Digital Earth
AFRICA

DE Africa Quarterly Progress Report

January - March 2022

Contents

About Digital Earth Africa

Our vision

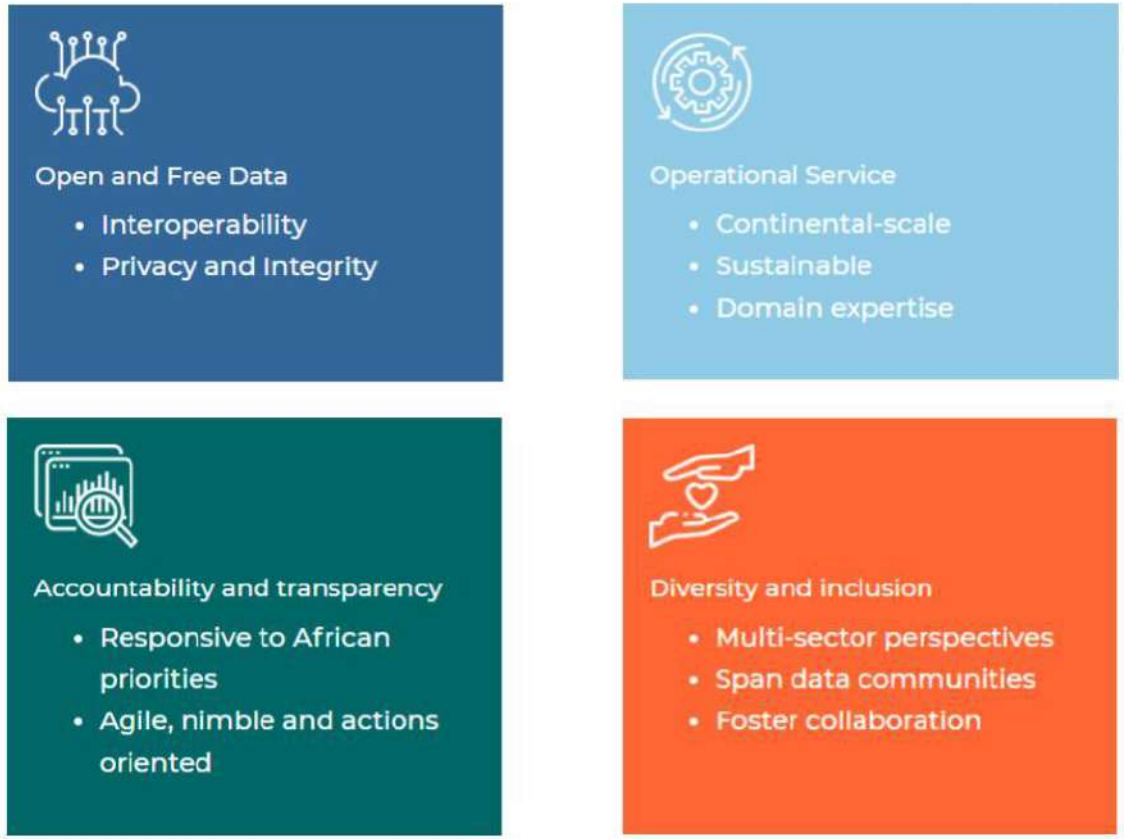
DE Africa will provide a routine, reliable and operational service, using Earth observations to deliver decision-ready products enabling policy makers, scientists, the private sector and civil society to address social, environmental and economic changes on the continent and develop an ecosystem for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

