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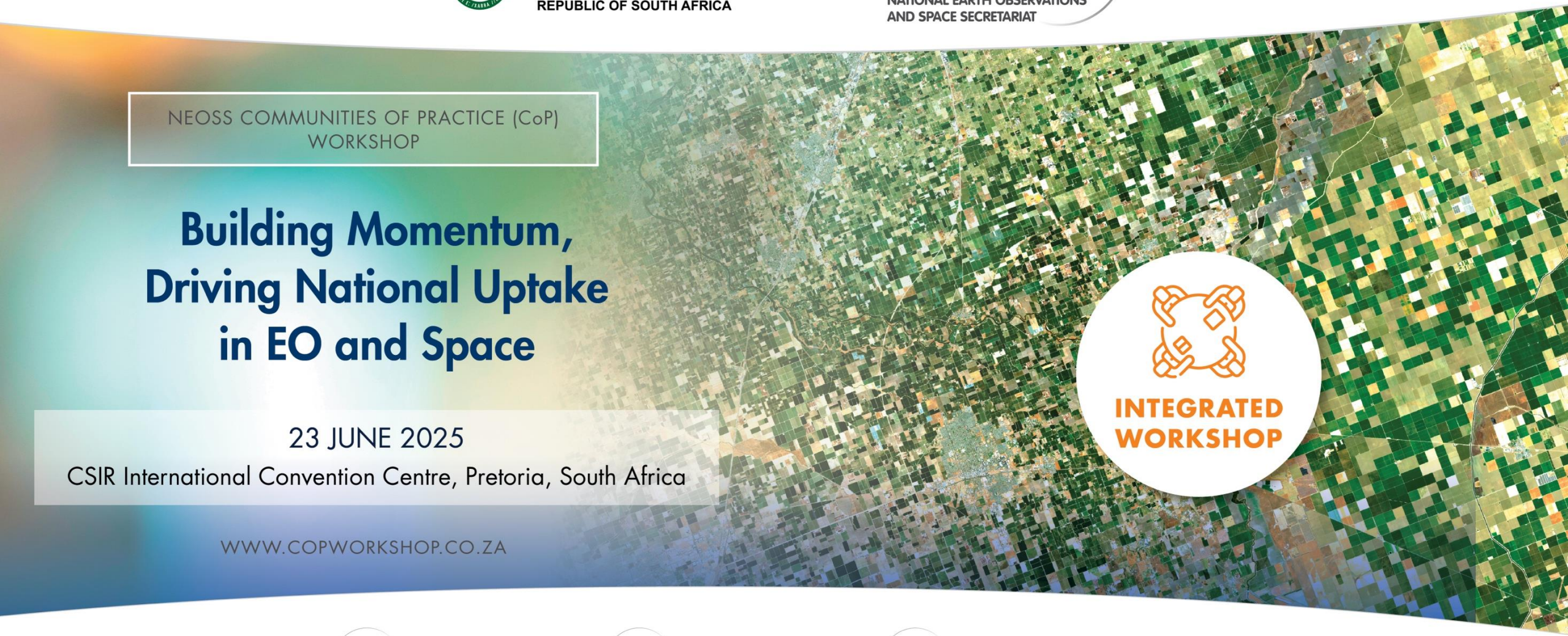
Science, Technology and Innovation
REPUBLIC OF SOUTH AFRICA

NEOSS
NATIONAL EARTH OBSERVATIONS AND SPACE SECRETARIAT

NEOSS COMMUNITIES OF PRACTICE (CoP) WORKSHOP

Building Momentum, Driving National Uptake in EO and Space



INTEGRATED WORKSHOP

23 JUNE 2025

CSIR International Convention Centre, Pretoria, South Africa

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Building Momentum, Driving National Uptake in EO and Space

Steward Bernard
Co-Chair , NCA CoP and EO
Consultant

EOMI OUTCOMES :
INFRASTRUCTURE

SA GEO
SOUTH AFRICAN GROUP ON EARTH OBSERVATIONS

SA GSC
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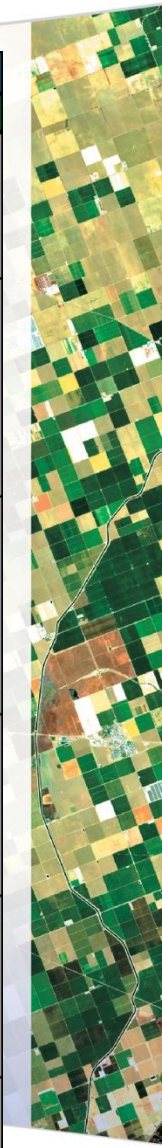
Introduction – The EOMI indicator matrix used for Infrastructure

