WP23_25: Digital Earth Africa

1447,249

Basic Information

Full title of the Initiative

Digital Earth Africa

Short Title or Acronym

DE-AFRICA

Current category in the 2020-2022 GWP

GEO Initiative

Proposed category in the 2023-2025 GWP

GEO Initiative

Points of Contact

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Purpose

Objective

Digital Earth Africa (DE Africa) aims to improve the lives of Africans by providing planners and policy makers with tailored Earth observation information to support better decision making and enhance sustainable development outcomes.

Please provide a short description of the Initiative

DE Africa is currently being established as an African-based and managed operational platform, funded by the Australian Government Department of Foreign Affairs and Trade (DFAT), and The Leona M. and Harry B. Helmsley Charitable Trust (Helmsley). DE Africa provides routinely updated information, 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. From 2023, focus of the program will be to secure funding for delivery beyond the Establishment Phase, capacity building, and delivering impact across Africa.

Why is this Initiative needed?

DE Africa offers significant productive gains and rapid uptake of EO data to solve problems by providing free access to continental scale analysis ready EO data and thematic products, open source algorithms and access to compute and training to undertake regional, national or local scale analysis.

What evidence is there to support this need?

Africa faces significant development challenges with a changing climate and a growing population. Studies published by World Economic Forum (https://www.weforum.org/reports/unlocking-the-potential-of-earth-observation-to-address-africa-s-critical-challenges) and DE Africa and GEO (https://www.digitalearthafrica.org/sites/default/files/downloads/Broader%20Perspectives%20on%20Digital%20Earth%20Africa.pdf) have shown the potential of EO to address these challenges.

Is this Initiative open to participation by representatives of any GEO Member, Participating Organization, and GEO Associate?

Yes

Are you aware of other projects or initiatives at a global or regional scale (both in GEO and externally) that provide similar products or services?

No

Please identify the most important actual and/or intended outputs (products, services, etc.) produced by the Initiative, along with their intended and/or actual users. This list does not need to be comprehensive but should identify the outputs which are most used and are expected to have the greatest potential impact.

Output	Status	Users	Additional info
EO data and services	Regularly updated	Geospatial organizations, government agencies, industry, researchers	
Analysis tools and training on use of EO data	Regularly updated	Geospatial organizations, government agencies, industry, researchers	
In situ and validation data	Occasionally updated	Geospatial organizations, government agencies, industry, researchers	In situ and validation data collected to support development of services are shared publicly

If needed, please provide additional comments or explanation to accompany the outputs table

More information about the data, services and tools provided by DE Africa can be found in the user guide: https://docs.digitalearthafrica.org/en/latest/. Specifically, datasets available are listed at https://docs.digitalearthafrica.org/en/latest/data_specs/index.html and analysis tools are provided at https://docs.digitalearthafrica.org/en/latest/sandbox/index.html.

DE Africa’s continental scale products include:
- Water Observations from Space (WOfS): a continent-wide service that allows anyone to better understand water availability. WOfS uses Landsat 2 Surface Reflection to enable users to understand the location and movement of inland and coastal water across Africa. It shows the presence and absence of water and can be used to assess the change in water extent over time and manage water resources.
- Cropland Extent Map provisional service uses Sentinel 2 surface reflectance to determine the presence or absence of crop at 10m resolution. This information is fundamental to developing more complex agricultural products and empowers governments to inform decisions on food security.

- Fractional Cover describes the landscape by classifying the ground cover as bare, green and non-green, enabling analysis of environmental conditions over time. The service uses Landsat 2 Surface Reflection therefore analyses can explore decades of change (back to 1980s to current day), providing powerful insights into long-term annual as well as shorter term seasonal vegetation change.
- GeoMAD is a rich data service that condenses an entire year's worth of satellite viewing into a single cloud-free, statistically significant composite (Annual GeoMAD), and is available for both Landsat and Sentinel-2 data. GeoMAD data can be used to inform decision making on crucial sustainability issues such as water resourcing, flooding, coastal erosion, land degradation, food security and urbanisation, and is particularly useful for visualising change over time.

DE Africa data and products are accessible through several open-source visualisations and analysis tools, accessible by users with different levels of technical background (e.g. Analysis Sandbox, DE Africa map, GIS Web Services and ESRI's Africa Geoportal).

