusion and Diversity working group.

*Women in Space social media promotion*

Platform and data

All DE Africa platform and services are now hosted in Amazon Web Services in Cape Town. A total of 2.8 PB of data is now available across our key Input Datasets and Services, including the following operational 'data pipelines' for all of Africa:

- Copernicus Sentinel-2 data, with nearly 2 PB of data available from 2017 onwards.
- Landsat data, with 1 million scenes and 550 TB of data available from 1984 through to the present day. Available measurements include both surface reflectance and surface temperature.
- Copernicus Sentinel-1 data, measuring radar backscatter. Data are available from mid-2018, with updates as new data become available.

See AWS Public Dataset technical documentation for more information: https://registry.opendata.aws/collab/deafrica/

The DE Africa Map interface has now been upgraded to Terria version 8, which includes a French version.
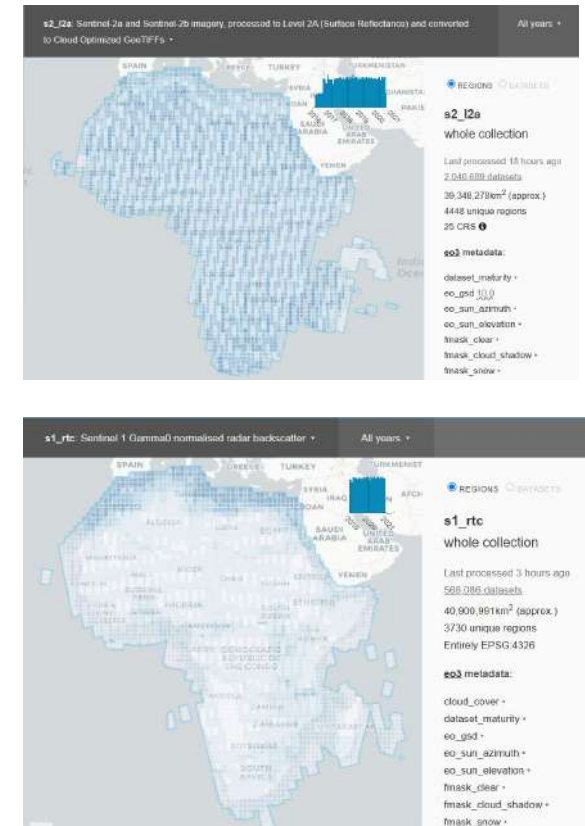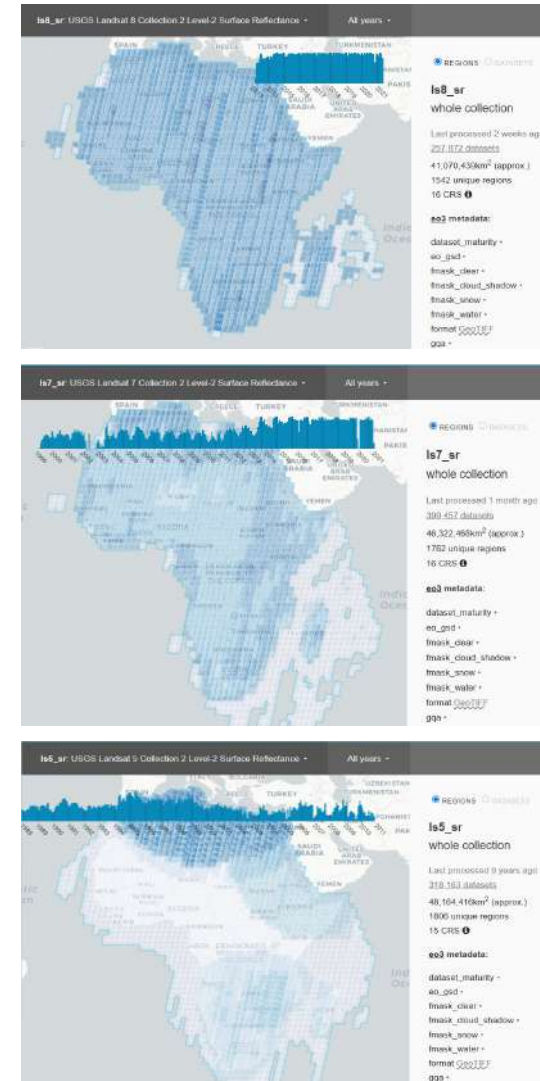
Coverage of operational data pipelines now available through DE Africa

Continental services

A provisional cropland extent service is now available for Western and Eastern Africa. Coverage for other areas of the continent are under development, aiming for continental scale. The cropland extent service provides important monitoring of crop presence to aid in food security mitigation activities.

DE Africa's new Sentinel-2 GeoMAD semi annual service was released in September 2021. This is a powerful new information source for the visualisation and analysis of seasonal changes across the African landscape and is available for 2019-2020.