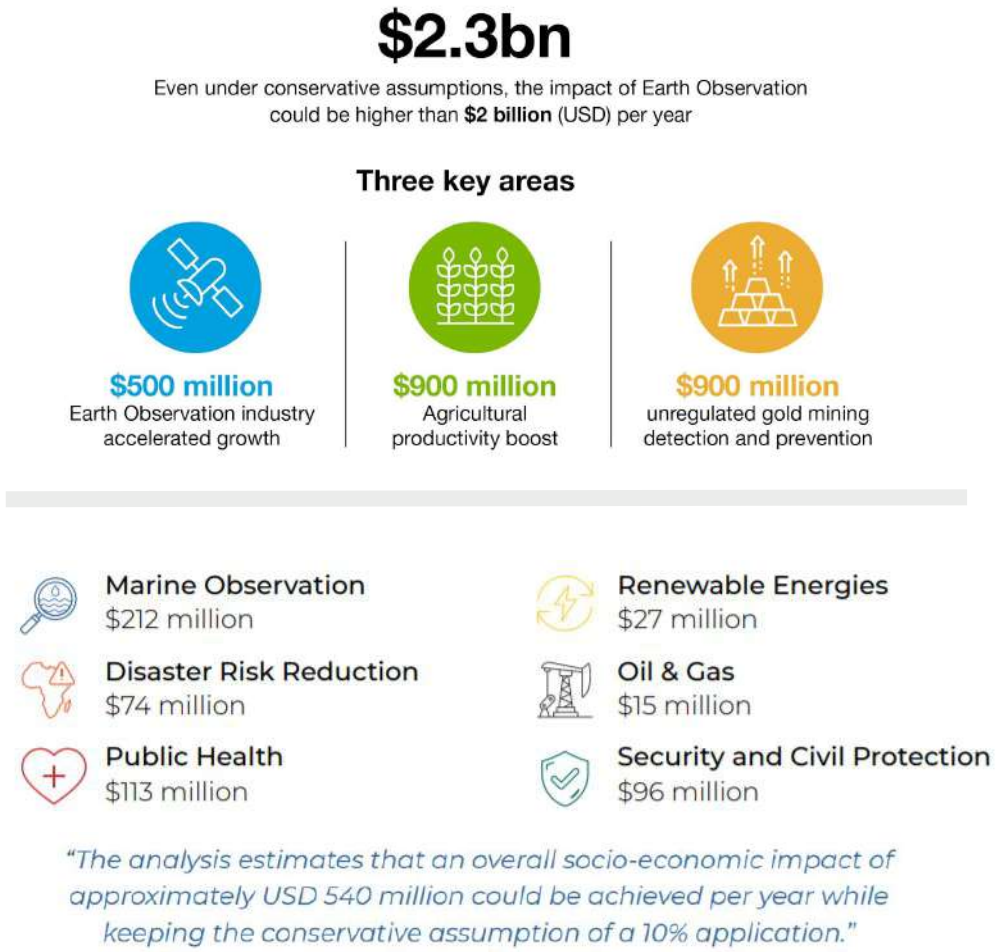
This Quarterly Progress Report provides a snapshot of DE Africa Phase II progress made between January and March 2021, as aligned with DE Africa's 2022 Annual Work Plan.



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 DE Africa. Increased economic development and job creation, through access to data for commercial products and services development.
- **Over $2bn USD of benefits to the African continent** are possible through accelerated industry growth, improvements in agricultural productivity and the detection and prevention of unregulated mining.

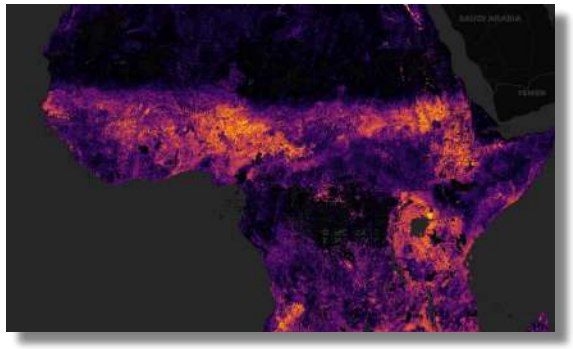


*Source; World Economic Forum Report 'Unlocking the Potential of Earth Observation to Address Africa's Critical Challenges'

January - March 2022 highlights

Technical successes

- >3,1 PB data now available in AWS Cape Town
- Provisional continent wide Cropland Extent Map complete
- Landsat 9 now available



Continental crop extent map

Strong partner support

- PMO Office ready to open
- Key implementing Partnership Agreements renewed

Strategic partner agreements renewed

Growing user capacity and engagement

- >300 certified Sandbox users.
- Bilingual live sessions
- DE Africa Masterclass beta has been released

DE Africa Training Session - Ghana

Increasing engagement & awareness

- Partnered with African Women in GIS to host a webinar for International Women's Day.
- >2,000 followers on LinkedIn; >4,000 on Twitter

International Women's Day

Governance

To begin the year, both the DE Africa 2021 Annual Report, and the 2022 Annual Work Plan were published after being endorsed by the Governing Board. Although the DE Africa Governing Board has yet to meet in 2022, preparations are underway for the next Board meeting 13th April.

DE Africa's Technical Advisory Committee (TAC) continues to provide strong guidance and support for the program. The 11th TAC meeting, held on the 10th of March, facilitated a deep dive into the theme of Food Security, including DE Africa's offerings, IP activities, Government and Agricultural sectors, as well as representation from the industry sector by Digital Earth Africa Innovation Challenge winners Big Data Ghana and agriBORA.

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

Program delivery transition

The transition of operations to Africa has been progressing quickly. The DE Africa Program Management Office is ready to open on 1st April, with the first new members of the leadership team starting in April. A second round of Africa based recruitment is now underway and positions include EO Data Scientists, User Engagement and Training Manager, Group Administrator, and Executive Assistant.

Five key strategic partnerships have been strengthened between Digital Earth Africa and expert Earth observation organisations across the continent, supported by SANSA as DE Africa's new PMO host. The partnerships, signed with AFRIGIST (Nigeria), AGRHYMET Regional Centre (Niger), RCMRD (Kenya), CSE (Senegal), and OSS (Tunisia), mark a renewed commitment to long-held successful relationships and will be a crucial foundation as Digital Earth Africa continues working towards a complete transition to African operations.

