



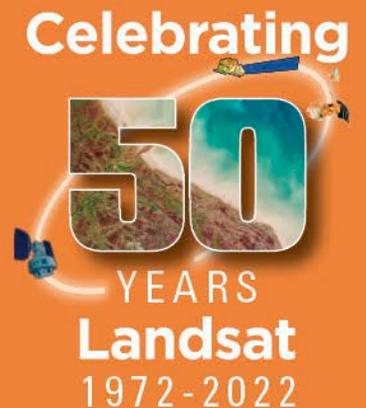
PECORA22

Opening the Aperture to Innovation: Expanding Our Collective Understanding of a Changing Earth

Leveraging Analysis Ready Data with Digital Earth Africa

Adam Lewis, Digital Earth Africa

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Digital Earth
AFRICA

**With thanks to Lisa
Hall, Fang Yuan, Nikita
Ghandi, Alex Leith,
Seffat Chowdry and
others...**



Digital Earth
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**What is 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.

Land degradation

Coastal erosion

Urbanisation

Water resources and flood risks

Agriculture and food security



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

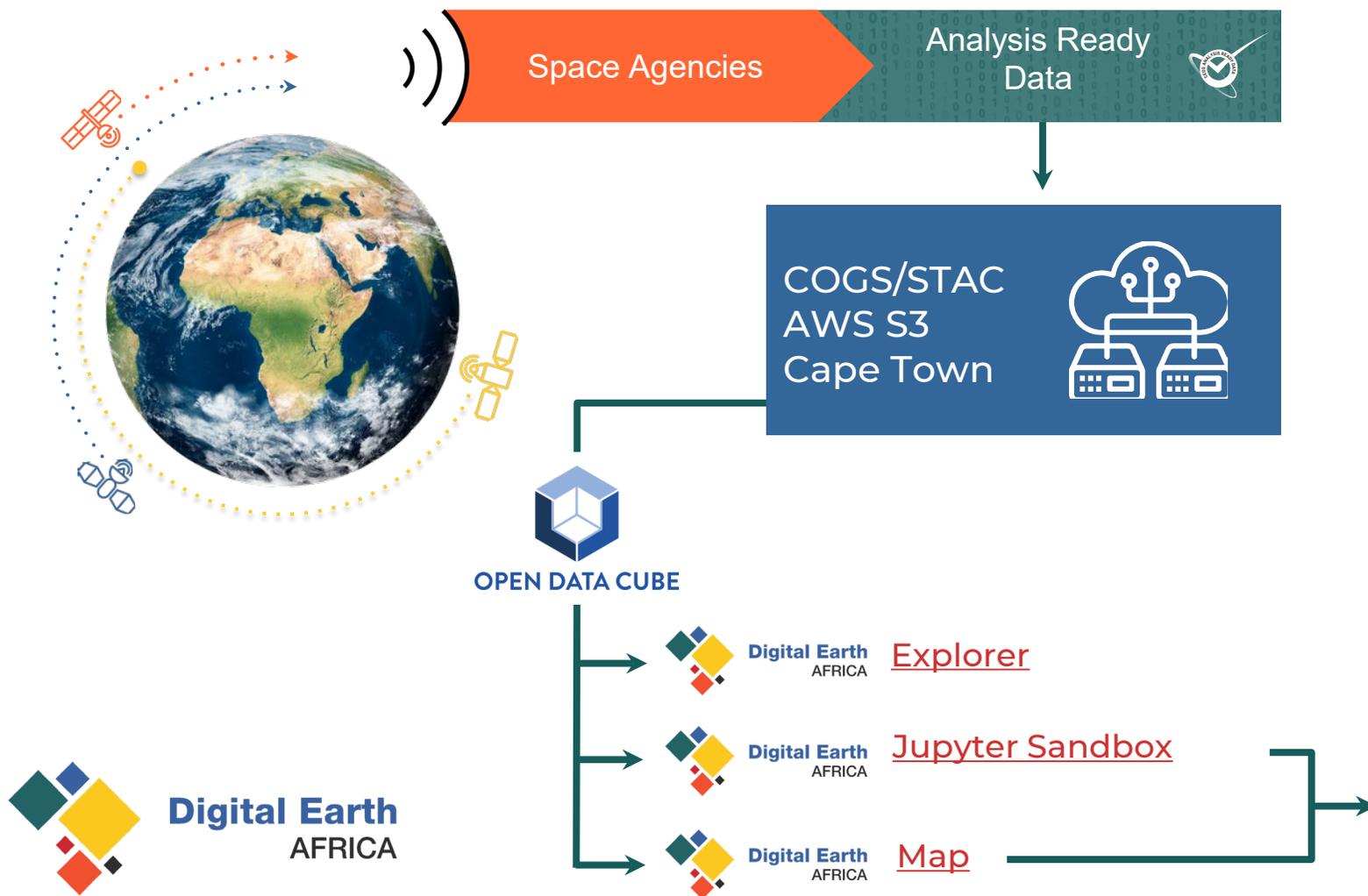
- Multi-sector perspectives
- Span data communities
- Foster collaboration



