Digital Earth
AFRICA

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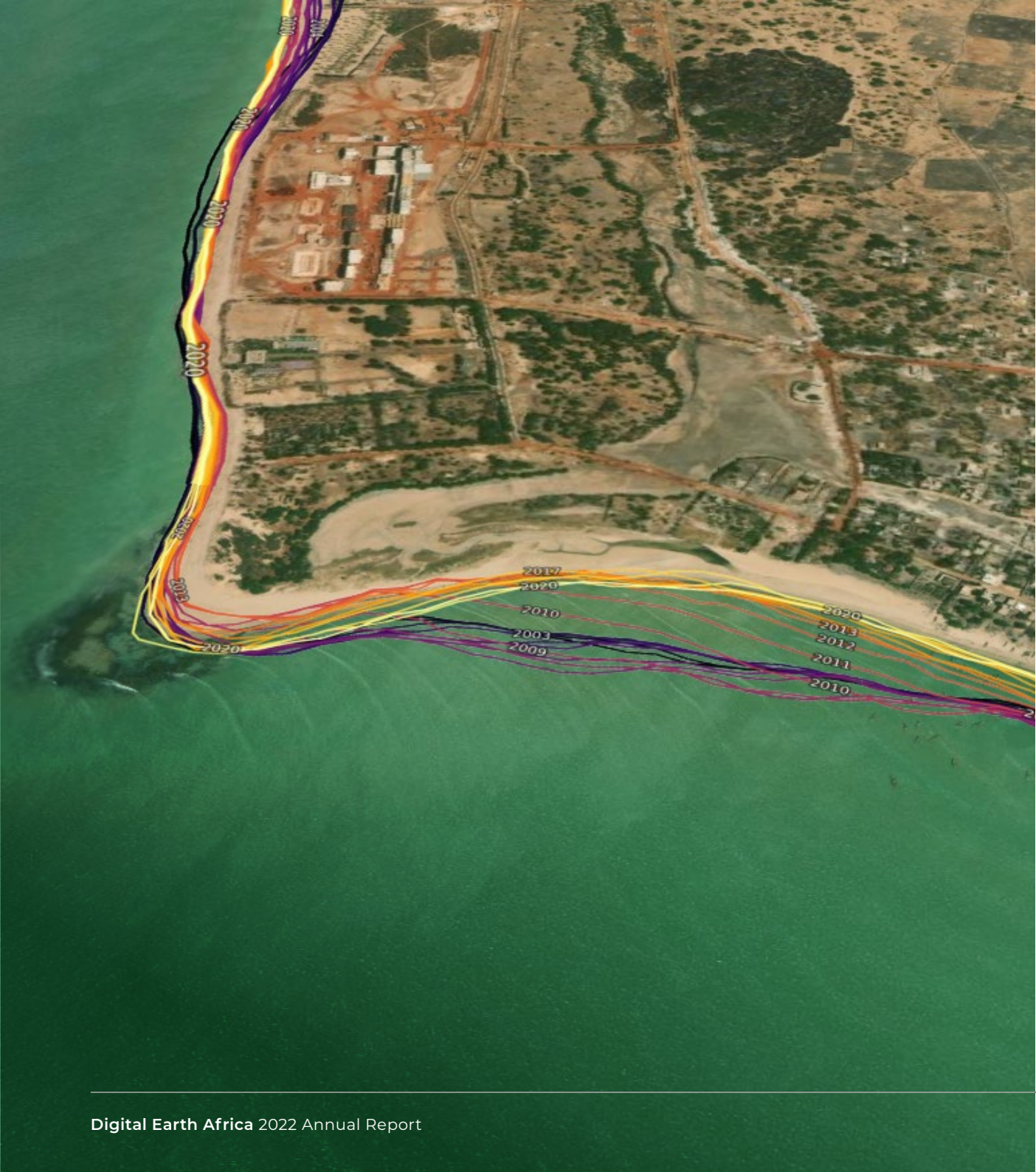2012
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2022
ANNUAL REPORT

Unlocking the Promise of Tomorrow from the Patterns of the Past

Table of Contents

About this Annual Report

This Annual Report covers the period 1 January 2022 to 31 December 2022. The Annual Report has been prepared by the DE Africa Leadership Team for the DE Africa Governing Board, Technical Advisory Committee, funding partners, and other stakeholders. The Report provides a summary of progress made through 2022.

Version Date   *25 January 2023*   *Endorsed by the DE Africa Governing Board*

Foreword

A joint message from the current and former Digital Earth Africa Managing Directors.

2022 has been another significant year for Digital Earth Africa, with a strong focus on embedding operations and leadership in Africa, expanding our impact and ensuring sustainment for the years ahead, as **outlined** in the 2022 Work Plan.

We are very proud that DE Africa has now transitioned to the continent. The appointment of Dr Thembi Xaba as Managing Director of Digital Earth Africa on 1st July 2022 marked DE Africa's formal transition to being fully Africa owned and led. Our African based team is now fully staffed with team members located in South Africa, Kenya, Ghana and Rwanda.

This year we saw a significant growth in our user base across the continent, driven by a return to face-to-face training and engagement, marked by our 3,000th Sandbox user and 100th live session. We launched our innovative new Digital Earth Africa Coastlines monitoring service that will continue to strengthen and empower Africa institutions and communities to harness the power of Earth observation data and services for better decision making around climate action. We also marked our 13th Technical Advisory Committee meeting with a face-to face-event at our new Program Management Office in South Africa and were delighted to celebrate our 3rd birthday.

We are proud of the achievements made this year and are excited for the opportunities that 2023 will bring. None of this would have been possible without the amazing support we have received from our partners and stakeholders. Thank you to everyone who has contributed to Digital Earth Africa's journey so far.

We look forward to a safe and productive year, working together to transition and embed this amazing program in Africa and fully realise the potential of Digital Earth Africa for the benefit of everyone across the continent.

Best regards,

Dr Thembi Xaba
DE Africa Managing Director

(1 July 2022 – Present)

Dr Lisa Hall
Former Managing Director

(1 Jan–30 June, 2022)

Executive Summary

Digital Earth Africa (DE Africa) is the only Earth observation platform offering free, open-source data and products for the entire African continent and is now the world's largest Open Data Cube implementation.

With support from our funding partners The Leona M. and Harry B. Helmsley Charitable Trust and the Australian Government Department of Foreign Affairs and Trade, DE Africa is on track to improve the lives of African people by providing planners and policy makers with tailored Earth Observation information to support better decision making and enhance sustainable development outcomes.

A snapshot of 2022

DE Africa has transitioned to an Africa-based, owned and managed program. Our new Program Management Office is fully established at the South African National Space Agency. We continue to work with all our Implementing Partners to support critical engagement, capacity building and uptake with end users across the continent. The DE Africa Governing Board continued to grow, providing guidance on long-term strategy, risks, and performance. The Technical Advisory Committee remains committed to providing pivotal support and guidance. After the COVID-19 interruption, the first face-to-face TAC meeting was hosted in Pretoria, South Africa, in October.