DE Africa Implementing Partner program management team

DE Africa sustainment

The Australian Department of Foreign Affairs and Trade has agreed to contribute further DE Africa Phase II funding to support on-boarding of the new Africa based team and accelerate delivery of climate products to be showcased at COP27, to be held in November 2022 in Egypt. This work will include a provisional continent wide DE Africa coasts product and a set of interactive tools to support climate adaptation and mitigation.

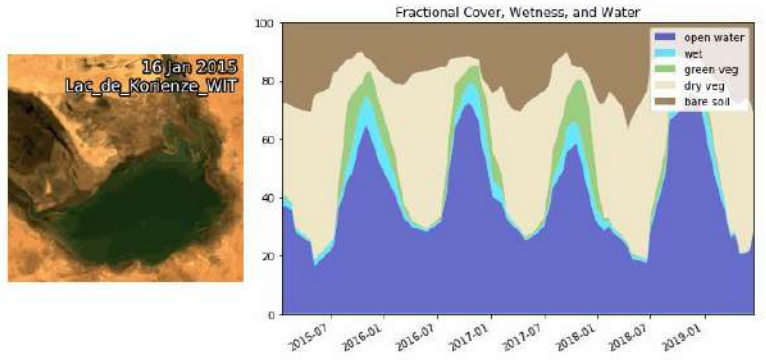
We continue to receive in-kind support from AWS from the Amazon Sustainability Data Initiative, for a growing data archive of over 3.1 PB of data. Our Implementing Partners have also committed significant in-kind contributions towards the 2022 Work Plan.

Additional funding has been received through the Enabling Crop Analytics at Scale (ECAAS) initiative, to support RCMRD and FrontierSI to develop an open source framework for crop type mapping and demonstration of an end-to-end workflow in Zambia. The project will leverage DE Africa's cloud-based platform, data and services such as the cropland extent map and GeoMAD, and the partner network across Africa and internationally.

Implementation of DE Africa's future funding strategy is now underway.

Annual coastlines, Dionewar, Senegal

Rates of coastal changes, Lagos, Nigeria



DE Africa Wetland Insight Tool - more interactive tools like this may be developed

Diversity and inclusion

DE Africa partnered with African Women in GIS to celebrate International Women's Day by hosting a virtual event: 'Unlocking the promise of tomorrow - Gender equality today for a sustainable tomorrow.' The event showcased the important work that women are doing across Africa using Earth observation to contribute to national development agendas and the SDGs.

DE Africa was also proud to support AFRIGIST's International Women's Day event with a series of talks from leading women in GIS, including DE Africa's Dr Fang Yuan and Dr Meghan Halabisky. It was a dual celebration as it was also the graduation day of students from AFRIGIST.

We also talked to Dr Meghan Halabisky in a recent blog post about her advice to women in STEM, how to encourage more girls into science and how Digital Earth Africa is accelerating progress towards achieving UN SDGs (read more here).

Diversity and Inclusion is a key part of the 2022 Work Plan. Our Implementing Partners are creating Diversity and Inclusion plans for each of the projects they are leading. This highlights how the program embeds this principle into all of our work, and encourages our community to do the same.

Students at AFRIGIST get together for International Women's Day

African Women in GIS and DE Africa celebrate International Women's Day

Platform and data

We have achieved some significant milestones this quarter. We have now over 3.1 PB of data hosted in the AWS Cape Town Region supported by the Amazon Sustainability Data Initiative (ASDI).

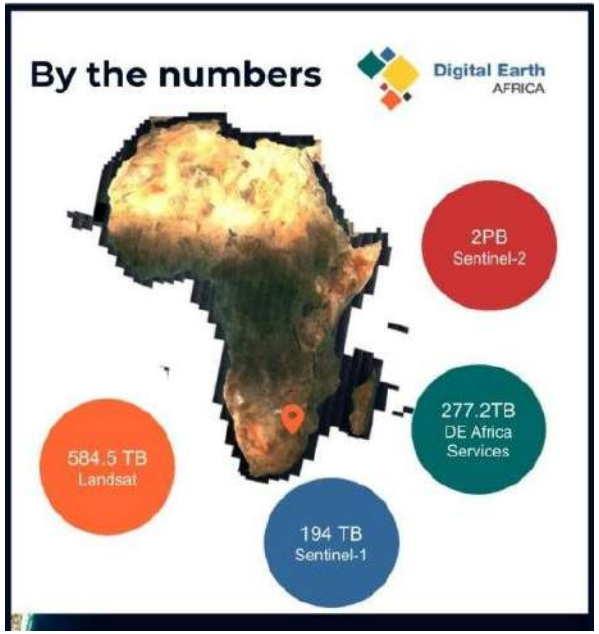
Imagery from the newly operational Landsat 9 satellite is now available on the DE Africa platform thanks to continued support from the US Geological Survey. The new data us already integrated into DE Africa's WOfS, Fractional Cover and GeoMAD services.

