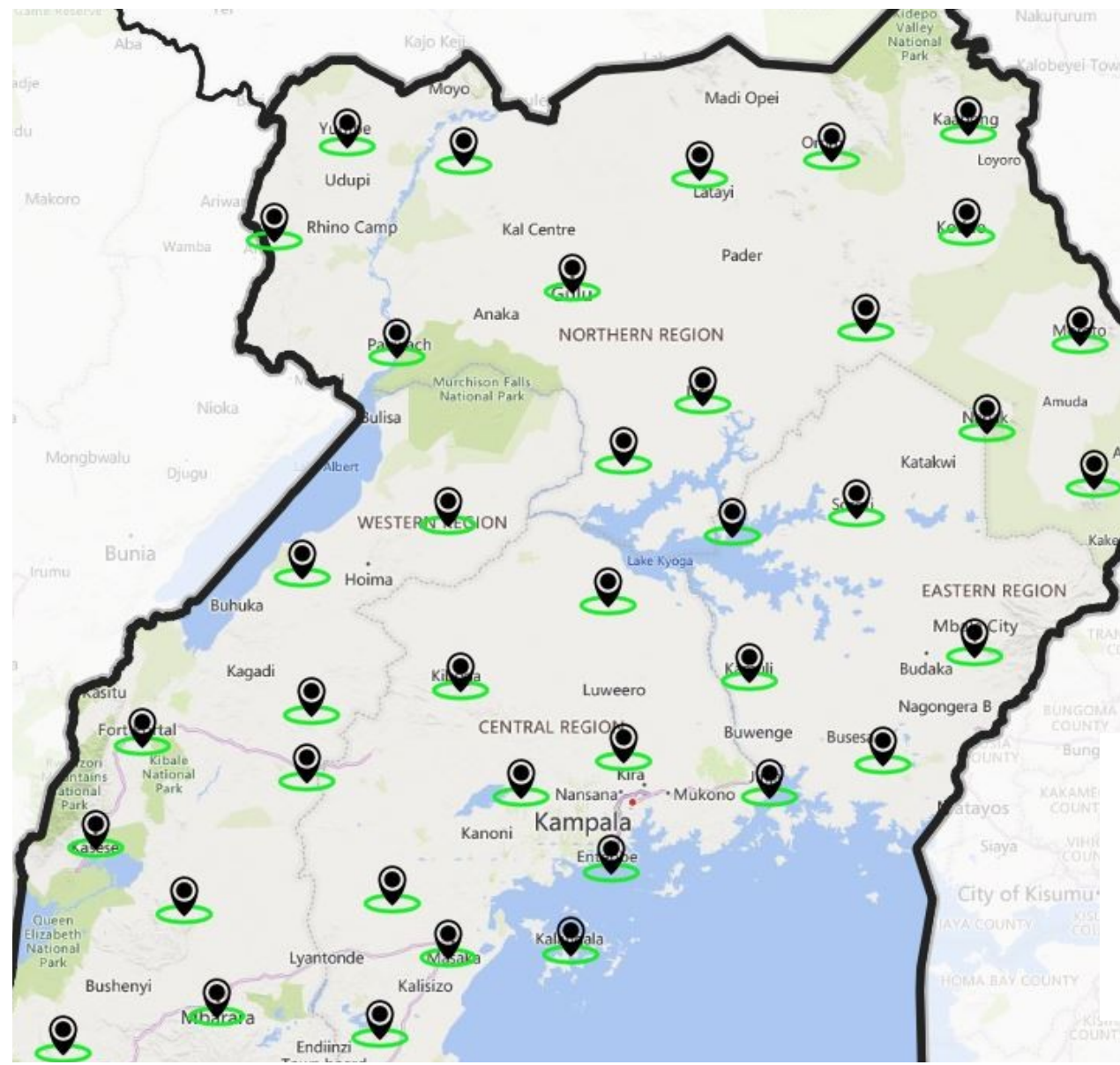




**GEODETIC NETWORKS IN
UGANDA**

ROBERT WAFULA

Presenter;