DE Africa's free, on-line training portal is now available to both English and French speaking communities. The capacity development model has resulted in the rapid growth of our diverse user base (government, academia, industry). For example, as of mid-2020 DE Africa has:
More than 2000 registered DE Africa sandbox users
More than 300 graduates from DE Africa's free, online, bi-lingual training course.
More than 10,000 unique DE Africa map users
2 completed industry incubator studies (Ghana, Kenya) leveraging DE Africa for innovation in agribusiness applications.

What kinds of decisions are the outputs of this Initiative primarily intended to support?

DE Africa outputs support decisions on climate action and reporting, water resources management, agriculture and food security, land degradation and coastal erosion, and sustainable urbanization.

To date DE Africa has published over 25 user-led case studies and impact stories, across Africa supporting 7 different sustainable development goals (Ghana, Kenya, Tanzania, Botswana, Uganda, Mozambique, Zambia), and has additional work in progress in many other countries.

How will these decisions benefit from the outputs of this Initiative?

EO data and services provides insights on patterns and trends to inform evidence based decision making and policy.

What kinds of impacts (for example, reduced loss of life, monetary savings, conservation of biodiversity, etc.) are anticipated as a result of the use of the outputs of this Initiative?

DE Africa enables countries to report on and take actions against climate change, and provides information to support better water management, to improve agriculture productivity and to achieve sustainable development.

Case study examples of how users have applied DE Africa by SDG are listed below.

SDG 2, Zero Hunger
Creating an open-source framework for crop-type mapping in Zambia
Identifying and analysing irrigated agriculture in Mozambique using DE Africa tools and services
Digital Earth Africa helps to remotely assess the productivity of mango farms in Ghana
DE Africa supports agriBORA to develop more robust insights for greater food security in East Africa
Big Data Ghana works towards more sustainable agriculture with the help of Digital Earth Africa
Intelligent Agriculture - supporting coffee production in Kenya
Mapping crop phenology key to addressing food security, Kenya
Cane Poaching, Kenya
Policy leaders see the benefits of Earth observations at Simiyu agriculture, Tanzania

SDG 6, Clean Water and Sanitation & SDG 14, Life Below Water
Monitoring Water Extent Using Earth Observation Data, Ghana

Rising Lakes in the Rift Valley in Kenya
Water Assessment and Monitoring in the Lake Ngami, Lower Okavango Delta, Botswana
Using Digital Earth Africa to address unsustainable agriculture, Kenya
Using Earth observation to protect and conserve wetlands in Kenya
EO for conservation: rehoming giraffes on Lake Baringo, Kenya
Monitoring Chlorophyll in Lake Elmenteita, Kenya
Using satellite data to combat drought: Monitoring Lake Sulunga, Tanzania

SDG 9, Industry, Innovation and Infrastructure & SDG 11, Sustainable Cities and Communities
Monitoring urbanisation in Gulu City, Uganda
Digital Earth Africa - Detecting landscape change and unregulated mining, Ghana

SDG 13, Climate Action
Climate Next: How data and community can save Zanzibar's mangroves.
See also SDG 6 examples above

SDG 15, Life on Land
Satellite Data for Giraffe Conservation in Kenya
Combining the power of Digital Earth Africa and local knowledge for planned grazing management in Northern Kenya
Mapping forest fires in Mount Kenya
Detecting Land Degradation Using Geospatial Data, Ghana

Has this Initiative been asked to provide specific information (for example, reports, data, services) on an ongoing basis to an international convention, organization, or other multilateral body?

No

Technical Synopsis

Please provide a brief description of the methods used by the Initiative to produce its (actual or planned) outputs.

DE Africa provides access to cloud-optimized analysis-ready EO datasets, such as Sentinel-2, Sentinel-1, and Landsat, and uses them to generate operational services for the entire continent. DE Africa's continental services are co-designed and co-developed with partners and users to ensure they are fit for purpose and can be used to support decision making. Current and under-development services include dynamic water extent (Water Observations from Space), cropland extent, Fractional Cover, and monthly NDVI Anomaly. DE Africa's GeoMAD service provides annual or semiannual cloud free surface reflectance and variability measures that can be used for visualization, land cover mapping and change detection. In addition to data and services, DE Africa provides free compute environment, open source analysis tools, and training and support to users.

If you would like to provide further details on the technical methods, you may upload one or more documents here.

- no supporting documents provided -

Are there any significant scientific or technical challenges that need to be resolved by the Initiative during the 2023-2025 period?

