



Digital Earth
AFRICA

DE Africa Quarterly Progress Report

January - March 2021

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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 2020, 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](#)'

Jan-March 2021 highlights

Technical successes

- Landsat & Sentinel-1 pipelines well advanced
- GeoMAD product release
- Validation team accomplishments: WOfS, crop mk

Strong partner support

- Good progress on operational model
- All Hands kick-off meeting success
- Strong support from funding partners

Growing user capacity and engagement

- Capacity development task team active
- Successful capacity development webinar
- Industry engagement study now underway

Increasing engagement & awareness

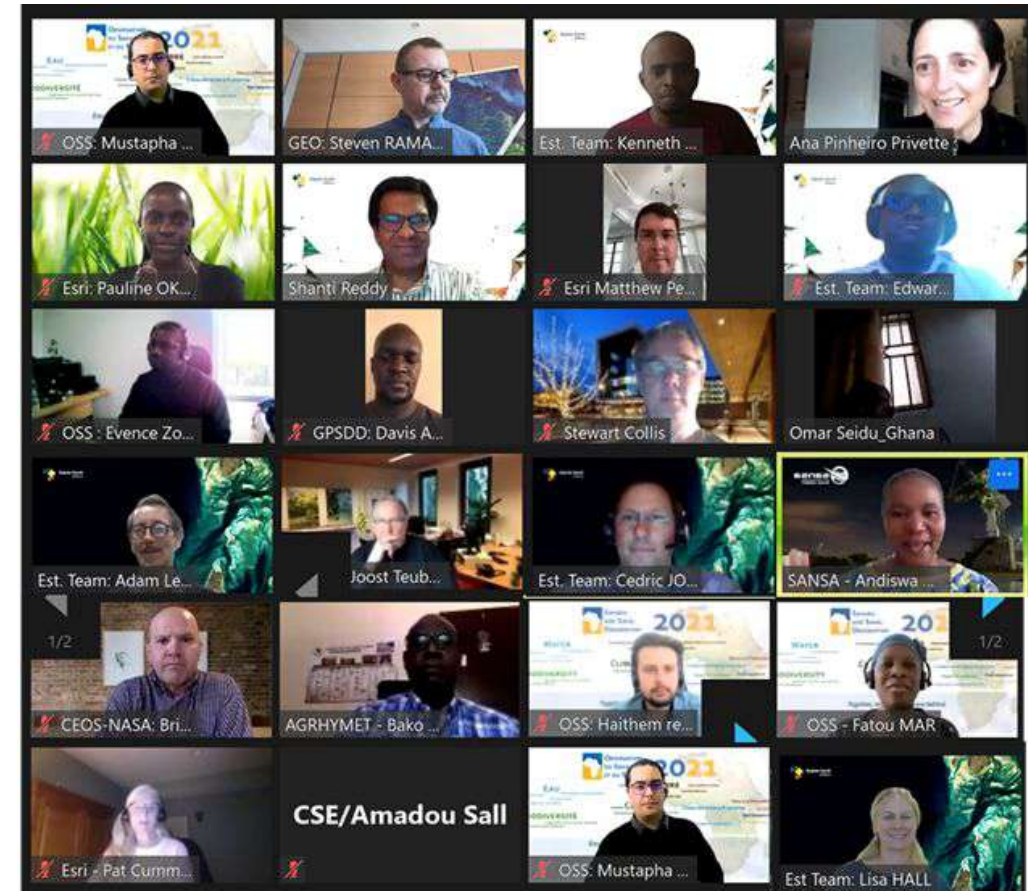
- WEF report release demonstrating potential impact
- Website refresh with new materials
- Comms strategy update & brand launch

Governance

The 7th Technical Advisory Committee (TAC) meeting was held virtually on 4th March, with a focus on 2020 year in review and 2021 work planning. The TAC endorsed our [2020 Annual Report](#) which is now published.

We are excited to welcome Omar Seidu of Data for SDGs as our new TAC co-chair. Omar will be working alongside existing co-chair, Andiswa Mlisa of the South African National Space Agency.

The DE Africa Governance Framework is currently being updated prior to the inaugural DE Africa Governing Board meeting to reflect the move to a more distributed operational model. This will include board composition, governing principles and accountability. Planning for the first meeting is now underway, which is tentatively scheduled for April-May.



7th Technical Advisory Committee Meeting -

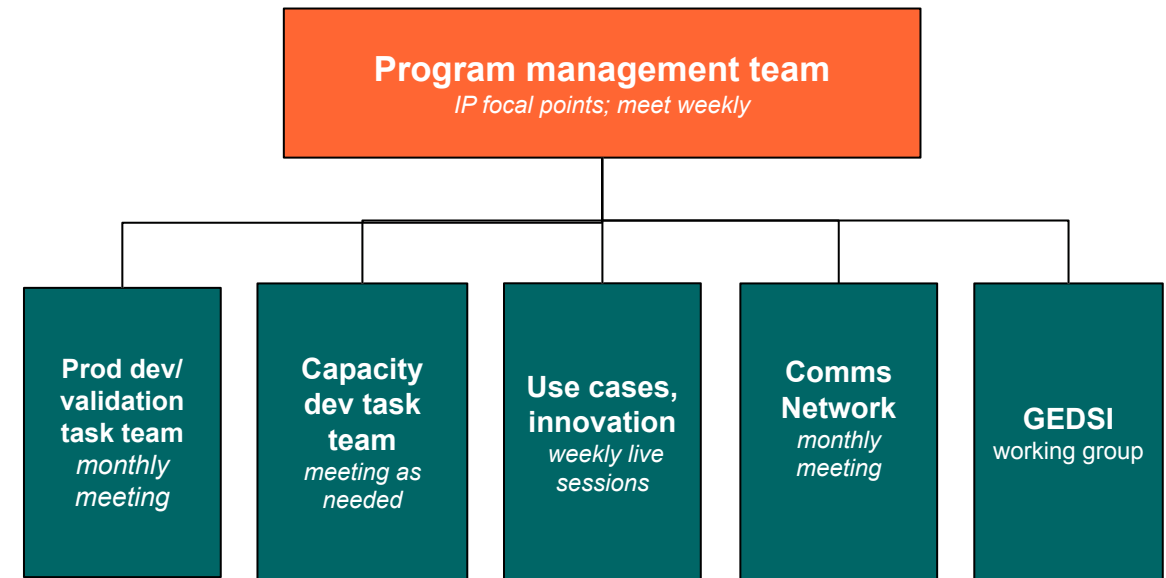
Program delivery transition

The selection process for the Program management office PMO should conclude in April. The selection panel is predominantly African stakeholders.

The Group on Earth Observations (GEO) trust fund mechanism is now active the first round of in-Africa recruitment has been completed.

Partnership Agreements have been established with multiple organisations - Implementing Partners. On 17th of Feb 2021, we were proud to host our first Digital Earth Africa 'All-Hands' meeting where we were delighted to hear from our network, including: AFRIGIST, AGRHYMET, CES, OSS, RCMRD and SANSA.