METHODOLOGY								
Pillar	**Group of indicators**	**Indicators**	**Description**	**0 - initial**	**1 - basic**	**2 - intermediate**	**3 - advanced**	**4 - optimised**
II. INFRASTRUCTURE	Space component	**Operation of own satellites**	If the country itself operates own satellite missions (public and private)	No missions, no technical readiness.	Technical readiness but no EO mission in course	At least one EO mission.	1-5 EO missions	> 5 EO missions
		Access to third party missions	Not owned nor operated by the country. Either a satellite operator or 3rd party mission/ including meteo.	No access to other missions [no access missions]	Access to less than 5 third party missions.	Access to 5-10 third party missions.	Access to 11-25 third party missions.	Access to over 25 third party missions.
		Ground-based facilities	Number of stations.	No capacity for ground-based control elements of EO spacecraft system [no ground-based capacity]	1 ground station	2-5 ground stations	6-10 ground stations	>11 ground stations
	In situ component	**In situ monitoring networks**	Number of in situ networks within the country or providing data to international networks.	0 in situ networks.	Up to 5 in situ networks.	Up to 10 in situ networks.	Up to 20 in situ networks.	Over 20 in situ networks.
	Data exploitation infrastructure	**Data portals and gateways (data access)**	Number of data portals originating from the country.	No data portals.	One generic data portal.	Up to 5 (including thematic ones).	Between 6 and 20 (including thematic ones-some serving different communities).	Over 20 (including thematic ones-some serving different communities).
		Value-added services exploitation platforms (services/advanced products level)	Number of existing VAS exploitation platforms (access to thematic products or services)	No existing platforms.	Up to 5 existing platforms.	6-15 existing platforms.	16-30 existing platforms.	Over 30 existing platforms.



Introduction – EO Infrastructure in South Africa

South Africa's Earth observation infrastructure spans across space-based assets, in-situ monitoring networks, ground stations, and advanced data platforms supporting decision-making across the region.

Key content:

- 11 national satellites deployed across civil, academic, and commercial use.
- Ground stations supporting regional and international EO operations.
- In-situ and data exploitation infrastructure enhances climate and environmental monitoring.

Together, these assets position South Africa as a continental leader in EO infrastructure, capable of addressing national and regional development priorities.

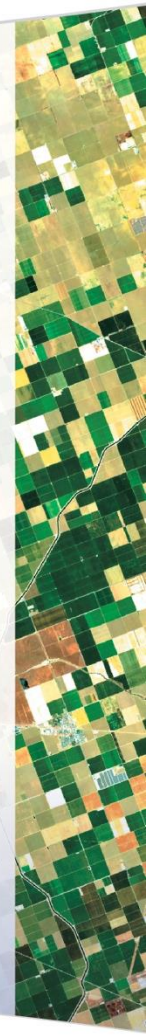
National EO Satellite Programme

South Africa's national satellite programme brings together institutions like SANSA, Stellenbosch University, and commercial actors in deploying satellites for disaster response, maritime security, and science..

Key content:

- Kondor-E (2014) – radar imaging for surveillance and EO.
- MDASAT-1a/1b/1c (2022) – maritime domain awareness.
- nSIGHT-1 (2017) – lower thermosphere and technology demo.
- SumbandilaSat (2009) – disaster and agricultural monitoring.
- SUNSAT-1 (1999) – SA's first educational satellite.
- SharedSat/Platform-2 (2023) – technology testing.

These national missions demonstrate South Africa's ability to produce and operate satellites tailored to societal and scientific challenges.



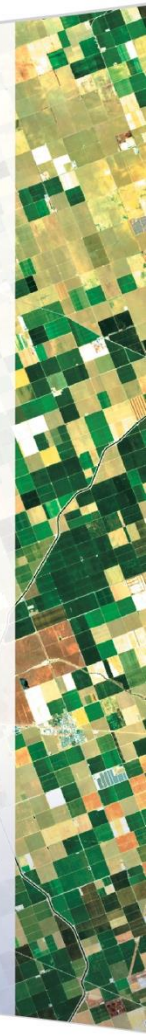
Educational and Research Satellites

Collaborative projects involving universities like CPUT and youth-focused organisations have positioned EO satellite development as a national tool for education, research, and innovation.

