

SANSA Space Operations

30 September 2026

E Avenant, Chief Engineer SANSA Space Operations



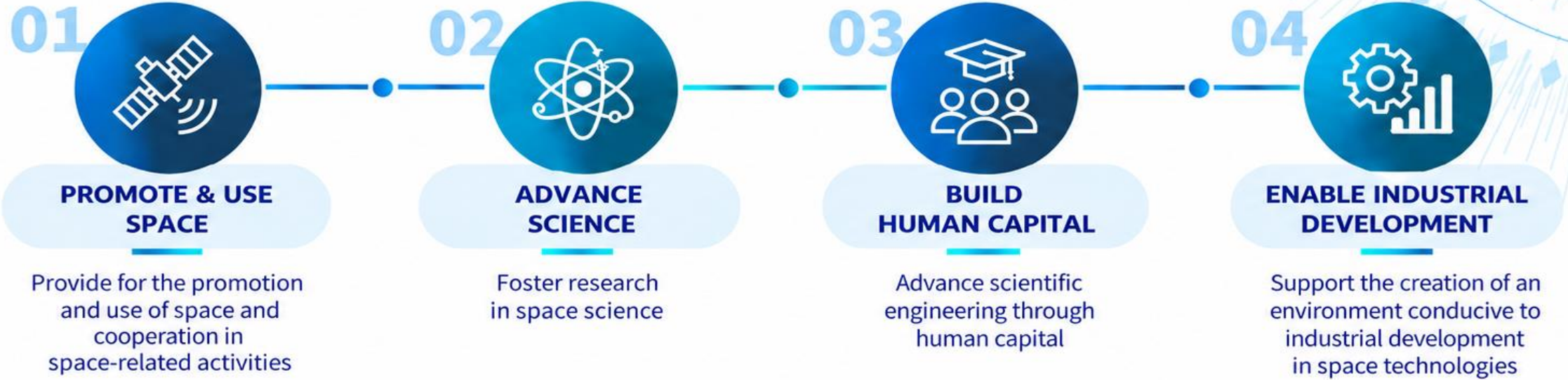
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OUR MANDATE

Connecting space capability to national development



“...Provide for the promotion and use of space and cooperation in space-related activities, foster research in space science, advance scientific engineering through human capital and support the creation of an environment conducive to industrial development in space technologies within the framework of national government policy...”



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Section 5. (1)(d) acquire, assimilate and disseminate space satellite imagery for any organs of state.



IN THE PURSUIT OF SPACE SOVEREIGNTY



VISION & MISSION

Our direction and purpose



VISION

“Accelerating space innovation for the advancement of all South African citizens, and enabling global impact”



MISSION

To advance South Africa's national interests by:



Leading and pioneering in space science, technology, and innovation



Transforming and supporting the growth of the space industry



Collaborating globally to drive inclusive socio-economic development and a capable state



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IN THE PURSUIT OF SPACE SOVEREIGNTY

STRATEGIC FOCUS AREAS AND PILLARS

OF THE RAMP-UP PHASE FOR 2025-2030



Contributing to inclusive economic growth and industrialisation, job creation, and a capable state through advancements in space science, engineering and technology.

01



Space Sensors
and Satellite
Development



02



Space Launch
Infrastructure
and Capability



03



Space Exploration
and Discovery



04



Space Science,
Earth Observation
RD&I and
Earth Intelligence



05



Space Operations
and Economic
Diplomacy



Leverage International Cooperations



Enable Local Space Industry Growth and Transformation



Develop Human Capital in Space Science and Technologies



Invest in and Build a Capable and Sustainable Space Agency



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IN THE PURSUIT OF SPACE SOVEREIGNTY

DSTI

SANSA

Programs

**Earth
Observation
Programme**

**Space
Operations
Programme**

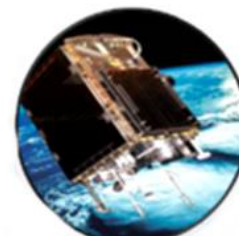
**Space
Science
Programme**

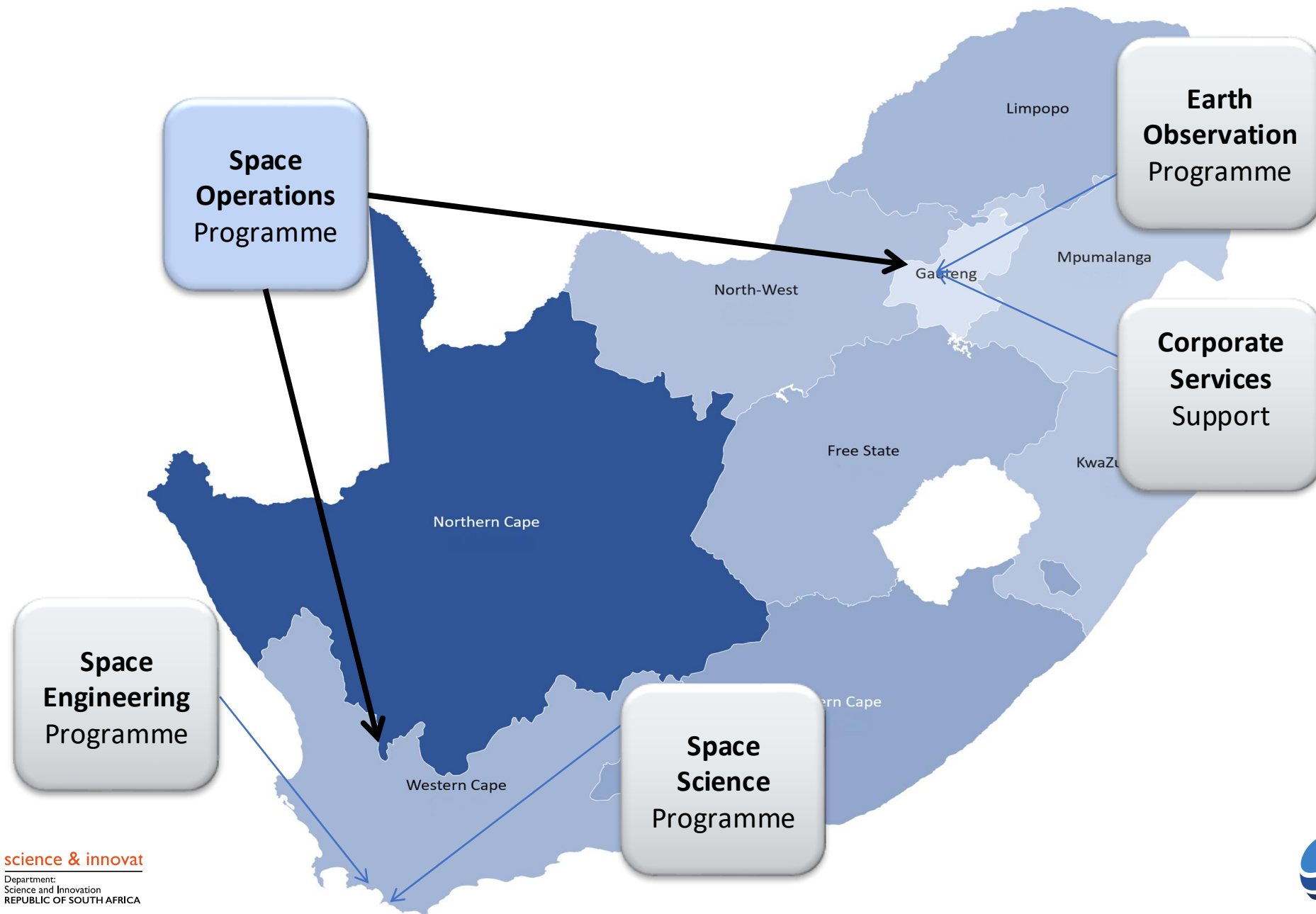
**Space
Engineering
Programme**



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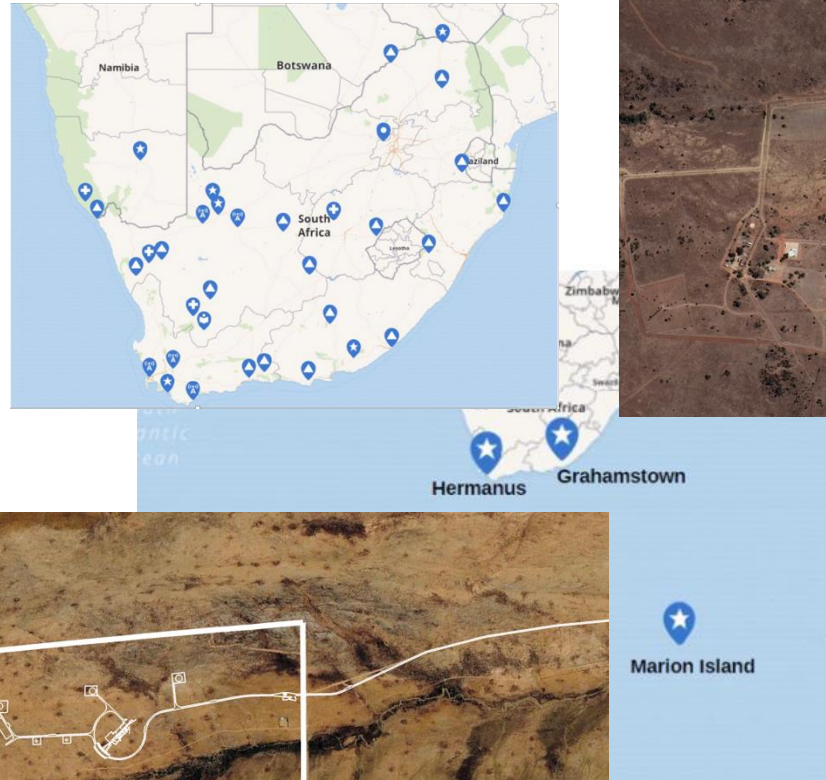