Following TAC endorsement, DE Africa will develop Terms of Reference for both Product Development and Communications Task Teams. TORs will harmonised and consistent with the governance framework and principles of the program (e.g. GEDSI Strategy).



DE Africa program delivery - working groups/ task teams



GEDSI impacts

Capacity development: how to use DE Africa to benefit women, men, youth and marginalised groups, and why this is important

Countries are empowered

Development activities are more effective

Lives are improved

Digital transformation is advanced

Research / use cases on how women, men, youth and marginalised group can use and benefit from DE Africa products

Specific training and support for youth and women's networks

Collaboration with international organisations: GEO and NASA

In focus: diversity & inclusion

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 now identified initiatives to operationalise our strategy and to ensure GEDSI is embedded in Digital Earth Africa's impact areas. For example:

- Our CD work will specifically include how DE Africa can be used to benefit women, men, youth and marginalised groups, and why this important.
 - Including GEDSI champions from each of the Implementing Partners in each CD Task team to actively participate and review materials with a GEDSI lens.
 - Ensuring specific training and support is provided to youth and women's GIS networks.
- Involvement at every stage will ensure countries are empowered to make evidence-based decisions that benefit all these groups, and that development activities are more effective because they consider the needs of different groups.
- A collaborative GEDSI group will provide the foundation for an agreed use case project by mid 2021 to benefit women, men and marginalised groups. Priority projects decided by African people for African outcomes.
- We are also actively collaborating with other international organisations - Group on Earth Observations (GEO) and NASA - to pursue consistent GEDSI approaches for DE Africa. Working collaboratively, harnessing existing knowledge and insights and pursuing a common goal will ensure all can benefit from digital transformation, both in Africa and beyond.



Dr Ken Mubea speaking on behalf of DE Africa at Youth Mappers' Open Data Day, Nairobi

Technical transition

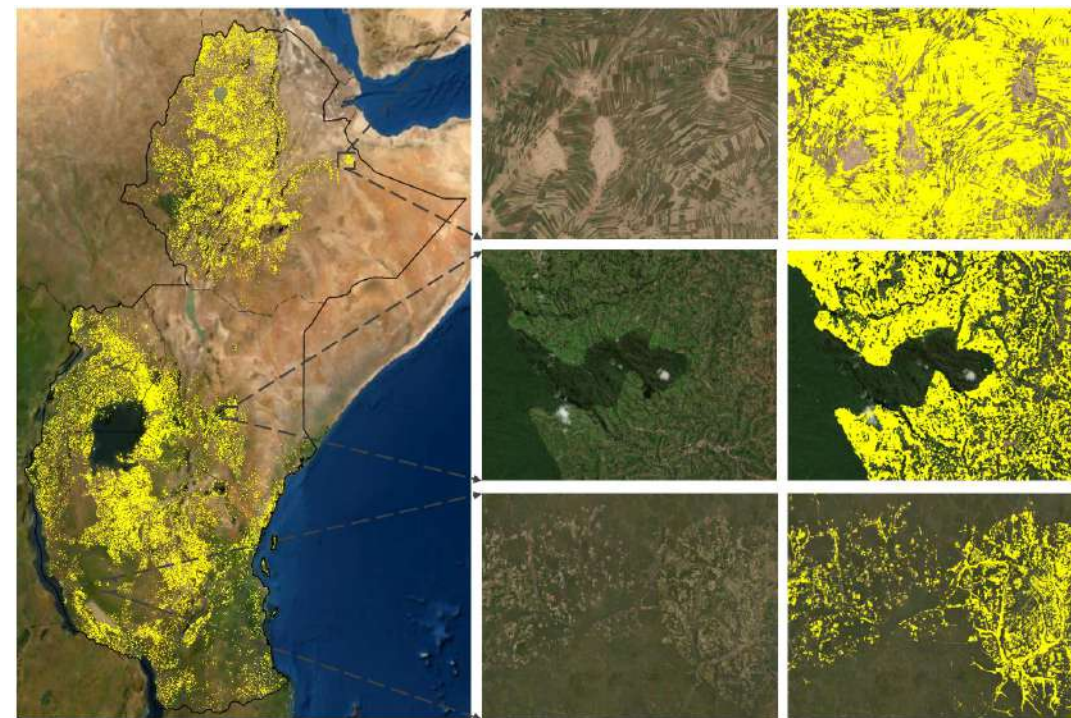
DE Africa's new [GeoMAD service](#) is ready for release in early April 2021. This is a powerful new information source for visualisation and analysis of changes across the African landscape.

For the first time in Africa, DE Africa is on track to routinely process Copernicus Sentinel-1 radar backscatter data for the entire continent by April/May 2021. Radar satellite imagery is important for Africa as it is not affected by cloud cover.

Work has also progressed towards the routine processing of United States Geological Survey (USGS) 'Collection 2' Landsat data for all of Africa. Landsat Collection 2 is a keystone dataset that provides consistent observations from the mid-1980s and will be available in DE Africa as an operational dataset early in 2021.

The validation of WOfS is complete enabling WOfS to become a fully operationalized product, once the Landsat 2 pipeline is operational. Crop mask validation data collection is complete with over 1100 samples collected and a prototype for East Africa has been developed.

A major upgrade of our notebook library was undertaken this month and our new technical documents portal is ready to launch - see example [here](#). All data and services will be available in [AWS Cape Town](#).



Prototype cropland area map for East Africa. This product will help to accurately define farmland areas and the change to crops over time.

