



FIG Commission 5  
Positioning and Measurement

## FIG Commission 5 Annual Open Meeting

12:15 – 13:15 Kundum Room, La Palm

# Commission 4/5/6 Dinner

- Tuesday 21 May 2024 – from 19:00
- Restaurant: **+233 Jazz Bar & Grill, Doctor Isert St, Accra**



Sign up at Registration Desk (closes after this meeting)

Pay for your own meal and drinks. Tips at your discretion

Shuttle Bus leaving La Palm @18:30

Shuttle Bus leaving +233 Jazz @22:00

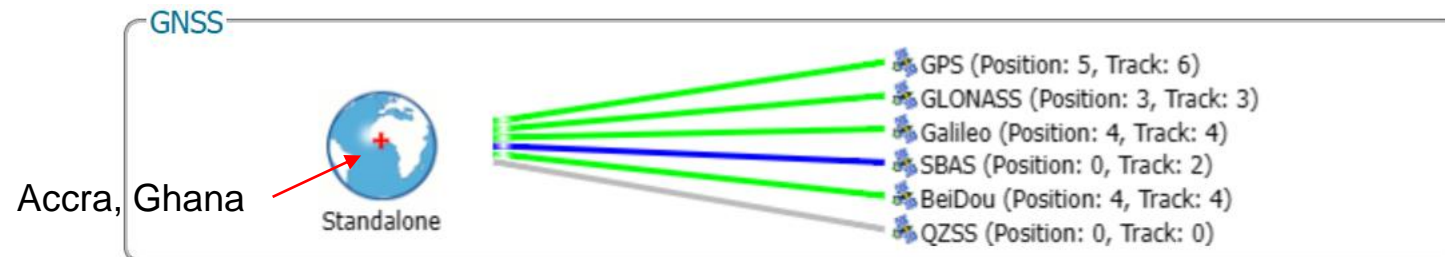
Uber is another option (at your cost)

# Comm 5 – Open Meeting Outline

- Welcome
- FIG Commission 5 - Term 2023-2026
- News and Updates
- Open Discussion



Please provide your contact information:



## Position

Lat: N5°33'40.3244"	9.536m
Lon: W0°8'38.2089"	10.031m
Hgt: 47.200m	7.845m



# FIG Commission 5

## Positioning and Measurement

### 2023-2026



Chair: **Ryan Keenan**, Australia

Vice-Chair of Administration: **Kevin Ahlgren**, USA

Working Group	Chair	Co-Chair
WG 5.1: Standards, Quality Assurance and Calibration	David Martin, France	
WG 5.2: 3D Reference Frames	Nic Donnelly, New Zealand	Chris Pearson, New Zealand
WG 5.3: Vertical Reference Frames	David Avalos, Mexico	
WG 5.4: GNSS	Eldar Rubinov, Australia	Safoora Zaminpardaz, Australia
WG 5.5: Multi-Sensor Systems (Joint w/ IAG / Com. 6)	Amir Khodabandeh, Australia	
WG 5.6: Cost Effective Positioning	Li Zhang, Germany	David Mulindwa, Uganda
WG 5.7: Emerging Technologies for PNT	Allison Kealy, Australia	Jelena Gabela, Austria



# Working Group 5.1: Standards, Quality Assurance, and Calibration

## **David Martin**, Chair, WG 5.1 & FIG Standards Network

- Head of the Survey and Alignment Group at the
- European Synchrotron Radiation Facility (ESRF)

### **General**

- Influence the development of standards affecting positioning and measurement instruments and methods, in collaboration with the FIG Standards Network and through participation in the relevant technical committees (TCs) of the International Standards Organisation (ISO) and other appropriate bodies
- Acceptance controls, quality assurance and certification and their impact on the surveying profession
- Testing and calibration of measuring instruments.
- Assist other Commission Working Groups to implement Standards from TC 172/SC 6 and ISO TC211 as appropriate

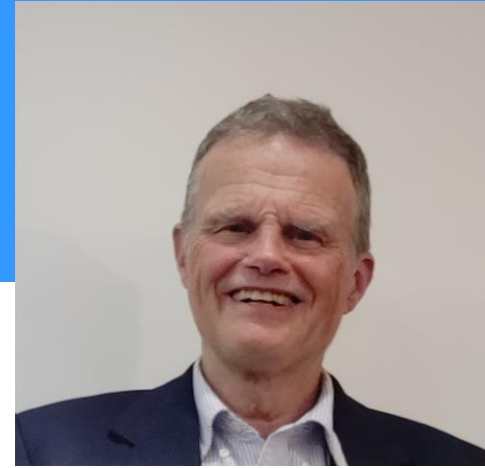
# Working Group 5.1: Standards, Quality Assurance, and Calibration

## Projects

- Promote the Guide for the expression of Uncertainty in Measurements (GUM) in the surveying profession,
- Promote connection to ISO TC 172 SC6 and ISO TC211.
  
- FIG [Standards Network Report](#) can be found in the GA Agenda



# Working Group 5.2: 3D Reference Frames



Chair:  
***Nic Donnelly***, New Zealand

Co Chair:  
***Chris Pearson***, New Zealand

## About WG 5.2:

- Encourage the adoption of modernized geodetic reference frames (dynamic and semi-dynamic datums) worldwide
- Encourage software providers to properly support dynamic and semi-dynamic datums
- Provide a forum for countries and other organizations involved in datum modernization to facilitate the exchange of ideas
- Contribute to the development of international standards on deformation models

# Working Group 5.2: 3D Reference Frames

## Projects

- Reference Frames in Practise (RFIP) seminar series – WW24 Accra (below)
- Contributed to OGC draft 'Deformation Models and Geodetic Grids exchange standards'
- Contributed to future capacity building initiatives
- Updating the Reference Frames In Practice manual (old FIG publication 64)
- LOC Chair of 2024 Survey and Spatial New Zealand conference



RFIP Workshop in Accra  
– 22+ participants with  
support from UNOOSA-  
ICG and Trimble





# Working Group 5.3: Vertical Reference Frames

Chair:

**David Avalos**, Mexico

## About WG 5.3:

- Inform FIG members on status of regional and global vertical reference frames, height systems and dynamics of the gravity field and geoid.
- Educate FIG members on practical aspects about the implementation of new geopotential datums (RFIP, ...)

## Projects:

- Develop a guideline to interpret and access the IHRF for local and national vertical control in connection with IAG, Commission 2.