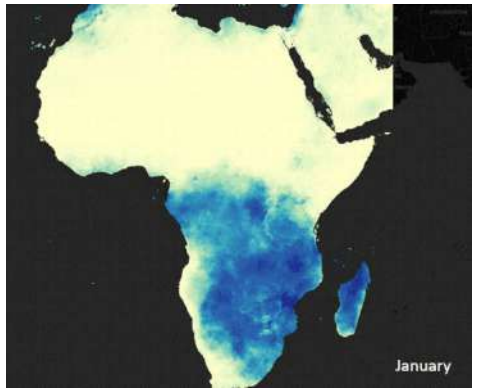
A range of additional datasets now available in DE Africa platform, including:

- Monthly and daily rainfall data sourced from Climate Hazards Group InfraRed Precipitation with Station (CHIRPS) initiative
- Norway's International Climate and Forests Initiative Data program (NICFI) data available through Planet can now be visualised on the DE Africa Map

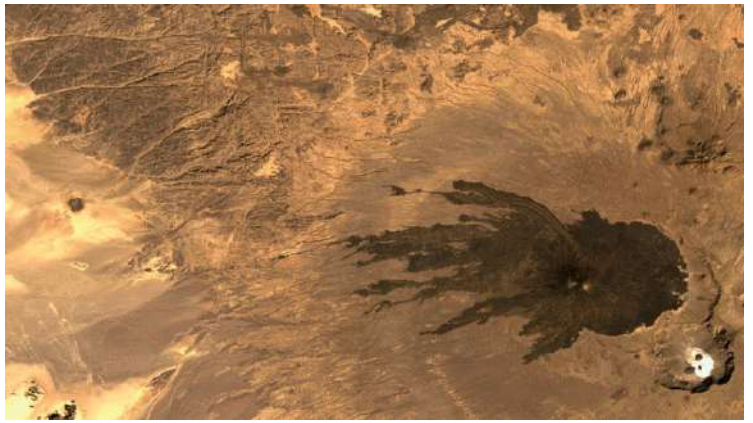
See the DE Africa Data Catalog or AWS Public Dataset technical documentation for more information.

We are proud to offer our users the opportunity to access more compute power through the DE Africa sandbox, enabling larger scale analyses to be run on our infrastructure.





CHIRPS monthly rainfall



Landsat 9 image over Toussidé volcano, Chad

Services and analysis tools

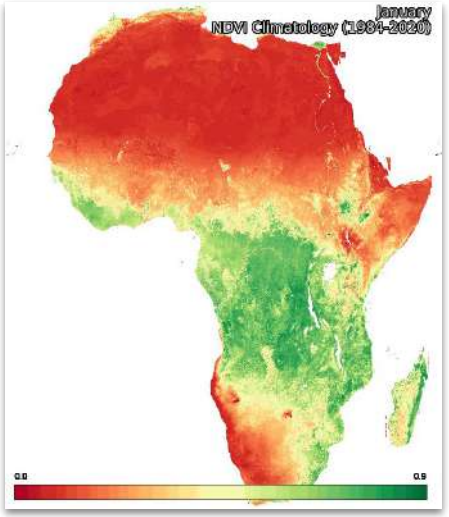
The Cropland Extent Map for 2019 has now been completed for the entire African continent. The provisional cropland extent maps have a resolution of 10 metres and were built using Sentinel-2 satellite imagery.

A new continental NDVI Climatology product is now available and there is early work developing a monthly NDVI Anomaly product, which uses this as a baseline. The Climatology product includes a long-term average baseline using almost 40 years of Landsat observations.

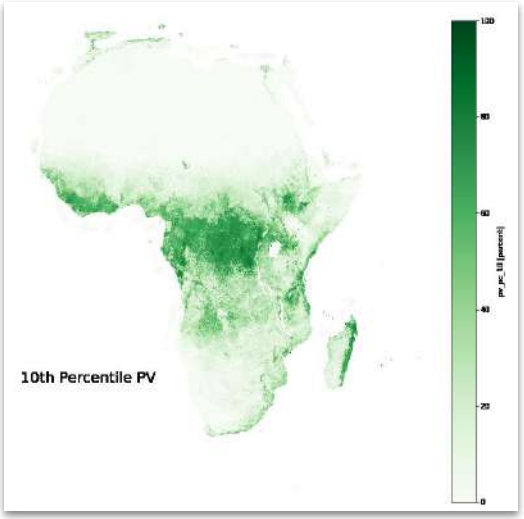
Annual Fractional Cover Summaries are now available, providing proxy measurements of the minimum, typical and maximum state for the green vegetation, non-green vegetation, and bare soil components for each pixel within a year.

GeoMADs for 2021 are now available for Sentinel-2 and Landsat imagery, and include Landsat 9 data for the first time.