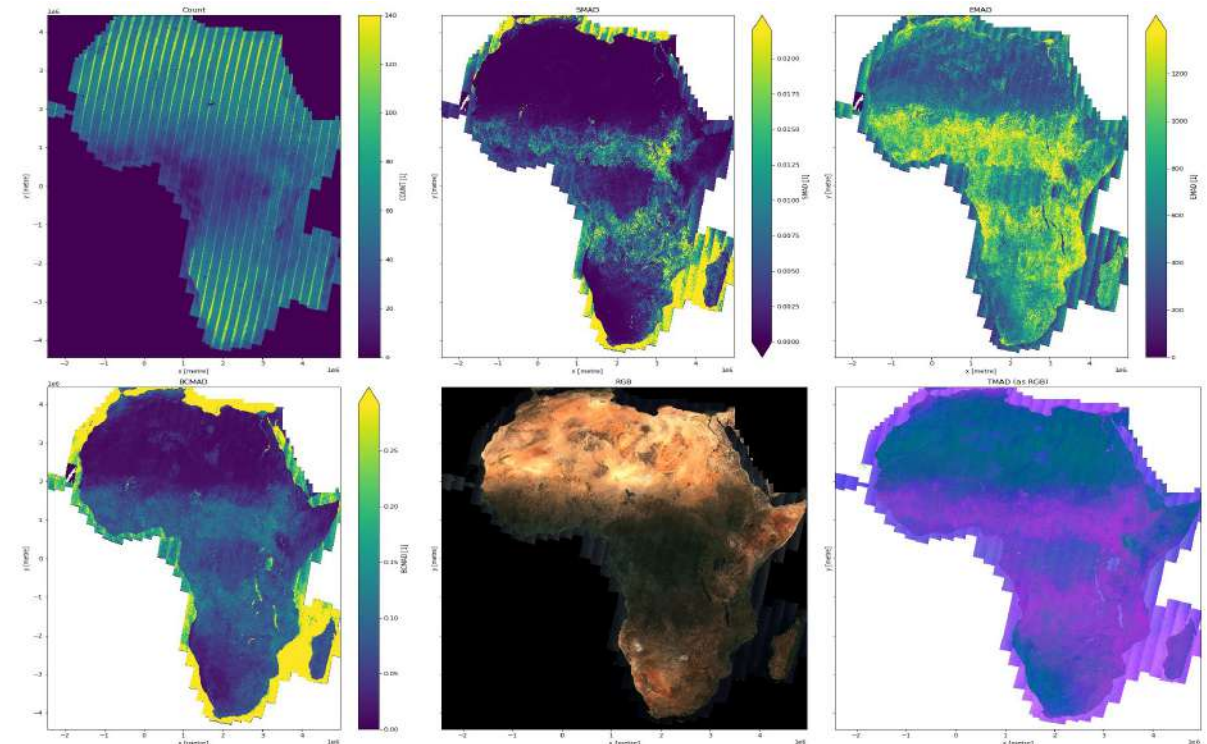
GeoMAD - New continental-scale service

“GeoMAD” is a powerful new information source for visualisation and analysis of changes across the African landscape.

In a typical year, satellites such as Sentinel-2 capture over 60 images of every part of Africa generating a vast amount of data. The GeoMAD service produces a rich new data source by condensing an entire year’s worth of satellite viewing into a handful of images. The service allows users to access annual cloud-free mosaics of the African landscape, as well as to view statistical variation over time.

GeoMADs can be calculated for any interval of time but we are initially producing them as annual products, available for each calendar year between 2017 - 2020. Each product is 10 metre resolution, and covers the entire African continent.

The GeoMAD service will provide vital inputs for a vast range of studies and down-stream products by making a free and practical evidence base available. The GeoMAD service could be used to inform decision making on crucial sustainability issues such as water resourcing, flooding, coastal erosion, land degradation, food security and urbanisation. GeoMAD will be of particular significance when analysing areas with heavy cloud cover.



A cloud-free image of all of Africa produced by combining tens of thousands of satellite image collected throughout an entire year - combined with additional data on uncertainty.

GeoMAD gallery

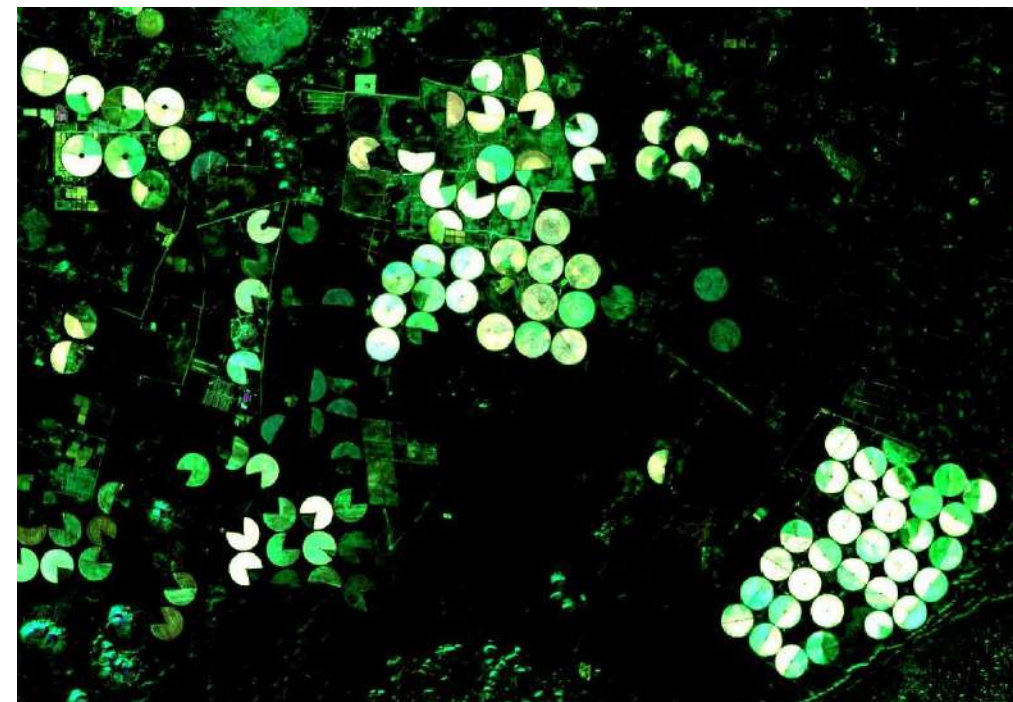
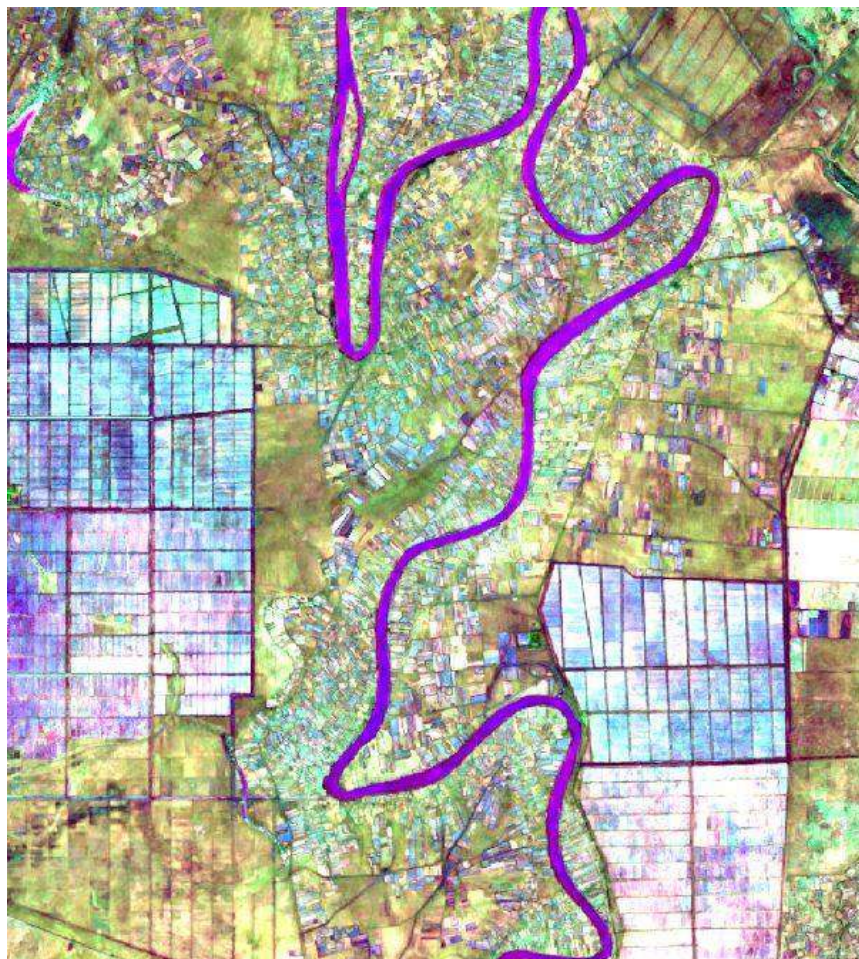


Above: Stellenbosch, South Africa. Annual surface reflectance variation, 2019.