Robert WAFULA, RSU, FISU

- o BSc. Surveying (MUK)
- o PGD Project Management
- o MBA (Leadership)

Experience: Over 20 Years in Engineering & Cadastral Surveying, GIS, Land & Project Management & Leadership

ISU Leadership Profile (Main)

- o President (2025-2027)
- o Vice President (2023 – 2025)
- o Honorary Secretary (2021 – 2023)

ISU Leadership Profile (others)

- o Supervisor & Professional Mentor (2017 – Date)
- o Counsellor APC Assessor (2017-Date)
- o Facilitator/Trainer (2019 – Date)



GGOS
Global Geodetic
Observing System



Presentation Outline

1. Background (Uganda)
2. Datum for Uganda (Horizontal datum, Vertical datum)
3. Public CORS Networks
4. Private CORS Networks
5. Applications, Challenges & Opportunities

Background

Uganda is a land linked (Land locked) Country in East Africa.

It is bordered to the east by Kenya, to the north by South Sudan, to the west by the Democratic Republic of the Congo, to the south-west by Rwanda, and to the south by Tanzania.



Land Size

Area	
Total	241,038 Km ²
• Water (%)	15.39% (37,096 Km ²)
• Dry Land	84.61% (203,942 Km ²)

Population: 46.00 Million People (Census, 2024)

Datum for Uganda (Horizontal datum)

- ARC 1960 datum or
- UGRF (ITRF 2005, Epoch 2010)

ARC 1960 datum

A set of triangulation measurements effectively creating an arc from Port Elizabeth in South Africa to Cairo in Egypt through the entire African continent.

The purpose of the measurement was to determine the size and shape of the Earth.

Map of the Nile River system showing the locations of 20 dams. The map covers Egypt, Sudan, Ethiopia, and parts of the Horn of Africa and Southern Africa. Dams are marked with green boxes and labeled: Helwan, Beni Suleiman, Assuit, Luxor, Aswan, Adindan, Amartege, Dwalet, Abu Qarn, Ayod, Kwidok, Bor Juba, Luluba, Semliki, Fort Porter, Kicherere, Kigoma, Kasulu, Kato, Mpange, Mkokomo, Fairsa, Manyanga, Tondongwe, Gwibi, Anseza, Sabi, Houta River, Belfast, and Port Elizabeth. The Nile River is shown in red, flowing from the south to the north. Major cities like Cairo, Khartoum, and Addis Ababa are marked. The map includes latitude and longitude lines and a note: "Note : States as in 1954".



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UGRF

The **Uganda Geodetic Reference Frame (UGRF)** provides the framework for all positioning activities in the Country.