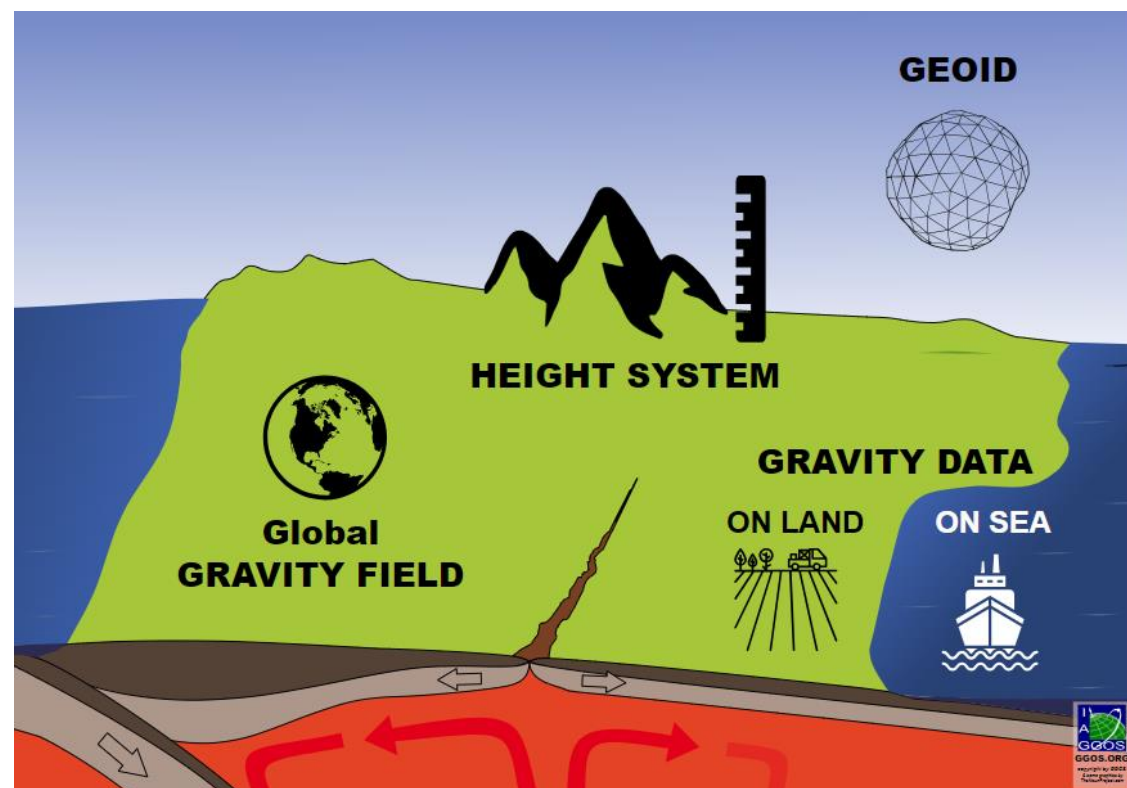


FIG Commission 5  
Positioning and Measurement



# Working Group 5.4: GNSS



Chair:  
***Eldar Rubinov***, Australia

Co Chair:  
***Safoora Zaminpardaz***, Australia

## About WG 5.4:

- Supporting GNSS applications in developing regions
- Explore cutting edge new tech such as LEO PNT, 5G, etc.

## Publications

- Several papers will be published covering:
  - Multi-GNSS advances including best-practice examples
  - Cost-effective high-precision positioning for mass-markets (together with WG 5.6)



# Working Group 5.5 / IAG - Multi-Sensor-Systems

**A joint WG between FIG and International Association of Geodesy (IAG). Focusing on the development of shared resources that extend our understanding of the theory, tools and technologies applicable to the development of multi sensor systems.**

Chair:  
***Amir Khodabandeh,***  
Australia

- Performance characterization of positioning sensors and technologies that can play a role in augmenting core GNSS capabilities
- Theoretical and practical evaluation of current algorithms for measurement integration within multi sensor systems.
- The development of new measurement integration algorithms based around innovative modeling techniques in other research domains such as machine learning and genetic algorithms, spatial cognition etc.
- Establishing links between the outcomes of this WG and other IAG and FIG WGs (across the whole period)
- Generating formal parameters that describe the performance of current and emerging positioning technologies that can inform FIG and IAG members.



# Working Group 5.5 / IAG - Multi-Sensor-Systems

## Projects:

- International field experiments and workshops on a range of multi sensor systems and technologies.
- Evaluation of UAV capabilities and the increasing role of multi-sensor systems in UAV navigation.
- Investigate the role of vision-based measurements in improving the navigation performance of multi sensor systems.
- Development of shared resources to encourage rapid research and advancements internationally.

## Workshops:

- Special Sessions at Working Weeks and Supporting Special international conferences and symposia including: Mobile Mapping Symposium, ION GNSS, IGSS Australia, IPIN, etc.

## Publications:

- A number of papers will be submitted to relevant conferences & technical journals.







# Working Group 5.6: Cost Effective Positioning



Chair:  
**Li Zhang**, Germany

Co Chair:  
**David Mulindwa**, Uganda

## About WG 5.6:

- Educate FIG member associations and individual surveyors on when to use which surveying instrument or evaluation software taking into account economic reasons
- Introduction of cost-effective tools (software and hardware) to make fit-for-purpose surveying systems more accessible in developing countries for sustainable development
- Support decision makers for establishing cost-effective positioning solutions

# Working Group 5.6: Cost Effective Positioning

## Projects:

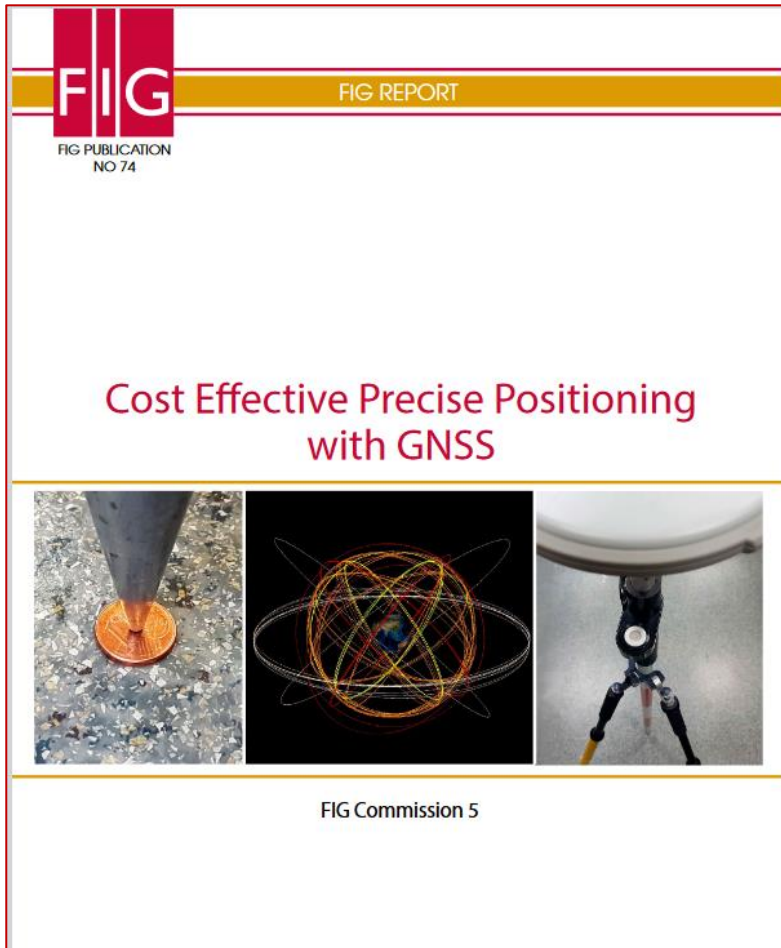
- Developing guidelines for cost-effective use and design of survey solutions including costs for labour and investment