SuperDarn Radar Antarctica



Instrumentation network



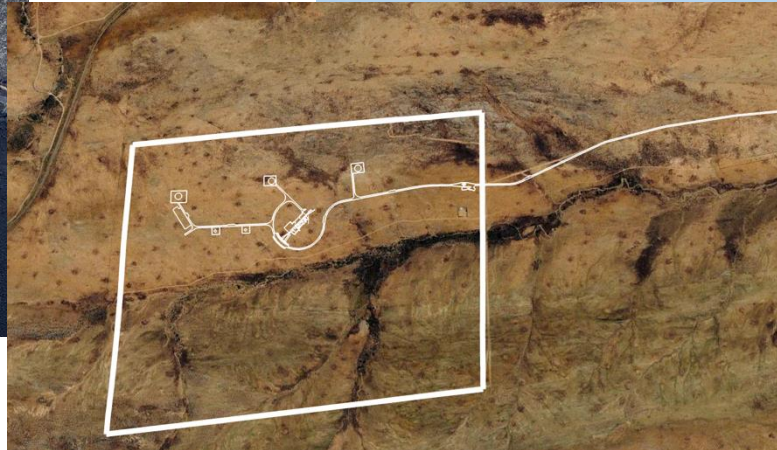
Hartebeeshoek Ground station



Space Science Hermanus



Houwteq AIT Facility



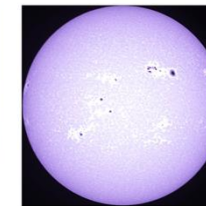
Matjiesfontein Ground station
(under construction)



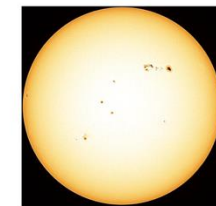
Solar telescope (under construction)



80mm Solar Telescope
Hydrogen Alpha image (SANS)
Coloured image



80mm Solar Telescope CoK
image (SANS)
Coloured image



60mm Solar Telescope White
Light image (SANS)
Coloured image

Early images from Solar telescope

SPACE Science



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SANSA – Designated Regional Space Weather Information Provider

- ✓ 24/7 Operational Centre & capability launched in November 2022
 - ICAO Compliant
 - ISO 9001: 2015 Certified
- ✓ Research, Forecasting and Prediction in the domains of
 - GNSS (navigation)
 - Communications (HF and Satellite)
 - Radiation Exposure
- ✓ Training, Interpretation and User Requirements
- ✓ SANSA is in a position to enable the mitigation of the risk created by Space Weather



Magnetically Clean Infrastructure –

New magnetically clean huts with equipped with sensitive magnetometers

African Instrumentation Network –

- Ethiopia
- Gabon
- Ghana
- Tanzania
- Cameroon
- South Sudan
- Egypt (South)
- Gough Island
- Ivory Coast



Upgrade of the Helmholtz Coil System

African Instrumentation Network: Solar Telescope

The project is currently in various phases:

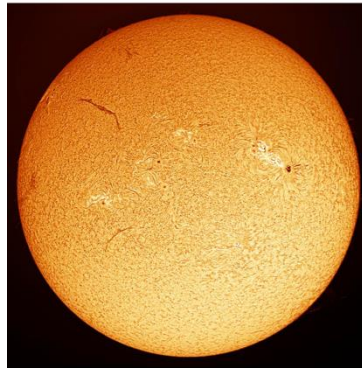
- Construction of the Solar Telescope building,
- Will run in parallel with the magnetically clean huts..
- Building awaiting the appointment of the civil contractors
- The designs for the telescope building have been handed completed..
- Solar telescope pedestal: Delivered
- Solar Telescope: Temporarily deployed while awaiting building

Telescope dome

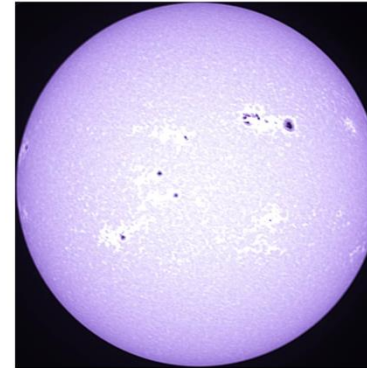
- The Specifications and market research for the telescope dome have been completed.
- Procurement options for dome under consideration

The data storage requirements

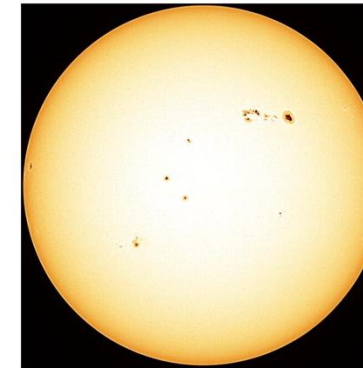
- Increase our storage by an additional 50TB.



80mm Solar Telescope
Hydrogen Alpha Image (SANSa)
Colourised Image



80mm Solar Telescope CaK
Image (SANSa)
Colourised image



60mm Solar Telescope White
Light Image (SANSa)
colourised image



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EARTH OBSERVATION (EO)



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Aim

- Acquisition of SAR to support OCIMS, and also development of additional decision support tools.

Progress

- The acquisition of SAR data continues.
- CSIR is already receiving the data for the Integrated Vessel Detection tool and other decision support tools.
- SANSA will develop additional products and services, and the decision support tool using this data for oil-spillage and also for disaster mitigation, response and recovery.

Future

- SANSA is looking at the sustainability model to ensure constant acquisition of these datasets.

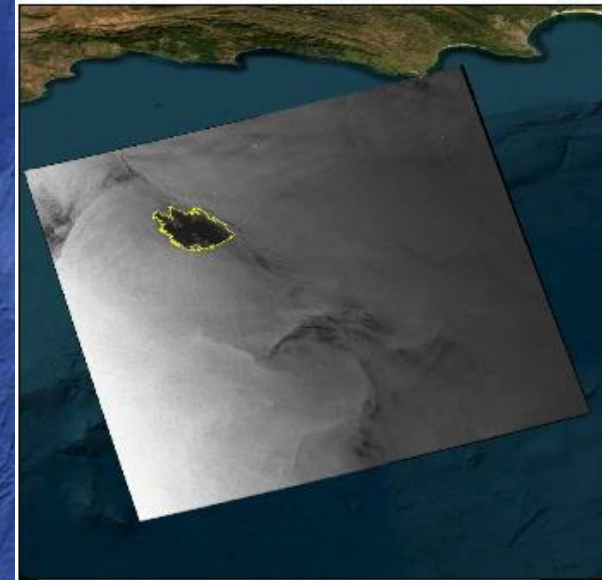
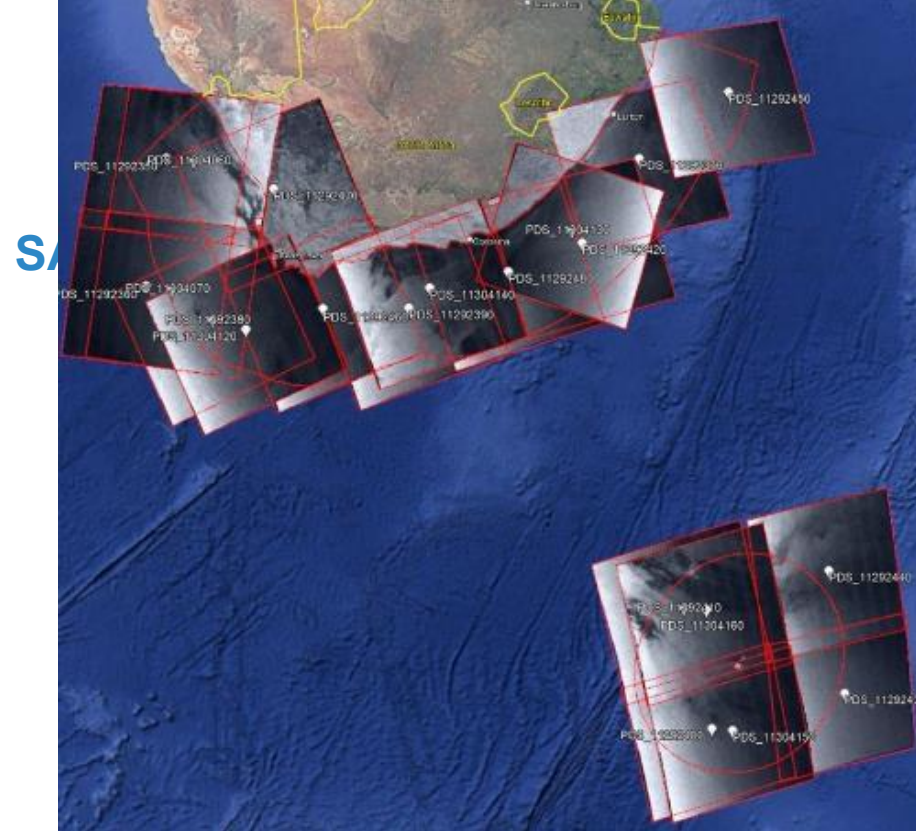