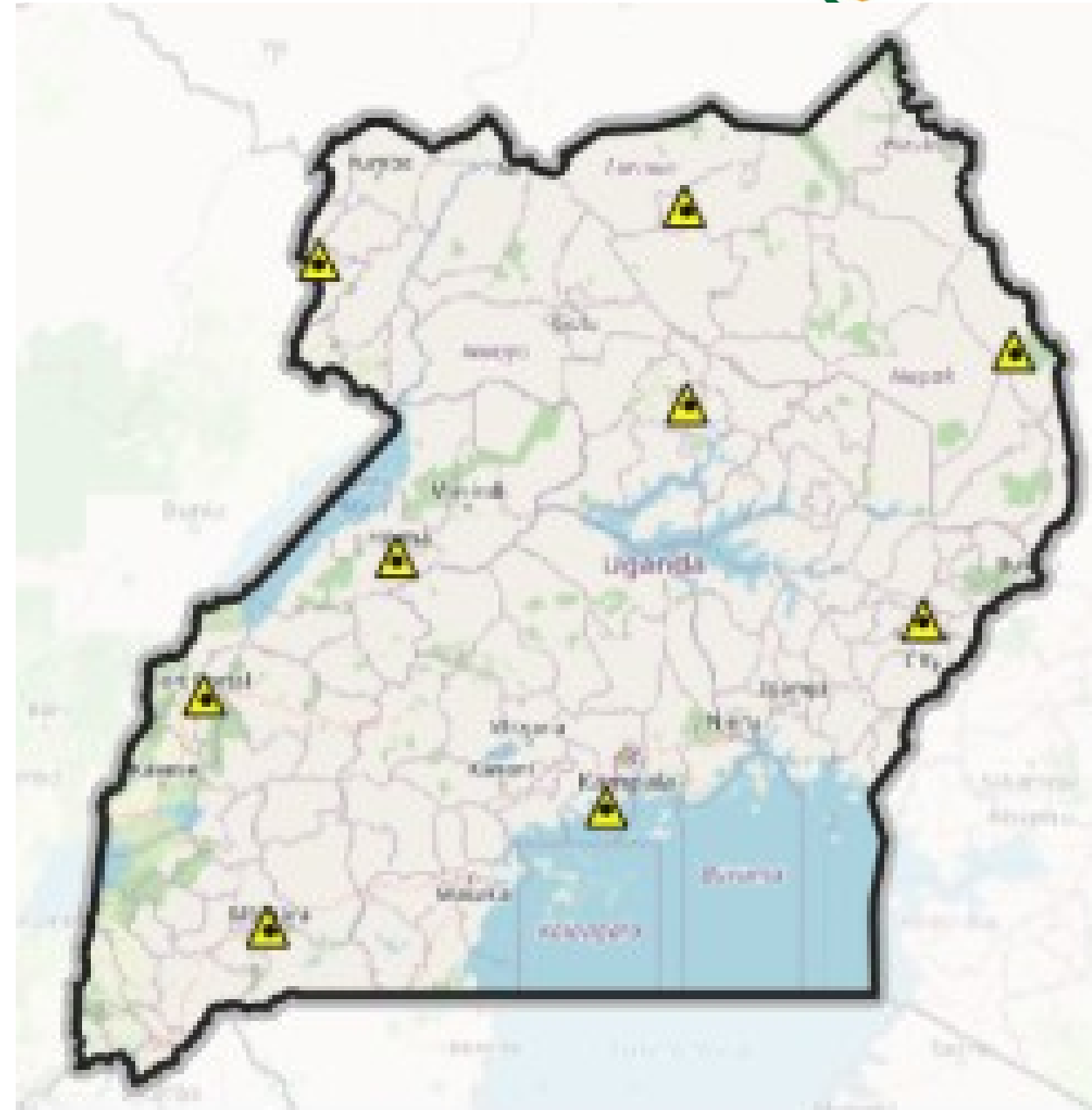
The UGRF is a modern geodetic infrastructure that provides accurate, reliable spatial data for geospatial activities in Uganda.

The UGRF is composed of the following classes of Geodetic Control Points:

- 9 Zero Order Geodetic Control Points with 6 Auxiliary Points
- 129 First Order Geodetic Control Points
- 297 Second Order Geodetic Control Points
- 40 CORS
- Geoid Model – UGEOID2020