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**Built on cloud-
enabled CEOS-ARD**

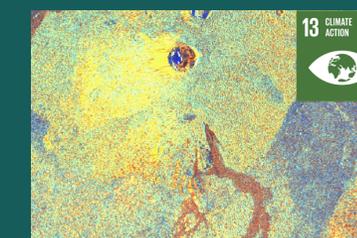
Satellite data available through Digital Earth Africa



Studying the Tanzanian Coastline with GeoMAD, 2019, RGB



Monitoring crops in Egypt 2001-2020, Landsat, RGB



Monitoring Mount Nyiragongo, 2018 Sentinel-2 RGB and 2021 Sentinel-1



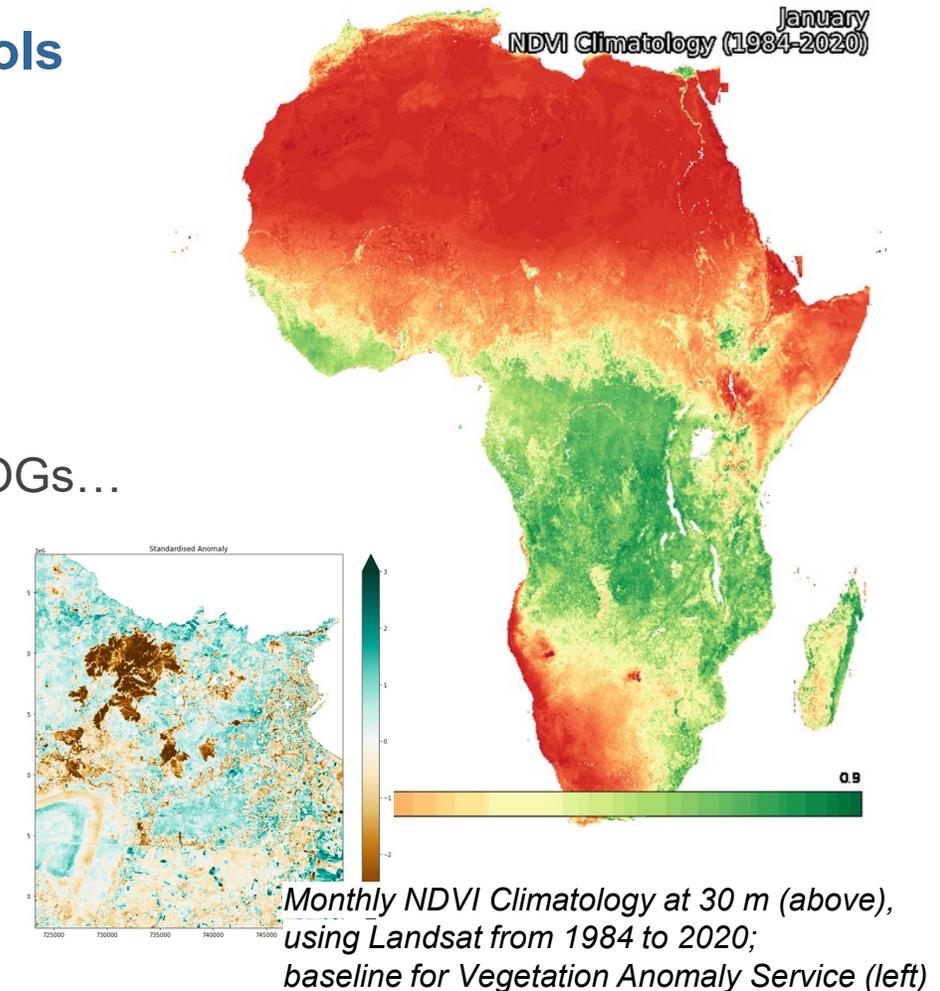
Measuring water extent on rangelands in Etosha National Park, Namibia 1992-2021, Landsat, False Colour