DE Africa operational infrastructure is successfully established in Africa, offering timely and reliable Earth observation data and decision-ready insights accessible to diverse user groups. In collaboration with Amazon Web Services' Amazon Sustainability Data Initiative at the end of 2022 DE Africa have stored over 3.5 Petabytes of data at the AWS Africa (Cape Town) region. This storage underpins the provision of a secure, stable and high performing platform for users across Africa. DE Africa now has 6 continental scale services, including the new DE Africa Coastlines monitoring service, along with >100 analysis tools, supporting progress towards seven SDGs across Africa.

DE Africa has continued to strengthen and empower users across the continent to harness the power of Earth observation data and services for better decision making. DE Africa continues to provide bi-lingual training and user community support services with online training now completed by more than 450 users. DE Africa now has >3,000 sandbox registrations and >13,000 unique DE Africa Map users. We are now demonstrating impact through a growing number of user stories and driven increased engagement with industry.

DE Africa continues to demonstrate the impact and benefits of Earth observation data for Africa with exceptional examples from the user community showcasing data-driven decision making and changes. The DE Africa insight report "Cost to Coast" estimates that DE Africa's new Coastlines Monitoring Service could inject ~$580 million per year into Africa's economy and change the lives of ~270 million people, across three different sectors. DE Africa has co-developed, published and promoted nine new use cases, across six different countries, and received two international awards for capacity development.

DE Africa has established strong partnerships with a diverse range of national, regional and international stakeholders and has developed a trusted and increasingly well known brand. DE Africa is now undertaking a range of collaborative projects focused on food security and land-cover mapping, supported by other major programs aligned with our mission and vision. The partners included the UN Food and Agricultural Organisation, the Australian Centre for International Agricultural Research and the Enabling Crop Analytics at Scale initiative, implemented by Tetra Tech.. We have strong continued collaboration with many partners, including Esri, the UN Economic Commission for Africa and the Group on Earth Observations. Through these partnerships, as well as the successful return to face-to-face engagement with our user communities, we are proud to continue to develop our strong and trusted organisational brand and growing global profile.

Digital Earth Africa at a glance

CAPACITY DEVELOPMENT

USER ENGAGEMENT AND TRAINING

>13,000
UNIQUE DE AFRICA MAP USERS

>450
COMPLETED TRAINING

>3,000
REGISTERED USERS IN SANDBOX

USER APPLICATIONS SUPPORTING SDGS

A growing portfolio with >25 new published use cases addressing Africa's priority development issues and >100 open source notebooks.

- 2 ZERO HUNGER
- 6 CLEAN WATER AND SANITATION
- 11 SUSTAINABLE CITIES AND COMMUNITIES
- 12 RESPONSIBLE CONSUMPTION AND PRODUCTION
- 14 LIFE BELOW WATER
- 15 LIFE ON LAND

AWARDS

JUST IN 2022, TWO INTERNATIONAL AWARDS FOR CAPACITY DEVELOPMENT AND COMMUNITY ENGAGEMENT

Digital Earth AFRICA

VALUE AND IMPACT

POTENTIAL ECONOMIC BENEFITS BY THE NUMBERS

$2.84BN*

Even under conservative assumptions the potential economic benefits of DE Africa could exceed USD 2 billion a year by 2024

$500M
EO industry accelerated growth

$900M
Agricultural productivity boost

$900M
Unregulated gold mining detection and prevention

*World Economic Forum and DISAL Consulting

$580M**

By mitigating coastal erosion risks in 3 key sectors DE Africa could inject $580 million per year into Africa's economy and change the lives of 270 million people.

$90M
Real Estate & Agriculture

$275M
Fishery

$215M
Insurance

**Costs to Coasts – DISAL Consulting and DE Africa

SERVICES AND INFRASTRUCTURE

DATA STORAGE EXPANDED AT AWS AFRICA (CAPE TOWN) REGION

3.5 PETABYTES
of data stored by Amazon Sustainability Data Initiative

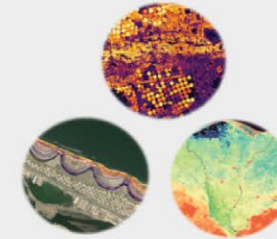### THREE CONTINUOUSLY UPDATED DATA PIPELINES

ONE OF THE WORLD-LEADING OPERATIONAL PLATFORM OF ITS KIND.

- ✓ Analysis ready data
- ✓ Decision ready products & services
- ✓ Routine updates to Landsat, Sentinel 2 and Sentinel 1 to cloud optimised format

DE Africa now has six continental services available on the Platform.

- ✓ Water Observations from Space
- ✓ Cropland Extent Map
- ✓ Fractional Cover
- ✓ GeoMAD
- ✓ Coastlines
- ✓ NDVI Climatologies
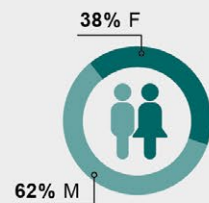
PARTNERSHIPS AND OUTREACH

Commenced two new Projects with aligned programs in collaboration with 5 partner organisations.

Renewed partnerships with **Implementing Partners** and continue collaboration with over **30 partner organisations**.
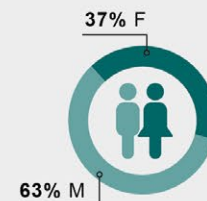
GOVERNANCE

GOVERNING BOARD
38% F
62% M

75% of the Governing Board members are from African countries.

AFRICA TEAM
62% F
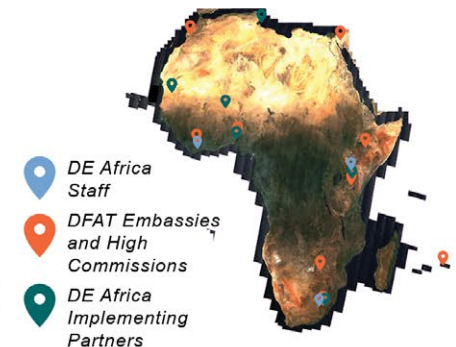38% M

The Africa based team is now fully staffed.

TECHNICAL ADVISORY COMMITTEE
37% F
63% M

The TAC held their first in person meeting since 2019.

AFRICAN OPERATIONS

- ✓ Expanded African operations
- ✓ Staff across 4 countries
- ✓ Program management office fully operational
- ✓ 6 pan-African Implementing Partners

📍 DE Africa Staff
📍 DFAT Embassies and High Commissions
📍 DE Africa Implementing Partners

Note these numbers are current as of December 2022

About Digital Earth Africa

Digital Earth Africa (DE Africa) aims to improve the lives across Africa by providing planners and policy makers with crucial Earth observation information to support better decision making, and through enhanced access to satellite data to progress sustainable development outcomes. See DE Africa Investment Logic.

DE Africa Vision: To 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.

DE Africa Mission: To 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.

The long-term DE Africa Goal is: DE Africa improves the lives of Africans through access to tailored information for decision making. This encompasses:

- **Livelihood strengthening** – Earth Observation (EO) data will support more informed decision making at government, sectoral and other levels, contributing to direct and indirect benefits for individuals and communities.

- **Development effectiveness** – DE Africa will support enhanced understanding of development challenges and solutions, and in so doing, strengthen collective impact and ability to assess progress towards national priorities, Agenda2063 and the Sustainable Development Goals.

