



FIG Working Week 2024

19-24 May

Accra, Ghana

Your World, Our World:
Resilient Environment
and Sustainable
Resource Management
for All

TS07F: Accelerating Land Administration Success: Powered by GNSS CORS Networks

TS07F: Special Panel Discussion

Tuesday 21 May 2024 14:30-16:00

Kundum Room, La Palm

Commission 5 Positioning and Measurement

Commission 7 Land Administration

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Session Overview

Introduction

Some changes to the Agenda

Keynote Presentations from Panellists

Panel Discussion

Attendees

Open Questions

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Setting the Scene – Administration of Land Parcels & Titles

Land Administration is a mega-complex process with myriad steps, connected to

Legal frameworks

Institutional frameworks

Spatial frameworks

Requiring consistent coordinate reference systems (CRS)

Challenges exist in all frameworks – especially Cultural!!

There is no ‘One Solution fits all’

Best practices can help to overcome challenges and minimise inefficiencies

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Setting the Scene – Spatial Framework Tools

GNSS CORS (and Networks) are a tool ideally suited for land surveying and mapping

CORS = Continuously Operating Reference Stations, 24/7/365

Providing consistent and reliable georeferencing over a given area

Multiple purpose and applications (surveying, agriculture, engineering, transportation, geodesy, science, timing et al)

Without a georeferencing datum, land titles could be ambiguous, untraceable and unFAIR

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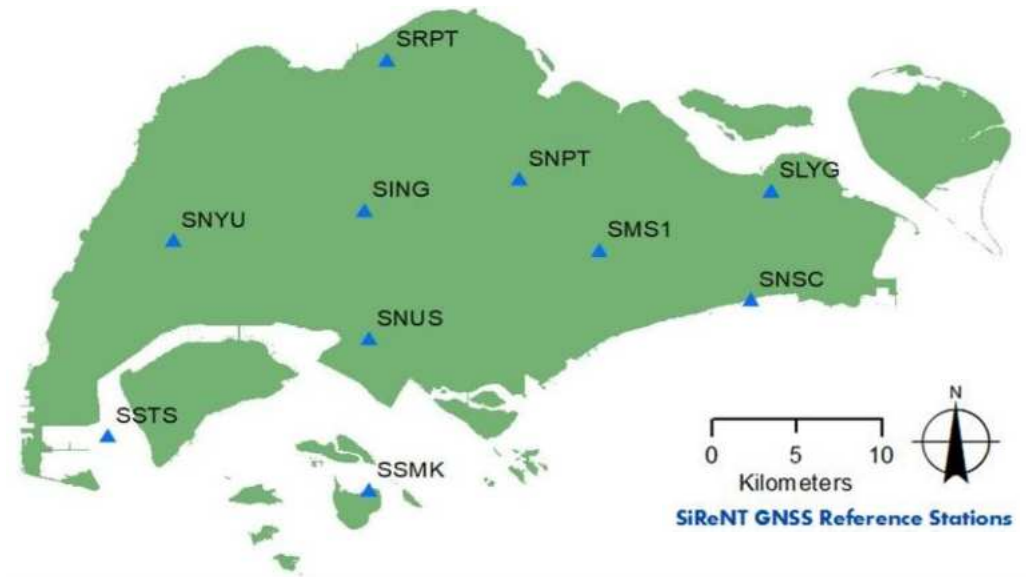
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Singapore's Precise GNSS Infrastructure

*Credit: Dr. Victor Khoo,
SLA, SG*



Singapore Satellite Positioning Reference Network (SiReNT)



- **National Reference System** for Surveying Mapping and GIS
- Adopt **Global Navigation Satellite Systems (GNSS)** technology
- Support up to **cm level real-time positioning** and navigation



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Precise GNSS supports Cadastral Mapping < > Cadastral Mapping benefits from Precise GNSS



Utilization of CORS Network to establish Integrated Survey Network directly used for Cadastral Survey