Right: Biombo, Guinea-Bissau. True colour cloud free image, for 2019.



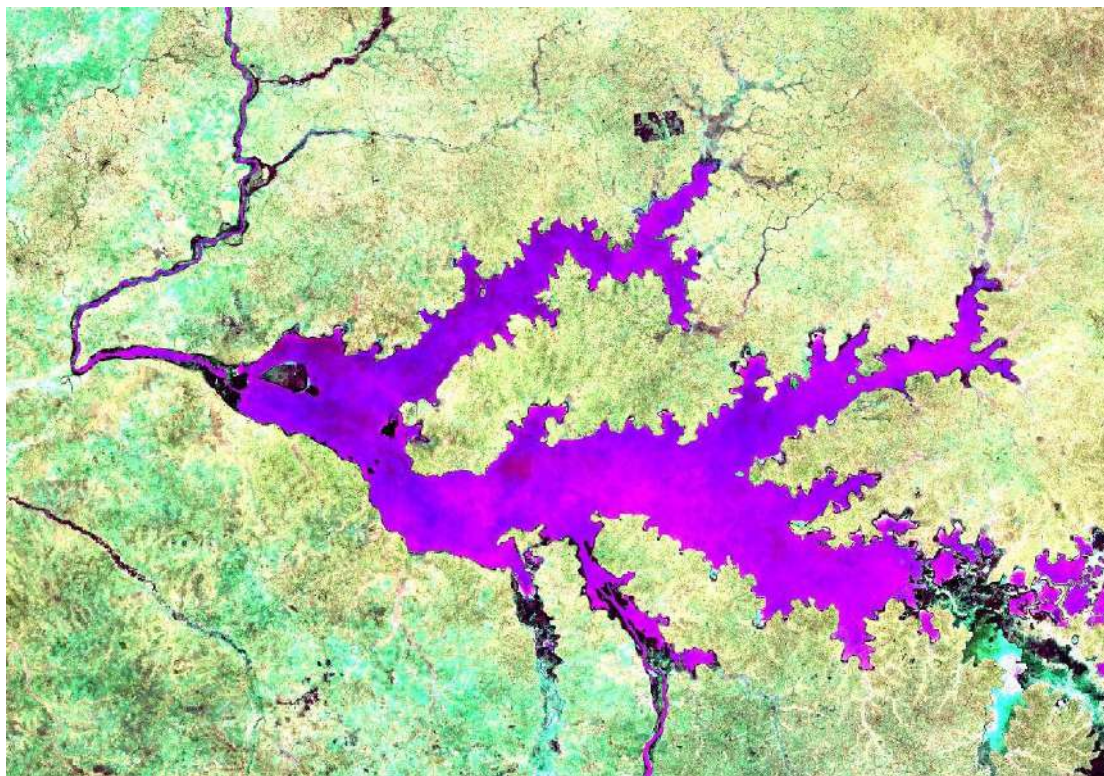
GeoMAD gallery



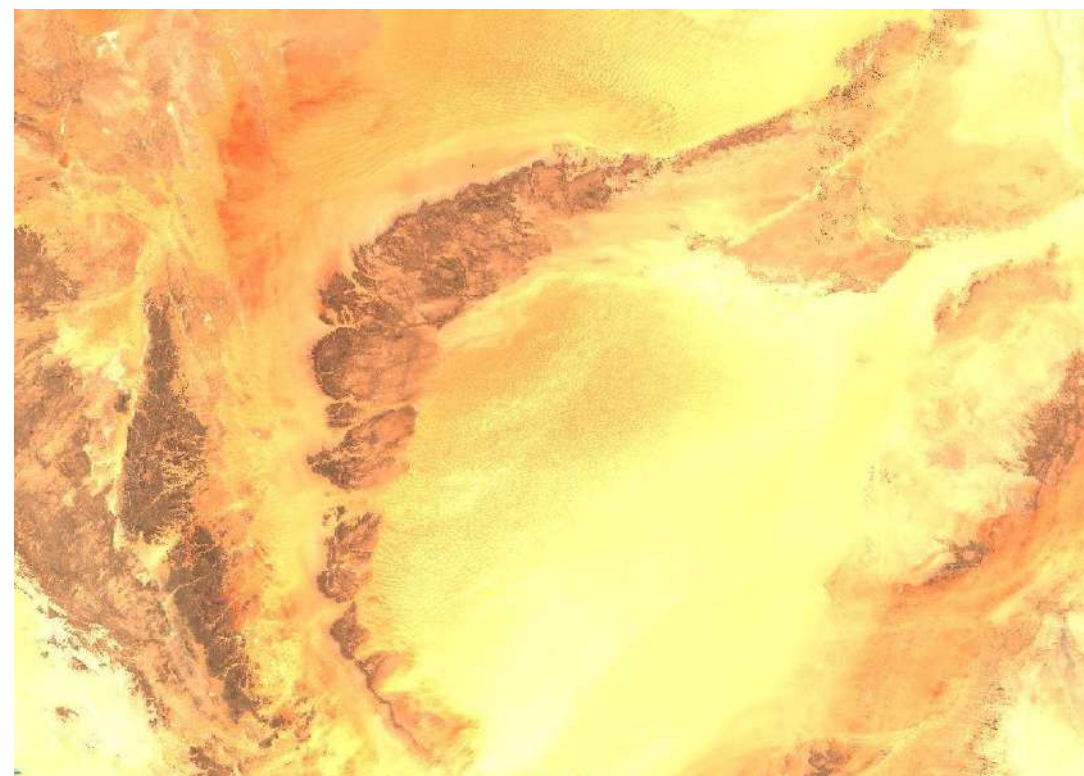
Left: Xai-xai, Mozambique. Above: Bahariya Oasis, Egypt.

Both images show annual variation in surface reflectance for 2019, highlighting patterns of agricultural development.

GeoMAD gallery



Above: Lake Kyoga, Uganda. 2019 annual variation in surface reflectance highlighting water body extent.