Key content:

- XinaBox ThinSAT – educational initiative for high school space science.
- ZA-AeroSat (2017) – aerosol and trace gas atmospheric research.
- ZACUBE-1 (2013) – vessel tracking, space weather.
- ZACUBE-2 (2018) – ocean and marine monitoring.
- Agrisat1 EOSAT-1 (2023) – environmental monitoring.

These projects nurture local expertise and innovation while addressing diverse scientific and environmental monitoring needs.



South Africa’s Role in Radio Astronomy

Led by the South African Radio Astronomy Observatory (SARAO), South Africa plays a key global role in space science and radio astronomy through its infrastructure and international partnerships.

Key content:

- MeerKAT Radio Telescope – operational and supporting global research.
- Square Kilometre Array (SKA) – global radio observatory to begin operations in 2028–2029.

This infrastructure reinforces South Africa’s global status in space science, contributing critical data to the international research community.

SANSA's Ground Operations Network

National ground operations, centred at Hartebeesthoek but extending through partnerships, provide ground-segment support for EO missions and satellite operations.

Key content:

- TT&C services: telemetry, tracking, and command.
- Launch support, in-orbit testing, space navigation.
- Hartebeesthoek Ground Station – over 50 years of satellite support.
- Ground segment includes operational capacity for over 33 international EO missions.

These capabilities position South Africa as a trusted ground operations hub for national and international EO programmes..

Ground Receiving Stations

South Africa’s ground segment includes key receiving stations that support international data partnerships and sovereign data acquisition.

Key content:

- CBERS Ground Station (2008–present) – high-res imagery from China-Brazil satellites.
- SPOT/Airbus Receiving Station – data for urban planning and disaster management.
- Proposed Russian Data Receiving Station – will enhance data from BRICS nations and increase strategic autonomy.

This multi-national infrastructure enables real-time access to critical EO data, enhancing South Africa’s space sovereignty.

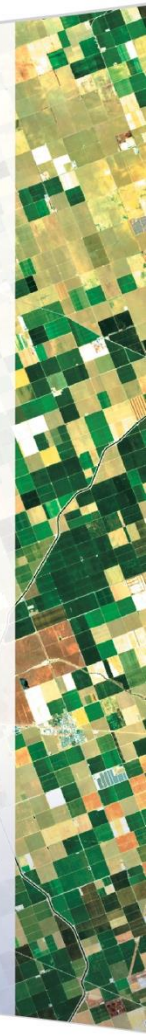
In-Situ Observing Systems

A network of national institutions—SAEON, SAWS, SASSCAL, and DWS—provides in-situ EO data essential for modelling climate, ecosystems, and disaster risks.

Key content:

- SAEON – long-term ecosystem and climate observations.
- AWS networks – managed by SAWS and SASSCAL.
- Hydrological Services – Department of Water and Sanitation monitors national water systems.
- AFIS – near real-time fire alerts and fire behaviour monitoring.

These systems are essential for early warning, resource planning, and evidence-based environmental governance.



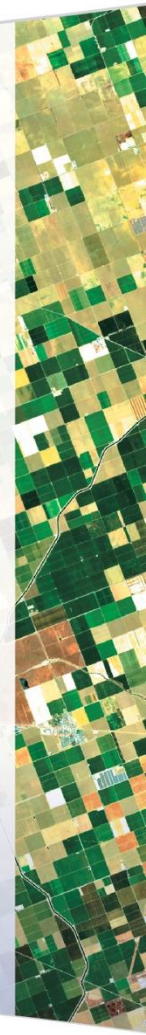
Specialised In-Situ Projects

Targeted EO-linked research initiatives across universities and government support applications in restoration, public health, and global climate tracking.

Key content:

- Quaternary Environmental Change Research Group – historical environmental trends.
- Thicket Restoration Programme – ecological EO applications.
- MAIA Project (NASA/USAID SERVIR) – particulate matter monitoring for air quality.
- Sea Level Stations & ADHI (UNESCO) – contributing to global hydroclimate indices.

These partnerships ensure South Africa contributes vital in-situ data to local resilience efforts and international environmental models.