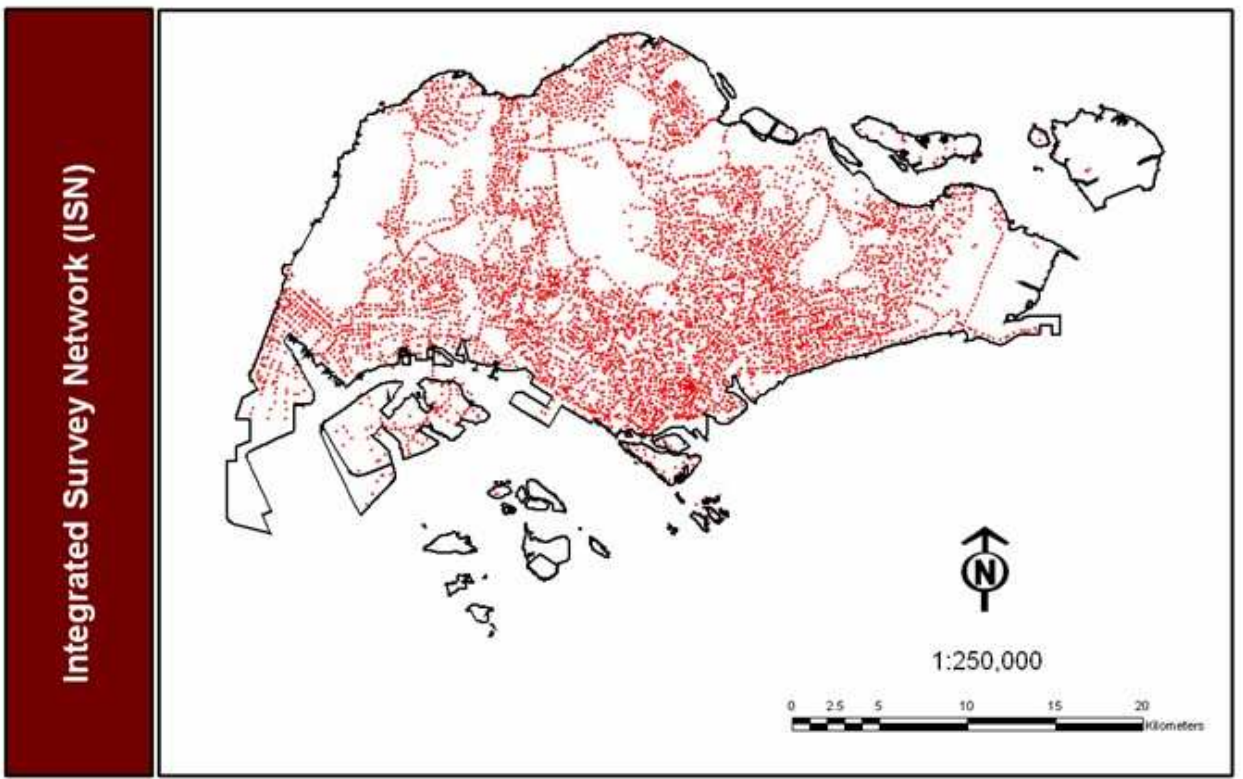




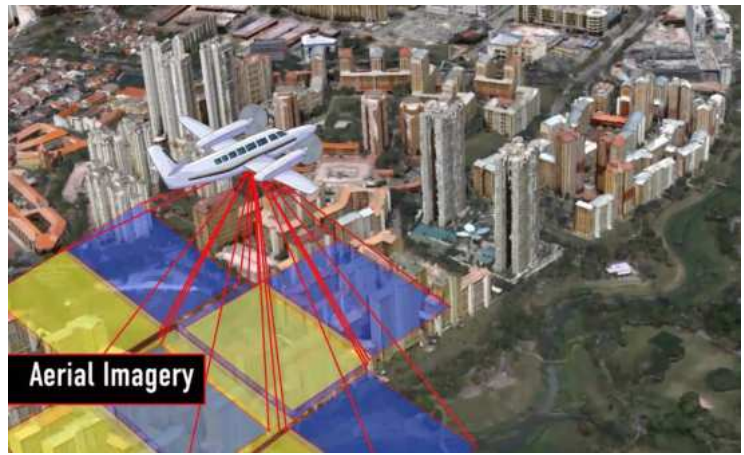
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Precise GNSS Supports National Mapping