Figure Above: Oil Spillage mapping using SAR data



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NEOFRONTIERS: SUPPORTING STARTUPS AND SMMEs

AIM

The primary objective of the NEOFrontiers Enterprise Innovation Support (NEOFrontiers EIS) initiative is to provide innovation support to startups, SMMEs, and organisations that will transform Earth Observation-based ideas into products and/or services, thereby increasing the competitiveness of the South African EO sector and benefiting South African society.

CURRENT PROGRESS & ACHIEVEMENTS

- SANSA collaborate with NRF and TuksNovation!
- 8 Startups and SMMEs were funded in FY 2024 (2nd NEOFrontierEIS cohort)
- Companies participated in the NSC 2025, showcasing their projects
- 2nd NEOFrontierEIS cohort calls
 - Number of proposals received: **30**
 - Proposals that met eligibility criteria: **19**
 - Number of qualifying proposal: **1**
 - Number of conditionally qualifying proposals: **5**
 - Total Recommended for funding: **6**

FUTURE OUTLOOK

- 6 Start-ups and MSMEs are funded, and Launch will be done in Q3, FY2025.
- Project implementation by the recipients of the funding.

Call opened : **13 March 2025 (Second Cohort)**

Call Closed : **10 April 2025**

Grant : **up to R1 million**

Period : **06-12 months**

Target : **Transformed Start-ups and MSMEs**

Thematic areas for this award

Agriculture/Insurance, Defense and Security, Health, Climate Change and Community-based services.



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NEW EARTH OBSERVATION FRONTIERS
ENTERPRISE INNOVATION SUPPORT FUND 2025

CLOSING DATE:
10 APRIL 2025

[I'M INTERESTED](#)

[VIEW RULES](#)



INTEGRATED EARTH OBSERVATION SOLUTIONS

AIM

The programme is designed to be adaptable and responsive, supporting the advancement of EO technologies that can meet evolving societal needs and emerging challenges. It establishes a framework to deploy innovative applications rapidly, catalyse new partnerships, and strengthen South Africa's EO ecosystem by leveraging state-of-the-art technologies, tools, data, and platforms.

CURRENT PROGRESS & ACHIEVEMENTS

- SANSA collaborate with NEOSS and CSIR
- About eighteen (18) project proposals were received on or before the closing date of the call.
- Only eight project proposals passed the eligibility evaluation stage and moved on to the technical evaluation stage.
- Only four project proposals out of eight met the required funding requirements.

FUTURE OUTLOOK

- Award of the recommended projects. This is now dependent on the NEOSS.
- Project implementation by the recipient of the funding.

3rd Call for Proposals (CFP) Integrated Earth Observations Solutions (IEOS) (CLOSED)

Opening date Friday, 25 April 2025

Closing date Monday, 26 May 2025



The banner features the logos of the Department of Science, Technology & Innovation and SANSA (South African National Space Agency). It includes two circular images: one showing a densely populated informal settlement and another showing two people in safety gear working on a construction site. Text on the banner includes: 'THIRD CALL FOR PROPOSALS Integrated Earth Observations Solutions (IEOS)', 'THEME: Empowering Communities to Drive Local Impact', 'The IEOS programme is funded by the South African National Space Agency (SANSA) and supports South African MSMEs and community organisations in developing practical, locally relevant Earth Observation solutions that address development and environmental challenges.', 'PUBLICATION DATE: 25 April 2025', 'CLOSING DATE: 26 May 2025', and 'APPLY NOW: www.neoss.co.za/opportunities/cfp'. Logos for NEOSS and CSIR are also present at the bottom.

Call Opened: **25 April 2025**

Call Closed: **26 May 2025**

Grant Amount: **up to R500k**

Period: **6 – 12 Months**

Target: **Startups and MSMEs**

Proposal received: **19**

Technical Evaluation: **Completed**

Awards: **Four companies to be awarded.**

DECISION SUPPORT TOOLS FOR VARIOUS APP. AREAS

AIR QUALITY TOOL

AIM

The Air Quality Decision Support Tool is being developed to provide real-time, satellite-derived forecasts of key pollutants across South Africa, enabling government agencies, researchers, and the public to understand better and manage air quality risks. It supports policy, health interventions, and long-term mitigation planning.

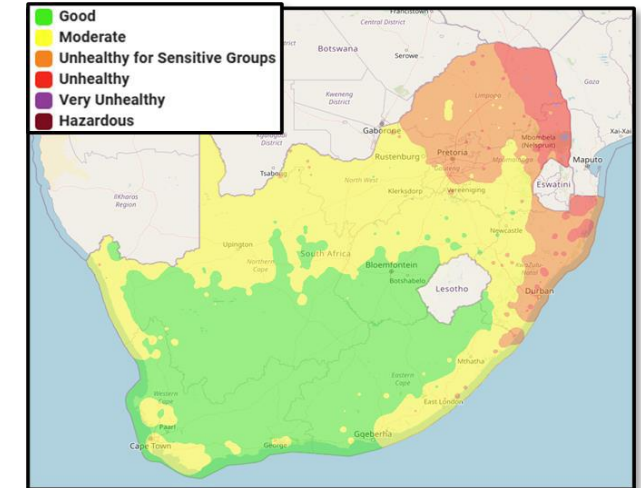
CURRENT PROGRESS & ACHIEVEMENTS

- ❑ Phase 1 development was successfully completed.
- ❑ Phase 2 has begun with internal testing of the LSTM-based (Long Short-Term Memory) model. The model has demonstrated pollutant forecasting capabilities across South Africa.

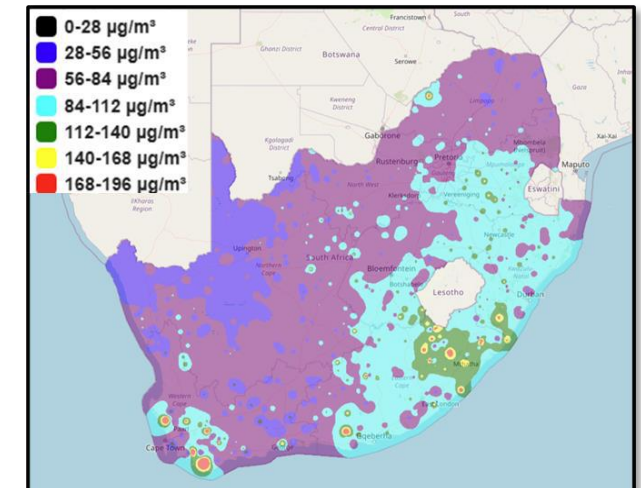
FUTURE OUTLOOK

- ❑ Appointment of consultants for the implementation of the forecasting model is scheduled for October 2025.
- ❑ The implementation phase will focus on model integration, data assimilation, and user interface development.
- ❑ Internal validation and predictive performance to be tested.
- ❑ Full roll-out is expected to support early-warning systems and strengthen national environmental management frameworks.

AIR QUALITY



POLLUTANTS



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DECISION SUPPORT TOOLS FOR VARIOUS THEMATIC AREAS

WATER MONITORING TOOL

AIM:

The Water Monitoring Decision Support Tool aims to provide near-real-time monitoring of water resources, including quality and quantity. It will support sustainable water resource management, compliance monitoring, and risk assessment in the context of droughts, pollution events, and climate change impacts.

CURRENT PROGRESS & ACHIEVEMENTS

- ❑ Phase 1 development is deployed, and User Acceptance Testing (UAT) has been conducted internally.
- ❑ Consultants are currently finalising bug fixes and technical adjustments based on UAT feedback.