EO Data Archive and Access

South Africa hosts one of the continent's most comprehensive EO imagery archives, spanning decades and accessible through public platforms.

Key content:

- Archive includes imagery from 1972 to present.
- Data coverage: South Africa and broader SADC region.
- Access to Landsat, SPOT, CBERS, MODIS, WorldView, RADARSAT, and more.
- Data available via SANSA Earth Observation Online Catalogue.

This long-term EO archive underpins policy development, research, and disaster response across Southern Africa.

Digital Earth South Africa (DESA)

SANSA's DESA platform transforms satellite archives into decision-ready data through cloud-based analysis.

Key content:

- Leverages data cube technology.
- Covers 30+ years of satellite imagery.
- Built-in access to JupyterHub for custom geospatial processing.
- Supports SDGs, environmental monitoring, and land management.

DESA represents a transformative shift toward user-driven EO services and scalable analytics infrastructure.

Infrastructure for Decision-Support Services

EO infrastructure enables the production of operational services for government departments, municipalities, and research institutions across sectors.

Key content:

- Applications: fire scar mapping, food security, water resource monitoring.
- EO decision tools used in climate adaptation, human settlement tracking, forest monitoring.
- SANSA provides products to multiple departments and municipalities.

These EO applications are already informing policies, protecting lives, and driving sustainable planning at all levels of government.

Summary of EO Infrastructure Maturity Strengths and opportunities

South Africa's EO infrastructure offers comprehensive capabilities across space, ground, and data systems.

Key content:

- 11 satellites launched; 3 operational nanosatellite constellations.
- SANSA operates legacy and cutting-edge ground stations.
- Active participation in over 33 international EO missions.
- DESA and SANSA Catalogue provide accessible EO analytics for national priorities.
- Data portals and Value-added services Limited

With these assets, South Africa is well-positioned to lead the continent in EO service delivery and innovation for sustainable development.

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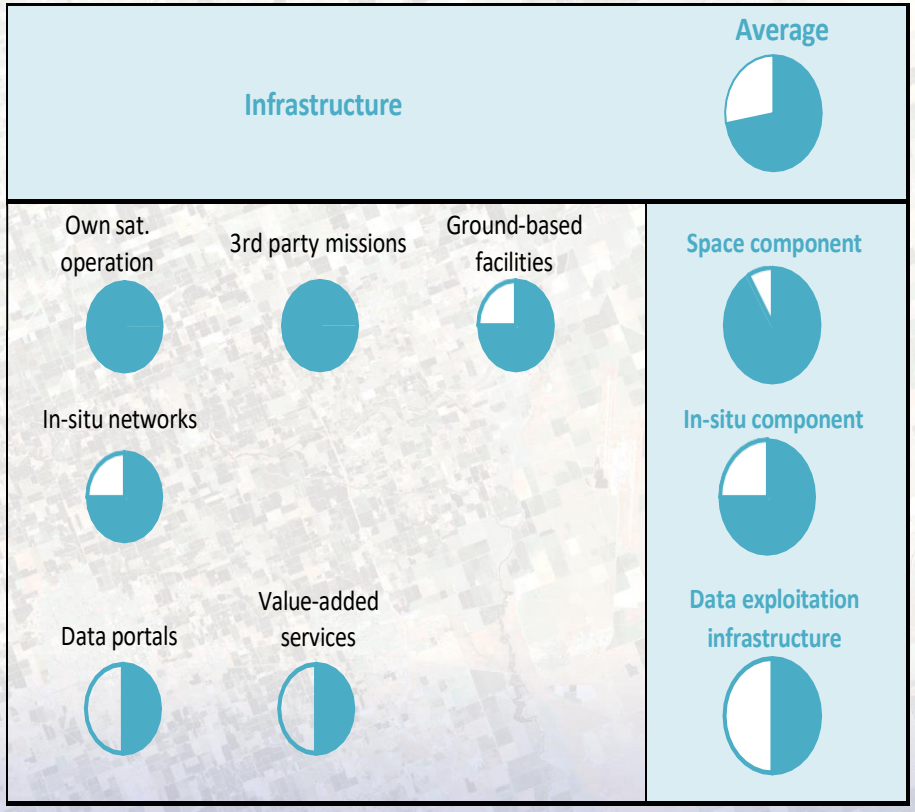

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Thank You

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