Aerial Photogrammetry
and Airborne Laser
Scanning



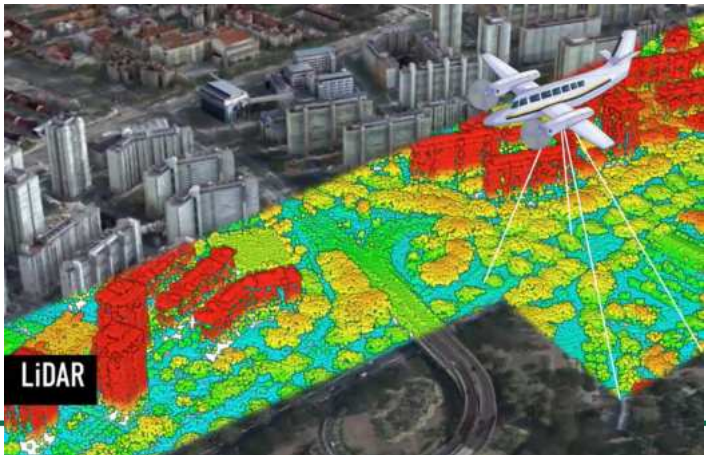
Mobile Laser Scanning on the
Public Roads



Rapid Ground Penetration Radar for
Underground Utility Mapping



Real-Time Kinematic
(RTK) for Land
Surveying and GIS
Data Capture





Engaging with the Global GNSS Community

Markus Bradke¹, Ryan Ruddick², Allison B. Craddock³, Dr. [Ryan Keenan](#)⁴

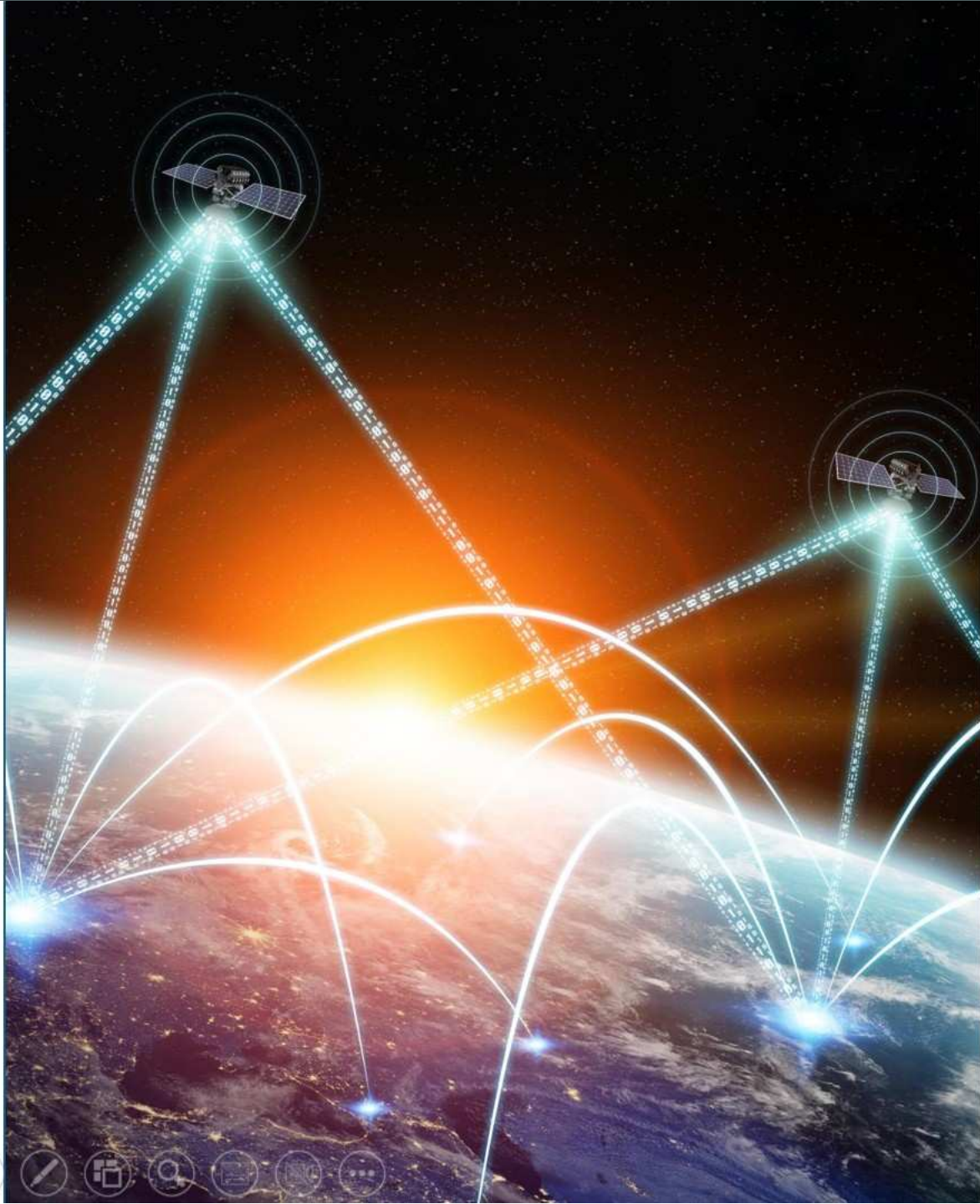
¹ Helmholtz Centre Potsdam – GFZ German Research Centre for Geosciences, Potsdam, Germany