The Water Observations from Space service was released in September 2021. It contains 30 years of historic data up to present. It provides the probability and frequency of surface water availability over the time period.
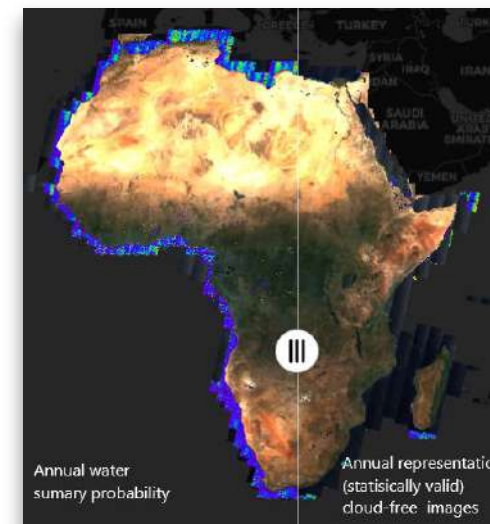
The following continental services are now planned for 2021:

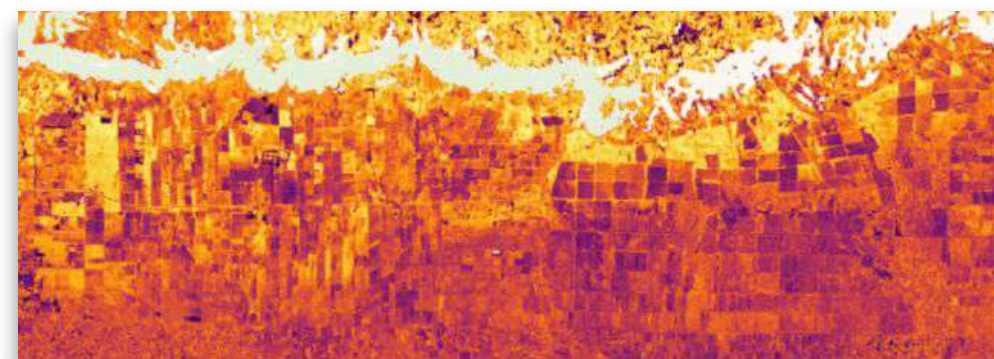- NDVI anomaly
- Annual Landsat GeoMAD
- Fractional Cover

We are continuing to improve the content of the DE Africa User Guide (Read the Docs) and the DE Africa notebook repository, to include new datasets and use cases.

Sentinel-2 semi-annual GeoMAD

Operational WOFs

Probability of cropping in Awendo, Kenya extracted from the provisional cropland extent for 2019. Yellow indicates high likelihood of crop presence while purple indicates a low likelihood of cropping.

Capacity development

The DE Africa help desk is now live and accessible through the website and sandbox at helpdesk.digitalearthafrica.org.

Our Train-the-Trainers program commenced in June and was recently completed. We have received positive feedback from the partners on the participants' experience.

We have held the first Trainer Live Session which is a follow-on series aimed at ongoing support for the network of trainers.

Our online 6-week self-directed training program, which supports new users to engage effectively with DE Africa data and products, remains very popular. We now have over 150 training course graduates.

We are continuing to run our increasingly popular weekly 'live sessions' along with tailored user communication and responsive support to active DE Africa platform users; for example via WhatsApp discussion groups. This is supporting user engagement with DE Africa products to address real-world development challenges.
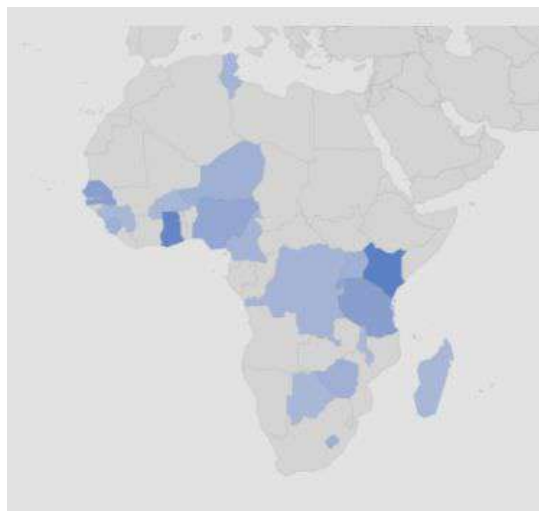
Metrics on our growing use community are shown here.

Some participants of the first Trainer Live Session in August.

Growing user community

Weekly live sessions are continuing

> **Diverse, active participation**
> 50th live session held in Sep.
> > 15 people on average per session
> max number 26 people

Countries that participated to the live sessions

Online training success confirmed

> 156 online training awardees
> Train the trainers program
> complete!