FUTURE OUTLOOK

- ❑ Final UAT and sign-off are planned prior to Phase 2 initiation.
- ❑ Phase 2 development, scheduled for October 2025, will expand tool functionality, integrate prediction and enhance user interface and decision analytics.

WATER QUALITY



WATER QUANTITY



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SPACE AGENCY

DECISION SUPPORT TOOLS FOR VARIOUS THEMATIC AREAS

FLOOD DECISION SUPPORT TOOL

AIM

The Flood Decision Support Tool is designed to enhance disaster preparedness, response, and recovery through Earth observation and predictive analytics. It will support decision-makers with near-real-time situational awareness, risk mapping, and early warning systems for floods.

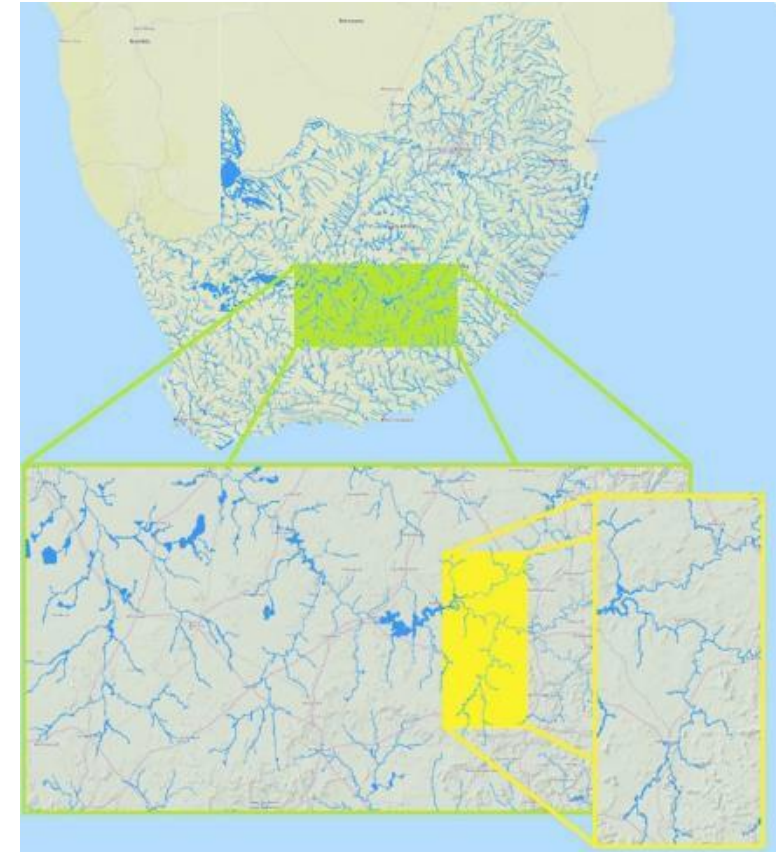
CURRENT PROGRESS & ACHIEVEMENTS

- ❑ Phase 1 development is finalised, and initial User Acceptance Testing (UAT) has been conducted.
- ❑ Consultants are addressing bugs and technical refinements identified during the UAT before deployment.

FUTURE OUTLOOK

- ❑ Final UAT and sign-off are anticipated ahead of Phase 2 development.
- ❑ Phase 2, scheduled to commence in October 2025, will focus on prediction and strengthening the user dashboard.
- ❑ The tool will ultimately contribute to the national disaster risk reduction framework, providing decision-makers with actionable intelligence to minimise disaster impacts.

FLOOD INUNDATION MODEL



Space Operations



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History

- 1958 Esselinpark (Vanguerd)
- 1960 Minitrack moved to HBK
- 1963 12M antenna
- 1975 NASA terminate
- 1977 First Meteosat
- 1983 Part of the CNES network
- 1998 Hughes Ku band Contract
- 2006-2010 Unprecedented growth
- 2011 Move to SANSA
- 2023 New Matjiesfontein Deep space site

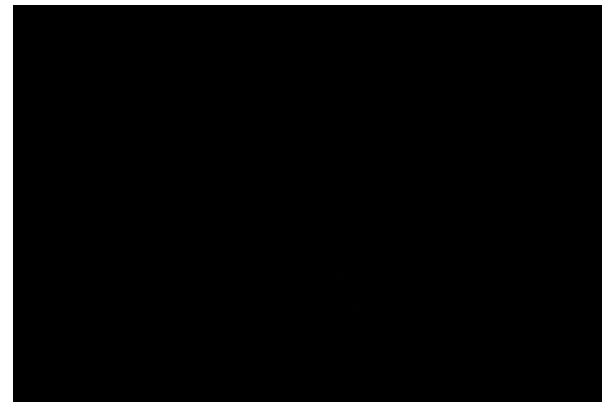


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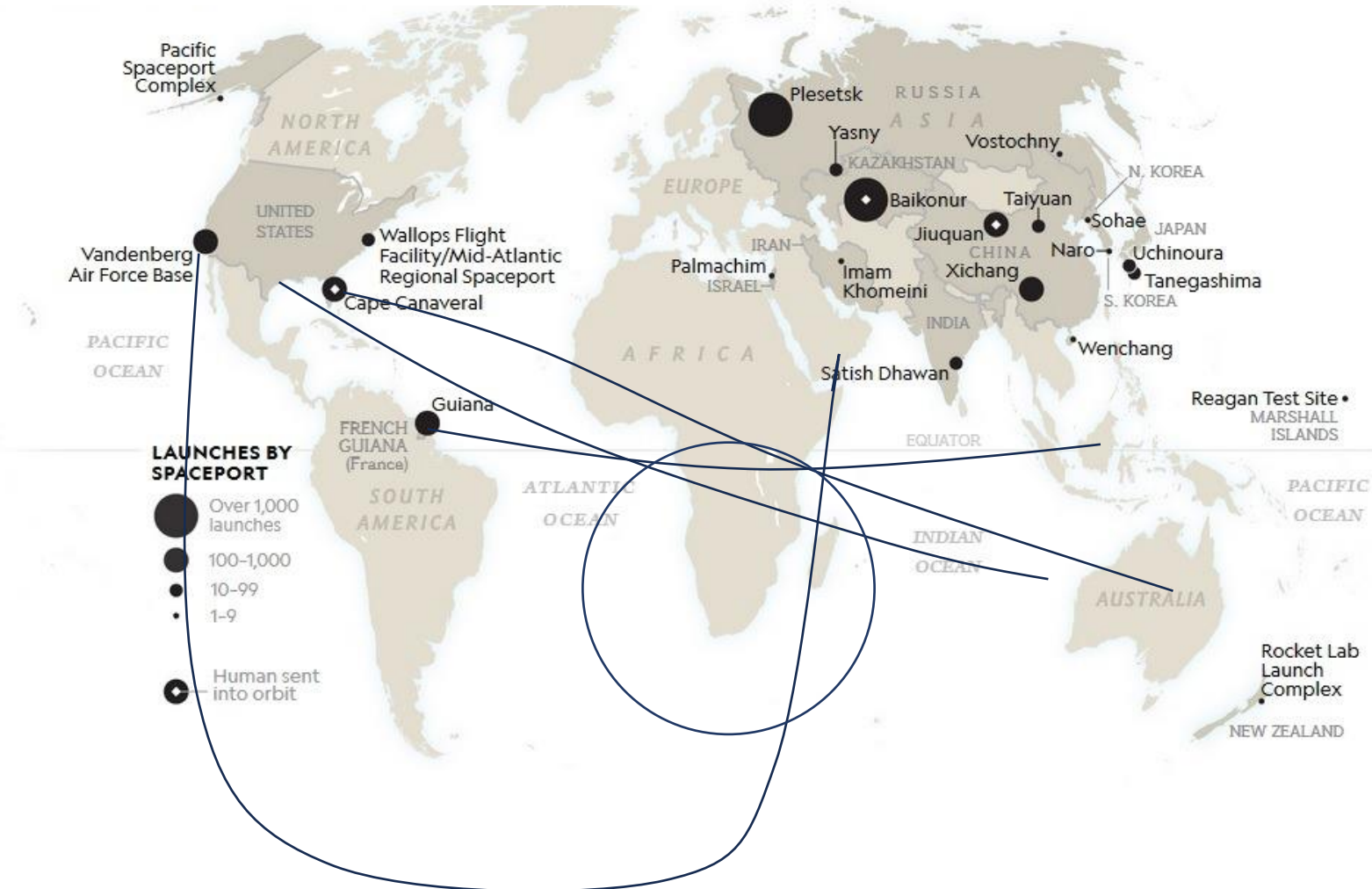
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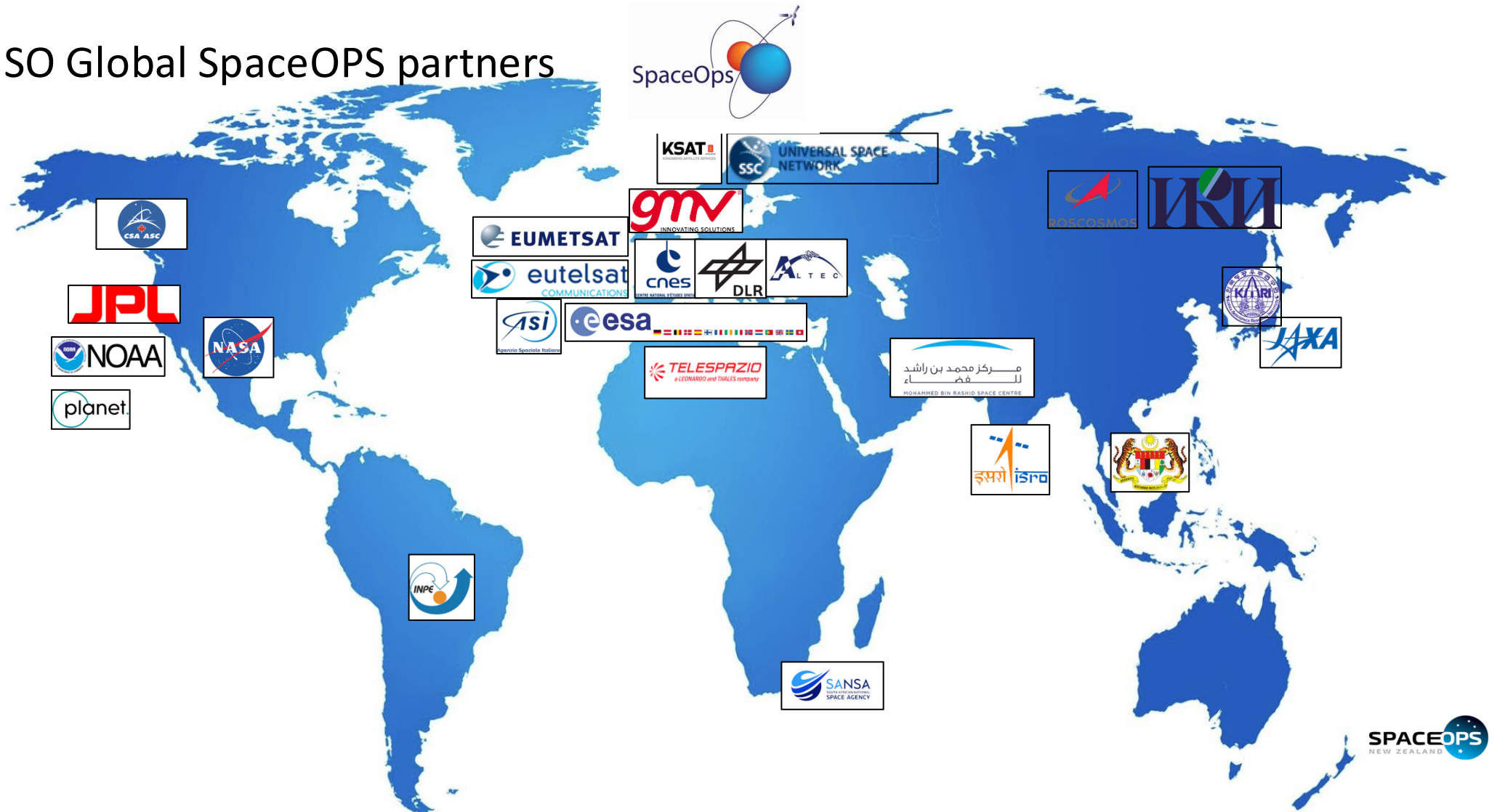
Value chain: TOSS, IOT & hosting services