Cloud Native Geospatial Technology



Collaborative data science using shared and scalable tools

- **Cloud Optimised GeoTIFFs**
 - Enable continental and global scale workflows
 - Integration between local, regional and global data
- **Spatio-temporal Asset Catalog**
 - Enables interoperability
 - Microsoft PC, USGS, DE Aus/Africa, Planet, Sentinel-2 COGs...
 - Development of CEOS CARD4L extension
 - Expanding ODC-STAC compatibility
- **Scalable product generation workflows**
 - Argo on Kubernetes
 - Automated scene-based or regular scheduled processing
 - Empower scientists to develop, test and scale up
 - Enable rapid iteration

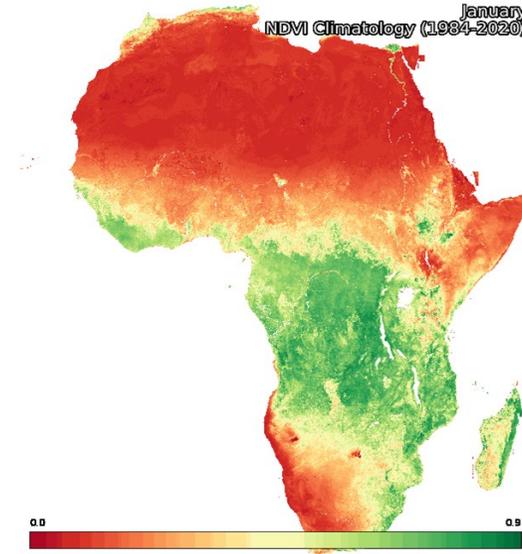
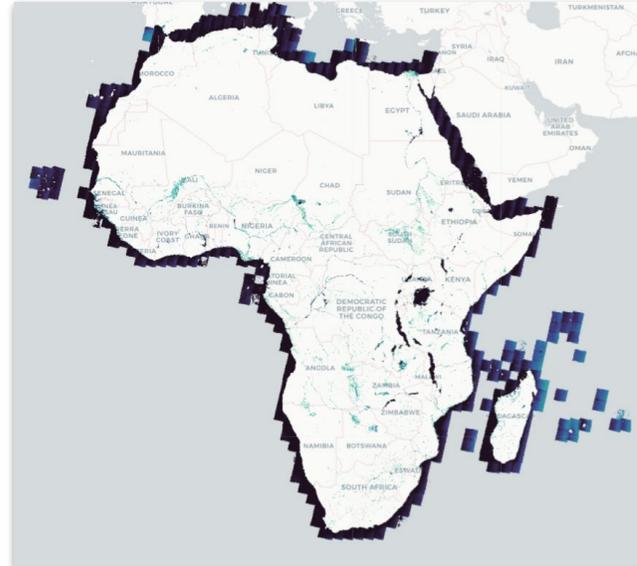
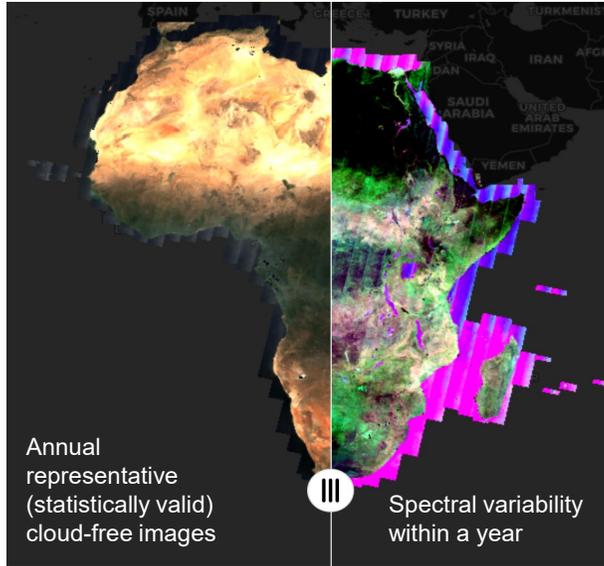