Yes

Please describe these challenges and the steps being taken to solve them.

To achieve user-focused development and continuous improvement of DE Africa services, DE Africa works closely with partners to engage and understand user needs.

Does the Initiative expect to complete any key new outputs, improvements to existing outputs, or improvements to the methods of producing outputs, in the 2023-2025 period?

Yes

Please describe these new outputs or improvements.

DE Africa aims to deliver a provisional coastline monitoring service by early 2023; existing services will continue to be improved based on user feedback; a number of tools and methods will be developed to support agriculture monitoring.

Please identify the key tasks that must be implemented to ensure delivery of these changes, with target dates for completion.

Task	Task description	Expected completion (month/year)
User consultation	Consolation with a range of national and regional agriculture, resource management and statistics agencies to understand user needs, supported by DE Africa partners	

Resources

Have all resources required to implement the Initiative's planned work in the 2023-2025 period been secured?

- Gap in financial resources
- Gap in human resources
- Gap in access to data

What is the estimated funding gap for the 2023-2025 period?

2023 funding is covered by existing funding (outlined below)
Forward funding model for 2024 and beyond is under development

What are the essential skill sets needed by the Initiative but are not currently resourced?

Forward funding model for 2024 and beyond is under development

What data sets are needed by the Initiative but are not currently available?

More in situ data are needed for development and validation of services

What actions is the Initiative taking to obtain the required resources?

DE Africa is actively working on securing additional funding to support the ongoing delivery of the program.

Please list all financial and non-financial contributions to the Initiative (other than in-kind, voluntary participation by individual contributors) having a value of more than USD 50,000.

Contributing Organization	GEO Status	Type of Resource	Value	Currency
Australian Government	Australia	Financial	10,000,000	AUD
Helmesely Charatable Trust	United States	Financial	10,000,000	USD
Bill & Melinda Gates Foundation	United States	Financial	200,000	USD
FAO	FAO - Food and Agriculture Organization of the United Nations	Financial	130,000	AUD

Lessons from the 2020-2022 Period

Were all planned activities for the 2020-2022 period implemented as expected?

No

Please describe which activities were delayed or not implemented and how has this affected plans for 2023-2025.

Identification of the Program Management Office host and the transition of the program into Africa have been delayed. The establishment phase is extended.
Development and implementation of the funding strategy have been delayed. The program will prioritize securing additional funding.

Were there any key challenges faced by the Initiative in the 2020-2022 period?

Yes

Please describe.

See below for challenges caused by COVID-19.

Were there any impacts or changes to operations due to COVID-19?

Yes

Please describe.

The program delivery has been significantly impacted by COVID-19. Funding from the Australian government was cut to support COVID response. Partnership building and collaborative work took longer due to the lack of face-to-face engagement. Operations of most partner institutions in Africa were impacted by COVID-19, resulting in delays in administrative processes and decision-making. Some capacity-building activities could not be conducted as planned. All training and user engagement and support were re-designed to be delivered online. Due to inconsistent internet coverage and language barriers, online-only training was not always effective.

Please describe the key changes proposed for the 2023-2025 period, for example, new projects, new areas of focus, or adjustments to the activity governance.

DE Africa will prioritize addressing food security and supporting climate actions.

Does the Initiative have outputs (products, services, etc.) available to users now, even

if only on a pilot or testing basis?

Yes

Please provide any available information describing this usage (for example, user statistics, results of user testing) and/or feedback from users (for example, user comments, evaluations).

The DE Africa Sandbox, a free computing environment, has over 2000 registered users and more than 100 active users every week. The DE Africa Map, a visualization and analysis interface, has had over 10,000 users.
Some example publications using DE Africa data or service include: Assessing the Potential of Sentinel-2 Derived Vegetation Indices to Retrieve Phenological Stages of Mango in Ghana (https://doi.org/10.3390/horticulturae8010011); Analysing effects of drought on inundation extent and vegetation cover dynamics in the Okavango Delta (https://agu2021fallmeeting-agu.ipostersessions.com/?s=7A-85-3A-E6-1F-5F-19-87-39-23-90-F1-DC-57-5C-E9).

Please provide supporting documentation if available.

- no supporting documents provided -

Do you have evidence of any impacts that have occurred in part as a result of using the outputs of the Initiative (for example, policy decisions taken, behaviour changes by users, risks mitigated)?

Yes

Please provide examples, with evidence where available.