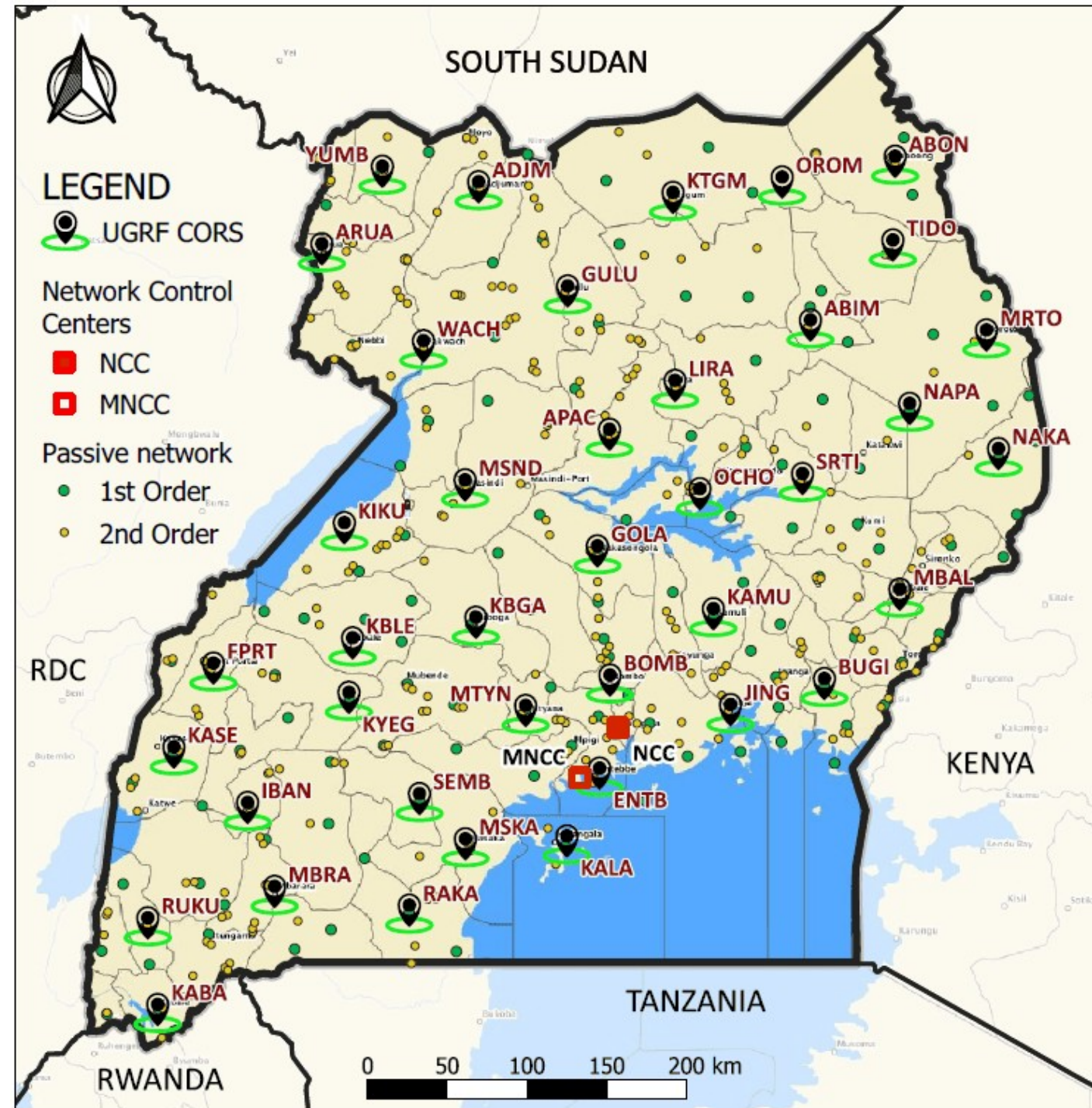
UGRF

9 Zero order control sites
(all made of 1 main and 1 or
2 secondary point(s)),
installed and observed in
2010 during the
establishment of the UGRF
reference system.