Improving map interfaces

> **TerriaJS map**
> >5700 users in two years across >100 countries
>
> TerriaJS map improvements on-going version 8 released inc. French
>
> **ESRI Geoportal**
> first round of data indexing complete

New user facing platform and sites

> - Docs.digitalearthafrica.org is live
> - Helpdesk.digitalearthafrica.org is live, accessible through website,sandbox and soon through a portal

Rapid increase in sandbox usage

> > 1100 registered sandbox users
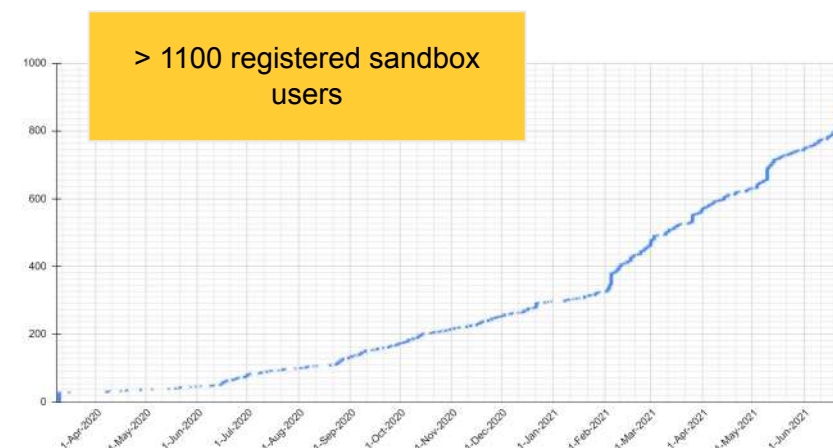
Latest User Case Studies

Developed by users

- Analysing effects of drought on inundation extent and vegetation cover dynamics, Botswana, (Botswana Uni)
- Invasive species in Lake Baringo, Kenya

Published

- Detecting landscape change and unregulated mining, Ghana here
- Monitoring Fire Activity in Table Mountain National Park, South Africa here
- Using satellite data to monitor agriculture in Ghana - The GAIMS platform from Big Data Ghana here
- Water Assessment and Monitoring in the Lake Ngami, Lower Okavango Delta, Botswana here

Example cases in development

- Time Series Analysis of Forest Reserve in Burkina Faso, AGRHYMET.
- Change detection in Kerio Valley in Kenya, Burkina Faso, AFRIGIST.
- Monitoring of Lake Chad, Niger, AGRHYMET.
- Coastal erosion in Senegal, CSE.

Detecting changes to Lake Chad

Chad, Nigeria, Niger and Cameroon

Bako Mamane from AGRHYMET is using DE Africa services to help map and monitor changes to Lake Chad, which can be used to inform decisions on water supply management.

Lake Chad is an important source of water to sustain both health and livelihoods in the surrounding countries of Chad, Nigeria, Niger and Cameroon.

Flooding and drought mean that lake levels have been extremely variable in recent years, and local industries and food supply chains are being disrupted as a result.

As an area that is often covered by clouds, the Sentinel-1 radar data available through the Digital Earth Africa platform will also be a helpful tool in accurately assessing the area.

Bako Mamane
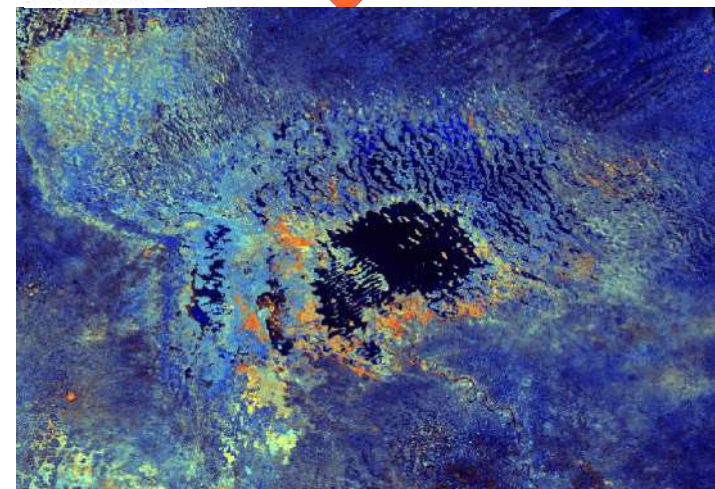
Lake Chad Normalized radar backscatter (Sentinel 1) Top, And with an annual Geomedian (RGB, Sentinel 2) Bottom.

# Using satellite data to monitor agriculture

Big Data Ghana

Henry Kwamena Baffoe and the team at Big Data Ghana are using DE Africa datasets and services in their new online data platform focused on utilising Earth observation for insights into Agricultural production in Ghana.

The platform aims to ensure accurate and reliable data is available to support the information and analytics required for decision makers.

The platform is currently in active development but not yet fully launched. GAIMS demonstrates DE Africa success in empowering innovation and Africa focused industry solutions.

The GAIMS platform integrates DE Africa datasets including the cropland mapping service, crop health analysis tool, NDVI, DEM and GeoMAD water resources used to visualise change on the ground.