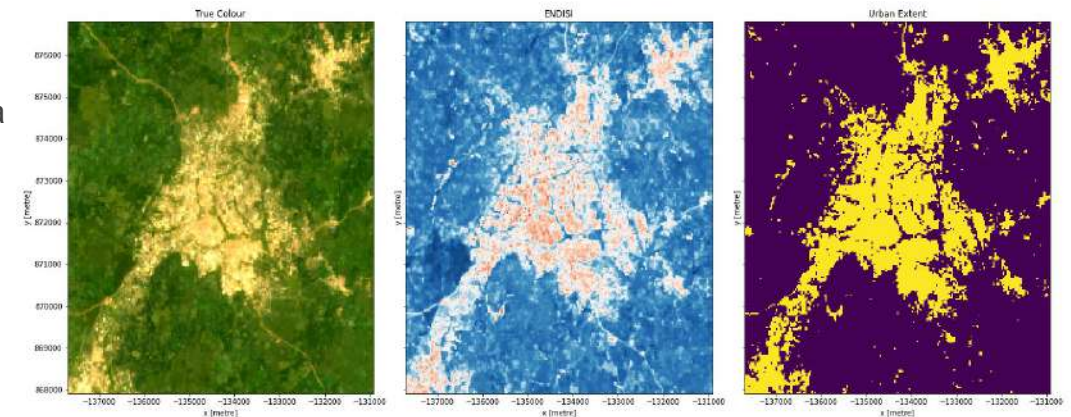
Above: Sabha, Libya. True colour cloud free image, for 2019.

DE Africa Notebooks

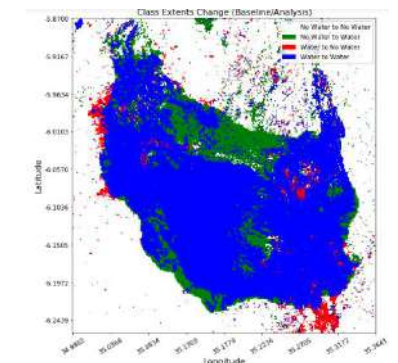
DE Africa provides a readily available selection of notebooks (user computational workflows and code) that allow users to use, interact and engage with the DE Africa Sandbox. These notebooks can also be found in your home folder on the sandbox, or accessed from GitHub [here](#). Real world examples include:

- Burnt area mapping using Sentinel-2 data
- Monitoring change through time using satellite imagery filmstrip plots
- Monitoring chlorophyll-a in African water bodies
- Monitoring coastal erosion along Africa's coastline
- Measuring crop health
- Modelling intertidal elevation using tidal data
- Machine learning with the Open Data Cube
- Monitoring mangrove extents
- Detecting water with radar
- Detecting change in urban extent
- Vegetation change detection
- Determining extent of water bodies
- Scalable supervised machine learning on the Open Data Cube

A major notebook library refresh was undertaken this month and we have now launched our new technical documents portal at: <https://docs.digitalearthafrika.org/>



Detecting urban extent using the Enhanced Normalized Difference Impervious Surfaces Index (ENDISI). Location is Effiduase, Ghana



Coastline and water extent analysis tools



Capacity development

Our newly formed capacity development task team is now actively developing the DE Africa CD Implementation Plan, informed by a capacity needs assessment of Implementing Partner organisations completed late last year. Our [latest webinar focused on Capacity Development](#) and issues related to the use of EO data to drive decisions, policy, action and innovation, bringing together key DE Africa program partners along >200 community members.

Our online 6-week self-directed training program to support new users engage effectively with our data and products remains very popular. Since December, this has grown by 150% with 104 awardees and 12 active users.

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. Establishment of a help desk is also underway.

Metrics on our growing use community are shown [here](#).



Everything GEO @saniamomercy · Mar 1
Honored to present one of my first achievements in 2021: 6 weeks ago I began a six weeks training offered by @DEarthAfrica and was today awarded my certificate. Super grateful to Digital Earth Africa for affording me with this opportunity to learn and use their platform.



O. Wyclife Agumba
@WYCLIFEAGUMBA

Amazing program by @DEarthAfrica ... am glad to have successfully completed the course using #Python in #Jupyter for #Sentinel and #Landsat data analysis. #openaccess #FOSS



Growing user community - the numbers

Weekly live sessions are very popular!

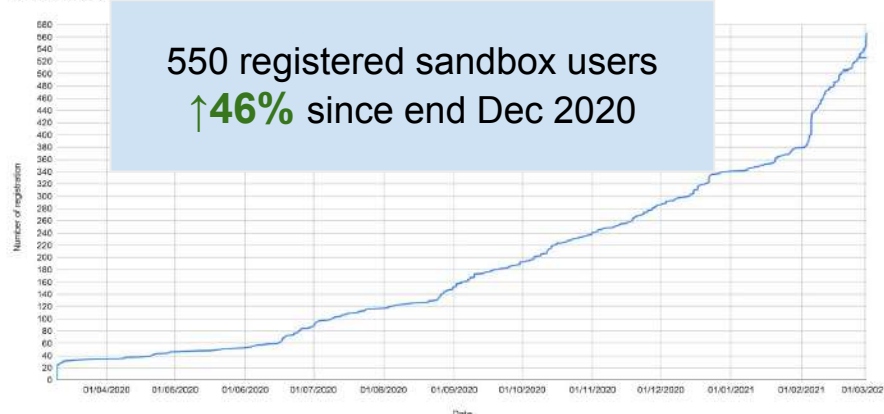
Diverse, active participation
 > 15 people on average per session
 max number 26 people
 10+ countries represented. 29th occurrence last week.

Online training successes

104 total awardees
 ↑**150%** since end Dec 2020
 12 active trainees now

Rapid increase in sandbox usage

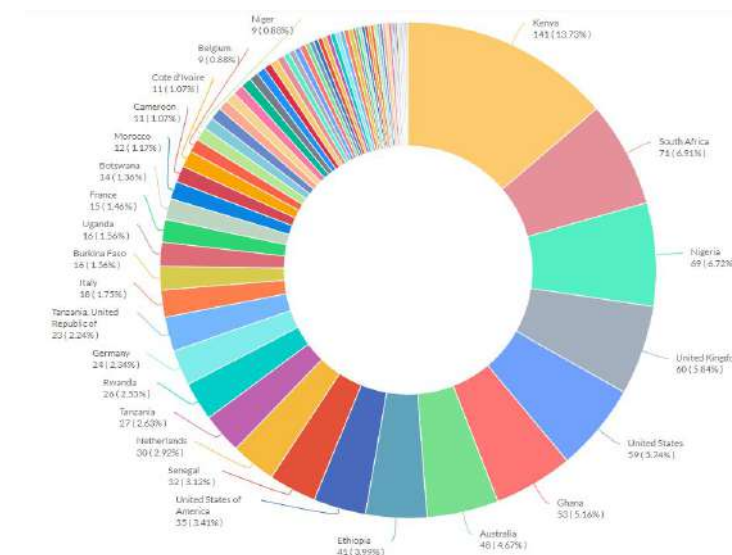
Evolution in the number of sandbox registration through time



Improving map interfaces

Terria map
 > 1,900 unique users (to date)
 across 97 countries
 Terria map improvements
 on-going (UX research)

ESRI Geoportal
 Upgrade underway!