UGRF

129 Primary and 297
second-order control
points, installed and
measured in 2019.



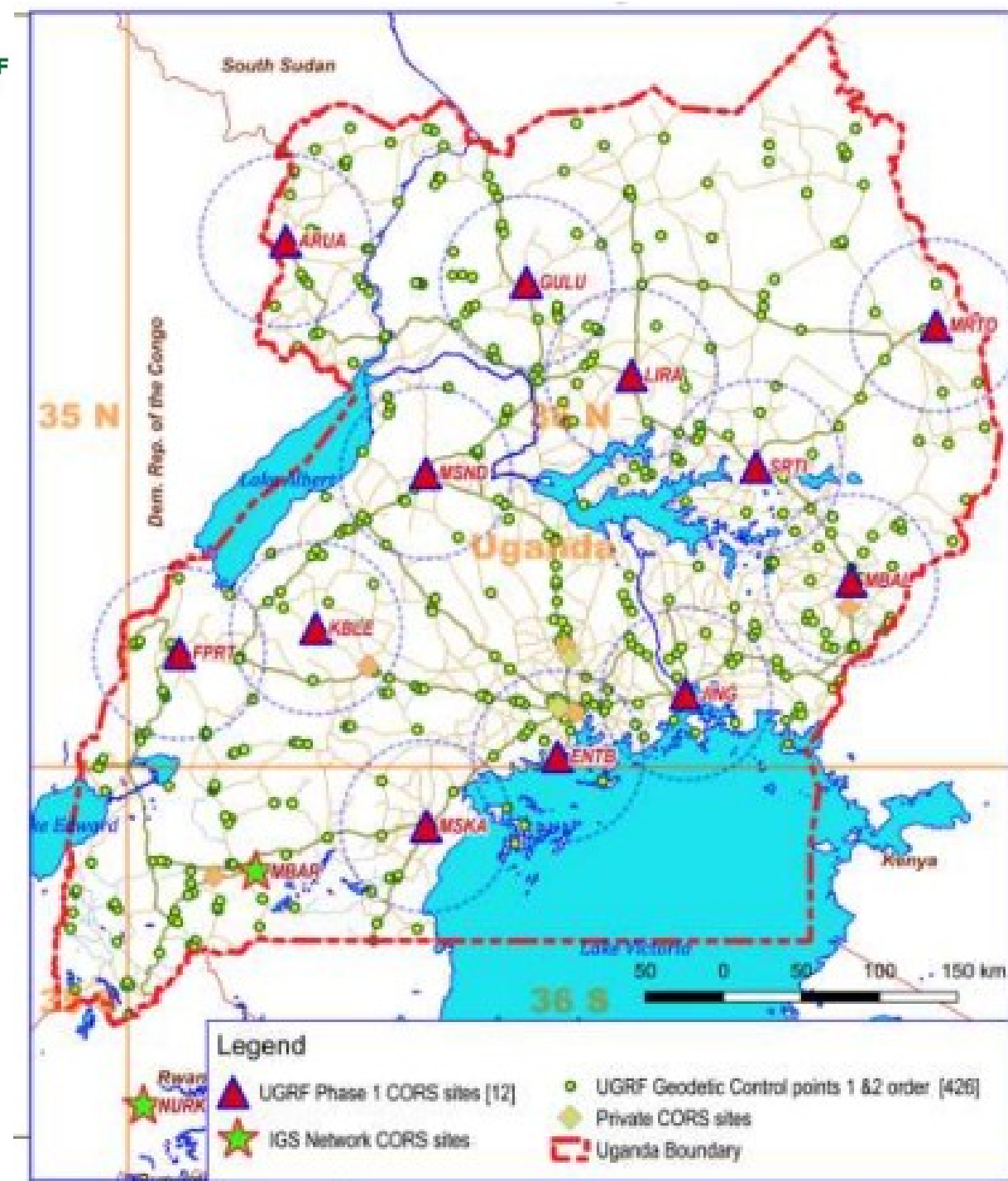
Datum for Uganda (Horizontal datum)

- UGRF (ITRF 2005, Epoch 2010)

UGRN based on ITRF2005 epoch
2010.0

Based on (12 points).

Then 40 stations



- ## What is UGRF as a reference system? What's the link with ITRF?
- **UGRF** aligns with the International Terrestrial Reference Frame (ITRF), ensuring global compatibility and consistency in spatial data.
 - **UGRF** is aligned to ITRF2005@2010.0 through the measurement of 9 Zero-order points in 2010, tying them to ITRF stations.
 - **Applications:** It supports applications like surveying, construction, land management, and disaster monitoring by providing high-precision positioning, standardizing geospatial data, and enhancing decision-making.