## Workshops:

- FIG workshop with Commissions 3 and 7

## Publication:

- FIG Publication and papers on Cost Effective surveying techniques





# FIG Commission 5

## Positioning and Measurement

### WG 5.7: Emerging Technologies for PNT

#### Activity Report: 2023-2024



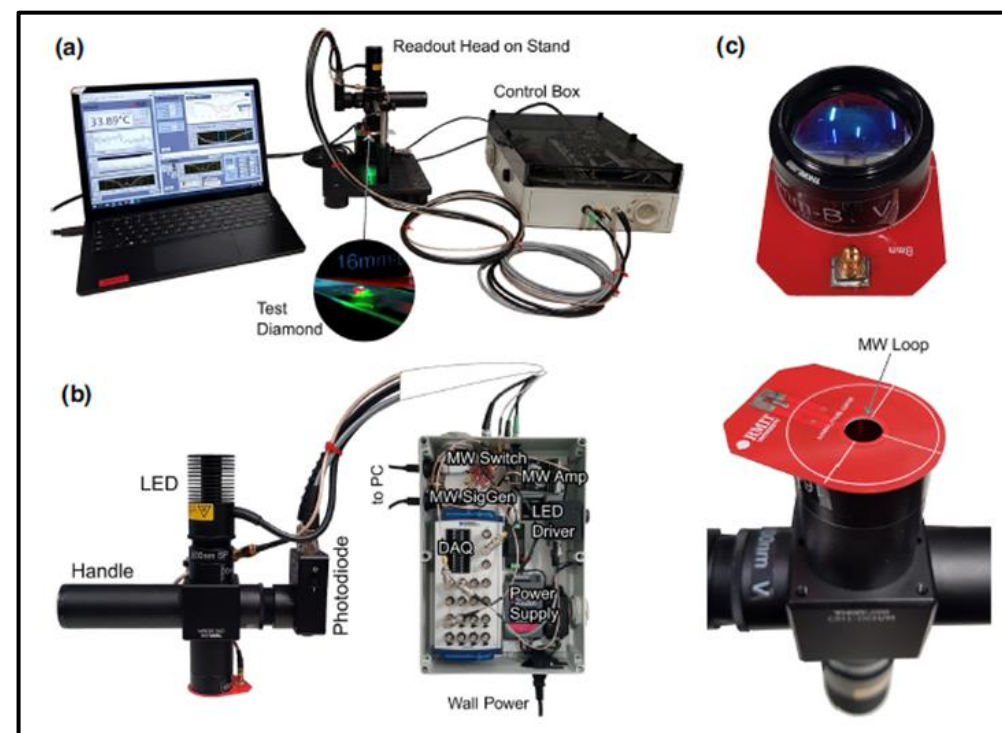
Co Chair:  
**Allison Kealy**, Australia

Co Chair:  
**Jelena Gabela**, Austria

- The primary mission of **WG5.7: Emerging Technologies for PNT\*** is to identify, assess, and integrate innovative technologies that have the potential to revolutionize precision navigation and timing systems.
- By fostering collaboration and experimentation, the group aims to shape the future landscape of PNT with the infusion of emerging and disruptive technologies.

*\*[Joint Study Group with International Association of Geodesy (IAG)]*

FIG Working Week 2024 - Accra, Ghana - Commission 5 Open Meeting



**Ref:** Handheld Quantum Diamond Sensor  
Abrahams *et al*, Phys. Rev. Applied 19, 054076 (2023)

# FIG Commission 5

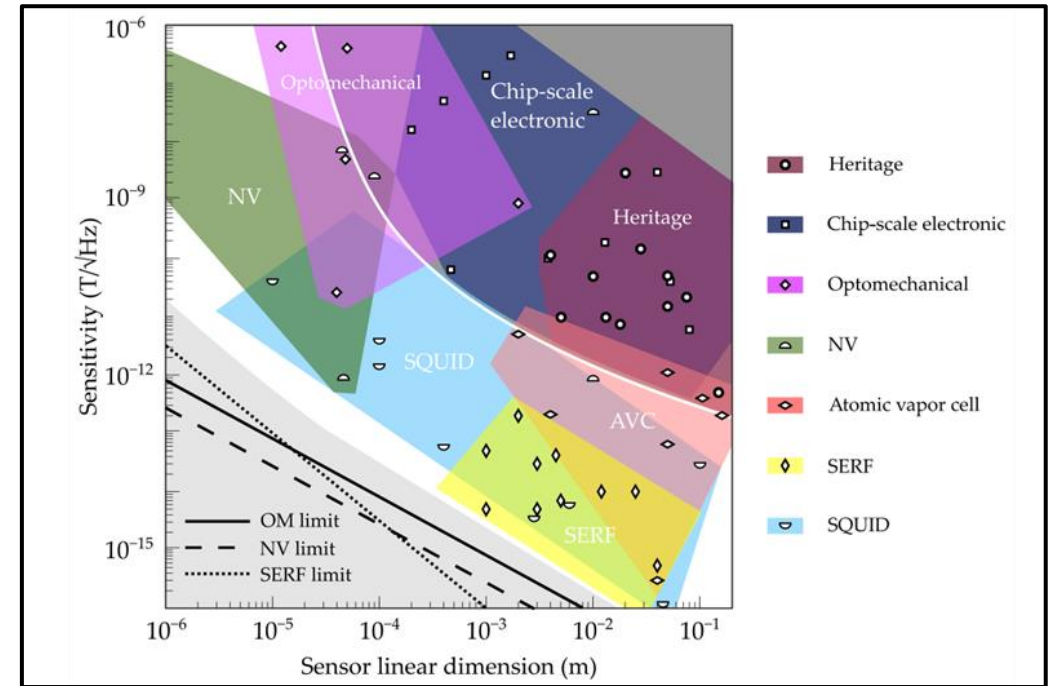
## Positioning and Measurement

### WG 5.7: Emerging Technologies for PNT

#### Activity Report: 2023-2024

#### Activities planned in next 12 months

- White Paper on current status of quantum sensors for PNT applications.
- Conferences:
  - IGNSS (Australia) ION PNT Pacific, ION GNSS+, IAG Symposium, ISPRS, Mobile Mapping.
- Webinar on Quantum PNT and AI
- Collaborations IAG special study groups on Quantum Geodesy and Quantum PNT
- Journal publication on performance assessment of integrated GNSS and Quantum Magnetometry.
- Joint membership through FIG/IAG/ION