**Digital Earth
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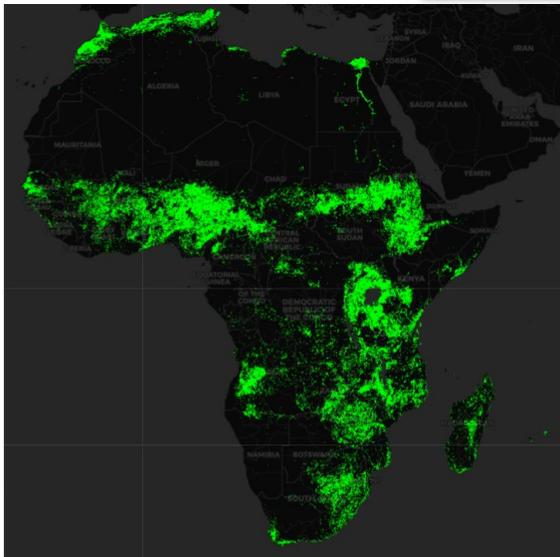
Continental services, local analysis in sand-boxes, rapid transfer of science (e.g. from Australia to Africa), training materials, training environments for capacity building, access to data, (low-latency) etc.

Operational Continental Services



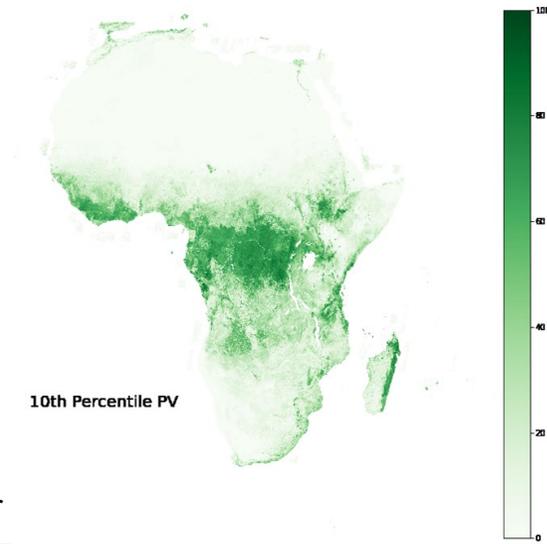
Monthly NDVI
Climatology
and Anomaly

Annual/Semi-annual
GeoMAD



Cropland Extent Map
(2019)

Water Observations
from Space



Fractional Cover

- + open source tools
- + user training

Open-source Analysis Tools (Jupyter Notebooks)



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100 Open-source
notebooks

7
Main Topics

7 SDG Indicators
Supported

From beginners to
advanced users

Agriculture and
food security

Water resources
and flood risk

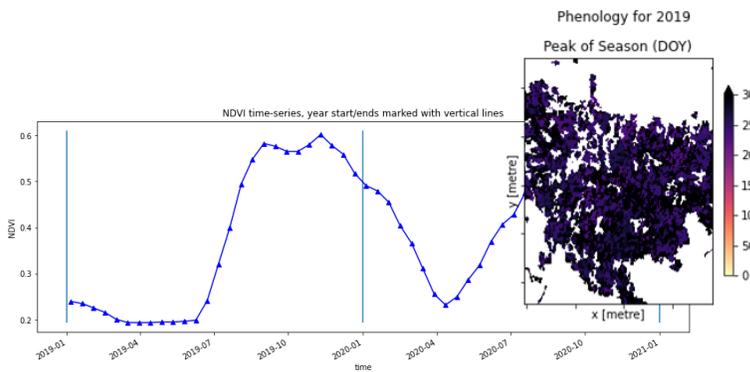
Vegetation

Urbanisation

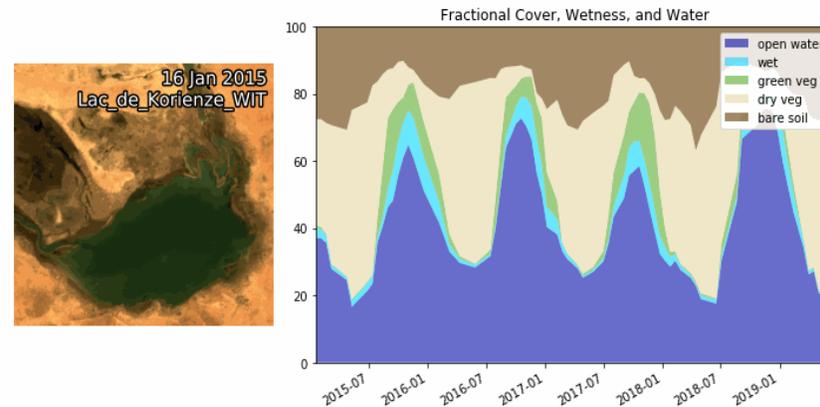
Land
degradation, land
cover and
accounting