² Geoscience Australia, Canberra, Australia

³ NASA Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California, USA

⁴ Positioning Insights, Melbourne, Australia





IGS Mission

The International GNSS Service (IGS) provides, on an openly available basis, the **highest-quality Global Navigation Satellite System (GNSS)** data, products, services in support of:

- the Terrestrial Reference Frame
- Earth observation and research
- Positioning, Navigation and Timing (PNT)
- other applications benefitting science and society

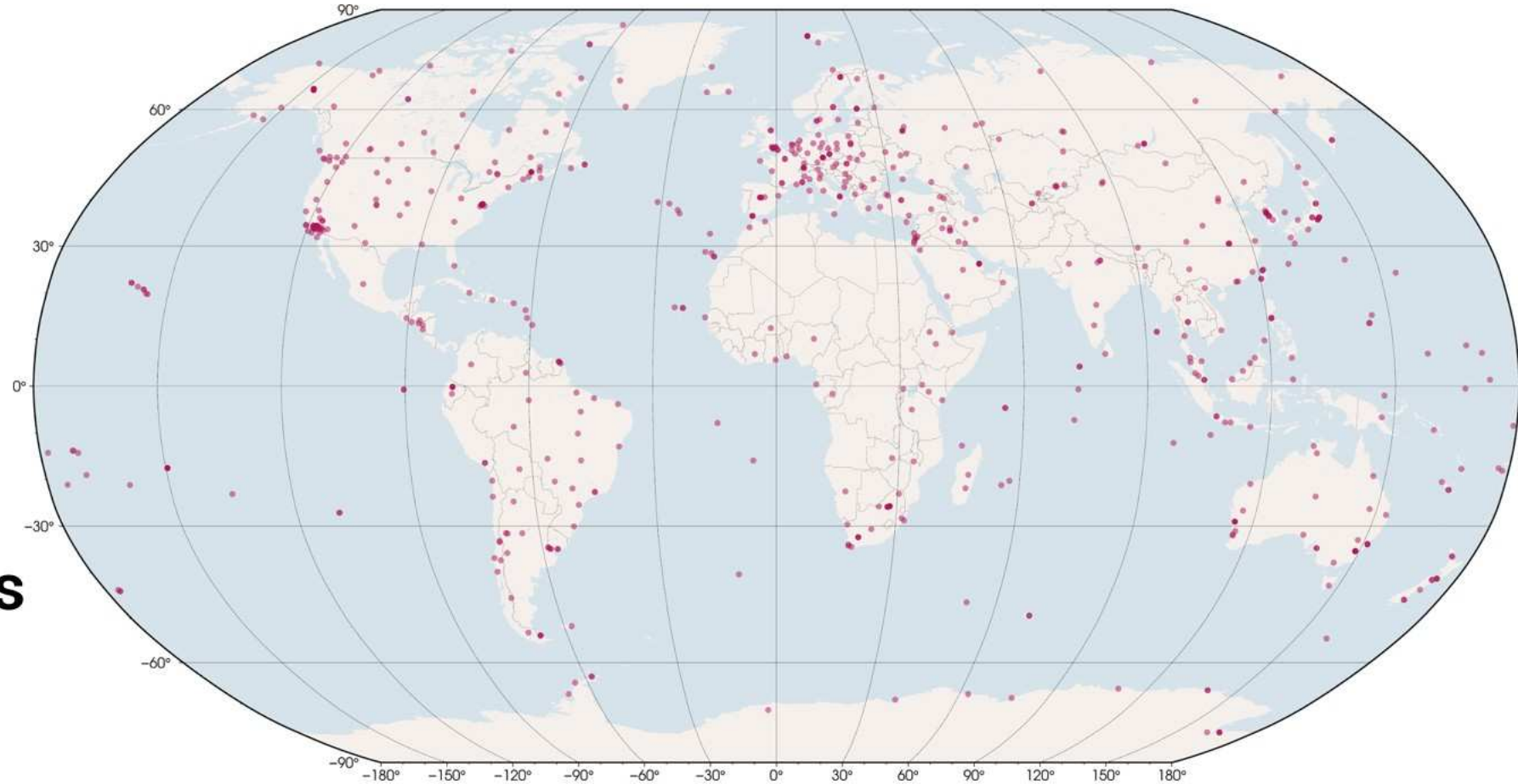
IGS Network

515

stations in

116

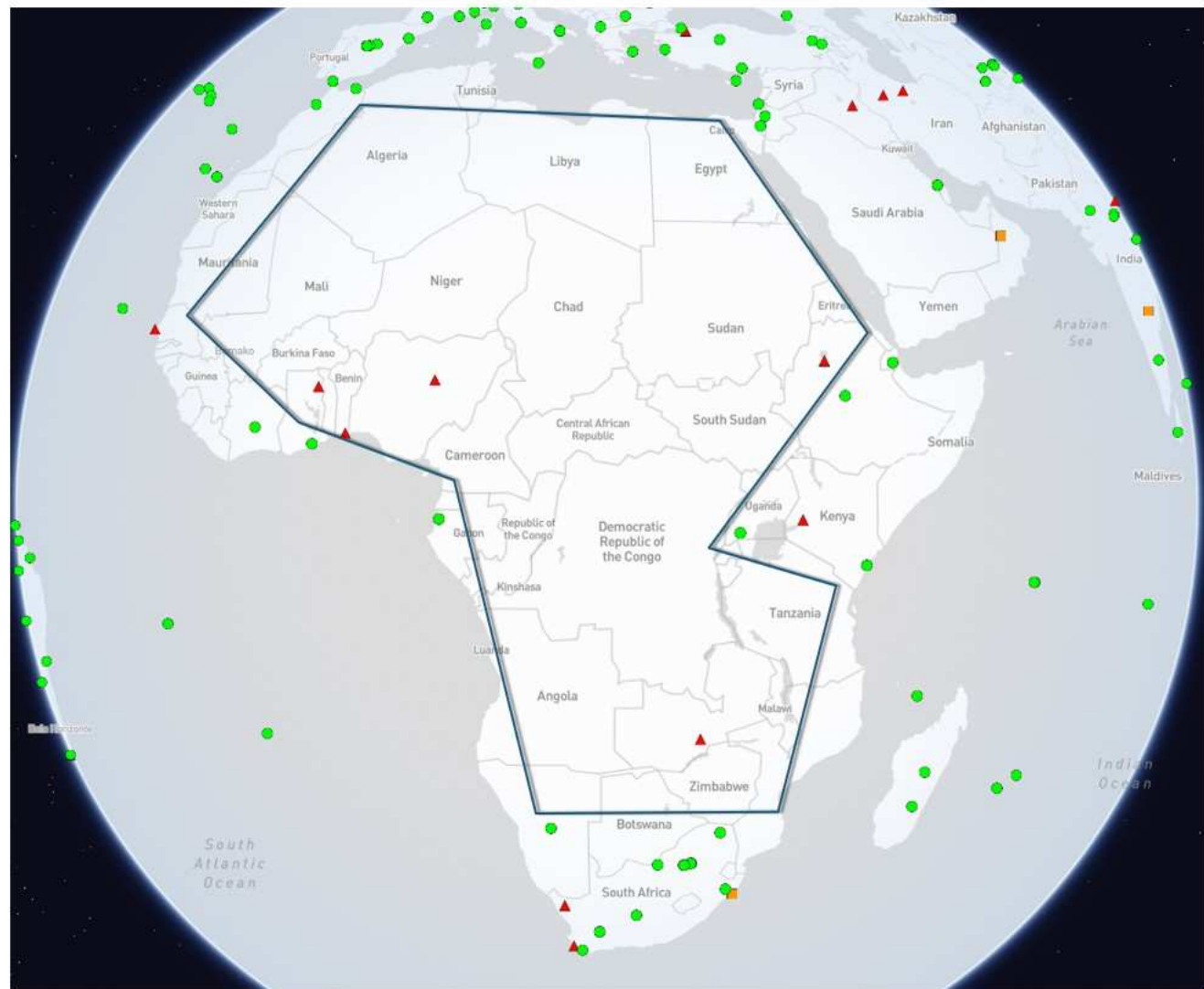
countries/regions



To explore all stations, visit
<https://network.igs.org>.

IGS CORS Contributions from Africa

Currently, there are 20* African countries contributing CORS to the IGS Network, 34 countries don't have single CORS within their national territory. Most of the stations are maintained by foreign partners. There is a significant gap in central Africa, where contributions are notably lacking.



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CORS Guidelines

The "[Guidelines for Continuously Operating Reference Stations in the IGS](#)" is now available to assist station owners and operators in planning and maintaining CORS. Translations to other languages than English would be welcome.