Ghana Statistical Service has used DE Africa data and services to produce a Natural Capital Report, that was provided to the Ghanaian Parliament and local authority, and resulted in a ban on logging and other activities to reduce deforestation in the area. More on how Ghana Statistical Service has used the DE Africa platform: https://www.digitalearthafrica.org/media-center/blog/digital-earth-africa-bridging-digital-divide-ghana

https://www.aboutamazon.com/news/aws/climate-next-how-data-and-community-can-save-zanzibars-mangroves

Please provide supporting documentation if available.

- no supporting documents provided -

Have there been any internal or external reviews or evaluations of the Initiative since 2019?

Yes

Please provide a copy of the report, if available.

- independent_rapid_review_digital_earth_africa.pdf (link)

Please indicate any GEO Work Programme activities with which you have ongoing collaboration.

- AFRIGEO - African Group on Earth Observations
- GEOGLAM - GEO Global Agricultural Monitoring
- GEO Secretariat Operations - GEO Secretariat Operations

Please indicate any additional GEO Work Programme activities with which you would like to establish new collaborations.

- EO4SDG - Earth Observations for the Sustainable Development Goals

- AFRICULTURES - Enhancing Food Security in African Agricultural Systems with the Support of Remote Sensing
- GEO BON - GEO Biodiversity Observation Network
- GEO-EV - GEO Essential Variables
- GEO-LDN - GEO Land Degradation Neutrality
- GEO-WETLANDS - GEO Wetlands
- GFOI - Global Forest Observation Initiative
- GEO-MOUNTAINS - Global Network for Observations and Information in Mountain Environments
- BLUE-PLANET - Oceans and Society: Blue Planet

Stakeholder Engagement and Capacity Building

Are there specific countries or organizations that your Initiative would like to engage?

Yes

Please list these countries, regions or organizations.

All African countries

Existing countries include: South Africa, Kenya, Senegal. Ghana, Rwanda, Tunisia, Niger, Nigeria, Botswana, Tanzania, Sierra Leone...

What are your plans to engage them?

African ministers and leaders on the DE Africa Governing Board and Technical Advisory Committee guide and support engagement with African countries. DE Africa works with regional and national partners to engage and build capacity for users from across Africa. DE Africa's five implementing partners have a mandate to serve more than 40 countries.

Does your Initiative engage users in the work of the Initiative (for example, consultation, testing, co-design)?

Yes

Please briefly describe the Initiative’s approach to engaging users.

All DE Africa services are co-designed and co-developed with partners. Users are consulted and engaged during service design, and evaluation throughout the development stages.
DE Africa is building a growing user community through awareness-raising and training, supported by our partners. DE Africa has engaged more than 15 geospatial and EO communities.
More than 300 users have completed self-paced online training. More than 1000 participants have attended online or face-to-face workshops. DE Africa training and interfaces are provided in both English and French.
A weekly live session is run in English and French that allows users to share their experiences using the platform. Users are also supported through a help desk and whatsapp groups.

Does the Initiative have a user engagement strategy or similar kind of document?

No

Are there categories of users that are not represented at this time, but you would like to engage?

No

Does the Initiative have a documented capacity development strategy?

Yes

Please upload it.

- de_africa_capacity_development_strategy.pdf (link)

Are there any commercial sector organizations participating in this Initiative?

Yes

Please list the commercial sector organizations.

Organization name	GEO Member/PO/...	Country in which the organization is based	City in which the organization is based
AWS	United States	United States	Seattle
ESRI	United States	United States	Redlands, California
Sinergise	Slovenia	Slovenia	Ljubljana
Element84	United States	United States	Alexandria

Are there opportunities for commercial sector uptake of the outputs of the Initiative?

Yes

Please describe these opportunities.

All DE Africa data and services are free and open to use by all sectors.

Is there already commercial uptake occurring?

Yes

Please describe the nature of this uptake and the relevant commercial sector organizations.

Through the Digital Earth Africa Innovation Challenge, two companies, agriBORA and Big Data Ghana, were supported in an incubator program to integrate DE Africa services into their operation.
Read more at:
https://www.digitalearthafrica.org/media-center/blog/de-africa-supports-agribora-develop-more-robust-insights-greater-food-security
https://www.digitalearthafrica.org/media-center/blog/big-data-ghana-works-towards-more-sustainable-agriculture-help-digital-earth

Are there opportunities for further commercial sector participation in the Initiative?