Global launch sites and HBK



SANSA SO Global SpaceOPS partners

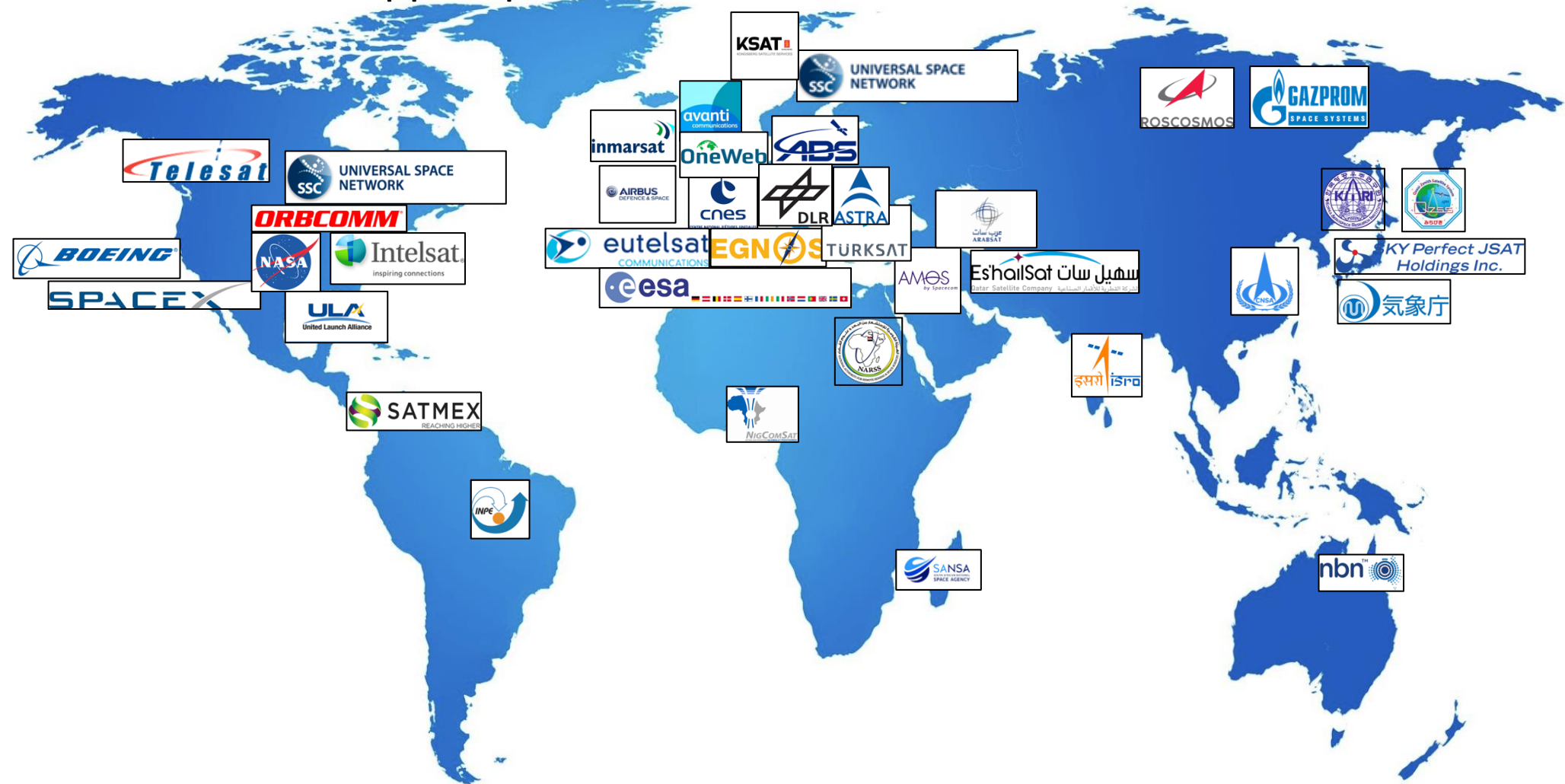


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SANSA SO mission Support partners



Telemetry, Tracking & Command

- 61 years operational, reputation as top-quality service provider
- Over 650 s/c supported since 1984
- Frequency Bands: VHF/UHF, L, S,C, Ext C, X, Ku, DBS, KA
- 93 Antennas
- 24 x 7 operations and monitoring
- Very reliable Teleport hosting
- Mission operations for Africa
- Mobile support
- First full IOT facility in Africa



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Launch and Early Orbit Procedure

Transfer orbit satellite Support

In orbit test



CENTRE NATIONAL D'ÉTUDES SPATIALES



Spectral monitoring and on station TT&C



Earth Observation data reception



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Gateway services



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Connectivity & Network Infrastructure Overview

Dark Fibre Link: Direct HBK–Teraco connection providing access to 150+ global and local carriers, ISPs, and content providers.