Ref: Magnetometer Sensitivity  
From: Bennett *et al*, Sensors 21, 5568 (2021)



# FIG Commission 5 - Positioning and Measurement Contributions to UN SDGs (Sustainable Development Goals) Activity Report: 2023-2024

## SDGs Task Force led by Paula Dijkstra (Comm5 representative Allison Kealy)

- Objective of the Task Force is to ensure that ‘in 2026 the understanding of the 2030 Agenda and the relevance of the SDGs for our profession are embedded within FIG’.
- Pilot Project initiated to link FIG abstracts (for the last 5 years) to SDG themes - Commission 5 as Pilot
  - Pilot idea is to go over all the papers that were submitted to Comm5 during FIG 2023 Conference and see which SDGs are relevant.
- Aim: To develop a formal approach to connecting all Commissions’ work to the SDGs (directly or indirectly), with results being presented at the FIG Congress 2026.



# Commission 5 Sessions 2024

## Pre-event: RFIP Workshop 18/19 May 2024





# Commission 5 Sessions 2024

## Pre-event: RFIP Workshop 18/19 May 2024

- 32 attendees, 15 countries, 5 continents
- Presentations from UNOOSA, IAG, IGS, AFREF, ARABREF and many African countries.
- Many thanks to sponsors:
  - Trimble
  - UN-OOSA ICG
  - sponsoring 3 attendees from Nigeria, Kenya and Uganda



L->R: Ms. Izuegbu UJU (Nigeria)  
Ms. Rachael UMAZI (Kenya)  
Dr. Augustus ATURINDE (Uganda)



# Commission 5 Sessions

## Technical Program

Session	Title	Date / Time	Location
TS01F	Novel Cost-Effective Positioning & Engineering Systems and their Applications for Africa <i>*Joint with Com6</i>	Monday, 08:00	Kundum, La Palm
TS05F	The Growing Roles & Responsibilities of Surveyors as Data Engineers and Resource Managers	Tuesday, 08:00	Kundum, La Palm
TS07F	Accelerating Land Administration Success with GNSS CORS Networks: Insights for Senior Decision Makers	Tuesday, 14:30	Kundum, La Palm
TS08F	GNSS CORS Reference Stations and Networks – Session 2 for Technical Experts	Tuesday, 16:30	Kundum, La Palm
TS09F	Advancing Surveying through Technology including Uncrewed Systems	Wednesday, 8:00	Kundum, La Palm



# TS01F – Novel Cost-effective Positioning & Engineering and their Applications for Africa\*

Monday,  
20 May  
08:00–09:00  
Kundum, La Palm



## TS01F: Novel Cost-Effective Positioning & Engineering Systems and their Applications for Africa

Commission: 5 & 6

Chair: Mr. **Peter Bauer**, Austria

Rapporteur: Mr. **David Mulindwa**, Uganda

The growth of African industries are heavily dependent on major civil infrastructure such as roads, rail tracks and ports allowing the transport of resources across and beyond the region. Energy infrastructure is also critical in supporting the civil infrastructure. The outputs of these infrastructures are dependent on its continuous operation under challenging conditions and environments, and benefit from all of positioning and measurement systems used to build, maintain and operate the industries, as well as monitor their stability and safety.

A number of case studies will be shared from Africa on how these positioning and surveying technologies are used in engineering projects. A panel discussion will delve into these technologies, and also allow questions from the audience.

Guiding Question for Discussions:

- How can surveying help ensure that safe and reliable infrastructure is available for the African region?

**Krasimir Matev** and **Raphael Goudard** (Switzerland):

Best Practices for Adopting 3D Laser Scanning and Mobile Mapping (12437)

[abstract] [paper] [handouts] [video]

**Jun Wang**, **Lee Hellen**, **Gao Wenzong**, **Wang Charles** and **Ryan Keenan** (Australia):

Low-Cost GNSS Solution to Densify the National Terrestrial Reference Frame Stations (12561)

[abstract] [paper] [handouts] [video]

**Okorocho Chika** and **Raphael Ehigior** (Nigeria):

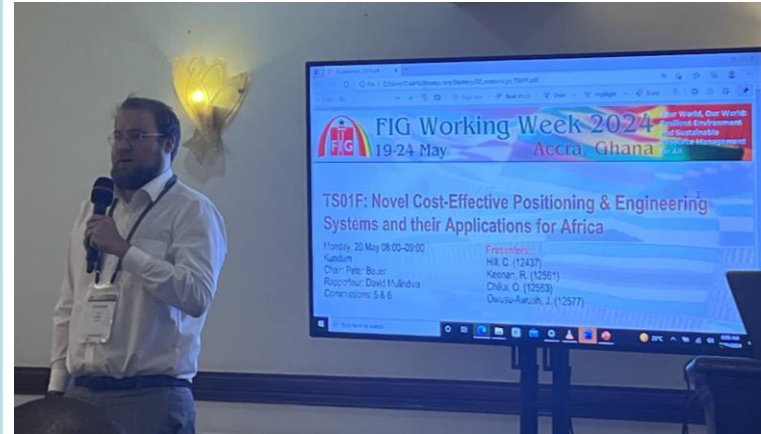
The Applications of Sacedron Online GNSS Positioning Service (SOGPOS) for Real-Time Kinematic GNSS Correction in Asset Mapping and Management (12563)

[abstract] [paper] [handouts] [video]

**Joseph Owusu-Awuah** (Ghana):

Delivering Sustainable Surveying Engineering Business in the 21st century - The Entrepreneurial Approach (12577)

[abstract] [paper] [handouts] [video]



# TS05F – The Growing Roles & Responsibilities of Surveyors as Data Engineers & Resource Managers

Tuesday,  
21 May  
08:00–09:00  
Kundum, La Palm



## TS05F: The Growing Roles & Responsibilities of Surveyors as Data Engineers and Resource Managers

Commission: 5, TF SDG

Chair: Mr. **Humphrey Togbe Amegadze**, Ghana

Rapporteur: Dr. **Frank Derby**, Ghana

*This session provides insights into a number of use cases where surveyors are extending their skills and strengths beyond the typical survey activities.*

**Samuel Osah**, **Akwasi Afrifa Acheampong** and **Osman Mohammed Abukari** (Ghana):

Ground-based GNSS for Meteorological Applications in Ghana (12701)

[\[abstract\]](#) [\[paper\]](#) [\[handouts\]](#) [\[video\]](#)

**Ibrahim Magemeso**, **Richard Oput**, **Godfrey Toko** (Uganda), **Cyril Romieu** (France) and **John Bosco Ogwang** (Uganda):

Enhancing Geodetic Controls for Secure Geospatial Data Quality and Integrity in Uganda (12591)