Coastal and
marine
environment

EO data, ML &
Open Data Cube



Crop and vegetation phenology using optical and radar data



DE Africa Wetland Insight Tool - an interactive notebook



Monitoring coastal erosion along Africa's coastline

Free, accessible and usable data

Over 3 PB of EO and derived information products

Thanks to AWS Sustainability Data Initiative

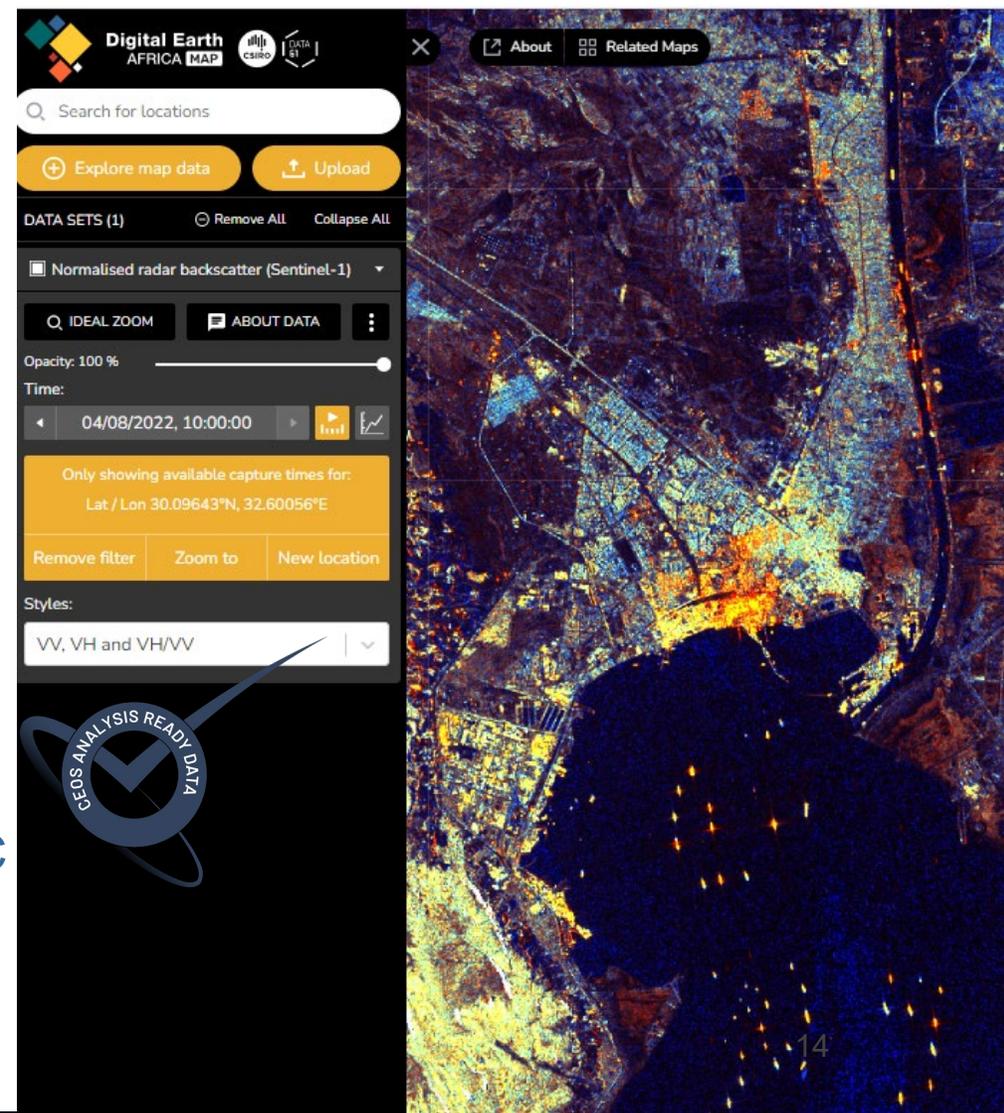
- Landsat, Sentinel-2, Sentinel-1, ALOS/PALSAR ARD
- DEMs, rainfall, land cover, Global Mangrove Watch etc
- DE Africa continental services

Scalable analysis, enabled by

- Cloud-optimized data format
- Cloud-native processing tools

Discoverability and interoperability, supported by Spatio-temporal Asset Catalog (STAC) and ODC API (including OGC Web Services)

Free analysis environment (Jupyter Sandbox) for training, exploration and application development



Accessing data from anywhere



Registry of Open Data on AWS



See all datasets managed by [Digital Earth Africa](#).