- **Digital transformation** – through industry uptake and innovations, DE Africa will help fuel ongoing evolution of the digital economy in Africa.

- **Economic development and job creation** – through access to data for commercial products and services development, DE Africa will support new business development and employment opportunities.

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 action-oriented**

DIVERSITY AND INCLUSION

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

Sustainable Supply
EOPO 1: DE Africa is an operationally, technically, and financially sustainable, and inclusive entity in Africa

Demand and Uptake
EOPO2: DE Africa is demonstrating environmental and development impact

Regional and Global Engagement
EOPO3: DE Africa is a flagship initiative that promotes the benefits of open and free earth observation data

DE Africa's establishment phase investment design

Strengthening our governance framework

Membership of the DE Africa Governing Board continued to grow and continue providing guidance on long-term strategy, risks, and performance. The Technical Advisory Committee remains committed to guiding the program, providing pivotal support, and championing the program.

In 2022, DE Africa:

- Held three Technical Advisory Committee meetings and one Governing Board meeting.

- Continued to deliver against established DE Africa policies and frameworks.

- Maintained a strong focus on diversity and inclusion, a guiding principle of DE Africa's Governance Framework.

Governance

The DE Africa team has continued to strengthen relationships with its Governing Board members who have continued to champion the program. The Technical Advisory Committee met in person in October, marking the first face to face meeting of a DE Africa governing body since 2020 (pre-COVID). The meeting also welcomed Implementing Partners and key stakeholders to engage with the team on a range of discussions, providing feedback and success stories from across the continent.

Diversity and Inclusion

DE Africa remains committed to being an exemplar of diversity and inclusivity by embedding the principles into all levels of the program.

In 2022, DE Africa partnered with YouthMappers to kick start their technical challenge and with African Women in GIS to support their 2022 Mentoring Program. DE Africa continued to showcase and promote diverse leaders and practitioners across the Earth observation sector, through a series of blog series featuring women in geospatial science, utilising social media networks and continued engagement at a range of international events.

DE Africa's Diversity and Inclusion activities:

AFRIGIST World Womens Day celebrations.

DE Africa capacity building workshop with the network of women scientists in Nigeria.

Diversity and inclusion panel session at the Living Planet Symposium in Bonn, Germany, featuring DE Africa.

Embedding program operations in Africa

DE Africa has transitioned to an Africa-based, owned and managed program. Our new Program Management Office is fully established at the South African National Space Agency. We continue to work with all our Implementing Partners to support critical engagement, capacity building, and uptake with end users across the continent.
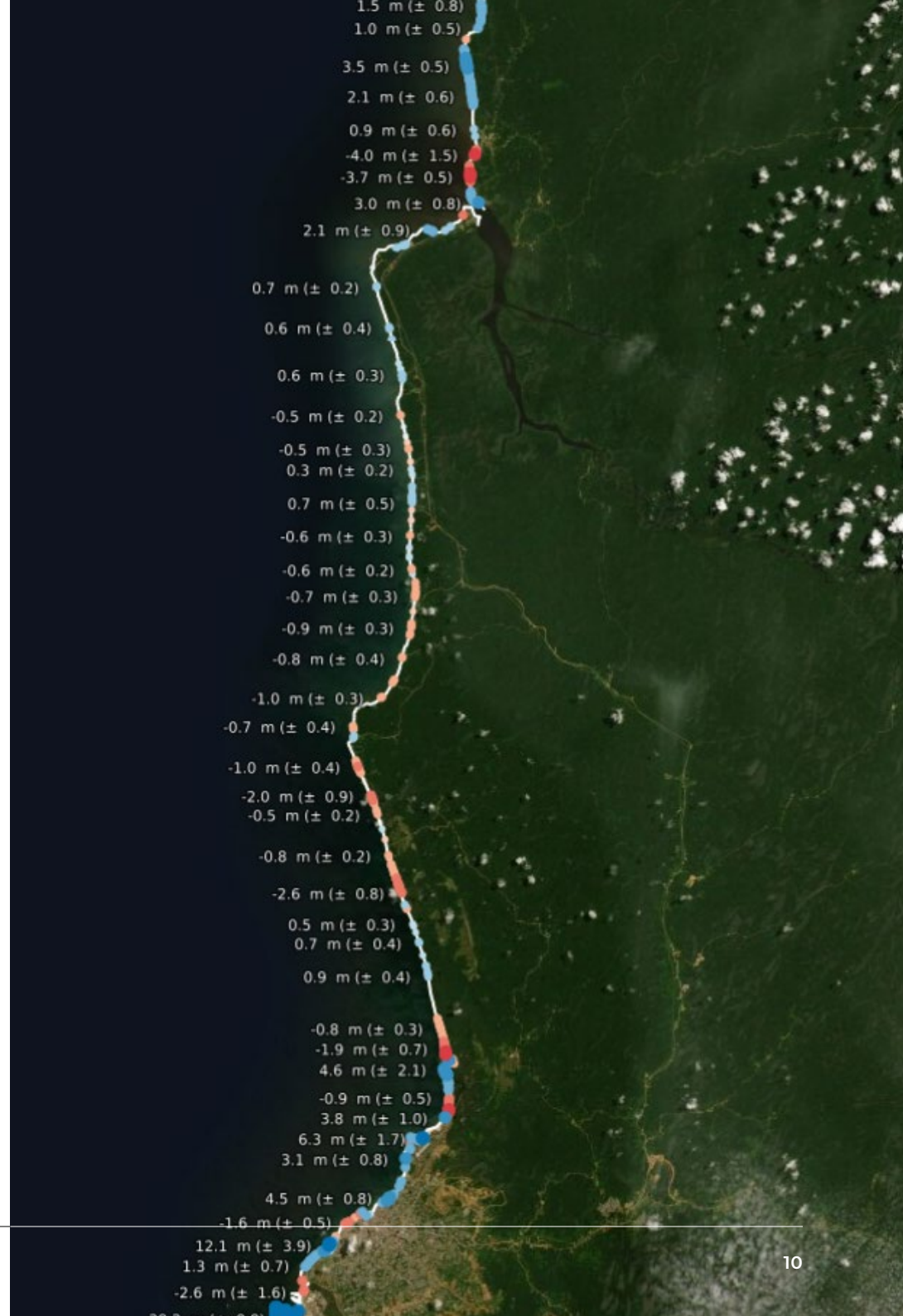
In 2022, DE Africa:

- **Formally transitioned program leadership to an Africa-based leadership team with staff based in four countries.**

- **Officially opened DE Africa head office hosted by the South African National Space Agency in Pretoria, South Africa.**

- **Continued to work with Implementing Partners.**

Transition to an Africa-based, owned and managed program

The appointment of Dr Thembi Xaba as Managing Director of Digital Earth Africa on 1st July 2022, marked DE Africa's formal transition to being a fully Africa owned and led program. The African based team is now fully staffed, with team members located in South Africa, Kenya, Ghana and Rwanda.

