

GGOS-AFRICA WORKSHOP 2026

CORS in Africa: From Scattered Stations to a

Continental Service
"Building the bridges between Africa's islands of
positioning excellence."

PRESENTER

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DATE

Tuesday 6 October 2026



Fentale-Dofen, Ethiopia

2024–2025: a 50-km dyke,
75,000 evacuated

One Station Felt the Continent Pull Apart

IGS station ADIS, Addis Ababa — moved ~20 mm west

~50 km

dyke length

M5.9

largest quake, 14 Feb
2025

75,000

people evacuated

In September 2024 a magma dyke began opening beneath the Fentale–Dofen segment of the East African Rift in Ethiopia. Over six months it grew to ~50 km. More than 300 earthquakes of magnitude 4 or greater shook the region; the largest, M5.9, struck on 14 February 2025.

☰ Source: *Bulletin of Volcanology* (2025); *Copernicus Sentinel-1*

IGS • ADIS



Not Every CORS Can Carry a Frame

What separates a continental-grade station from a survey-grade base



01

Stable Monument

Deep-braced or bedrock pillar; forced-centring mount. A moving monument looks like tectonic motion and corrupts the frame.



02

Calibrated Antenna

Geodetic choke-ring with IGS ANTEX phase-centre model. Clear sky above 10°. Multi-frequency, multi-constellation tracking.



03

Continuous Operation

30-second RINEX archive + 1 Hz real-time stream. Site log + DOMES number. Years of uninterrupted operation — the hardest part.



AFREF design target: ~500 km inter-station spacing (UN-GGIM Africa, 2025)

One station, three jobs



Service

Real-time cm corrections for surveyors, machine guidance, drones — across a 50–70 km cell.



Frame

The realisation of ITRF/AFREF on the ground, with site log, DOMES, and ties to global VLBI/SLR/DORIS.



Science

Deformation, ionosphere, water vapour — every CORS is a low-cost geophysical observatory.

Two Decades of African Achievement

From 15 IGS stations to 9 countries in 10 with CORS

2005

About **15 IGS stations**
across the entire continent
— 15 for 54 countries.

1

2013

AFREF data centre tracked
~110 stations — but only
~49 actually delivered

2

2019

22 African countries
operating permanent
GNSS stations.

3

2026

About **9 in 10** African
countries have CORS — a
remarkable African
achievement.

4

◆ **Striking comparison:** Ghana's national network alone — **60+ stations** — now has more than three times as many stations as the entire continent had in IGS in 2005.

Seven Countries, Seven Models

State • Turnkey • Public-private • Hybrid — none wrong, but islands unless they share

Country	Network & Status	Model/State
● South Africa	TrigNet: 70+ CORS (Oct 2025); Land Survey Act 1997; TrigNet 2030 Strategy in prep	Mature state
● Uganda	UGRF: 40 CORS in two phases (2017–20; 2023–25); 426 legacy markers rehabilitated; private EagleCORS also operates	Hybrid public + private
● Ghana	Lands Commission + LiSAG + GMX Systems: 60+ CORS, target 100; solar-powered	Public-private
● Rwanda	10 CORS (RLMUA); maintenance cost cited as a challenge	Public

We Built the Islands. Five Bridges Are Missing.

We invested in hardware. Now we must invest in coordination, governance and people.



1

Coordination

Stations a few km apart in some cities, none for hundreds of km elsewhere. No authoritative continental inventory.



2

Open Data

Some countries with CORS are not sharing the data. In 2013, ~110 archived vs ~49 actually supplying.



3

Standards

No site log, no DOMES number, uncalibrated antennas — and the station cannot realise the frame, however good its receiver.



4

Sustainability

Operational funding is the single biggest challenge. Networks are bought with capital and die for lack of recurrent budget.



5

A Moving Frame

Coordinates published without epochs, velocities or deformation models. Legal coordinates drift; users mix epochs.

What's on the Other Side of the Bridges (1)

Land • Food • Drones — the positioning economy is already here



Land

World Bank: only **~10%** of Africa's rural land is registered. Every parcel needs a coordinate — CORS makes it fast, cheap, permanent.



Food

Auto-steer tractors and precision spraying run on network RTK. Centimetre guidance across the field, every pass.



Drones

Ten years ago a drone took off in Rwanda carrying blood to a clinic. In Jan 2026 that company reported its two-millionth delivery — across Rwanda, Ghana, Nigeria, Kenya and Côte d'Ivoire.



Drones in Agriculture



2,000,000+

deliveries (Jan 2026)



Zipline — across 5 African countries

What's on the Other Side of the Bridges (2)



Early Warning

Watch the ground breathe: landslides, eruptions like Fentale, before they become disasters.



Weather

Every CORS measures water vapour above it — free data for rainfall forecasts.



Timing

Precise clock for telecoms, power grids, banks. Every CORS is a clock.



Infrastructure

Machine guidance, autonomous systems, BIM, smart cities.



African Space Science

Continental capability in an African-led data infrastructure.



GLOBAL GNSS MARKET

€260 bn

Global GNSS market, 2023

~€580 bn

Forecast, 2033

"The question isn't whether that economy comes to Africa. It's whether African institutions, African data and African geodesists will run it."

Where Are Africa's CORS? Help Us Complete the Map

RCMRD Africa CORS Map — built from metadata contributed by station owners

[RCMRD Africa CORS Map](#)

[The NOAA CORS Network \(NCN\)](#)

[IGS Network](#)



 **CONTRIBUTE**

Help us complete the map

The map is only as good as what you send us. Ownership stays with you; it's for coordination and research.



Scan to submit metadata



<https://arcg.is/>



1K1y8x0

<https://www.research.net/r/AfricaCORS>

Five bridges to build — starting this month

Recommendations for GGOS Africa

01

Register every CORS

Build one continental inventory within six months, coordinated through RCMRD & GGOS Africa etc.. You cannot coordinate what you cannot see.

02

Share one station per country

Stream data from at least one representative CORS to the AFREF data centre — and to IGS where possible.

03

Adopt common standards

IGS site guidelines, site logs, RINEX 3+. Publish national coordinates with their epoch and velocity model.

04

One national coordinator

Each country designates one body to coordinate government, private and academic networks, with periodic checks.

05

Invest in people

Every opportunity shown today — land, food, drones, weather, time — needs trained people to deliver it. Train them.



A leader or a follower?

Five asks. No new money to start — only the political will to coordinate. Suggestions for candidate resolutions for Wednesday.



Q & A

Imagine if, next time, a network feels it — connected, open and shared across borders. That network would survey our land, guide our tractors and drones, warn our towns and keep our time.



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