DE Africa datasets can be combined datasets on the GAIMS platform and analysed to form insights on the state of agriculture in Ghana. The value of this platform is knowing the precise location of assets such as crops.
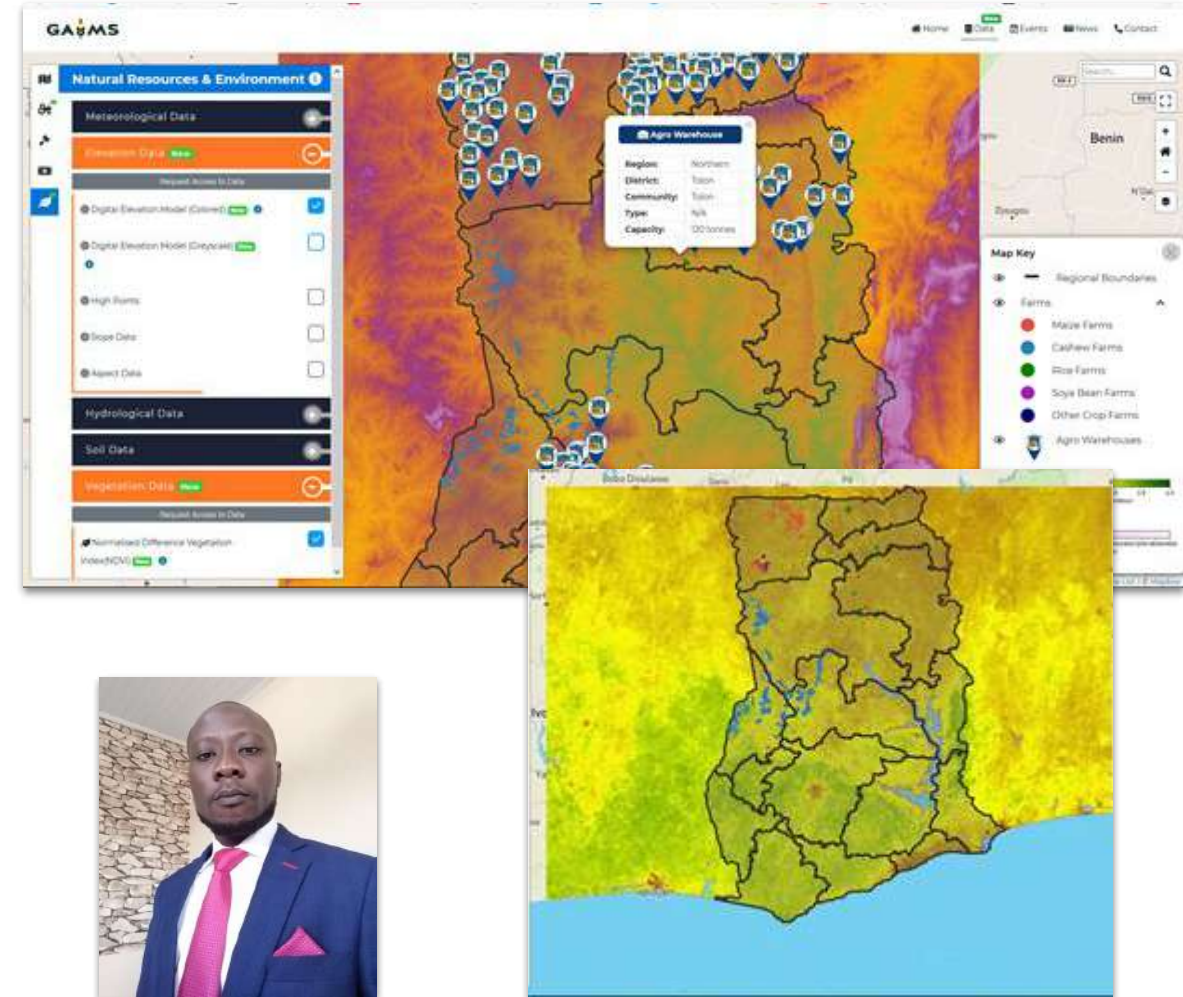
Henry Kwamena Baffoe

Captures of the GAIMS platform under development.

Monitoring Rift Valley Lakes

Kenya

David Ongo from RCMRD has been studying changes in water extent and quality across the Rift Valley Lakes using Landsat data. On the platform the Landsat data allows users to make annual comparisons, such as in the condition of the lakes, as far back as the 1980s. The goal is for policymakers and industry to use this information to plan more effectively how to use and protect the lakes in the future.