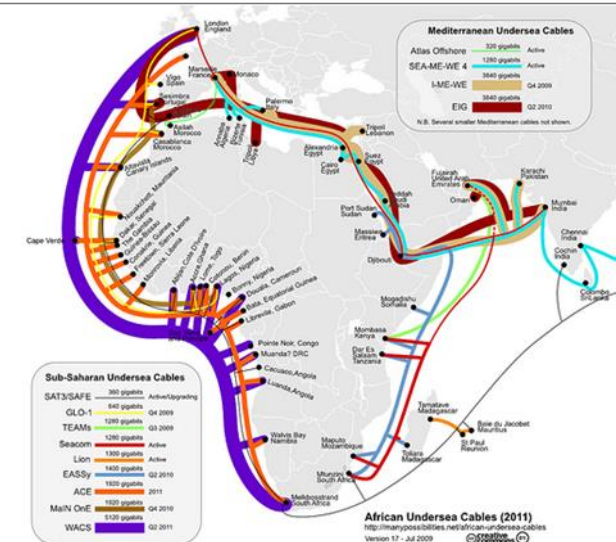
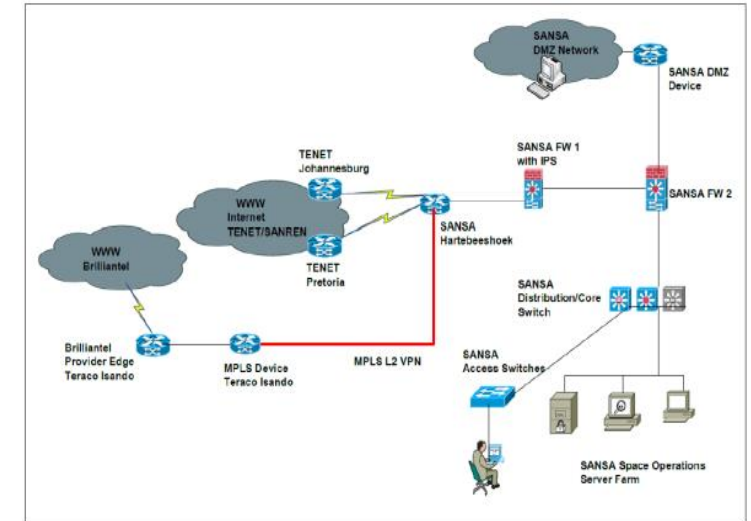
Low-Latency Access: Teraco's proximity to major undersea cables enhances international connectivity.

National Backbone: 40 Gbps SANReN link via Telkom, plus three buried Telkom fibre routes to the Telkom Earth Station.

International Reach: Connectivity through SEACOM, WACS, EASSy, SAT-3/WACS, and SACS submarine cables; peering supported by Liquid Telecom, Cogent, NTT, and GÉANT.

Performance: Google and Akamai caches improve national traffic efficiency.

Uptime Target: Building on 99.95% in 2023, SANSA targets 99.98% availability for 2024.



Site Power Infrastructure Overview

Primary Supply: 11 kVA Eskom grid feed, transformed to 230 V (3Ø, 400 V), 50 Hz via SANSA's power distribution station.

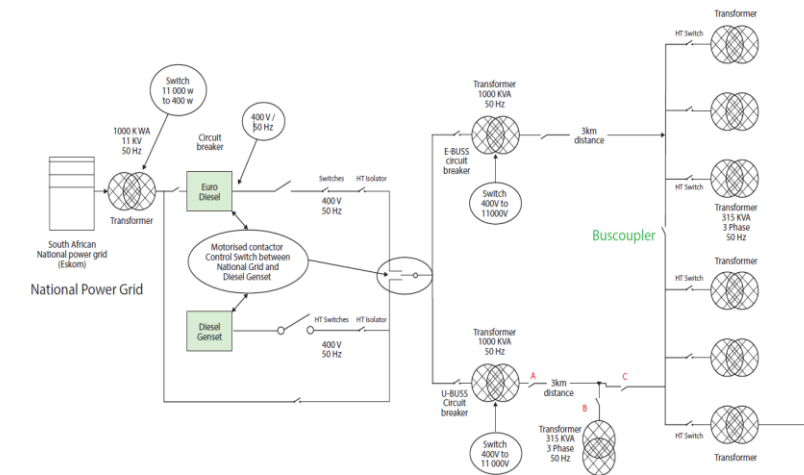
Dynamic Protection: Mitsubishi 1000 kVA rotary UPS activates on >5% voltage fluctuation.

Backup Generation: 1900 kVA generator reaches full load within 17 seconds; ~40,000 L fuel onsite provides ± 14 days autonomy.

Critical Load Support:

- Operations Room & Main Building: Dual UPS systems with ≥ 60 minutes backup.
- Standalone systems across site: Individual UPS units (45–60 minutes).

Additional Resilience: 380 kVA mobile generator available for maintenance or fault conditions.



Environmental health and safety

Received SAEF Excellence Award and Outstanding Achievement award

South African centre of excellence

Comply with the Health and Safety act 85/1993 and SANSA SO has been

awarded a 4-star rating for 3 years in succession

- ISO 9001
 - ISO 14001
 - ISO 45001
-
- Exploring green energy



SANSA Space Operations Recent Projects

- **ISRO IRMS**
 - Completed and handed over to ops & maint
- **AIRCAS SA02 SA3 & SA04**
 - Completed and operational
- **HBK Fence expansion**
 - completed.
- **KSAT-HA10**
 - Project is currently underway. Awaiting delivery of antenna
- **RENEWABLES DESIGN & CONSRUCTION**
 - Site establishment
- **UPCOMING PROJECTS**
 - ESSP—SANSA RIMS V2 and VSAT
 - DIGOS SLR



ISRO NavIC (Navigation with Indian Constellation) station



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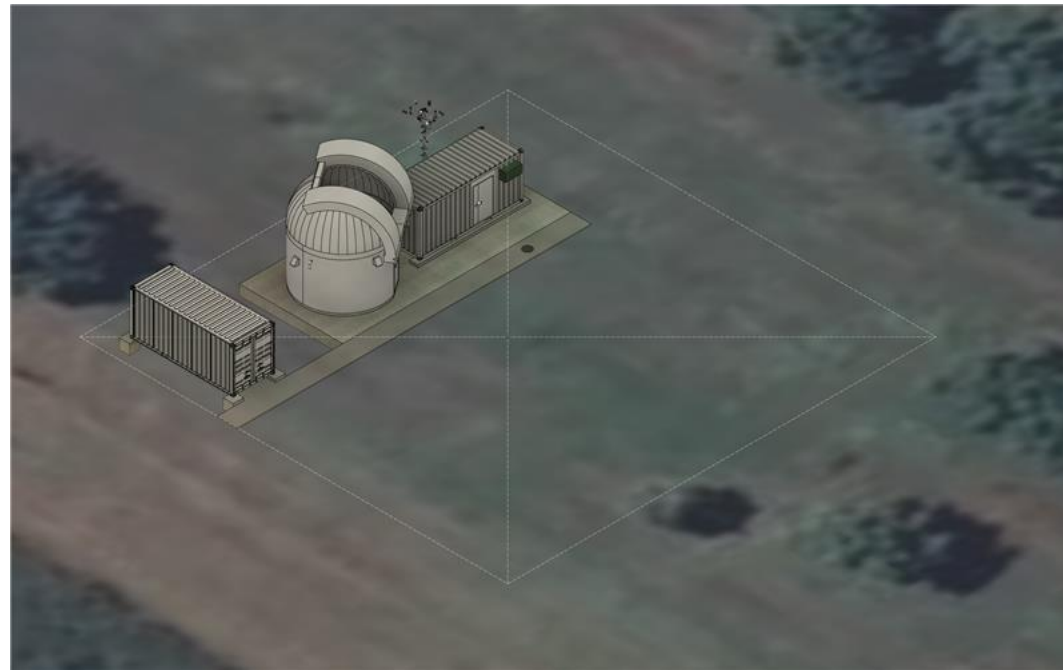
New Client EO TT&C and DATA download station



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Satellite Laser Ranging station



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Space Operations: MTJ



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Project Overview

Project Owner: South African National Space Agency (SANSA)

Supporting Partner: Department of Science and Innovation (DSI)

Purpose: Establish a world-class deep space ground station in Matjiesfontein.

Current Phase: Implementation stage – multiple workstreams progressing simultaneously.

Scope: Infrastructure, connectivity, community integration, and environmental compliance.

Project Status Summary

Project is in progress with significant advancements and a few regulatory challenges.