Yes

Please describe these opportunities.

DE Africa provides free data and tools to support uptake by all sectors and continues to improve the documentation and support for users, including those from the commercial sector.
There are potential opportunities for the commercial sector to support the development and delivery of services for the program. For example, DE Africa has investigated use of the Norway's International Climate and Forests Initiative Data program (NICFI) data (https://docs.digitalearthafrica.org/en/latest/maps/external_web_services.html#Steps-to-load-NICFI-visual-layers-in-Maps) and is in discussion with NICFI and other data providers to potentially provide high-resolution data to support analysis.

Does the Initiative have a plan for commercial sector engagement?

Yes

Please describe this plan or upload the relevant document.

DE Africa's industry engagement implements a dual approach that aims to grow new users and applications of EO for Africa and improve the EO experience of the existing user base and ensure that products delivered are fit for purpose. The strategy is supported by a high-level market sector analysis of EO use in Africa conducted by FrontierSI, NGIS and COOi Studios. Guided by the action plan, DE Africa has run an innovation challenge (https://www.digitalearthafrica.org/media-center/blog/big-data-ghana-and-agribora-win-digital-earth-africa-innovation-challenge) and supported initiatives such as the 2021 Africa EO Challenge.

- no supporting documents provided -

Governance

Please describe the roles of each of the key leadership positions, as well as any team structures involved in day-to-day management.

The Managing Director (MD) reports to the Governing Board and has delegated authority to lead the PMO and deliver the approved work plan, according to the priorities and strategies set by the Governing Board. The MD is responsible for ensuring the work packages within the Program meet their objectives and deliver the expected outcomes.
The Head of Operations reports to the MD and manages the PMO resources to ensure the work packages within the Program are delivered to the agreed time, cost and benefits and manages the day-to-day operations of the PMO.

Is there a steering committee or other governance bodies that advise the Initiative but are not involved in day-to-day management?

Yes

Please describe the roles of each body. If there are multiple governance bodies, please describe the relationships among them (such as through a governance structure diagram).

The Governing Board is accountable for the funds allocated to the Program and also sets and approves the strategy, champions the guiding principles, and endorses the priorities.
The Technical Advisory Committee provides the Program Management Office with ideas, advice, expertise, and endorsement for developing the work packages using the strategy, guiding principles, and priorities set by the Governing Board.

- de_africa_governing_framework_2021.pdf (link)

What methods does the Initiative use to communicate with its participants?

- Email / e-newsletters
- Regular conference calls
- Website

Please describe the key risks that could delay or obstruct the completion of the planned activities and outputs of the Initiative, along with any actions taken to mitigate these risks.

Description of the hazard	Description of the possible impacts	Scale of impact	Likelihood of occurrence	Mitigation measures
Not securing adequate funding	Unable to support operation beyond the Establishment Phase.	Severe	Possible	Prioritizing implementation of the suitability plan; managing operating cost through regular monitoring and reporting.
Limited user capacity	User capacity for EO uptake and application is not sufficient	Moderate	Possible	Identify gaps and opportunities, and design targeted capacity building activities.
Transition delayed or ineffective	Transition of technical and management functions to Africa delayed or not effective in achieving the DE Africa vision and mission.	Severe	Not very likely	Quarterly monitoring and reporting of achievements and issues

What methods are used by the Initiative to monitor its effectiveness?

- Informal discussions with users / beneficiaries
- User or beneficiary surveys
- Website statistics
- Consultations or events
- Evaluations

Would the Initiative be interested in assistance from the GEO Secretariat for developing an impact plan?

No

How are the results of the monitoring and evaluation activities shared with participants and the wider GEO community?

Annual reports and quarterly progress reports are published on DE Africa website.

Are any monitoring or evaluation activities required by funders/contributors?

Yes

Please describe and provide reports if available.

The Australian Government requires an independent program evaluation for the program by end of the investment period (June 2023). A rapid mid-term review was conducted and found that DE Africa was on track to achieve all End-Of-Program Outcomes. The rapid review report is attached.

- independent_rapid_review_digital_earth_africa.pdf (link)

Participants

Please list the active individual participants in the Initiative

First name	Last name	Email address	Member	Org
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Other information

Please provide any other comments or information that was not included in the previous sections, but you would like to appear in the Implementation Plan.

- no answer given -

- no supporting documents provided -

Co-Editor Management

List of co-editors for this initiative

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