The DE Africa team hosted the official opening of the Program Management Office at the South Africa National Space Agency (SANSA). The office was officially opened by Dr Mmboneni Muofhe, DE Africa Board member, Mr. Patrick Ndlovu SANSA Board Chairperson, Australian High Commissioner to South Africa H.E. Excellence Gita Kamath & Mr. Mooketsa Ramasodi DG of Agriculture, Land Reform and Rural Development.

*Dr Mmboneni Muofhe DE Africa Board member,
Mr. Patrick Ndlovu SANSA Board Chairperson, Australian
High Commissioner to South Africa H.E. Gita Kamath &
Mr. Mooketsa Ramasodi DG of Agriculture, Land Reform
and Rural Development, officially opening the Program
Management Office.*

*DE Africa leadership workshops at Geoscience Australia,
in Canberra, Australia.*

*Dr Thembi Xaba and Dr James Johnson, CEO
Geoscience Australia.*

Implementing Partners

Digital Earth Africa continues to work with a strong and established network of 6 Implementing Partners, who together represent the interests of 43 African countries: African Regional Institute for Geospatial Information Science and Technology (AFRIGIST, Nigeria), *Centre Régional* AGRHYMET (Niger), Centre de Suivi Ecologique (CSE, Sénégal), Regional Centre for Mapping of Resources for Development (RCMRD, Kenya) and Sahara Sahel Observatory (OSS, Tunisia).

DE Africa Working Groups

DE Africa's three working groups (Product Development Task Team, Communications Working Group and Diversity and Inclusion Working Group) remained active throughout 2022, meeting monthly and supporting multiple aspects of program delivery.

Driving African-led technical innovation

DE Africa has successfully established an operational infrastructure in Africa. This offers timely and reliable Earth observation data and decision-ready insights that are accessible to users from a wide range of technical backgrounds.

In 2022, DE Africa:

- Now hosts > 3.5 Petabytes of data in AWS Africa (Cape Town) Region.

- Upgraded the operational data pipelines to include Landsat 9 and a number of new datasets.

- Received endorsement of the DE Africa Sentinel-1 radar backscatter product is compliant to CEOS Analysis Ready Data (CARD) specifications.

- Launched the new continent scale service DE Africa Coastlines.

- Completed continental coverage of the Cropland Extent Map.

- Developed 13 new publicly available notebooks, including real world use cases and user guides.

Africa-based infrastructure and Analysis Ready Data pipelines

DE Africa continues to provide a secure, stable and high performing platform. The platform is now managed in Africa through program partners The South African National Space Agency and Kartoza. DE Africa now hosts over 3.5 Petabytes of data in the AWS Africa (Cape Town) Region - equivalent to >1,700 billion pages of standard printed text - thanks to continued support from Amazon Web Services through the Amazon Sustainability Data Initiative.

DE Africa continued to upgrade and enhance the operational data pipelines. DE Africa's Landsat archive and derived services were expanded to include data from NASA's recently launched Landsat 9. Additional datasets updated during 2022 included: ESA Climate Change Initiative Land Cover, Esri/Impact Observatory Land Use Land Cover and ALOS-2/PALSAR-2 annual mosaic.

DE Africa's Sentinel-1 radar backscatter dataset was endorsed by the Committee on Earth Observation Satellites (CEOS) to be compliant with CEOS Analysis Ready Data (CARD) international data standards. This is the first radar data set globally to receive such an endorsement and demonstrates DE Africa's continued leadership across the international Earth observation community.

Continental services

DE Africa released three continental services in 2022, co-designed with program partners. All continental services are the product of continental-scale collaboration, guided by DE Africa's Product Development Task Team:

- The DE Africa Coastlines is a provisional service that maps the typical location of the African coastline through time. The service helps users to understand the past changes to the coastline and identify areas of concern for the future. The service is based on USGS Landsat data and was developed in collaboration with Digital Earth Australia, Centre de Suivi Écologique (Senegal) and other Implementing Partners. See DE Africa Coastlines in action here.

- In 2022 the team completed continental coverage of the Cropland Extent Map. The service shows an indication of the presence or absence of crops for a 10 metre pixel resolution for 2019, based on Sentinel-2 data. 2022 marked the release of a provisional service that covers the entire African continent, including Madagascar, Mauritius, Reunion and Comoros.

- The NDVI Climatologies service represents the long-term average baseline condition of vegetation for every 30 metre pixel across the African continent. Both mean and standard deviation NDVI climatologies are available for each calendar month based on calculation over the period 1984-2020. NDVI climatologies may be used for many applications including identifying extremes (anomalies), both long and short-term changes in vegetation condition, and as an input into machine learning processes for land use classification.

Analysis tools and user guides

DE Africa now hosts over 100 notebooks, supporting Africa to drive progress towards meeting over seven SDGs. In 2022, new datasets notebooks were developed to support NDVI Climatology, NDVI Anomalies and Coastlines. Eight new notebooks describe real world examples and use cases, including:

- Forecasting vegetation condition
- Monitoring changes in forest extent
- Temperature trends analysis
- Water turbidity estimate
- Mountain Greenness Cover Index (SDG 15.4.2), implementing UN FAO method
- Generating satellite imagery animation
- Mapping water extent (SDG 6.6.1)
- Waterbodies identification and inspection

DE Africa also released the following new notebook user guides:

- DE Africa Services and Tools for Sustainable Development Goals
- Understanding Dask for scaling-up analysis
- Access and visualise high-resolution imagery from the Norway's International Climate and Forests Initiative Data program (NICFI)
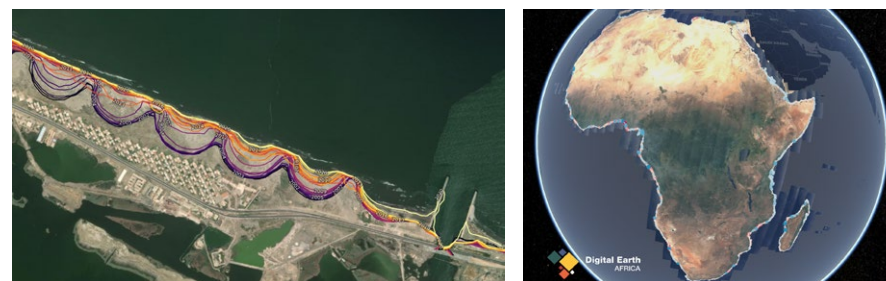
Significant efforts have been undertaken to upgrade existing notebooks, This work has been reflected in a larger uptake of existing notebooks by users, as opposed to increasing demand for new notebooks.

International Open Data Cube Collaborations

DE Africa has also commenced collaborations with the Brazilian Open Data Cube team to enable R programming language in the Sandbox. An R image was released in August 2022. This has made the platform more accessible to existing users and provides an opportunity to expand the user uptake of the platform.

In focus: DE Africa Coastlines

DE Africa's Coastlines uses satellite data to map the typical location of the African coastline through time. It helps to understand the past changes in the coastline and identify areas of concern for the future. Using the interactive map, users can easily visualise and translate years of satellite imagery into information about the growth and erosion of coastlines across Africa. DE Africa Coastlines is the first of its kind for the African continent, and has been developed to support decision-making in diverse infrastructure and livelihood-threatening situations, contributing not only to the Sustainable Development Goals, but also the 2063 agenda of the African Union.