Over the past few years, extreme weather events have become increasingly common in Kenya. Periods of intense rainfall and drought are threatening the natural ecosystems of the Rift Valley Lakes and affecting the lives and livelihoods of those that rely on the lakes as a source of water or industry.
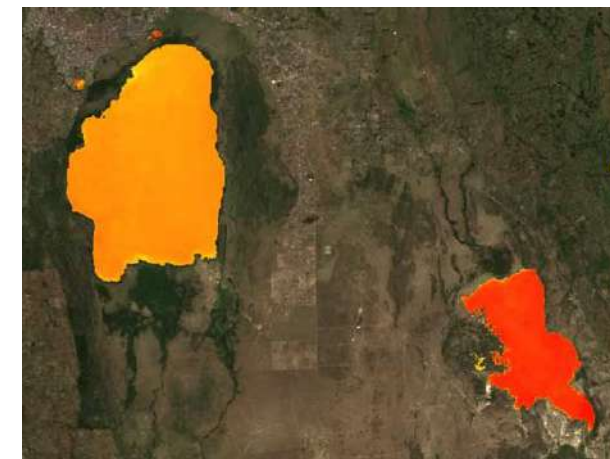
NDCI derived from 2018 geomedian overlayed on the geomedian for Lake Elmenteita (right) and Lake Nakuru (left).

David Ongo
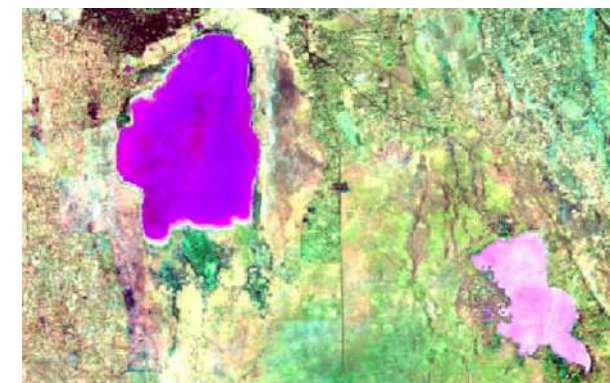
Triple MADs showing different variability patterns of reflectance during year 2018 for Lake Elmenteita (right) and lake Nakuru (left).

Water Assessment and Monitoring in the Lake Ngami, Lower Okavango Delta

Botswana

Dr. Kelebogile Mfundisi from the Okavango Research Institute (ORI) has been studying Lake Ngami in the Okavango Delta. Digital Earth Africa provided the data, services and tools necessary to evaluated this complex water system. Dr. Mfundisi hopes this study will enhance awareness of the condition of the Delta and encourage change in management planning and practices.

The Okavango Delta is a dynamic and complex freshwater wetland in Botswana. The ORI under the University of Botswana (UB) is mandated to carry out research on the Delta as well as support Okavango Delta Management.

The results highlight the variability of water extent over recent years, with exceptionally low levels of water present in the Lake during 2019 during a historic drought. By the end of 2019 the Lake had completely disappeared and remained empty until late 2021. The results from August 2021 show the lake has only partially recovered to earlier levels.
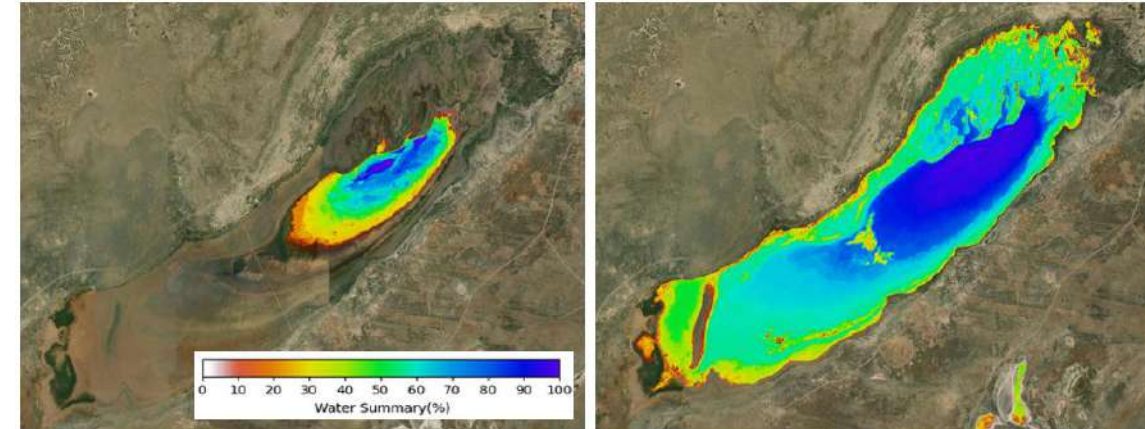
Left: The annual WOfS summary for 2019, showing the diminished extent of Lake Ngami. Right: The 'all-time' WOfS summary showing the long-term extent of Lake Ngami. Colour ramp shows the frequency of water observations.
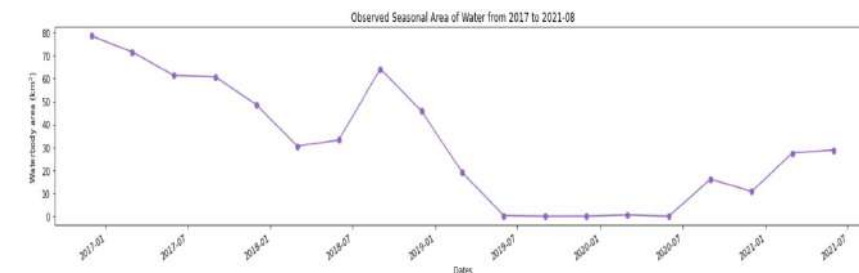
Seasonal changes to water extent (km²) from 2017 to 2021, analysis conducted using Sentinel-2.