[\[abstract\]](#) [\[paper\]](#) [\[handouts\]](#) [\[video\]](#)

**Gabriel Scarmana** (Australia):

Evaluating the Accuracy of Oblique Photography in Determining Urban Tree Heights (12351)

[\[abstract\]](#) [\[paper\]](#) [\[handouts\]](#) [\[video\]](#)

**Paa Kwesi Ezanator Akuffo Owusu-Ensaw**, **Ernest Obiri-Yeboah**, **Anthony Wordi**, **Joseph Owusu-Awuah** and **Portia Gyemfah Addo** (Ghana):

Navigating Precision with Network Controls for Construction Continuity (12587)

[\[abstract\]](#) [\[paper\]](#) [\[handouts\]](#) [\[video\]](#)

**Richmond Nii Otokunor Sackey**, **Eric Kofi Kwaako** and **Seyram Quist** (Ghana):

Construction Economics - The Economic Impact of a Resident Geomatic Engineer (12581)

[\[abstract\]](#) [\[paper\]](#) [\[handouts\]](#) [\[video\]](#)

### Further Reading:

**Alexander Ayettey** (Ghana):

Reaffirmation of Ghana-Togo Boundary: a Crossroads of Old and New Approaches to Position Determination (12642)

[\[abstract\]](#) [\[paper\]](#) [\[handouts\]](#) [\[video\]](#)

**Sylvester Efe Owhojeta** (Nigeria):

Surveying of Oil Theft Activities in Wetlands Nigeria – A Case Study of Niger Delta Region. (12640)

[\[abstract\]](#) [\[paper\]](#) [\[handouts\]](#) [\[video\]](#)





# TS07F - Land Administration Success with GNSS CORS CORS – Insights for Senior Decision Makers

Tuesday,  
21 May  
14:30–16:00  
Kundum, La Palm



## TS07F: Accelerating Land Administration Success with GNSS CORS Networks: Insights for Senior Decision Makers

Commission: 5, 7, ARN, IAG, IGS, UN-GGIM-Africa, UN-GGCE  
Chair: Dr. **Ryan Keenan**, Chair, FIG Commission 5, Australia  
Rapporteur: Dr. **Kevin Ahlgren**, United States

GNSS Reference Stations (aka CORS) are now commonplace in nearly every nation on Earth – either as standalone stations or part of a networked solution, and contribute to both scientific and civil applications. They can support multiple purposes, ranging from real-time surveying and positioning on land, from the air, and on water.

The ambitious vision for extending land administration across Africa is highly dependent on nations establishing their own national reference frame as well as regional reference frames the establishment and sustained management of GNSS CORS infrastructure.

This session, is the first of two sessions, and will introduce the subject: GNSS CORS Reference Stations in the context of geodetic infrastructure to support and sustain land administration. The second session will be more focussed on technical presentations followed by a panel discussing sustainable CORS infrastructure and practices.

### Presentations:

- Setting the Scene:

### Panel discussion:

- Ms. **Izuegbu Ogochukwu UJU**, Office of the Surveyor-General, (Nigeria)
- Ms. **Rachael UMAZI**, Land Administration & FIG Commission 7 (Kenya)
- Mr. **Aslam PARKER**, TRIGNET (South Africa)
- Mr. **Nicholas BROWN**, Head, UN-GGCE (Germany)

### Further Reading:

**Izuegbu Ogochukwu UJU** (Nigeria):  
GNSS CORS and Land Administration  
[handouts]

**Rachael UMAZI**(Kenya): GNSS CORS for Land Administration and Reform  
[handouts]

**Diogoye Diouf** (Senegal):  
ITRF and Geodetic Reference Frames in Africa (12365)  
ITRF et Référentiels géodésiques en Afrique  
[abstract] [paper] [handouts] [video]

**Markus Bradke** (Germany), **Ryan Ruddick** (Australia), **Allison B. Craddock** (USA) and **Ryan Keenan** (Australia):  
Exploring the IGS Network: Engaging with the Global GNSS Community (12715)  
[abstract] [paper] [handouts] [video]





# TS08F – GNSS CORS – for Technical Experts

Tuesday,  
21 May  
16:30–18:00  
Kundum, La Palm



## TS08F: GNSS CORS Reference Stations and Networks – Session 2 for Technical Experts

Commission: 5, 7, ARN, IAG, IGS, UN-GGIM-Africa, UN-GGCE

Chair: Dr. Kevin Ahlgren, United States

Rapporteur: Dr. Chris Pearson, New Zealand

*GNSS Reference Stations (aka CORS) are now commonplace in nearly every nation on Earth – either as standalone stations or part of a networked solution, and contribute to both scientific and civil applications. They can support multiple purposes, ranging from real-time surveying and positioning on land, from the air, and on water.*

**Aleksei Lapshin and Sergey Staroverov** (Russia):

Creation and Development of Continuously Operating Networks in the Russian Federation. Yesterday, Today, Tomorrow. (12509)

[abstract] [paper] [handouts] [video]

**Wayneworth Hamilton** (Turks And Caicos Islands):

Development of a CORS Network for the Turks and Caicos Islands (12451)

[abstract] [paper] [handouts] [video]

**Saad Al-Qahtani, Abdullah Al-Thawwad, Abdulwasiu Salawu, Meshari Al-Shahrani, Abdullah Al-Qahtani and Othman Al-Kherayef** (Saudi Arabia):

The Maintenance of KSA-CORS Network in Saudi Arabia's Desert Areas (12505)

[abstract] [paper] [handouts] [video]

**Peter T.Y. Shih** (Chinese Taipei):

An Analysis of Clock Performance in GNSS Receivers for CORS Applications (12474)

[abstract] [paper] [handouts] [video]

**Christopher Pearson** (New Zealand) and **Sebastien Viellard** (France):

Trimble's Support for Modernized Datums in Africa (12426)

[abstract] [paper] [handouts] [video]

### Further Reading:

**Wang Junyi, Xu Caijun, Wang Xiaohang, Zhao Xiong and He Kefeng** (China, PR):

The Coupling Evolution of Seismic Faults in the Eastern Margin of the Bayan Har Block Before and After Three  $\geq M7.0$  Earthquakes (12770)

[abstract] [paper] [handouts] [video]

**Faisal Al Balushi** (Oman), **Amir M. Abolghasem** (Germany), **Yousuf Al Wardi, Ismail Al Sheidi and Aseel Almusalhi** (Oman):

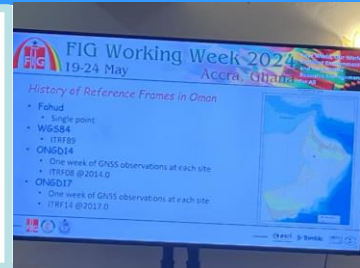
A New Reference Frame for Oman, Derived by Precise Processing of the CORS Network (12396)