Major focus areas:

- Land & Legal Approvals
- Infrastructure & Utilities
- Environmental Compliance
- Community & Stakeholder Engagement
- Economic & Social Development



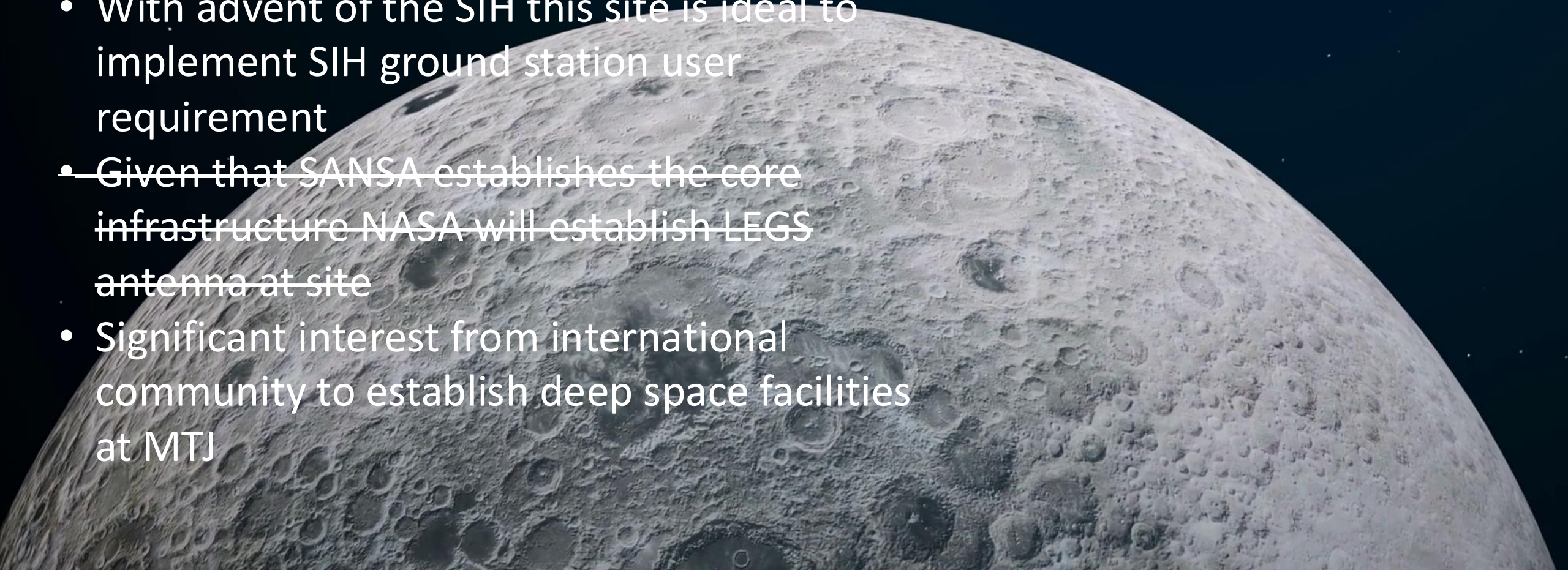
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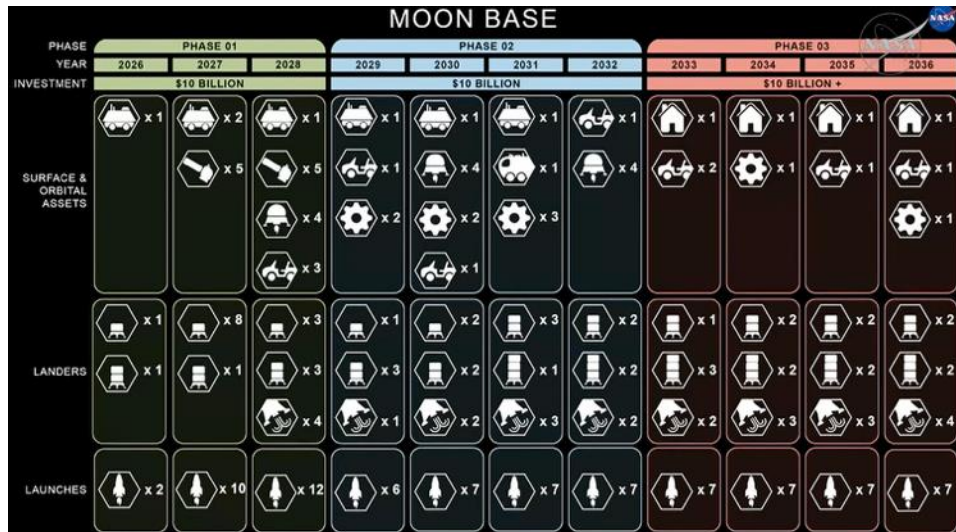
Matjiesfontein(MJT): Deep Space Communications

- Original motivation:
 - Deep space facility for NASA
- With advent of the SIH this site is ideal to implement SIH ground station user requirement
- ~~Given that SANSa establishes the core infrastructure NASA will establish LEGS antenna at site~~
- Significant interest from international community to establish deep space facilities at MTJ



State of the DSN business case

- SANSA SO remains positive on the business case for the DSN ground station.
- We are responding to enquiries and strong interest in establishing hosted at facilities at MTJ.
- NASA has just announced their cadence for moon missions. Even though we are currently not particularly optimistic about their participation at the DSN site, with the newly announced cadence, we expect there to be constrained earth-space communication capacity.



Newly defined NASA moon program...

Year	Missions
2027-2028	39
2029-2032	46
2033-2036	38

Matjiesfontein: Site requirements:

Governmental

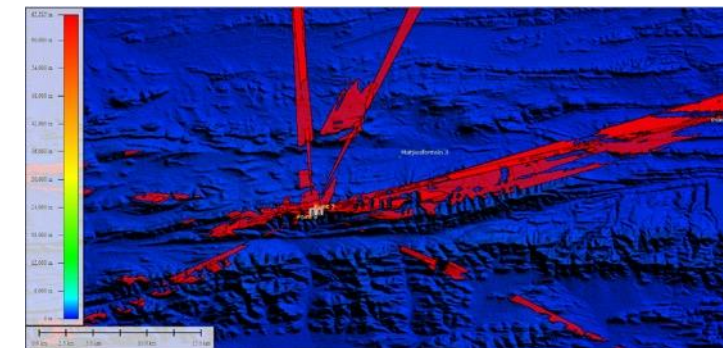
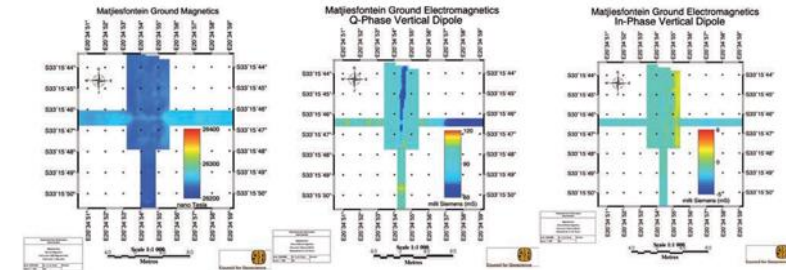
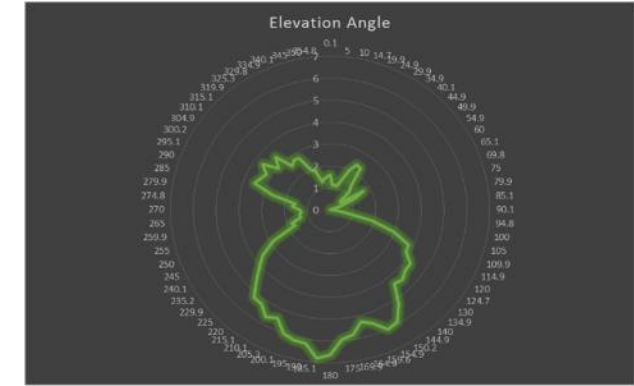
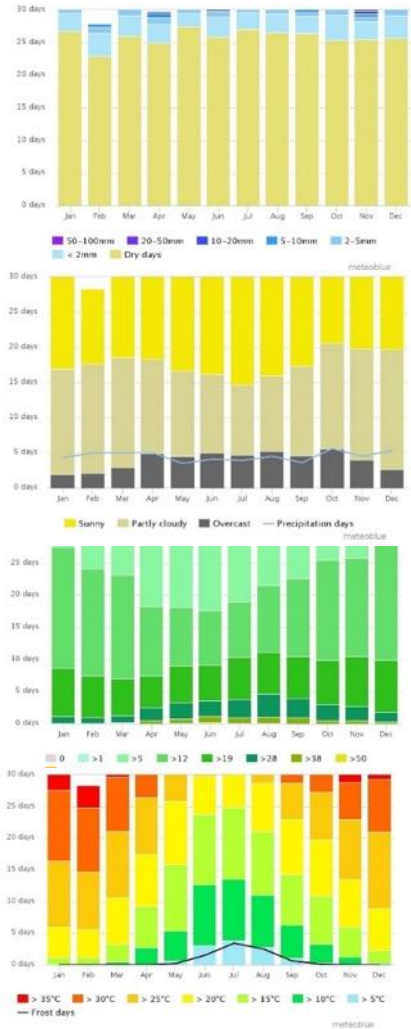
- Laws
- Agreements
- Taxation
- RF Spectrum protection