Dr. Kelebogile Mfundisi

Monitoring the coastline of West Africa

West Africa

West Africa's coastal areas host about one third of the region's population and generate 56% of its GDP.

According to a World Bank Study*, environmental degradation in the coastal areas of Benin, Côte d'Ivoire, Senegal, and Togo cost $3.8 billion, or 5.3% of the four countries' GDP in 2017.

Beyond the economic cost, coastal degradation takes lives and destroys livelihoods. Rising sea levels and the destruction of important natural barriers such as mangroves is only adding to the issue.

Digital Earth Africa empowers countries and institutions to use Earth Observation, helping them to understand how the coastline has been changing over the years, and predict how it might change In the future.

* THE COST OF COASTAL ZONE DEGRADATION IN WEST AFRICA: BENIN, CÔTE D'IVOIRE, SENEGAL AND TOGO. World Bank.

Dr Moussa Sall

Mapping Deforestation in Benin Republic

Benin Republic

Joseph Oloukoi, PhD from AFRIGIST has been using the Digital Earth Africa platform to map deforestation. The platform can be used to analyse changes that have occurred over time in forests due to human activities and climate change.

Landsat and Sentinel-2 data from Digital Earth Africa will help to assess the deforestation in the sudano-guinea transition zone of Benin Republic over the past 30 years.

Not only will this help to refine policy around deforestation, but it will also contribute towards remedying its effects and providing valuable research and case studies for those working in an environmental research management.

Using Sentinel data from 2017 to 2020 in the month of July, it is clearly observed that vegetation within the *Oueme Boukou* forest reserve in the study area has changed over time and areas under threats are visible.

Joseph OLOUKOI, PhD
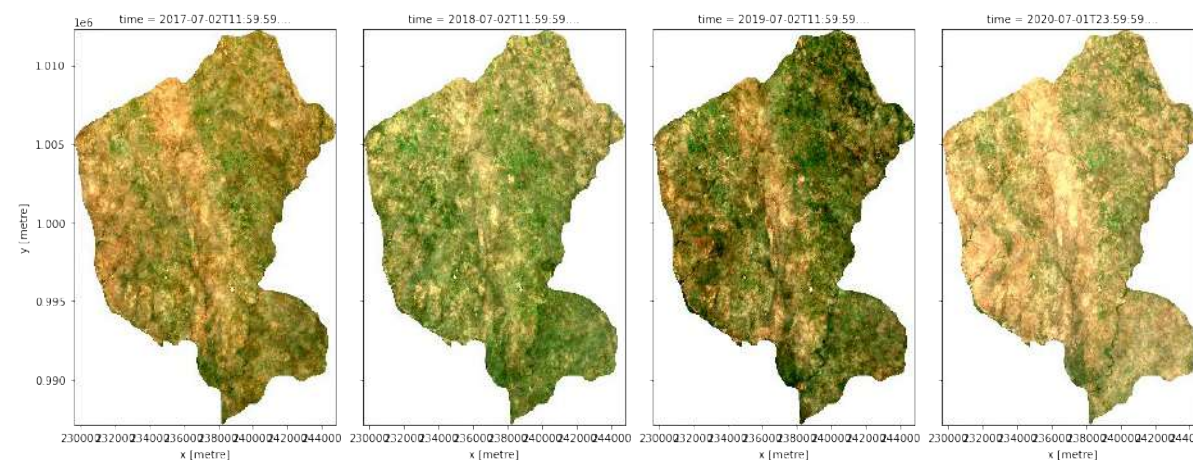
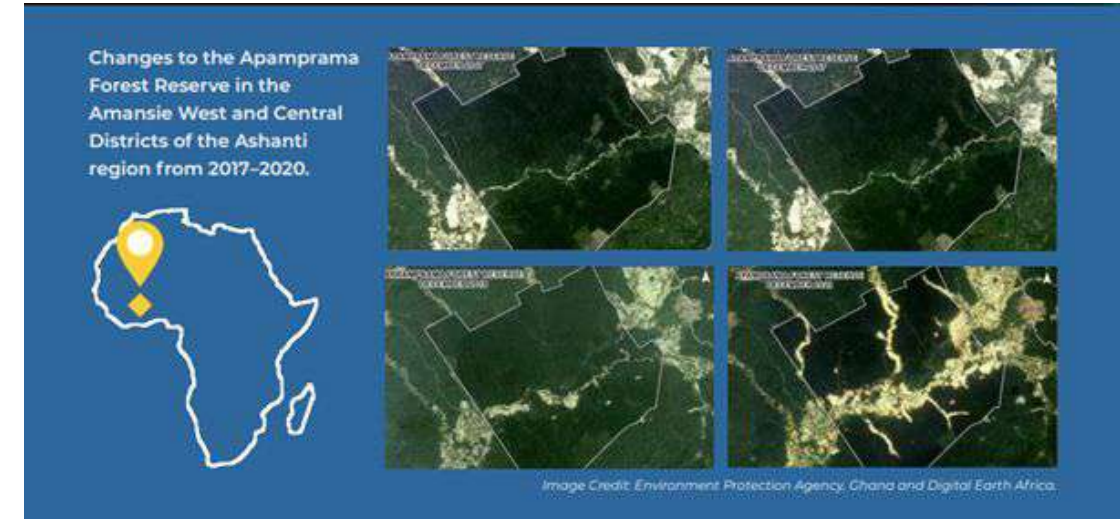Sentinel data of the *Oueme Boukou* forest (2017-2020).