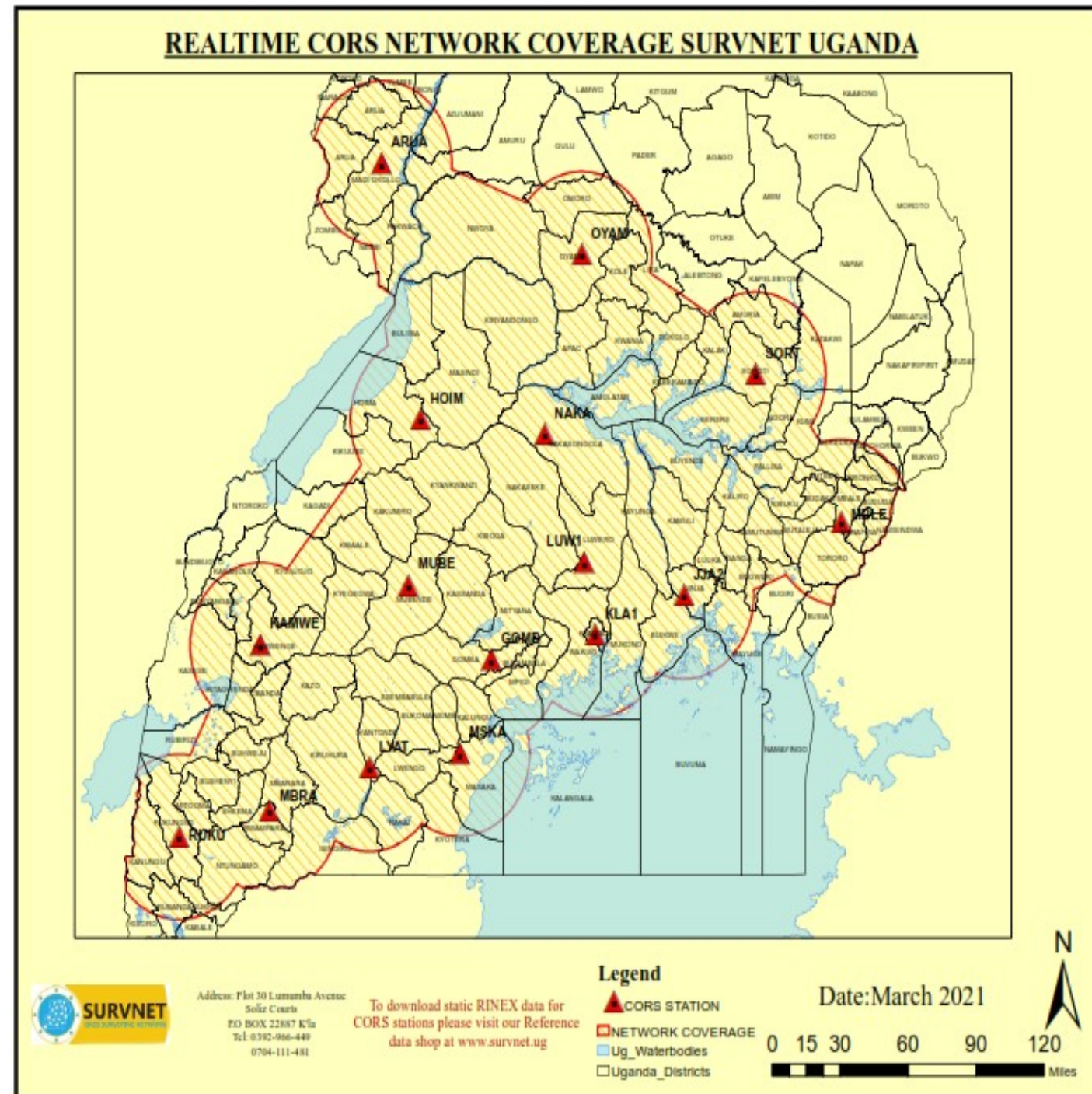
Private CORs Providers (Main)