Contact

helpdesk@digitalearthafrika.org

How to Cite

Digital Earth Africa Sentinel-1 Radiometrically Terrain Corrected was accessed on DATE from <https://registry.opendata.aws/deafrica-sentinel-1>.

Usage Examples

Tutorials

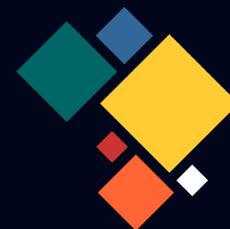
- [Digital Earth Africa Training](#) by Digital Earth Africa Contributors
- [Water detection with Sentinel-1](#) by Madeleine Seehaber



Tools & Applications

- [Digital Earth Africa Explorer](#) by Digital Earth Africa Contributors
- [Digital Earth Africa Geoportal](#) by Digital Earth Africa Contributors
- [Digital Earth Africa Map](#) by Digital Earth Africa Contributors

[Water detection using radar in SageMaker Studio Lab](#)



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**Impact through a
diverse community
of users, and uptake
by governments**

Expanding and engaged user community



Capacity development & user support

English

Digital Earth Africa
DEA101-en

Introduction to the Digital Earth Africa Sandbox

Français

Digital Earth Africa
DEA101-fr

Introduction à la sandbox de Digital Earth Africa



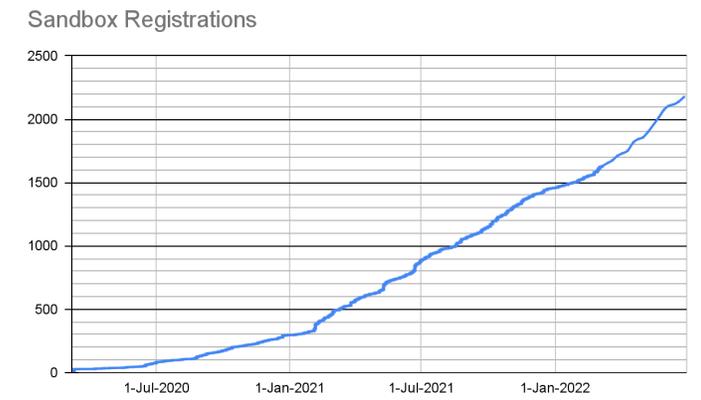
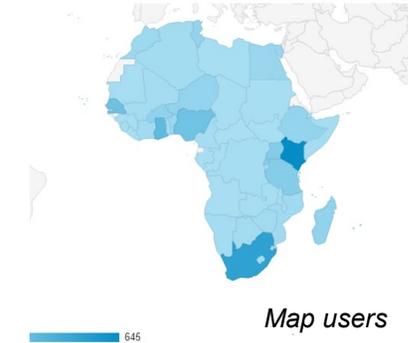
>300 certificates awarded

Digital Earth Africa 6-week training

Digital Earth Africa 50th Live Session

- Bilingual Platform, user support and training
- JupyterLab 3.x interface now available in French
- Worldwide thanks to DE Africa est. team