Conclusion

- The IGS plays a crucial role in advancing our understanding of Earth and supporting a wide range of applications benefiting science and society
- Through its global network of reference stations and collaborative efforts, the IGS provides high-quality GNSS data, products, and services essential for precise positioning and Earth observation
- A notable gap remains in central Africa that needs to be addressed through increased outreach and collaboration to ensure broader participation and representation from all regions
- We will continue advocating for the expansion of the IGS network, particularly in underrepresented areas



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FIG Publications

<https://fig.net/resources/publications/figpub/index.asp>

FIG FIG GUIDE
FIG PUBLICATION NO 64

Reference Frames in Practice Manual

Commission 5 Working Group 5.2 Reference Frames
May 2014

FIG INTERNATIONAL FEDERATION OF SURVEYORS (IFS)

FIG FIG REPORT
FIG PUBLICATION NO 74

Cost Effective Precise Positioning with GNSS

FIG Commission 5

FIG INTERNATIONAL FEDERATION OF SURVEYORS (IFS)

FIG GUIDE
FIG PUBLICATION NO 80

DIGITAL TRANSFORMATION AND LAND ADMINISTRATION

Sustainable practices from the UNECE region and beyond

FAO Food and Agriculture Organization of the United Nations
UNEP UNITED NATIONS
FIG INTERNATIONAL FEDERATION OF SURVEYORS (IFS)

#64
#70
#80





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Panellists

Ms. Izuegbu Ogochukwu Uju (Nigeria)

GIS Analyst, Office of the Surveyor-General of the Federation of Nigeria

Ms. Rachael Umazi Gedion (Kenya)

Principal Surveyor, Regional Centre for Mapping of Resources for Development (RCMRD)

Mr. Nicholas Brown (Germany)

Head of Office, United Nations Global Geodetic Center of Excellence (UN-GGCE)

Mr. Aslam Parker (South Africa)

Chief Director: National Geospatial Information at Department of Agriculture, Land Reform and Rural Development

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Panel Discussion – Question 1

How can land administration activities benefit from a GNSS CORS infrastructure?

Could they be an obstacle?

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Panel Discussion – Question 2

Which comes first – a land administration policy or GNSS CORS stations?

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Panel Discussion – Question 3

How can we access funding for GNSS CORS for land administration purposes?