Management

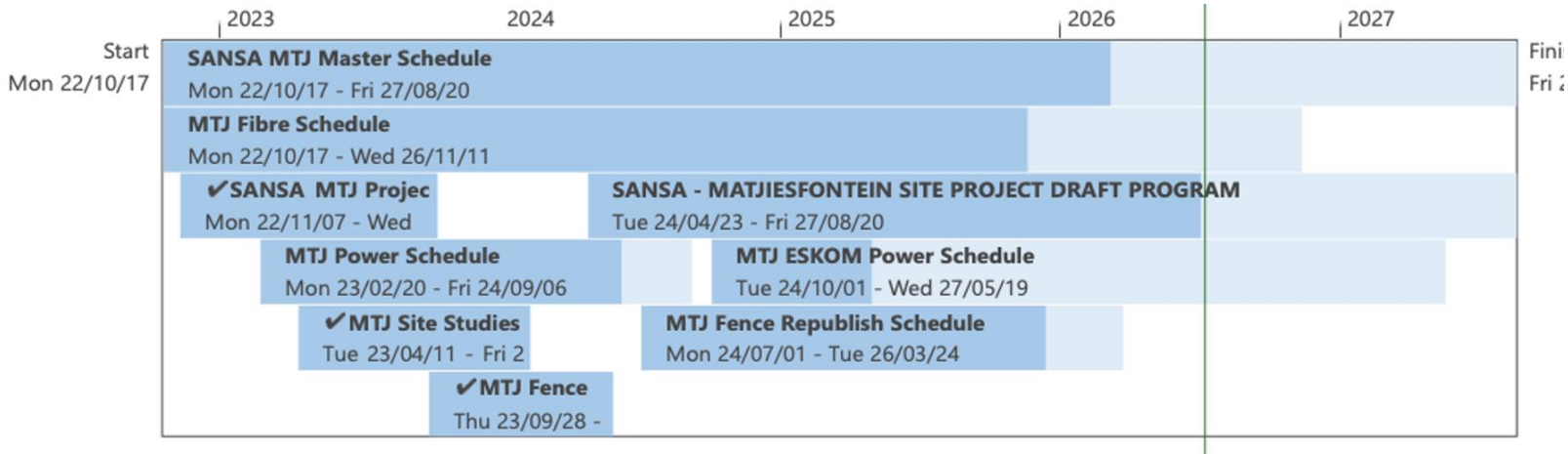
- Land ownership
- Site Accessibility
- Environmental impact assessment
- Fire protection
- Water
- Maintenance and Operations plan

Technical

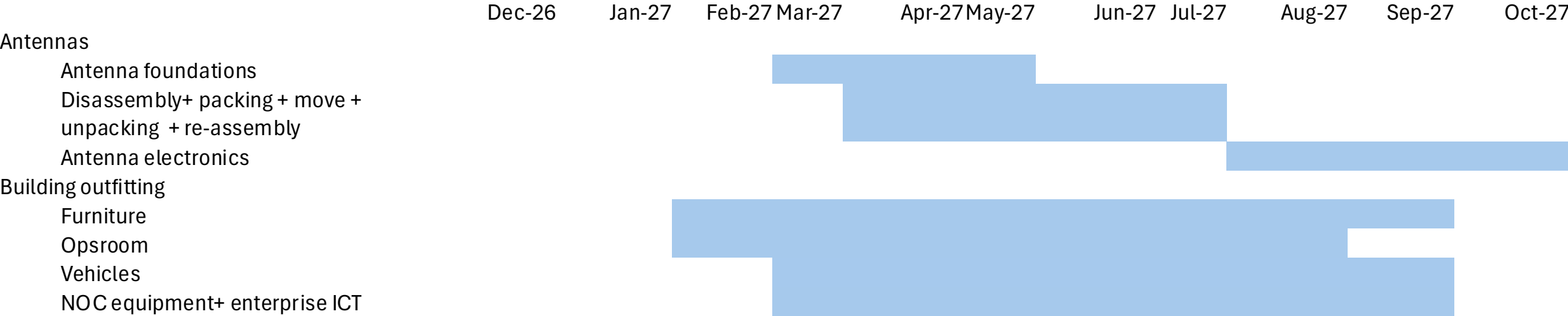
- Climate
- Backhaul Connectivity
- Geological
- Mechanical infrastructure
- Power Requirements
- Radio Frequency environment
- Security



Project phases



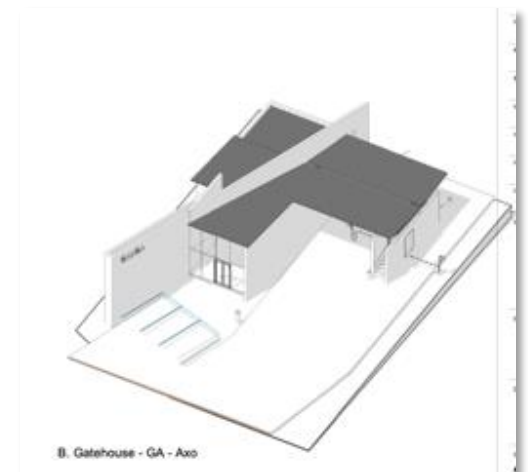
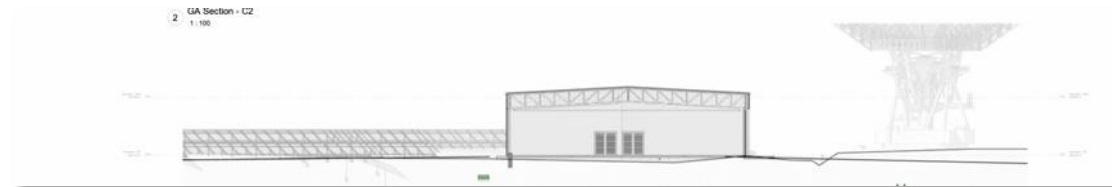
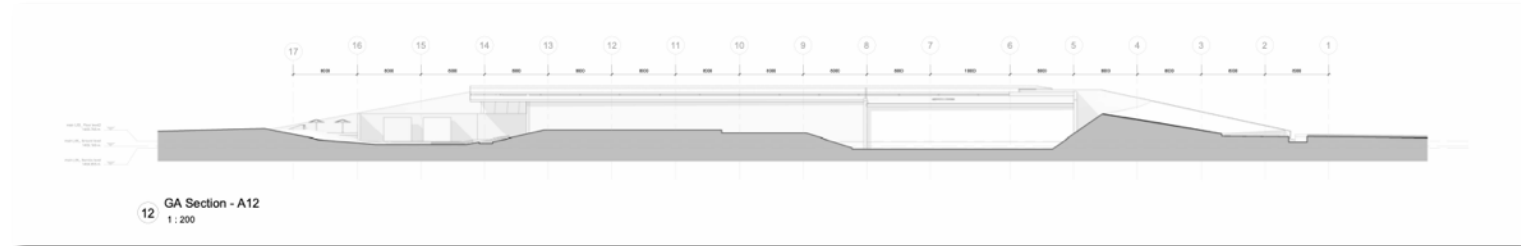
Upcoming elements



SITE DESIGN



- Cubesat infrastructure in support of HEI, Local industry and SIH, Typically 3.7m S/X band receive and S-band transmit
- Cubesat infrastructure in support of HEI, Typically VHF,UHF band Tx and RX
- TT&C, Image Download infrastructure in support of SIH: S-X,-Ka(11m)
- Space weather mission support: S-X-Ka (11m)



New concept to support budget

MTJ development photos



Matjiesfontein Deep Space Network

Overall Progress

Project continues to progress across multiple workstreams, with several key milestones achieved.

Fibre Infrastructure

- SANREN contracted and payment completed.
- Extend the fibre contract due to civil works delays;

Fibre Route

- Engineering consultant appointed for design and construction monitoring.
- Project inception meeting successfully held on 24 June 2026.

Power Supply

- Commercial power design completed for a 500 kVA supply from Matjiesfontein.
- Agreement reached with Eskom and Laingsburg Municipality.
- Procurement to commence based on completed design and BOQ.
- Long-term strategy includes increasing site capacity via the main transmission line and exploring a Transnet connection.
- Eskom preparing commercial offer



Matjiesfontein Deep Space Network

Civil Engineering

- Construction monitoring phase

Site Civil Works

- Civil construction contract awarded and site handed over on 30 March 2026.
- Contractor commenced work under Offer and Acceptance and JBCC provisions.
- Contract fully executed and Purchase Order issued on 19 June 2026.
- Monthly invoicing against schedule.
- Engagement underway with DSTI to host an official construction commencement event.

Fencing

- Approximately 50% of the site is currently secured
- SANSA will complete the fencing in the next 6 months.

Building outfitting

- Review of requirements completed
- Tender to be launched to coincide with the completion of the building

Antenna establishment

- Feasibility study to create deep space capability



Building MTJ



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SANSA MTJ ground station will be ready for business from Q3 2027!



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Thank you

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