[abstract] [paper] [handouts] [video]

**Christian Kartey Quarcoo, Ziggah Yao Yevenyo and Bernard Kumi-Boateng** (Ghana):

Artificial Intelligence Approach to Predicting Local Crust Movement Using GNSS Continuous Operating Reference Systems Data (12376)

[abstract] [paper] [handouts] [video]





# TS09F – Advancing Surveying through Technology incl. Uncrewed Systems

Wednesday,  
22 May  
08:00–09:00  
Kundum, La Palm



## TS09F: Advancing Surveying through Technology including Uncrewed Systems

Commission: 5

Chair: Dr. Chris Pearson, New Zealand

Rapporteur: Mr. David Avalos, Mexico

*The introduction of autonomous platforms on the ground, in the air and on the water, has been both a boon for geospatial experts needing to acquire data over larger often hazardous environments, and for clients seeking a swifter completion of their surveying and mapping projects.*

*Accordingly there is a growing need on surveyors to become aware and proficient around autonomous systems, in particular on how to plan and benefit from them. This session shares a number of case studies on the use of autonomous technologies, and will have a panel discussion allowing questions from the audience.*

### Guiding Questions for Discussions:

- How can surveyors take advantage of today's autonomous technology for tomorrow's projects?
- How can surveyors remain as essential part of projects using autonomous technologies?

**Ngoc Ha Hoang** (Vietnam):

Combining Gns with Terrestrial Measurement Systems for Modernizing the Coordinate Systems in Vietnam (12513)

[\[abstract\]](#) [\[paper\]](#) [\[handouts\]](#) [\[video\]](#)



**AWARD WINNER:**

**Janet Tangadzani, Charles Paradzayi and Tanaka Muromo** (Zimbabwe):

Application of UAV-based Photogrammetry in Monitoring Slope Deformations in Open Pit Mining Environments: A Systematic Review (12400)

[\[abstract\]](#) [\[paper\]](#) [\[handouts\]](#) [\[video\]](#)

*This is a peer reviewed paper.*

**Audrey Alajouanine** (France):

Implementation of a Complete Process for the Collection, Processing and Use of UAV Multi-Spectral Data for Agriculture (12462)

[\[abstract\]](#) [\[paper\]](#) [\[handouts\]](#) [\[video\]](#)

**Franz Okyere** (Ghana), **Lena Augner, Fabius Limpaecher** (Germany), **Joshua Oddoye** (Ghana), **Ansgar Brunn, Franziska Heering** (Germany), **Tracy Arthur and Prosper Fometi** (Ghana):

Enhancing Ambulance Accessibility in Deprived Regions: A Drone-Based Spatial Data Solution for Ashaiman, Greater Accra (12479)

[\[abstract\]](#) [\[paper\]](#) [\[handouts\]](#) [\[video\]](#)



# NavXperience Award 2024

## Best Peer Reviewed Commission 5 Technical Paper



*navXperience*



navxperience Award - presented by Dirk Kowalewski to the authors of the Best Peer-reviewed Technical Paper

Janet Tangadzani, Charles Paradzayi and Tanaka Muromo  
(Zimbabwe):

**Application of UAV-based Photogrammetry in Monitoring Slope Deformations in Open Pit Mining Environments: A Systematic Review (12400)**



# Commission 5 Open Meeting

Tuesday,  
21 May  
12:15–13:15  
Kundum, La Palm

## ANNUAL MEETING - FIG COMMISSION 5

Commission: 5

Chair: Dr. **Ryan Keenan**, Chair FIG Commission 5, Australia

Rapporteur: Dr. **Kevin Ahlgren**, United States

## FIG COMMISSION 5 – POSITIONING AND MEASUREMENT

*This will be the annual open meeting of Commission 5 at Accra Working Week. It will provide an update on Commission 5's Work Plan for the Term 2023-2026, and updates on the activities of the Working Groups. National Delegates are warmly invited to present a short (3-5 minute) status of their national activities around Positioning & Measurement, as well as upcoming conferences, events and publications.*

*This meeting is the ideal opportunity to learn about Commission 5, network with its People, and for anyone to get involved in promoting Positioning and Measurement!*

### Working Groups:

WG 1 – Standards, Quality Assurance and Calibration

WG 2 – 3D Reference Frames

WG 3 – Vertical Reference Frames

WG 4 – GNSS

WG 5 – Multi-Sensor Systems

WG 6 – Cost-Effective Positioning

### • Work Plan

### Guiding Questions for Discussions:

- What more can Commission 5 be doing as the voice of Positioning and Measurement within FIG, and beyond FIG?
- How can interested people get involved with Commission 5 activities and events?
- How can interested people get involved with a Work Group within Commission 5?
- Panel Discussion: What can we in Commission 5 do, to make the 2026 Congress a memorable and worthwhile event?



**FIG**

FIG Commission 5  
Positioning and Measurement

# Upcoming Events



**FIG** **NICS** **Regional Conference 2024**

*Climate Responsive Land Governance and Disaster Resilience: Safeguarding Land Rights*

Kathmandu, Nepal  
14–16 November

The banner features a stylized map of Nepal, a silhouette of a person in a meditative pose, a mountain range with a large orange sun, and the Nepalese flag.



**FIG Working Week 2025**

Brisbane, Australia | 6-10 April

**FIG** **Geospatial Council of Australia**

COLLABORATION, INNOVATION AND RESILIENCE:  
CHAMPIONING A DIGITAL GENERATION

The banner includes a colorful map of Australia with concentric circles, a city skyline, and a bridge.



**FIG** **XXVIII FIG CONGRESS**

**MAY 2026**  
**Cape Town, South Africa**

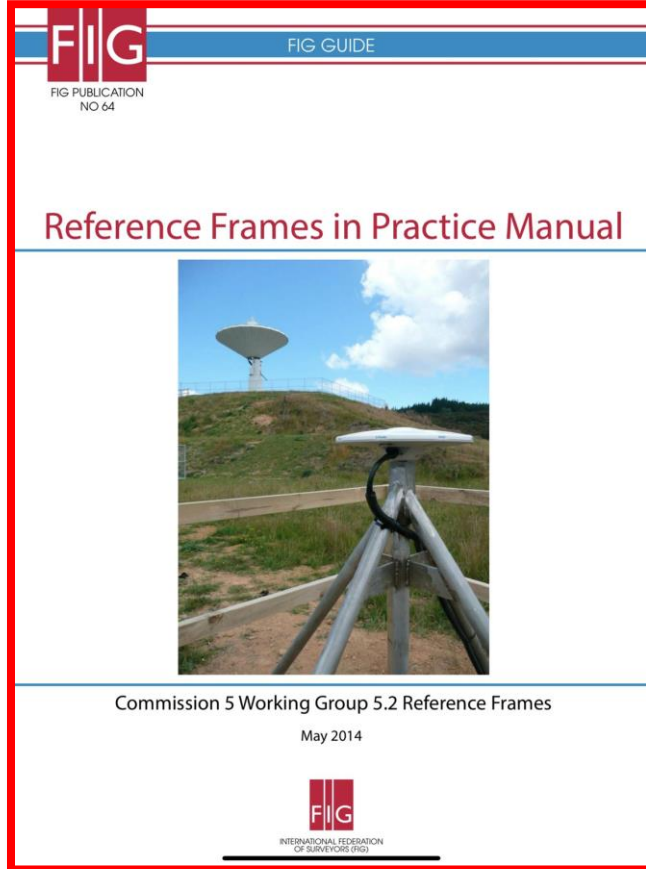
Solutions and Technologies  
towards the 2030 Sustainable  
Development Goals

The banner features the FIG logo, a map of Africa, and a scenic view of a coastline with mountains in the background.