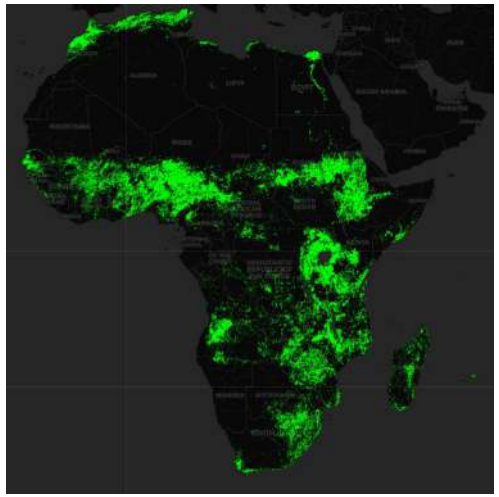
More information about DE Africa Services can be found here.

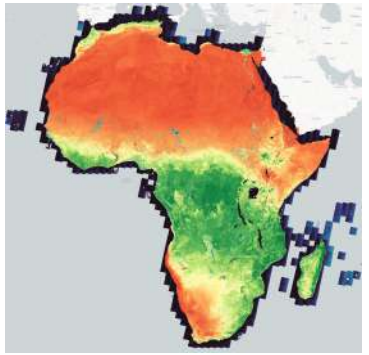


NDVI Climatology Service



Annual Fractional Cover Summary





Cropland extent service

Capacity development

Our online 6-week self-directed training program, which supports new users to engage effectively with DE Africa data and products, remains very popular and we now have over 300 training course graduates. We are finalising a beta test for our Masterclass. Masterclasses cover Earth observation datasets in-depth, their use in a GIS environment and Python to cover more institutional needs. They will be freely available to everyone on the DE Africa learning platform in both English and French.

We have now held 73 Live Sessions and are excited to now offer these in both English and French. Five workshops and awareness sessions have been run including with OpenBurkina, Ghana Space Institute and Rwanda Space Agency.

We have started a collaboration with ESRI© on capacity building involving the university of Makarere, Uganda. The aim is to provide fit-for-purpose training material on how to build and leverage ESRI's popular web applications to optimise the insight of DE Africa continental services.

We are also continuing to improve the content of the DE Africa User Guide (Read the Docs) with information on Cube-in-a-Box, external datasets and instructions on how to visualize high resolution mosaics in DE Africa Maps.

Metrics on our growing use community are shown here.

DE Africa workshop, Bakavu Higher Pedagogical Institute, Democratic Republic of the Congo

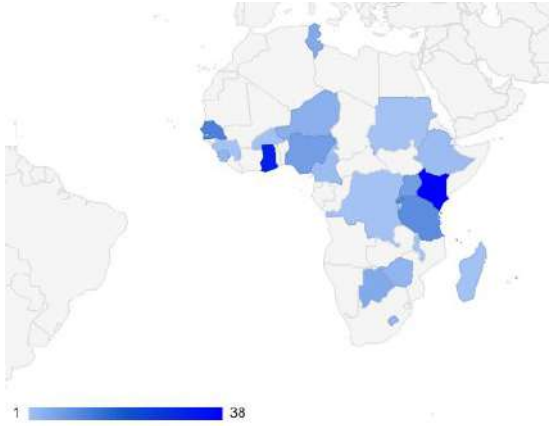
DE Africa workshop, Ghana Space Science and Technology Institute

Growing user community

Weekly live sessions

73

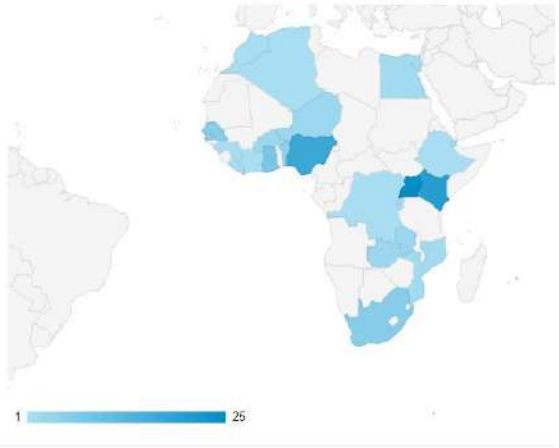
now in EN and FR -180 unique attendants from 31 countries