Expanding user capacity across Africa

DE Africa is building ownership, buy-in, and engagement through the implementation of targeted engagement and capacity development initiatives. Leveraging the multilingual Learning Platform, DE Africa has continued to strengthen and empower users across the continent to harness the power of Earth observation data and services for better decision making.

In 2022 DE Africa:

- Participated in 40 face-to-face training and awareness events and workshops in 12 countries, reaching over 400 people from over 55 institutions.

- Co-developed four Learning Platform bilingual training modules with program Implementing Partners. These modules focused on the themes of food security, water resources, urbanisation and land degradation. These are expected to be released in 2023.

- Awarded >200 training completion certificates. The team also saw over 900 additional Learning Platform registrations.

- Released the first out of three Learn ArcGIS lessons in collaboration with Esri.

- Held the 100th live training session in September and added regular french spoken sessions.

- Saw over 6,400 DE Africa map users and 1,878 DE Africa Sandbox unique logins.

- Continued to maintain the DE Africa Help Desk and added a number of online knowledge base articles.

Training and support

The team participated in over 40 face-to-face training and awareness events and workshops across 12 countries in Africa, reaching over 400 people from over 55 institutions. Many of these workshops have been run thanks to support from the program Implementing Partners, and partners through collaborative projects supported by aligned programs (see the 'Strengthening Partnerships and Communities' section below).

The DE Africa online, bilingual Learning Platform continues to grow. In 2022, we awarded over 200 certificates of completion for the 'Introduction to the DE Africa Sandbox' training and saw >900 new registrations in the Learning Platform. There are now almost 1,500 authenticated users total on the platform. In collaboration with the programs Implementing Partners, the team have co-developed four new bilingual training modules for the Learning Platform to be formally released early 2023. These focus on the themes of food security, water resources, and urbanisation developed with AFRIGIST and land degradation developed with OSS. In collaboration with Esri, the team also released the first out of three 'Learn ArcGIS' lessons.

The user base for the DE Africa Help Desk also continues to grow in bilingual content. The Help Desk hosts a growing knowledge base and community forum that will allow DE Africa users to find information, ask questions, share ideas and help other users. In 2022, the team closed 79 support requests in the Help Desk and added 41 knowledge base articles.

DE Africa training sessions hosted by our implementing partners

RCMRD, Kenya.

AGRHYMET Regional Centre, Niger.

A DE Africa User Guide was developed to provide comprehensive technical documentation on DE Africa datasets, services and platforms. Instructions for data access, how to use the visualisation and analysis tools and a gallery of analysis examples are available in English and French. A growing list of video tutorials are also available through DE Africa YouTube channel.

DE Africa continues to run an increasingly popular weekly 'Live Sessions', which support user engagement with DE Africa products to address real-world development challenges. This year the team held the 100th live training session and added french spoken sessions. Live Sessions have now reached over >1,200 total attendees. 26 sessions are now publicly available on DE Africa's Youtube channel.

Growing our user community

DE Africa's capacity development effort is continuing to support our diverse user community to build new skills and resulted in significant increase in engagement across all platforms. Throughout 2022, the progressive return to face-to-face training workshops following the COVID-19 pandemic, has driven a major increase in sandbox registrations, DE Africa map users and support requests. During the year, we saw >6,400 new people consulting the DE Africa Map (a 40% increase), taking the total number of users to >13,000. We also saw 1,878 new authentications in the DE Africa Sandbox, This was an 80% increase, taking the number of all-time unique registrations to above 3,000.

DE Africa also welcomed 37 requests to become a Power User with increased computing resources access in a 3-month trial that has been expanded. 23 users have been provided access. We are now learning from their experiences and the outcomes of their work.
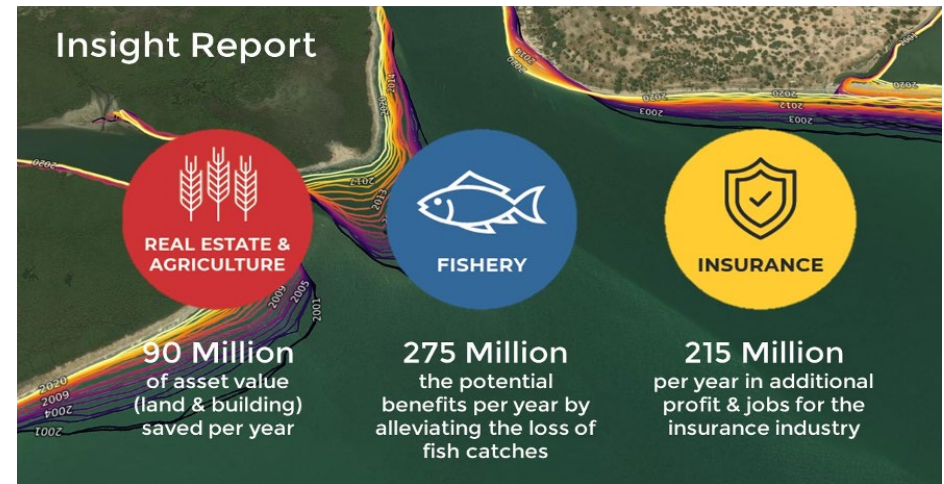
Delivering and demonstrating impact for Africa

DE Africa continues to demonstrate the impact and benefits of Earth observation data for Africa with exceptional examples from the user community showcasing decision making and changes.

In 2022, DE Africa:

- Published a new economic value report: Cost to Coast: Estimating the benefit of DE Africa's coastal monitoring service.

- Co-developed, published and promoted 9 new use cases, across 6 different countries.

- Supported multiple industry engagement initiatives, including the Africa Earth Observation Challenge

- Won two international awards for community impact, a GEO Sustainable Development Goal (SDG) Award for Climate Action and the 2022 SIBA|GITA APSEA NSW Award.

Economic value of Earth observation data – Coastlines

A DE Africa insight report "Cost to Coast" estimates that DE Africa's new Coastlines Monitoring Service could inject ~$580 million per year into Africa's economy and change the lives of ~270 million people, across 3 different sectors.

Impact stories from our user community

- EO for Coastline Erosion Monitoring in Saly-Portudal/Senegal

- 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

- Creating an open-source framework for crop-type mapping in Africa, Zambia

- Combining the power of Digital Earth Africa and local knowledge for planned grazing management in Northern Kenya

- Digital Earth Africa - a use case for Earth observation from the UN Big Data Task Team

- DE Africa support for Ghana Statistics Service, including integration of DE Africa products into constituency reports

Industry engagement

Key industry engagement initiatives for 2022:

- DE Africa supports agriBORA to develop more robust insights for food security in East Africa

- Big Data Ghana works towards more sustainable agriculture with the help of DE Africa

DE Africa was also proud to continue to be a technical partner and to become a funding partner of the Africa Earth Observation Challenge. The Africa Earth Observation Challenge seeks to identify some of the most innovative downstream applications of space technology and geospatial intelligence across Africa. It is aimed at improving various industries such as agriculture and food security, smart cities and logistics. The Challenge was open to participants from across the continent and successfully received 80 relevant submissions received from 25 different African countries.