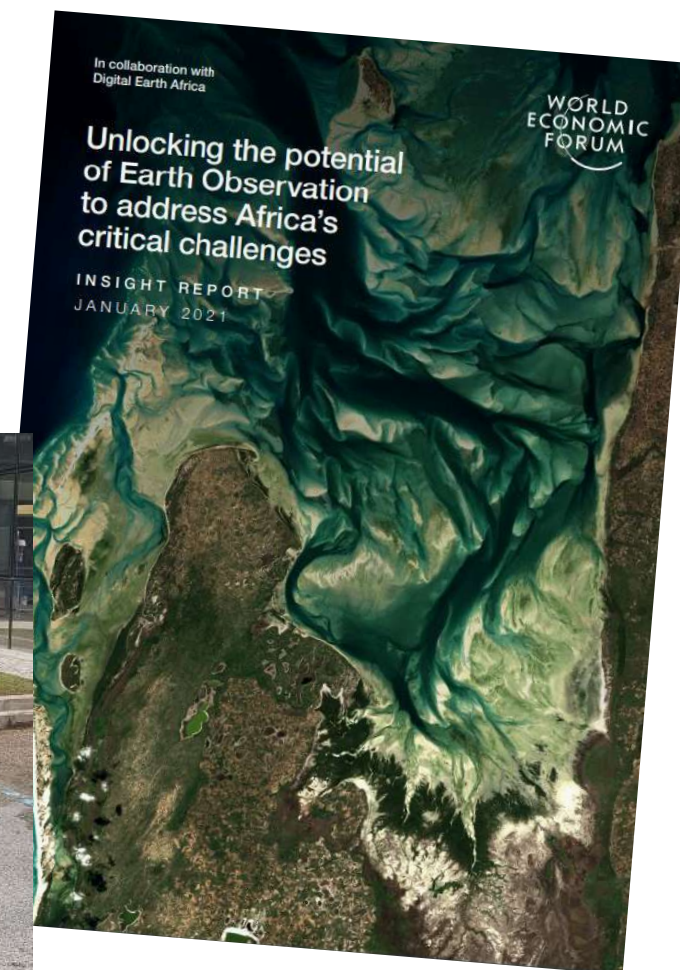


Drive and demonstrate impact

The World Economic Forum report '[Unlocking the Potential of Earth Observation to address Africa's critical challenges](#)' was published in collaboration with DE Africa. This estimated that EO data could contribute up to \$2 billion (USD) a year from 2024 to the African economy.

This quarter, 5 user driven case studies have either been published or are in review, with many more in the pipeline. See [here](#).

Digital Earth Africa, FrontierSI, COOi Studios and NGIS are partnering to undertake an [Industry Engagement Study](#) in Africa. This will provide vital insight into how African industry is engaging with satellite imagery, with a particular focus on African organisations that are working towards improving food security for the continent.

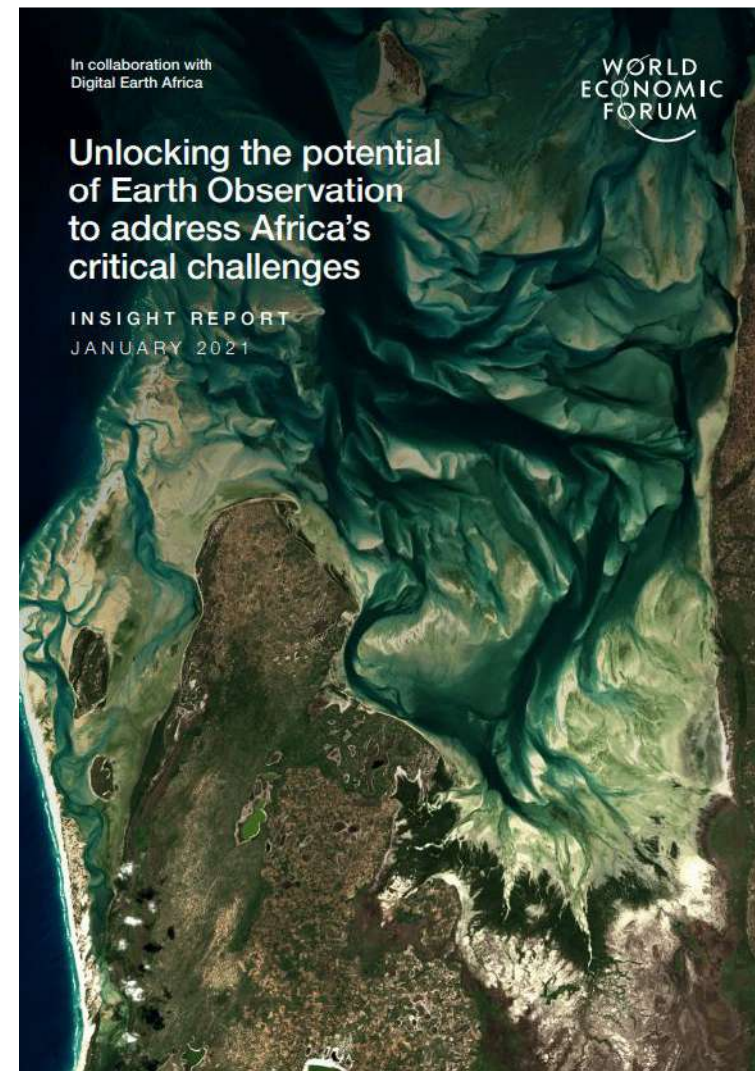


Potential of Earth Observation to address Africa's critical challenges

The World Economic Forum's report "[Unlocking the Potential of Earth Observation to address Africa's critical challenges](#)", published in collaboration with DE Africa, estimates that EO data could contribute up to \$2 billion (USD) a year from 2024.

This report marks the first of its kind to quantify the potential economic impact of the DE Africa platform which could be billions of dollars each year thanks to:

1. A strengthened EO industry. Improved use EO data could lead to an extra \$500 million (USD) in yearly EO sales along with new job opportunities and increased revenue.
2. Boosted agricultural productivity. Better data could potentially be worth an extra \$900 (USD) million a year, thanks to water savings and productivity gains for farmers, it could also contribute to reduced pesticide usage.
3. Better regulation of mining activity. Data allows countries to track unregulated mining, providing a potential savings of at least \$900 (USD) million from reduced environmental damage and fiscal evasion.