Online training

303 +21 %

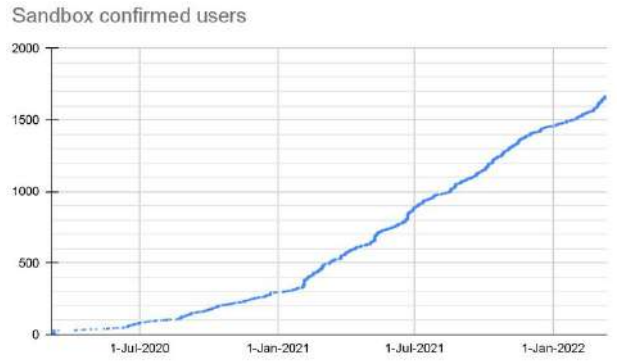
Certificates of completion



Users

1711 +18 %

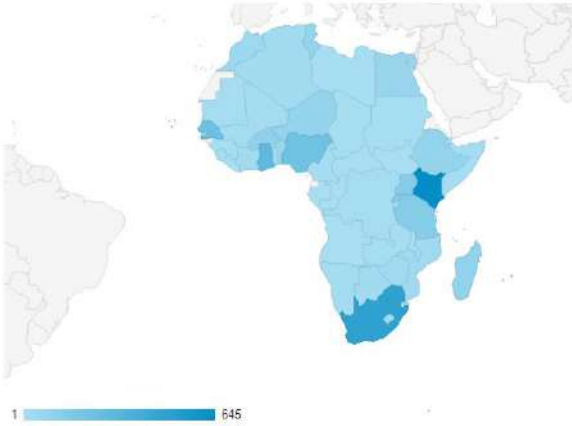
Registration in Sandbox



Users

9011 +28 %

Unique DE Africa map users



Industry engagement

Two Digital Earth Africa Innovation Challenge winners completed the 3 month incubator program.

BigData Ghana integrated Digital Earth Africa's free data and services into the GAIMS, an information platform driven by satellite and AI & ML technologies to provide precise insights for agriculture investment.

Most farmers in this region practice rain-fed agriculture, so by integrating DE Africa data, we can help stakeholders like Ghana Irrigation Development Authority and the financial institutions serving these individuals to know where and what type of irrigation would benefit them and make this information available at their fingertips.

- **Henry Baffoe, Director Technical and Strategies at Big Data Ghana**

agriBORA used Digital Earth Africa to to advance their SMARTFARMER project, which integrates EO data in crop growth models to provide a digital information service for smallholder farmers in western Kenya.

The analysis ready data and open-source notebooks available thanks to Digital Earth Africa were crucial to developing our product. We were also diligent in our stakeholder engagement - it's so important to combine world-leading tech inputs with local knowledge to create a holistic solution.

- **Kizito Odhiambo, agriBORA CEO**

Latest use case studies

Published/In Press

- Combining the power of Digital Earth Africa and local knowledge for planned grazing management in Northern Kenya | Digital Earth Africa
- Digital Earth Africa - Bridging the digital divide in Ghana | Digital Earth Africa
- DE Africa supports agriBORA to develop more robust insights for greater food security in East Africa | Digital Earth Africa
- Big Data Ghana works towards more sustainable agriculture with the help of Digital Earth Africa
- Future of Space: Propelled by Data, Driven by Demand. Geospatial World.
- Climate Next: Using data to address tree cover and climate change. Market Screener.

Academic Publications

- Sentinel-1 data for Africa, Remote Sensing MDPI authored by members of the DE Africa Establishment Team.
- Mango productivity, Ghana, Horticulturae MDPI by Torgbor *et al.*

In scoping and development

- Combined Drought Index, Uganda
- Crop Monitoring in Guinea Conakry
- Decline in crop productivity in Subukia, Nakuru Country, Kenya
- Developing an Operational Surface Water Monitoring Framework for Northern Rangelands Trust (NRT), Kenya
- Soil Erosion and water quality, DRC

Improved grazing management

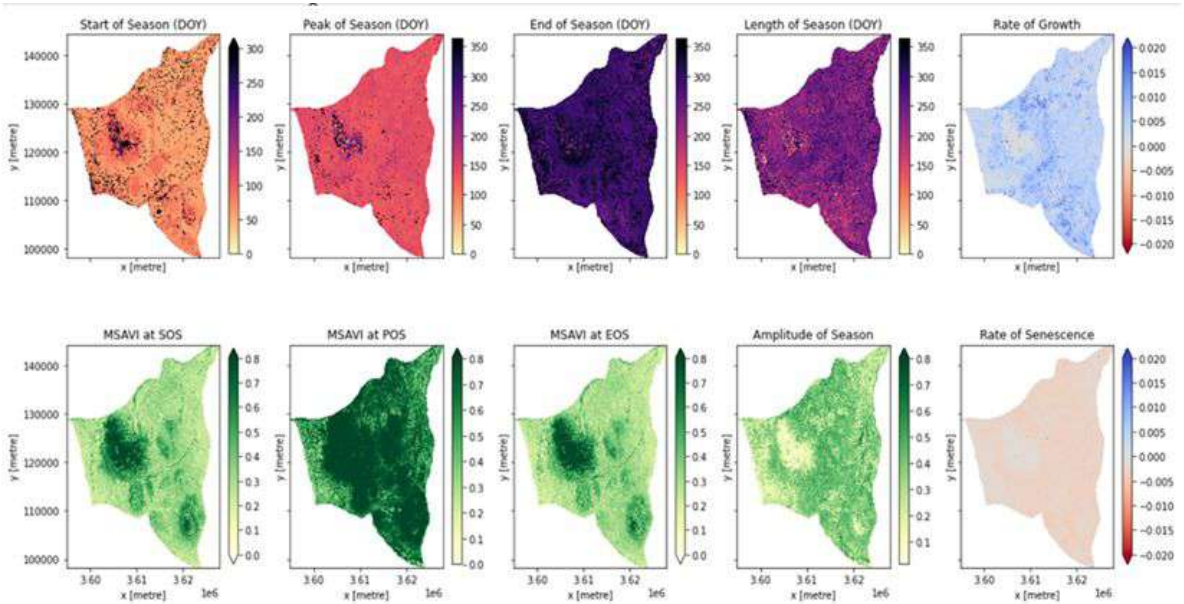
Northern Kenya

The Northern Rangelands Trust (NRT) has been working with pastoralists through community conservancies to improve rangeland conditions for livestock and improve the health and diversity of wildlife in northern Kenya.