The overall winner of the Africa Observation Challenge was AgriBora. The success in this Challenge follows from their win of the 2021 Digital Earth Africa Industry Challenge. The continued success and growth of AgriBora realises some of the potential impacts that DE Africa can provide in the private sector across the continent.

International Awards

DE Africa won the GEO Week 2022 Sustainable Development Goal Award for Climate Action for the project "How data and community can save Zanzibar's mangroves", led by Khairiya Masoud, Raya Ahmada and Massoud Hamad (State University of Zanzibar), and supported by Dr Kenneth Mubea (DE Africa Capacity Development Lead). DE Africa also won the 2022 SIBA|GITA APSEA NSW 'Award for Community impact' for the exceptional engagement of the team with communities in Africa to deliver meaningful impact.

Dr Kenneth Mubea (DE Africa) and Ms. Khairiya Masoud (State University of Zanzibar), accepting the Sustainable Development Goal Award for Climate Action, at GEO Week 2022, for the project "How data and community can save Zanzibar's mangroves".

DE Africa's Dr Lisa Rebelo and Dr Fang Yuan with the 2022 SIBA|GITA APSEA NSW 'Award for Community Impact'.

Strengthening partnerships and community

DE Africa is continuing to strengthen existing partnerships and form new relationships where needed to progress our objectives; becoming a trusted brand in Earth observation data and services at almost all levels in Africa.

In 2022, DE Africa:

- Completed a crop type mapping project in Zambia in partnership with RCMRD and FroniterSI, supported by the Enabling Crop Analytics at Scale (ECAAS) initiative, implemented by Tetra Tech.

- Commenced new project in collaboration with the Food and Agriculture Organisation (FAO) of the United Nations and FrontierSI which is focusing on land-cover and crop mapping.

- Commenced the Information for Agriculture, Food and Water Security (IAFWS) Project in partnership with Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) and Centre for Coordination of Agricultural Research and Development for Southern Africa (CARDESA), funded by Australian Centre for International Agricultural Research (ACIAR).

- Continued collaboration with many key groups including; Esri, the UN Economic Commission for Africa, the Group on Earth Observations and the Australian Government.

Enabling Crop Analytics at Scale initiative

DE Africa partnered with the RCMRD and FrontierSI to design an open-source framework for crop-type mapping in Zambia. This collaborative project combines the services and tools of Digital Earth Africa with field data to develop a reproducible algorithm for crop-type analysis. This project was funded by the Enabling Crop Analytics at Scale (ECAAS) initiative, implemented by Tetra Tech.

The DE Africa team participated in the ECAAS closing event and workshop in Washington, DC in December gathering a large portion of the project's community of practice. This concluded the first phase of the initiative and provided an opportunity for the team to collaborate ahead of continuing co-designing for future phases of work.

Crop labels collection using the ECAAS Tool by the Zambia Ministry of Agriculture staff.

UN Food and Agriculture Organisation

DE Africa commenced a partnership with the FAO and FrontierSI to upscale existing work from FAO on land cover and crop mapping using DE Africa's tools, services and experience. Building on the foundations already established by DE Africa with the Cropland Extent Map service, this project is aimed at supporting National Statistics Offices across Africa and the FAO's existing Hand in Hand Initiative. Outputs to date include preliminary land cover maps for Mozambique and Rwanda, support of user engagement activities including a webinar on 'National Land Cover Mapping using the DE Africa Platform, and various training workshops supporting uptake and usage by Mozambique users.

Information for Agriculture, Food and Water Security Project

Funded by the ACIAR, the IAFWS Project is supporting consultations with East and Southern African agricultural and water management agencies, research and farmer organisations, and agriculture communities. These consultations enable the team to understand the needs, opportunities and gaps for using Earth observations based services to increase agricultural productivity and sustainability, and improve water use. Work is being undertaken in partnership with ASARECA and CCARDESA, with support from the International Water Management Institute. In 2022, four face to face workshops were run in Botswana, Uganda, Rwanda and Kenya.

IAFWS project engagement sessions hosted in collaboration with ASARECA

Nairobi, Kenya.

Kigali, Rwanda.

DE Africa Memorandums of Understanding

DE Africa was proud to sign a new MOU with Esri. Under this collaboration, DE Africa released the first of three 'Learn ArcGIS lessons. The team will also continue collaborations with a range of other organisations, including the UN Economic Commission for Africa (UNECA), Rwanda Space Agency and University of Energy and Natural Resources, Ghana.

Group on Earth Observations

DE Africa continues to collaborate closely with the Group on Earth Observations (GEO).

- The DE Africa team presented at GEO Week on the value and uptake of DE Africa's tools and services, demonstrating DE Africa's impact, support of the GEO Program and other African initiatives.

- In partnership with GEO, DE Africa participated in the National Adaptation Plans Expo 2022 in Gaborone, Botswana, an outreach event organised by the Least Developed Countries Expert Group under the UN Framework Convention on Climate Change (UNFCCC).

- With support from GEO, AfriGEO and RCMRD, 13 DE Africa scientific knowledge packages are now published on the GEO Knowledge Hub, expanding the reach of DE Africa to the global GEO audience.