Detecting landscape change and unregulated mining

Ghana

Ghana's Environmental Protection Agency (EPA) and Ghana Statistics Service (GSS) used DE Africa's Vegetation Change and Detection tools to analyse the health of the Apampram Forest Reserve. The reserve contains rich gold deposits as well as important semi-deciduous trees and medicinal herbs.

They used the Sandbox environment to apply and test hypothesis and identify areas of significant change (e.g. land degradation or deforestation) within the reserve. The results showed the rapid increase of potential mining activity between 2017 and 2020.

If DE Africa could help to prevent just 10% of unregulated gold mining activity in Africa, the estimated economic benefit to the continent could exceed $750 million per year.

Changes to the Apamprama Forest Reserve in the Amansie West and Central Districts of the Ashanti region from 2017–2020.

Image Credit: Environment Protection Agency, Ghana and Digital Earth Africa.

DE Africa data can help detect and prevent unregulated mines, leading to:

1. Reduced environmental impact
2. Less destruction of farmland
3. Protection of forest reserve
4. Improved water quality
5. Preservation of habitats and biodiversity
6. Improved health and quality of life
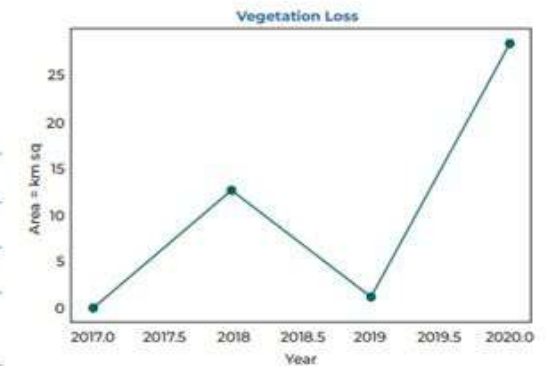
* World Economic Forum Report 'Unlocking the potential of Earth Observation to address Africa's critical challenges'

Partnerships and community

This quarter has provided some opportunities for the program to participate and sponsor some events such as the RCMRD RIC conference held in August and launched the Earth Observation Challenge. This has helped the program to engage with the geospatial community by broadening its reach into new audiences. It also helps to promote uptake of these events via utilisation of our platforms communications channels and influence.

We have continued to engage with CEOS, attending and chairing monthly meetings.

A number of partners and the DE Africa Establishment Team have been hosting awareness sessions both in person and online across Africa. This has helped increase usage of the platform and increased sign up to the Sandbox and short course.

The DE Africa Establishment Team has also been hosting weekly live sessions to enhance the engagement of the existing user base through tutorials and demonstrations of the new services.
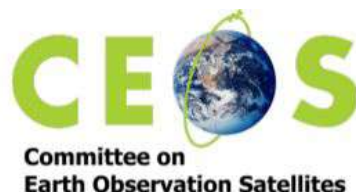
Building awareness

The communications network has been continuing to develop with monthly meetings and the creation of a Whatsapp group. This regular communication enables collaborative discussions, sharing ideas and distribution of materials. From these we have seen an increase in engagement from our Implementing Partners not just in materials from DE Africa but in generating opportunities to enhance the communication of the program through events and promotion.

Our communications metrics show we are building and maintaining an engaged community on social media as well as increasing traffic to the website.

For the PMO host announcement there was wide coverage in both Africa based and international media which demonstrates high interest in the program. We were also mentioned in a video featuring AWS Director, Clint Crosier, as a notable example of innovative solution, in a podcast recommended as an important and accessible geospatial tool and in thought leadership piece as a solution for climate mitigation. Being promoted as a leading example of innovation in Africa within the geospatial areas highlights the expanding awareness of the program.