Growing user community

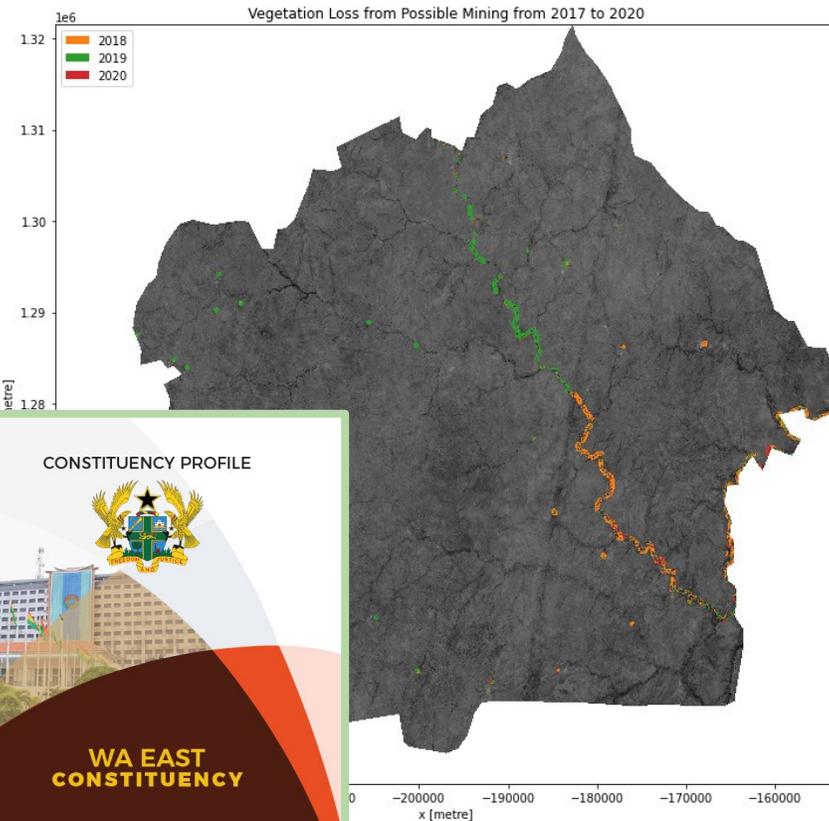


African Regional Institute for Geospatial Information Science and Technology (AFRIGIST), @OSS, RCMRD Estri @CSE



- Growing user engagement: >2,000 sandbox users; >10,000 unique Terria users
- Bilingual live sessions & awareness sessions

Supporting Government Decision Making - Ghana Statistical Service



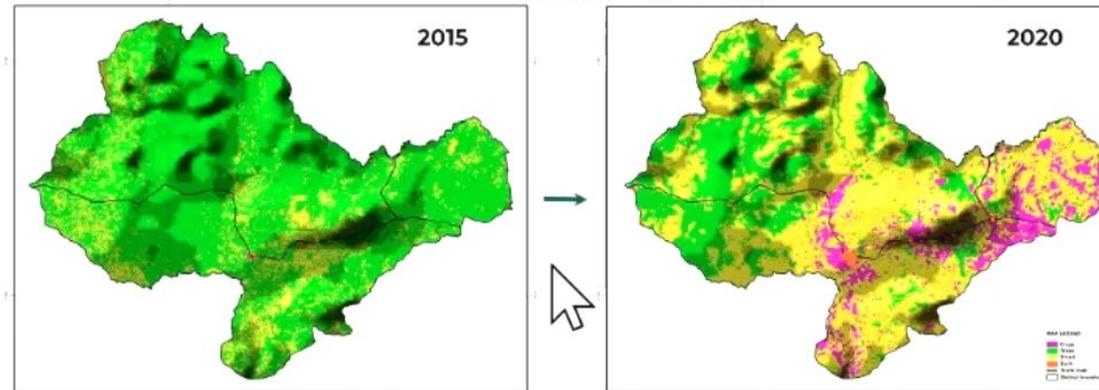
CONSTITUENCY PROFILE

**WA EAST
CONSTITUENCY**

A PUBLICATION OF THE DATA FOR ACCOUNTABILITY PROJECT

Satellite data available through Digital Earth Africa for Natural Capital Accounting

Monitoring biophysical changes



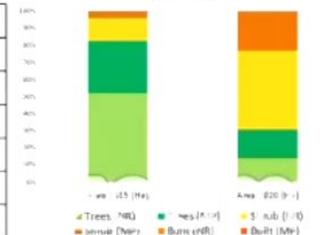
Category	Location	Area 2015 (Ha)	Area 2020 (Ha)	Net gain (Ha)	Net gain (%)	Condition
Trees	Non Reserved Areas	240,821.8	58,283.4	-182,538.3	-76%	Alarming
	Mole National Park	140,587.3	67,767.9	-72,819.4	-52%	Bad
Shrub	Non Reserved Areas	60,700.6	187,576.5	126,875.9	209%	
	Mole National Park	18,906.7	93,407.9	74,501.3	394%	
Built	Non Reserved Areas	147.4	1,350.7	1,203.3	817%	
	Mole National Park	0.0	3.0	3.0	-	



Extent & Condition of West Gonja District Natural Capital Stocks (2015 - 2020)

How sustainable are
15% & 10% yearly
tree reductions?
(National Avg: 3%)

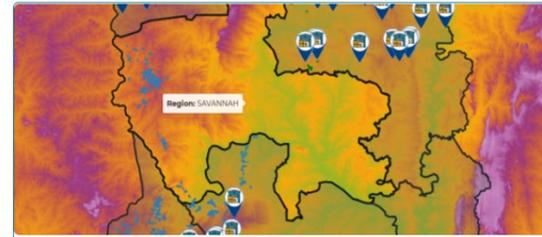
Change in Gonja West District Natural Capital Stock (2015 - 2020)