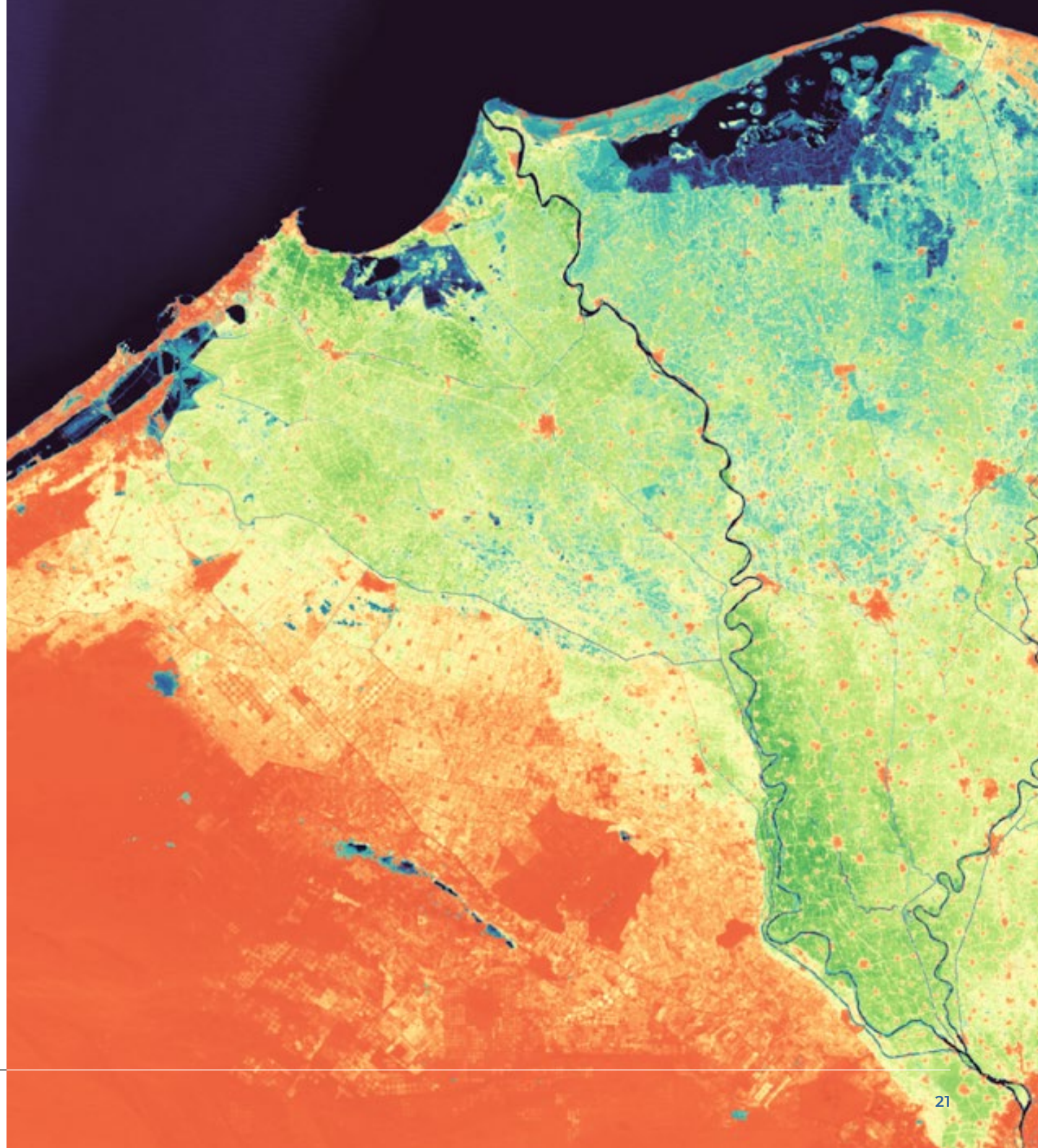## Australian Government Engagement

DE Africa links and relationships with key funding partner the Australian Department of Foreign Affairs and Trade (DFAT) have gone from strength to strength over the past year. The DE Africa Program has been mentioned by Heads of Mission or Embassies in Ethiopia, South Africa, Egypt, Kenya, Ghana and Nigeria on social media through organic and shared continent in addition to content supplied to Embassies from the DE Africa team

Expanding awareness

DE Africa is recognised as an award winning brand and a leading example of geospatial innovation in Africa. DE Africa have continued to enhance the brand with the Africa-based voice to ensure engagement and uptake across the continent.

In 2022, DE Africa:

- Attended over 25 events across Africa and the globe targeting a diverse range of audiences.

- Continued growth of the website audience with the DE Africa website reaching 73.5k all time visitors, with 32.1k in 2022.

- Expanded the audience of the social media channels with approximately 1,800 new followers on Twitter and 2,800 on LinkedIn in 2022.

Events

Throughout 2022 the DE Africa team and Implementing Partners attended and presented at over 25 events across Africa and the globe. The return to face-to-face events allowed the DE Africa team to strengthen relationships with existing supporters and make a wide range of new connections. Event highlights include:

Global Events

- At GEO Blue Planet, GEO Week and the AfriGEO Symposium (Accra, Ghana), DE Africa was proud to feature in the plenary sessions and support a wide range of side events.

- Thanks to Australian Government support, COP27 (Sharm El Sheik, Egypt) provided an excellent opportunity to promote how DE Africa can support African climate action.

- DE Africa participated at SatSummit in Washington, DC. This participation was made possible through the support of the Bill & Melinda Gates Foundation financial support which provided travel and accommodation to the DE Africa Managing Director.

- European Space Agency's Living Planet Symposium (Bonn, Germany) provided the team with the first major opportunity since COVID to engage face-to-face with the European Earth observation community.

- The Pecora conference (Denver, USA) facilitated high level engagement with key US stakeholders, reinforcing DE Africa's strong relationship with the US Geological Survey.

Africa-Based Events

- DE Africa hosted a virtual side event at the Conference of African Ministers of Finance, Planning and Economic Development with thanks to the support from the UN Economic Commission for Africa.

- DE Africa sponsored the Kenya Space Expo in Nairobi, Kenya. This offered an opportunity to engage with the space sector in Kenya and allowed engagement with youth in the country. The Kenya Space Agency has expressed interest in using the platform for relevant Earth observation data.

- DE Africa was a gold sponsor for the RCMRD International Conference in Nairobi, Kenya.

- DE Africa was a bronze sponsor for the African Association of Remote Sensing of the Environment conference, supporting technical community engagement in Kigali, Rwanda.

- The team participated at the National Adaptation Plan Expo in Gaborone, Botswana in partnership with other GEO initiatives, GEOGLAM, Blue Planet. This event focused on advancing national adaptation plans to climate change by Least Developed Countries across the world.

- The UN Economic Commission for Africa invited the Digital Earth Africa team to present at the United Nations Global Geospatial Information Management (UN-GGIM) Africa which allowed engagement with government departments from across the continent.

- DE Africa was also invited and hosted by the Australian Ambassador to Zimbabwe, H.E Ms. Bronte Moules, where DE Africa participated at the round table discussions for food security in Africa.

- Other events the team participated in during the year included the Zimbabwe Institute of Geomatics Conference and Annual General Meeting, GIS Day in Kenya, and the 50th anniversary Implementing Partner AFRIGIST.

DE Africa Team at the RCMRD International Conference, Kenya

Members from the GEO Group, including DE Africa meeting with President of the Republic of Botswana, H.E Mokgweetsi Masisi, at the NAP Expo, Botswana

Dr Lisa Hall presenting on DE Africa at the Australian Pavilion, COP27, Egypt

H.E. Brontë Moules and Dr Thembi Xaba as guests on 3KtvZim People n' Earth show, Zimbabwe

DE Africa's Dr. Kenneth Mubea at the Zimbabwe Institute of Geomatics Conference 2022