Mohamed Shiba, in collaboration with the DE Africa team, created an operational tool to assess rangeland health. The DE Africa platform enables the assessments to be completed faster and more easily implemented.

“The time has come to embrace technology like DE Africa to better manage conservancies in Kenya and meet the challenges of a growing population”.

Mohamed Shibia



Phenology maps of Nalowuon community conservancy in 2018.

Mango farm productivity

Ghana

A new study by Benjamin Adjah Torgbor *et al.* has used DE Africa to assess the productivity of mango orchards in Ghana.

Using innovative technologies can help to understand growing patterns in current mango farms across Ghana, empowering farmers to inform and adapt future farming practices

Benjamin's study shows that through remote sensing alone you can identify the productivity of commercial mango farms in Ghana without the requirement for physical inspection of the crops.This research into optimal growing conditions and sustainable management practices can help further the expansion, productivity and profitability of the mango industry in Ghana.

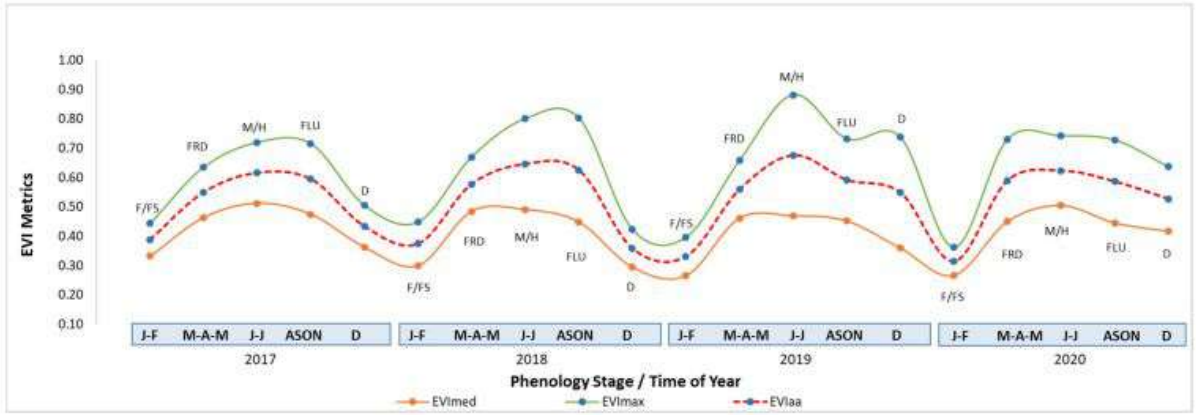


Figure 4. Temporal profile of mango in relation to the phenology cycle across the 4-year time series of median and maximum EVI metrics (EVI_{med}, EVI_{max}) together with their overall yearly average (EVI_{aa}) from the Pentacom Farm.

Benjamin Torgbor, Forestry Commission, Ghana

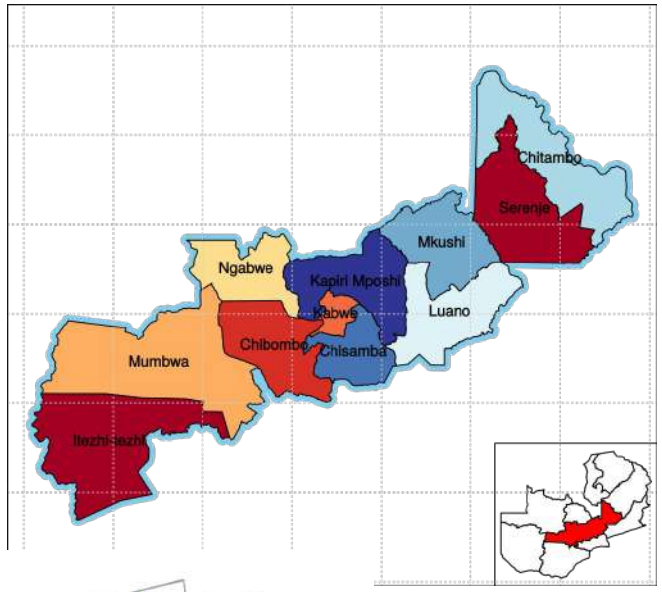
"*The Notebooks in the Sandbox make work even more amazing as the scripts were easy to modify and produce result*s," said Benjamin.