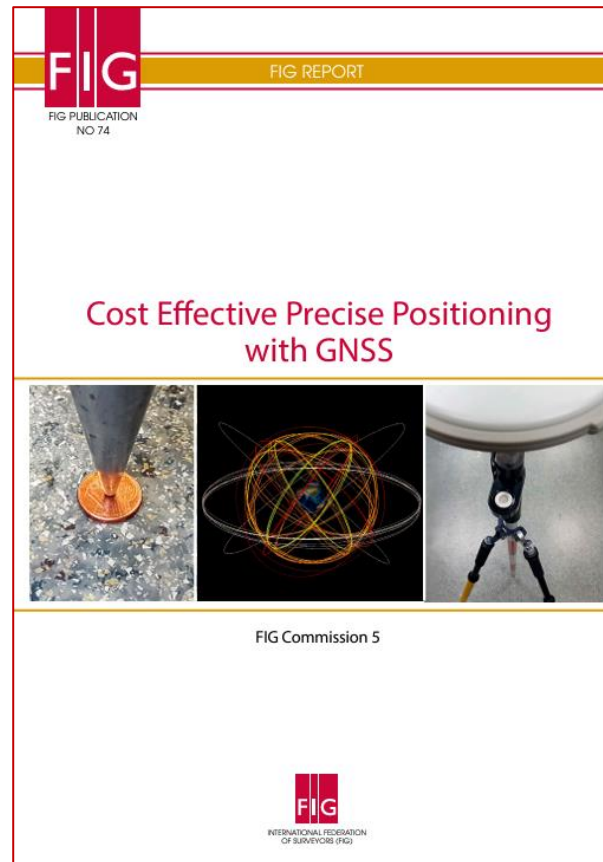
# Publications

#64



also in Spanish

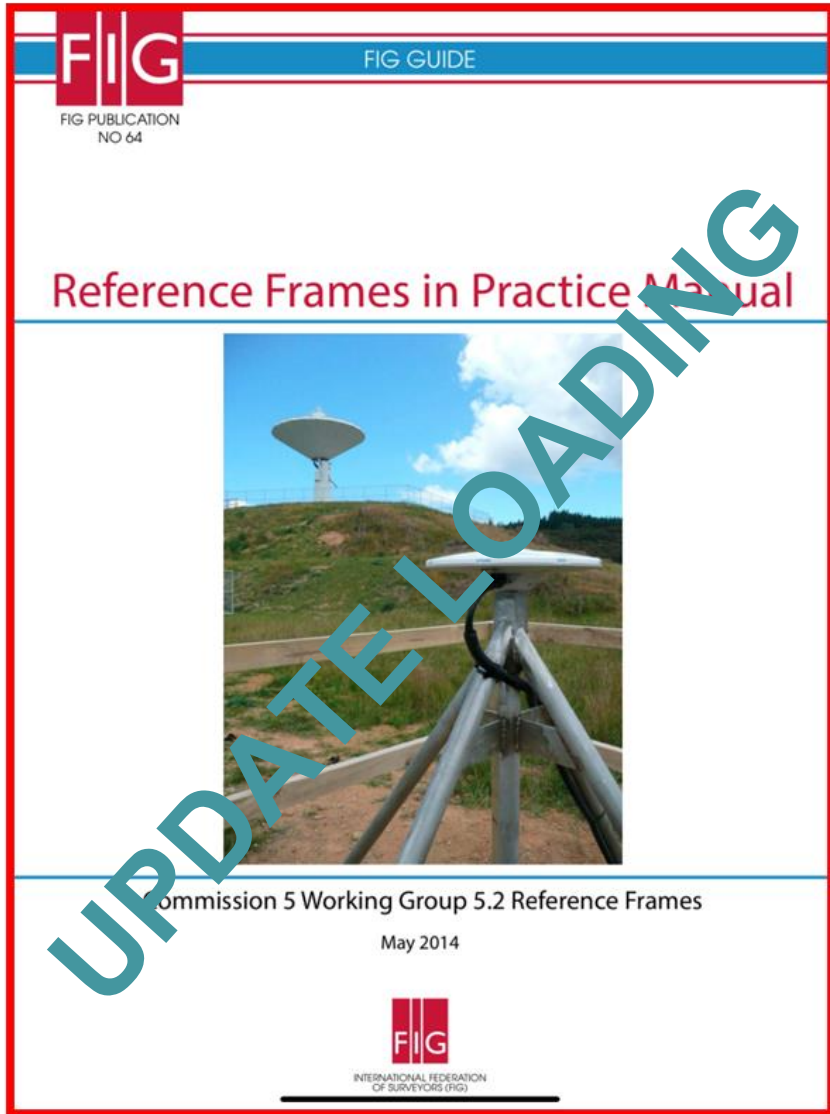
#74



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



# Upcoming Publications



- FIG Reference Frames in Practice Manual v2
  - Updates on GNSS Constellations, international geodesy initiatives,
  - Planned Release after Accra WW
  - Languages (EN initially, then others)
  - Digital Copy (PDF) only



# FIG Commission 5

## Positioning and Measurement

### 2023-2026 Working Group Chairs/Co-Chairs

Chair: **Ryan Keenan**

[ryan@positioninginsights.com.au](mailto:ryan@positioninginsights.com.au)

Vice-Chair Admin: **Kevin Ahlgren**

[kevin.ahlgren@noaa.gov](mailto:kevin.ahlgren@noaa.gov)

WG5.1: **David Martin**

[david.martin@esrf.fr](mailto:david.martin@esrf.fr)

WG5.2: **Nic Donnelly** and **Chris Pearson**

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WG5.3: **David Avalos**

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WG5.4: **Eldar Rubinov** and **Safoora Zaminpardaz**

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WG5.5: **Amir Khodabandeh**

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WG5.6: **Li Zhang** and **David Mulindwa**

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WG5.7: **Allison Kealy** and **Jelena Gabela**

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# Discussion - Open

## Membership in WGs

- 5.1 Standards
- 5.2 3D Reference Frames
- 5.3 Vertical Reference Frames (with Comm 4)
- 5.4 GNSS
- 5.5 Multi-Sensor Systems (with Comm 6)
- 5.6 Cost-effective Positioning
- 5.7 Emerging Technologies for PNT (with IAG)

All welcomed - national delegates, friends of Comm5



# 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

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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.