Social media engagement

This quarter has seen an overall increase in engagement and conversation across the community. This could be attributed to the number of program milestones, events and increasing engagement from partners in hosting awareness raising events featuring the program. We have also started to post more often in French to increase reach into Francophone countries across Africa.

In September three new services were released which was a great opportunity to showcase the DE Africa Map and tools. Using animations, videos and images of the map enhanced engagement. We have also seen an increase in followers and organisations capturing their and sharing visuals of the platform.

The DE Africa Establishment Team and Partners have been busy this quarter attending events including RIC hosted by RCMRD, awareness sessions online and in person, conferences and presentations. We have also been co-promoting events such as the EO Challenge and RIC as part of sponsorship agreements. Leveraging the reach of other accounts through collaborations such as these increases the reach of our content and broadens our audience.
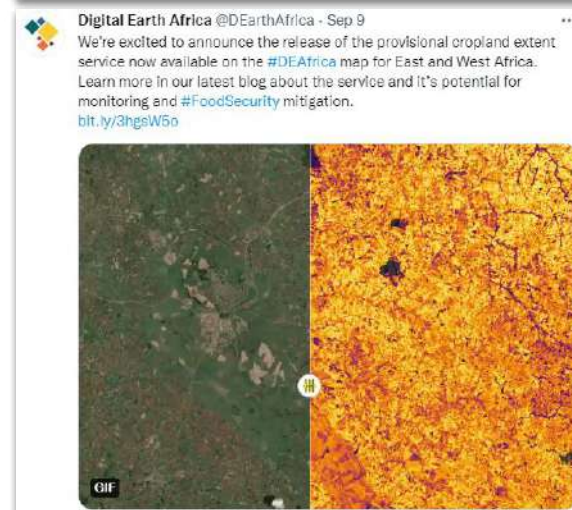
Communication metrics

Digital Earth
AFRICA

|			
Website engagement is increasing **7848** website users, up **20%** Average session duration increased by **9%**	**Our website user base in Africa is growing** **577** users from Kenya **353** users from South Africa **238** users from Rwanda	**The Twitter community is engaged** 155K impressions since July 1st 444 retweets since July 1st 2.1% engagement rate has increased this quarter	**Our followers are on the rise** Twitter - **3196** LinkedIn - **1213**

*All statistics compare May-June '21 with July-September '21
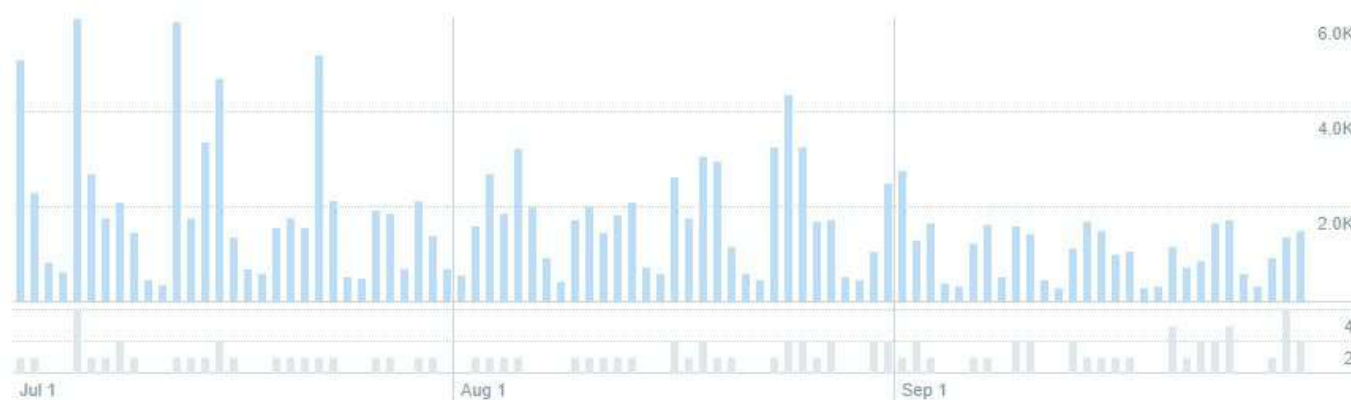
Twitter impressions over the last quarter noting spikes from program announcement posts.

Digital Earth Africa @DEarthAfrica - Jul 22
Our recent Governing Board meeting was a wonderful opportunity to connect and discuss program milestones and future endeavours. Thank you to all our Board Members for your insight and leadership.

Get to know our Governing Board: bit.ly/3xZy68c

DIGITAL EARTH AFRICA'S GOVERNING BOARD

Paula Ingabire and 9 others

Our top tweet received **8,835** impressions

Digital Earth Africa Quarterly Report - July-September 2021

Acknowledgements

THANK YOU