Partnerships and aligned programs

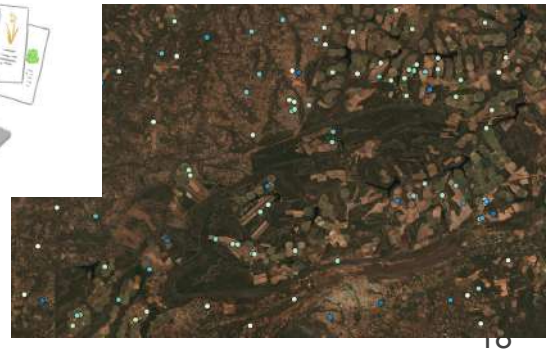
A project funded by the Enabling Crop Analytics at Scale (ECAAS) initiative has kicked off in March, to develop a open source framework for crop type mapping and demonstrate an end-to-end workflow in Zambia. The project will be delivered by a team with members from Digital Earth Africa, FrontierSI and the Regional Centre for Mapping of Resources for Development (RCMRD). RCMRD will engage with government users in Zambia to understand needs, collect field data and gather feedback on the preliminary products. The project is on-track and the RCMRD team expects to start field data collection in early April. Data collected for this project and the method developed will be shared with other DE Africa partners and publicly to enable users to map crop in other regions of Africa.

Implementing Partners have started their 2022 Work Plan projects. IP-led sub-working groups, focusing on crop type, wetland, coastline mapping and land degradation, have been established within the Product Development Task Team.

DE Africa team presented our services and tool for food security to the GEOGLAM community and started a discussion with World Food Program on possible collaboration.



Field data sampling has been designed for central province, Zambia.



Building awareness

This quarter we continue to see significant growth in community engagement on social media as well as increasing traffic to the website. Key metrics are shown on the following page.

A highlight for this quarter was International Women's Day in March. DE Africa partnered with African Women in GIS for a webinar featuring the important work of women across Africa using Earth observation to contribute to national development agendas and Sustainable Development Goals (SDGs). DE Africa also supported AFRIGIST in their International Women's Day celebrations with talks from Dr Fang Yuan and Dr Meghan Halabisky from the DE Africa Establishment team on their work as leading women in GIS.

This quarter, the DE Africa Team and Partners have participated in a range of successful events across the continent and internationally, including;

- The World Water Forum in Dakar.
- African Regional Forum on Sustainable Development.
- Southern African Mountain Conference.
- A presentation to the GEOGLAM community.
- The partners have been hosting awareness sessions including; RCMRD and OSS running crop type mapping workshops, AGRHYMET running a workshop for start-ups.
- The Establishment Team have held awareness sessions in the Democratic Republic of the Congo, Burkina Faso and Rwanda.

Communication Metrics

Twitter

- There are now **over 4,000 Twitter followers** with 410 new followers gained this quarter
- **80.2K impressions** over the quarter
- **19K profile visits** over the quarter
- Average 903 impressions per day

LinkedIn

- There are now **over 2,000 LinkedIn followers** with 437 new followers gained this quarter
- 76 new followers gained in one day
- A total **51K impressions** and mentions over the quarter

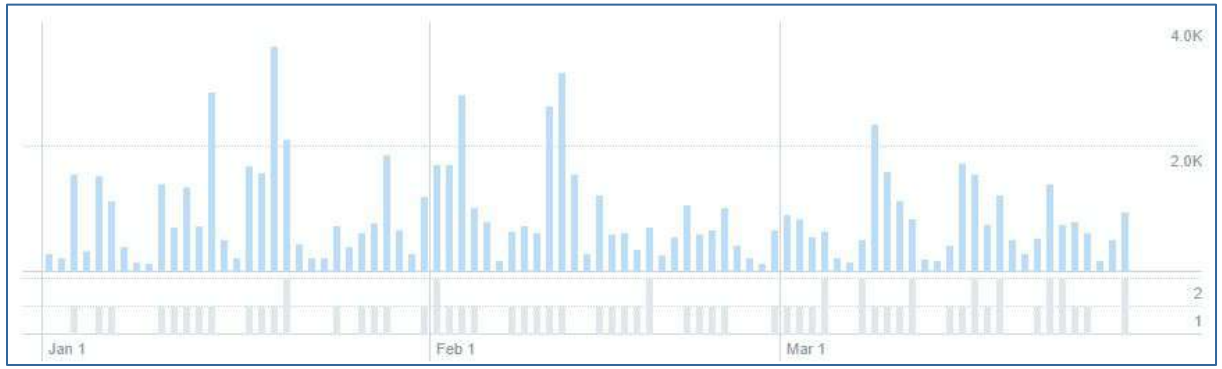
Website

- **7,179 visitors** so far in 2022
- **31,830** unique page views in 2022

Visitor locations (% users)

USA (19.5%), Kenya (11%), Australia (7%), South Africa (5%), UK (5%), Nigeria (3.5%)

Tweet impressions Jan-March 2022



Note all calculations made on data - 1st January to 28th March 2022.

Acknowledgements

Digital Earth AFRICA

THANK YOU