User Case Studies: Jan - Mar activity

Published or in review

- **Stella Mutai (IFAD) & Geo M&E (Kenya)** - crop phenology statistics and analysis of agricultural fields to farmers in Africa - 2020 Farming by Satellites Prize winner
- **Stephen Korir: Data Driven Agriculture** - advice on crop poaching and harvesting regimes in support of Kenya's Big Four Agenda on food security
- **Big Data Ghana** - integrating DE Africa platform data into Ghana Agriculture Information Management System, an Online Open Data Platform for Agricultural Sector Data Sharing Initiative
- **RCMRD** - [burn scarring from fires around Mount Kenya](#) - useful for the **Kenya Forest Service (KFS)**
- **RCMRD** - chlorophyll index and water, Lake Elmenteita in Kenya

Example cases in development

- **Forestry department, Botswana** - evolution of water/ water scarcity, Okavango Delta
- **NADMO, Ghana** is using the WOfS product to create flood hazard maps and inform disaster risk mapping, planning and decision making
- **Ghana Environmental Protection Agency (EPA)** - monitor unregulated mining at scale
- **CSE, Senegal** - identification of unregulated construction in protected ecological coastal zones
- **Northern Rangelands Trust, Kenya** - moving wildlife and habitat monitoring

USE CASES BY STATUS

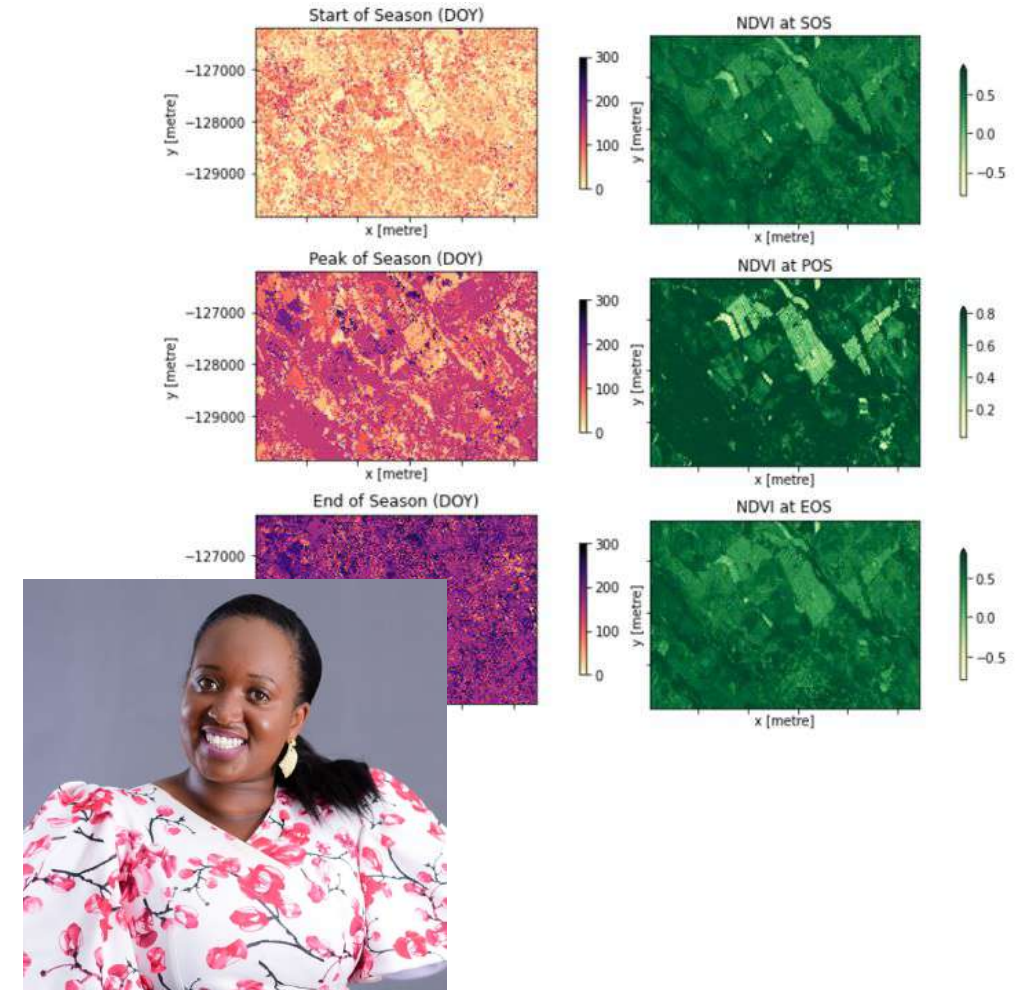


Intelligent Agriculture

Supporting sustainable coffee production in Kenya

Geospatial Consultant Stella Mutai is using the DE Africa platform to support sustainable coffee production in Kenya. Her innovative work, which was recently awarded the Farming by Satellite Prize from the European Global Navigation Satellite System Agency, unlocks the power of Earth observations to support the agricultural sector to adapt and mitigate against the effects of climate change. In doing so, it empowers communities in vulnerable areas to increase agricultural production and productivity.

[Read more here](#)



Mapping Forest Fires

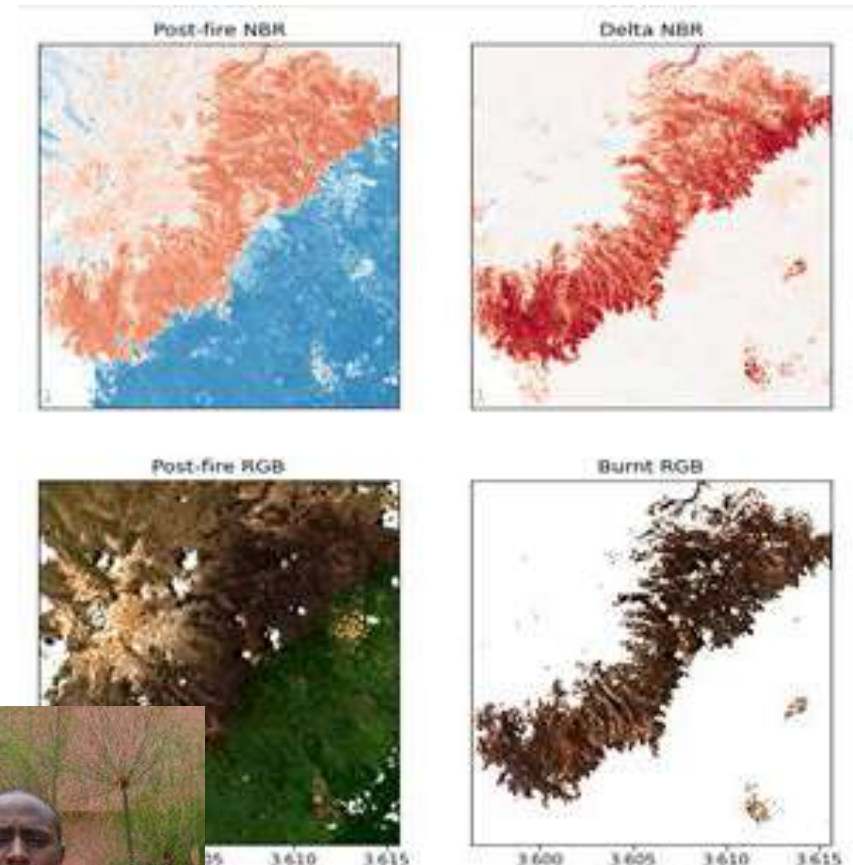
Rapid impact assessment - Mt Kenya

Mount Kenya lies within the UNESCO designated World Heritage Site of Mount Kenya National Park, and is a key driver of both local and international tourism to Kenya.