Dr Lisa Rebelo, Dr Mansour Mahamane (Centre Régional AGRHYMET), Ms. Maud Nale, Mr. Omar Seidu, (Ghana Statistical Service), Dr Meghan Halabisky, Mr. Edward Boamah (DE Africa), and at the 6th AfriGEO Symposium in Accra, Ghana
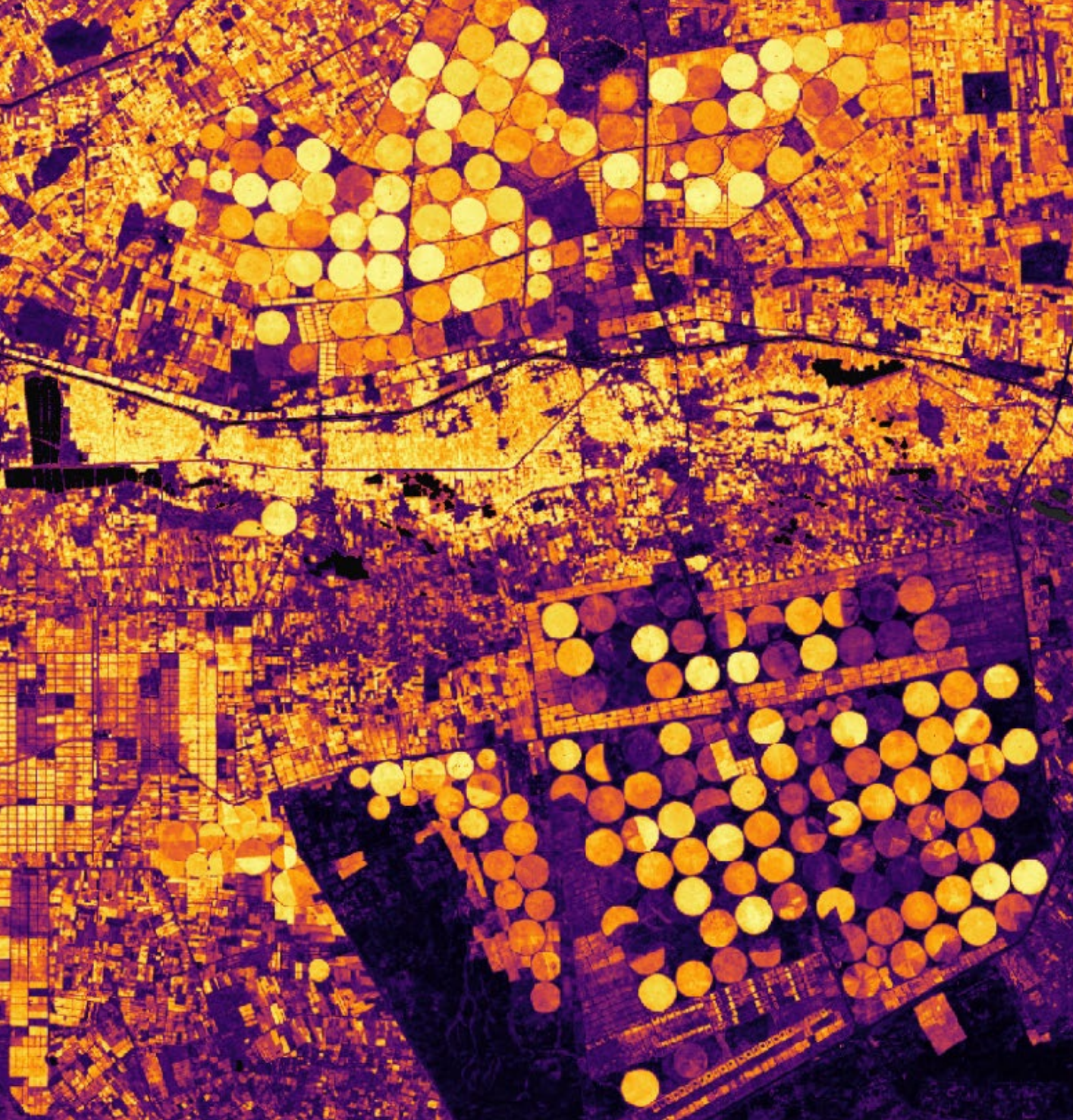

Hon. Samuel Jinapor Minister for Land and Natural Resources, with Dr Cedric Jorand and Ms. Sarah Fitzpatrick (DE Africa) at the Africa Down Under conference in Perth, Australia

DE Africa at the Kenya Space Expo

Dr Meghan Halabisky (DE Africa) and Mr. David Ongo (RCMRD) presenting at the Living Planet Symposium, Germany

A growing audience

This year, DE Africa saw continued growth in social media engagement, gaining approximately 1,800 new followers on Twitter and 2,800 on LinkedIn, taking the total followers to >5400 and >4,500 respectively. Engagement with the website continues to grow with 73,500 all time users (32,100 in 2022). The DE Africa team also expanded the YouTube channel with the new uploads of weekly Live Sessions and other regular content.

The team also engaged with the media with Dr Thembi Xaba and H.E. Brontë Moules, the Australian High Commissioner to Zimbabwe, featuring as guests on 3KtvZim People n' Earth show. DE Africa was also mentioned and/or featured in 35 media publications in Africa, Australia, US and global outlets.

The short film, *The Patterns of the Past – The Promise of Tomorrow, was produced by Southern Cross University Associate Professor Grayson Cooke* as a multimedia artwork demonstrating the importance of satellite technology in tracing environmental change. The work featured at the Australian Pavilion at COP27, Egypt. The work was commissioned by Geoscience Australia and incorporates Sentinel 2 imagery from satellite data platforms Digital Earth Australia and Digital Earth Africa. View the full film here.

Securing the future

Securing funding for the next Phase of DE Africa is of the highest importance and implementation of DE Africa's future funding strategy is now underway. The DE Africa team is now pursuing a range of strategies, targeting both African and international investors, to support this priority.

In 2022, DE Africa:

- Secured additional funding from ACIAR, in collaboration with ASARECA and International Water Management Institute (IWMI).

- Secured additional funding from ECAAS initiative, implemented by Tetra Tech, collaborating with RCMRD and FrontierSI.

- DE Africa is in initial discussions with funders regarding investment for Phase III of the program.

Phase II Investment

DE Africa secured additional funding from ACIAR, in collaboration with ASARECA and IWMI to continue focusing on how Earth observation data and services can increase agricultural productivity and sustainability.

Phase III Future Funding Strategy

Phase III (2023–2026) funding will focus on growth and scaling up linked to the strategic outcome of embedding the program in Africa, country to country level engagement, with anticipated government uptake in thematic areas of food security, climate action (climate adaptation) and sustainability. Political buy-in and co-investment is crucial for Phase III funding.

Whilst Phase IV is projected to be African funded capability, there is a reality check that Phase IV will still have diverse funding sources, without having to close out funding potential funding from international funders.

Outlook for 2023

Looking ahead, 2023 will see a strategic emphasis on embedding operations in Africa, ensuring sustainment in terms of governance, management and resources, empowering climate action and enhancing community engagement.

- **Embed in Africa:** DE Africa and Implementing Partners will embed DE Africa products and services to support regional activities across Africa. The DE Africa will create a roadmap for country engagements that will ensure consistent support for countries.

- **Ensure our Sustainability:** We shall strengthen the roles of the Technical Advisory Committee and Governing Board to ensure sustainable governance in the future. We maintain our commitment to delivering on the strategic goals of our funding partners. We will ensure we operate efficiently, diversify our sources of income and deepen key partnerships for long-term sustainability.

- **Empower Climate Action:** We aim to empower climate action by developing in-country knowledge and skills. We will ensure decision-ready products are well placed to enable policymakers, scientists, the private sector and civil society to better address issues of climate adaptation, mitigation and reporting.

- **Enhance Community Engagement:** We need to understand our users, and their needs and provide excellent support that increases use of the platform. We must continue to capture the impact our users have and increase the visibility of the champions of the platform. We will serve an audience that meets our diversity and inclusion strategy, and explore how to bridge science and community action.

To achieve these goals, DE Africa will continue to deliver Earth observation products that meet Africa's development needs and can be applied to real world development challenges. We will continue capacity development to strengthen African institutions to collaborate and work together to better understand, access and use DE Africa.

The 2023 Annual Plan will be developed with these priorities in mind, and success will be defined by the extent to which we can achieve them.

Acknowledgements