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Panel Discussion – Question 4

Based on your experience, if you had 1 wish for GNSS CORS to boost the ‘spatial framework’ of land administration, what would it be?

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Panel Discussion – Question 5

How can my organisation learn more about GNSS
CORS for land administration purposes?

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Closing Summary

Effective Land Administration relies upon accurate and consistent spatial frameworks, which can be provided efficiently by GNSS CORS networks

Effective GNSS CORS networks can:

- Support **precise and consistent** mapping with scalability to nations and regions

- Support multiple industry sectors and demonstrate strong ROIs over their lifetime

TS08F GNSS CORS Reference Stations and Networks – Session 2 for Technical Experts..... This room, at 16:30-18:00

Future Joint C5/7 Sessions at WW25 in Brisbane, and Congress 2026 in Cape Town

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GNSS CORS Infrastructure Survey – Africa

- Com5 supporting partners UN-GGIM: Africa, IGS and UN-GGCE on this Infrastructure Survey
- Next Steps....
 - Increasing Responses
 - Portal creation
 - Initial layouts
 - Display at WW24 GNSS CORS sessions in support of Land Administration



Excerpt of GNSS CORS Questions from the UN-GGIM ETCB Survey 2021

OPENING PAGE

 [Switch accounts](#)

The name, email address and photo associated with your Google Account will be recorded when you upload files and submit this form



United Nations
Global Geodetic
Centre of Excellence

This Questionnaire seeks to gather information on the current GNSS CORS Infrastructure and Capabilities within Africa. This information will help considerably to building a sustainable geodetic reference frame for Africa.

/

Ce questionnaire vise à recueillir des informations sur l'infrastructure et les capacités actuelles du GNSS CORS en Afrique. Ces informations contribueront considérablement à la construction d'un cadre de référence géodésique durable pour l'Afrique.

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-fbale@bnetd.ci.



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Information – Commission Pages on LinkedIn

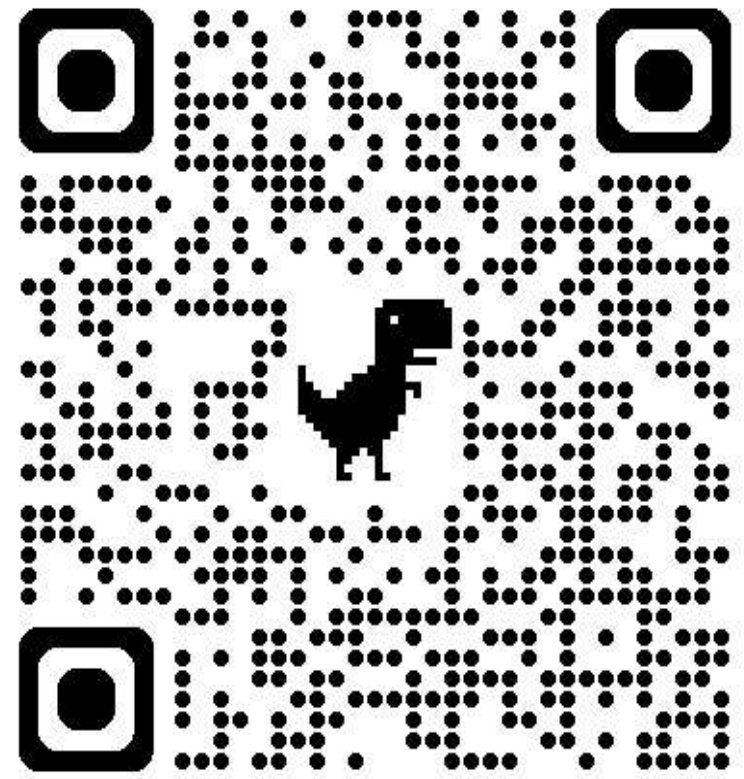




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Closing Thanks

To all

Panellists for their Presentations and Insights

Attendees for their Participation and Questions

THANK YOU !!

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SUSTAINABLE DEVELOPMENT GOALS

International Federation of Surveyors supports the Sustainable Development Goals

Commission 5

Positioning and Measurement

Serving Society for the Benefit of People and Planet



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