DE Africa is helping Eric Nganga from the Regional Centre for Mapping of Resources for Development (RCMRD) to provide a rapid assessment of the impact of fires in Mount Kenya. This will be useful in engagement with the Kenya Forest Service (KFS), which has been mandated with the task of monitoring forest cover.

DE Africa is providing access to free and open Analysis Ready Data from Sentinel-2 (available at 10 metre resolution) along with technology and a range of algorithms and to provide insights into fire-affected regions. Eric uses the Normalized Burn Ratio (NBR) tool - an index designed to highlight burnt areas in large fire zones, by measuring how healthy, green vegetation and burnt vegetation reflect light differently.

[Read more here](#)



Cane Poaching

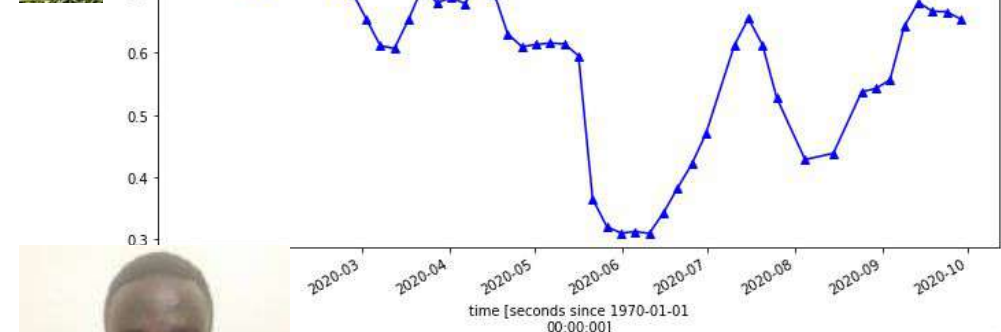
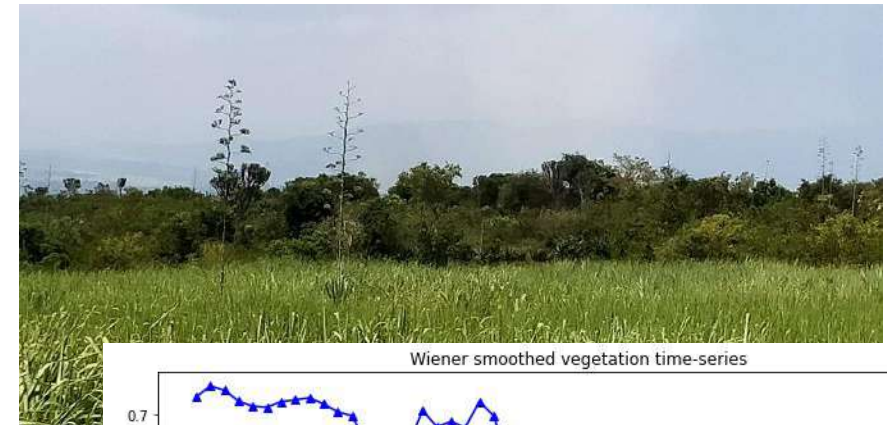
Food security & local farmers

The sugar industry in Africa has had its fair share of seasonal challenges and problems, ranging from fragmentation of lands making it uneconomical for small holder farmers, nutrient exhaustion in soil from maintaining the same crop over years without any kind of regenerative activity, and dwindling crop yields among many others. The industry also faces the challenge of cane poaching, with the survival of many sugar companies threatened by the practice.

As a potential solution to the regulation challenges faced by this industry, Stephen Korir from Data Driven Agriculture in Kenya, is using satellite imagery to monitor fields over the crop cycles. They can then note changes which are not in tandem with their normal operations.

Stephen is using NDVI (Normalized Difference Vegetation Index) values trends - the operating code for Crop Health is available for access on the Notebook Repository.

[Read more here](#)



Partnerships and community

Partnership is at the heart of the Digital Earth Africa program and we are proud to be collaborating with a range of influential organizations from across the African continent and the globe.

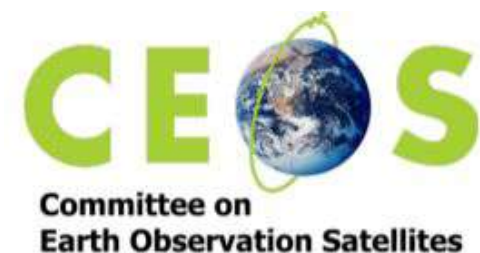
DE Africa is currently in active discussion with the following programs whose objectives and interests intersect align with our own:

- NASA- SERVIR
- International Water Management Institute (IWMI)
- Bridges to Prosperity
- Food and Agriculture Organisation

DE Africa continues to actively contribute to the Committee on Earth Observation Satellites (CEOS), including jointly supporting the [CEOS Analysis Ready Data for Land \(CARD4L\) webinar](#) in February. We are also active participants in the Open Data Cube (ODC) community

DE Africa continues to work very closely with the Group on Earth Observations (GEO), and an application is underway to upgrade our program status from a Community Activity to a GEO Initiative.

Establishment of a DE Africa community of practice is being discussed as part of the Capacity Development Implementation Plan development.



Building awareness

In January, we launched our new [DE Africa website](#) to enhance public communication about the benefits of our program and to promote uptake and engagement with our services

The 2021 [DE Africa Communication Strategy](#) is now published, and is designed to ensure strategic and effective communications across all DE Africa operations. We also launched a DE Africa brand refresh. The vibrant new brand aims to communicate aspects of the African landscape, culture, people and economy that the program seeks to benefit. Updated logos, factsheets, and postcards can be found [here](#),

We have established a Communications Network with our Implementing Partners. The first meeting was held in late Feb and included active participation from communications leads from all 6 implementing partners. Meetings will now be held monthly and working group Terms of Reference are now being established.

Our [communications metrics](#) demonstrate that we are building an engaged community on social media and we are grabbing the media's attention. In addition, we continue to engage in a wide range of international and Africa based events.



The new DE Africa Fact Sheet available in [English](#) & [French](#).

Communication metrics

We are building an engaged community on social media

LinkedIn

- + **105%** page views
- + **60%** more views from users in the defence & space industry
- + **242** new followers

Compared to Oct-Dec 2020

Twitter

- + **69%** impressions
- + **20%** engagement
- + **423** new followers
- + **793** likes

Compared to Oct-Dec 2020

The new website is proving effective amongst relevant audiences

- 4,307** website users
- 474** users from Kenya
- 203** from South Africa
- + **6** new blogs with **692** blog page views
- 707** views of 'Training and resources' web page
- Strong organic search and referral performance

Digital Earth Africa grabbed the media's attention



- 30 media mentions, 19 of which were regarding the World Economic Forum Report
- Strong inbound media approaches from trade and national publications

Acknowledgements



THANK YOU