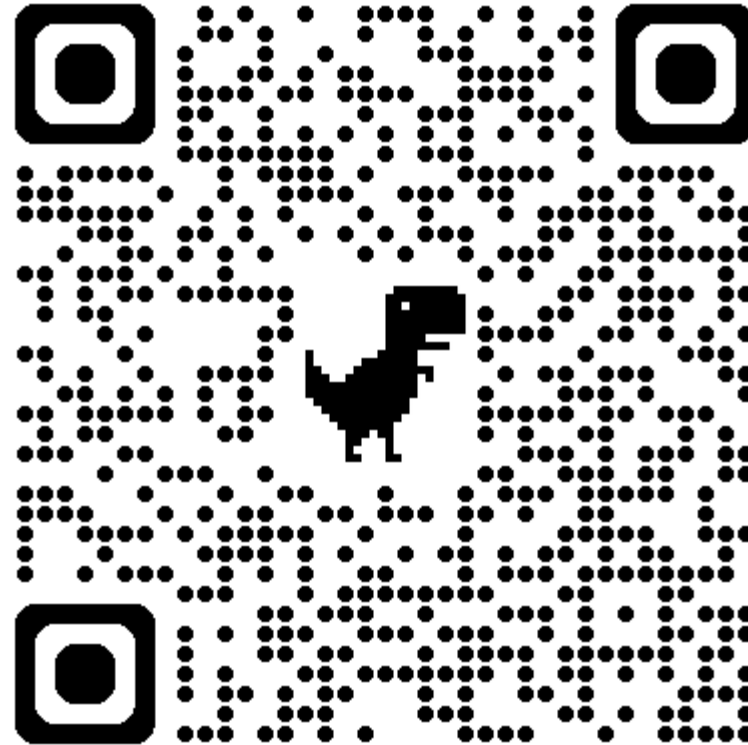
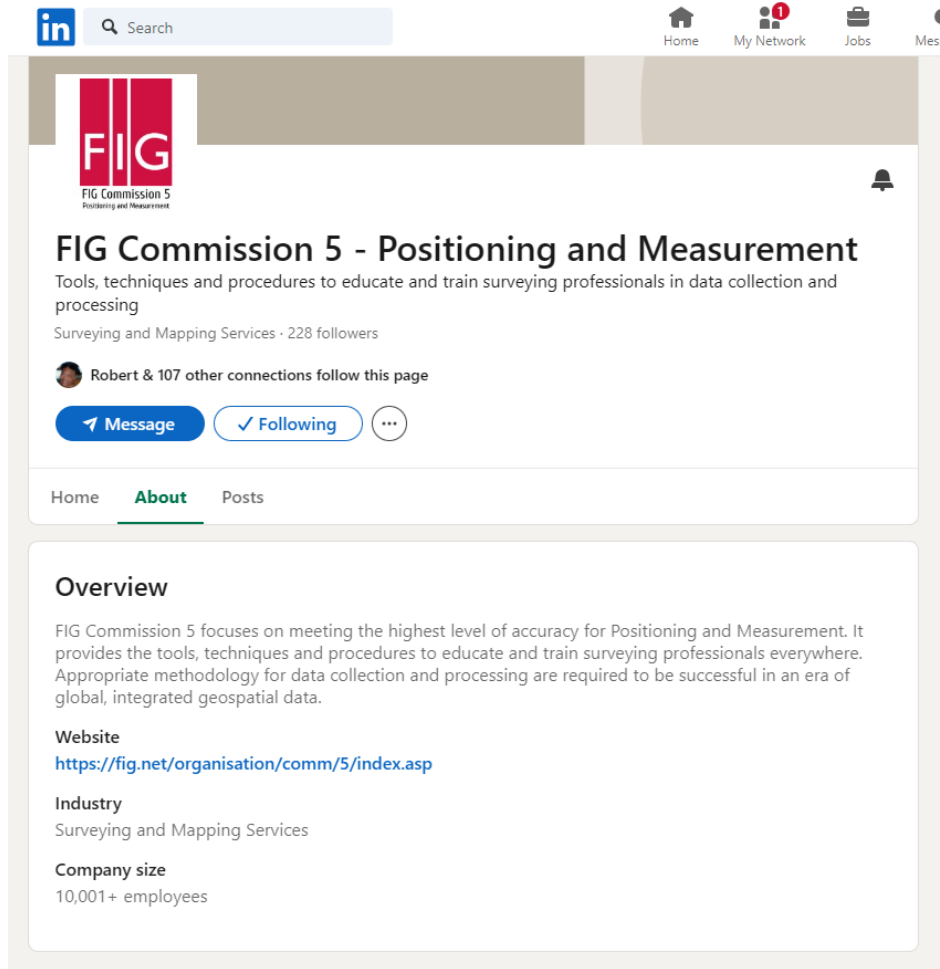
Email Contact :

-nicholas.brown@un.org;

-fbale@bnetd.ci.

# Commission 5

## New LinkedIn Group Page!!



<https://www.linkedin.com/showcase/fig-commission-5-positioning-and-measurement>



# Commission 4/5/6 Dinner

- Tuesday 21 May 2024 – from 19:00
- Restaurant: **+233 Jazz Bar & Grill, Doctor Isert St, Accra**



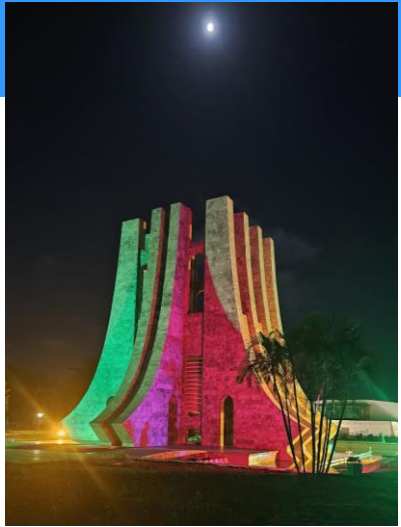
Pay for your own meal and drinks. Tips at your discretion

Shuttle Bus leaving La Palm @18:30  
Shuttle Bus leaving +233 Jazz @22:00

Uber is another option (at your cost)



# Working Week 2024 - Accra







# FIG Working Week 2024

19-24 May

Accra, Ghana

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

SUSTAINABLE  
DEVELOPMENT **GOALS**

International Federation of Surveyors supports the  
Sustainable Development Goals

## Commission #5 - Open Meeting

Positioning and Measurement



FIG Commission 5  
Positioning and Measurement

Serving Society for the Benefit of People and Planet



Please provide your contact information:

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