For more use-cases in Ghana: <https://www.digitalearthafrika.org/media-center/blog/digital-earth-africa-bridging-digital-divide-ghana>

Co-developed use-cases

- 14 published use case studies in 2021 (Kenya, Ghana, Tanzania, Botswana, Uganda), across government, industry, academic
- 7 use case studies in development (Senegal, Benin, Burkina Faso, Niger, Botswana, Kenya, Nigeria)
- 2 industry projects supported
- Ongoing crop type mapping and national land cover mapping projects with TetraTech, FAO



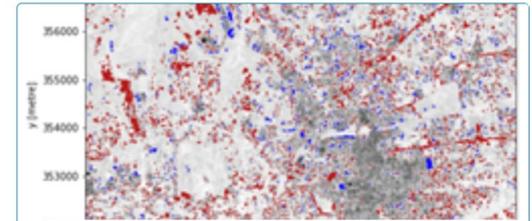
Using satellite data to monitor agriculture in Ghana - The GAIMS platform from Big Data Ghana.



Using Earth observation to protect and conserve wetlands in Kenya



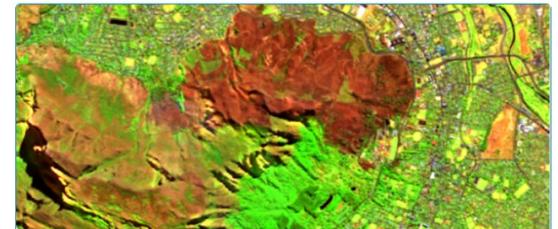
Rising Lakes in the Rift Valley in Kenya



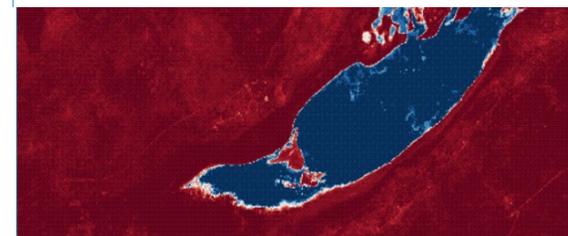
Monitoring urbanisation in Gulu City, Uganda



EO for conservation: rehoming giraffes on Lake Baringo, Kenya



Monitoring Fire Activity in the Table Mountain National Park, Cape Town



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



Monitoring Chlorophyll in Lake Elmenteita, Kenya



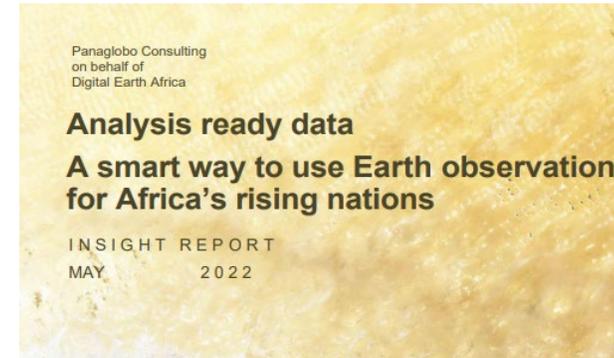
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**Estimating the
potential value of DE
Africa and ARD for
Africa**

Estimating the value

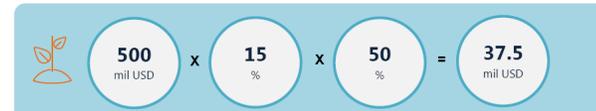


WEF, Jan 2021:
EO could contribute \$ 3BN through agriculture, mining, and acceleration of the geospatial industry



Panaglobo Consulting 2022 modelled the contribution of ARD:
\$5.5 bn by 2030

AGRICULTURE – CROP MICRO-INSURANCE BENEFIT



Disal Consulting 2021 looked at additional areas:

'.. estimates that an overall socio-economic impact of approximately USD 540 million could be achieved per year'

-  Marine Observation \$212 million
-  Renewable Energies \$27 million
-  Disaster Risk Reduction \$74 million
-  Oil & Gas \$15 million
-  Public Health \$113 million
-  Security and Civil Protection \$96 million

Cost to Coast:

Estimating the benefit of Digital Earth Africa's coastal monitoring service on the continent's economy





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Conclusion

DE Africa shows what is possible with free, open and global ARD.

The benefits will grow over time as more and more people are empowered with information.

Acknowledgements