1. Eagle CORS: 19 Stations

2. Survnet: 16 Stations

**TOTAL: 35; (19+ 16)
Stations**

**TOTAL (GOVT +
PRIVATE) = 75; (40+ 35)
CORS Stations**

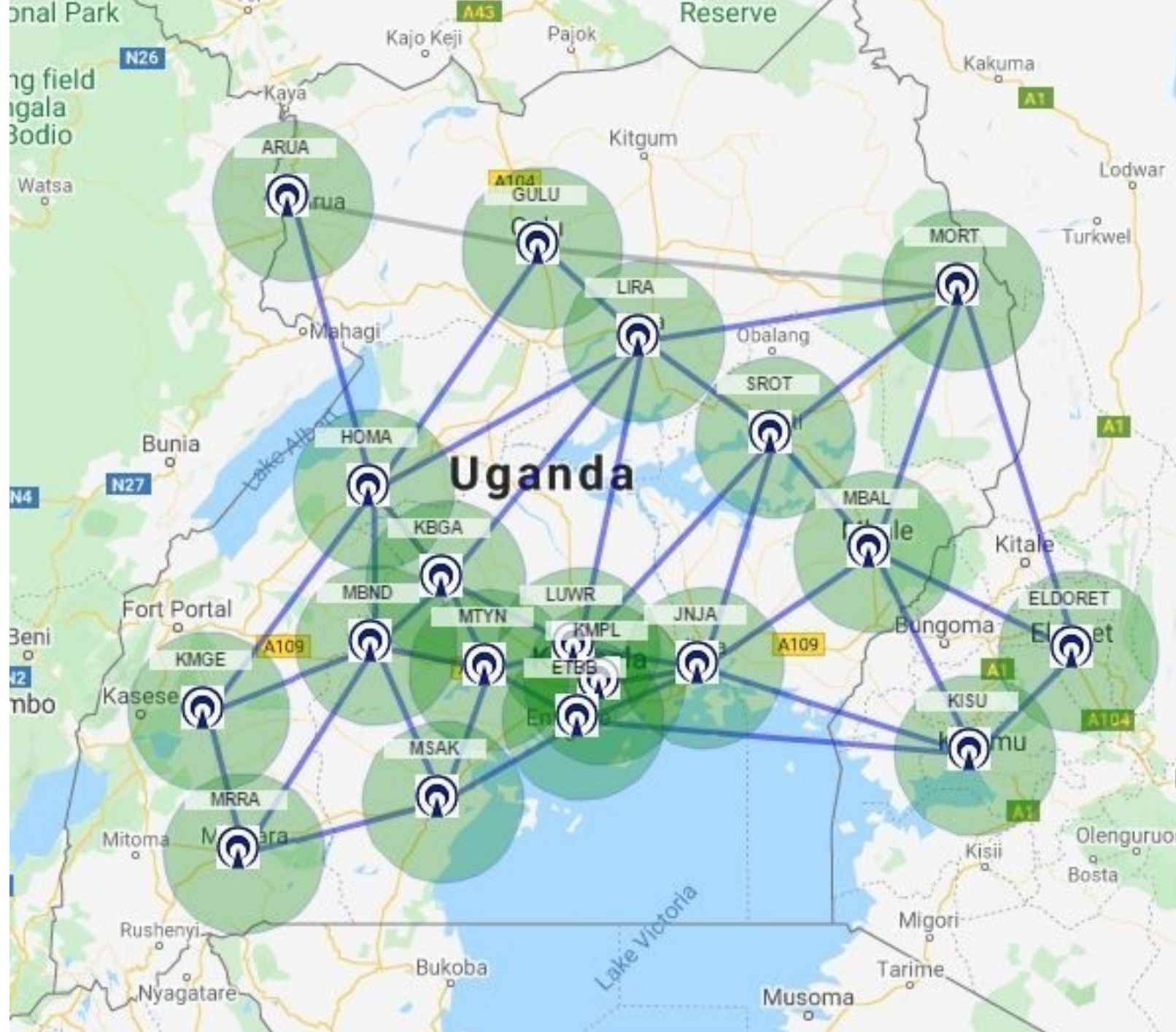




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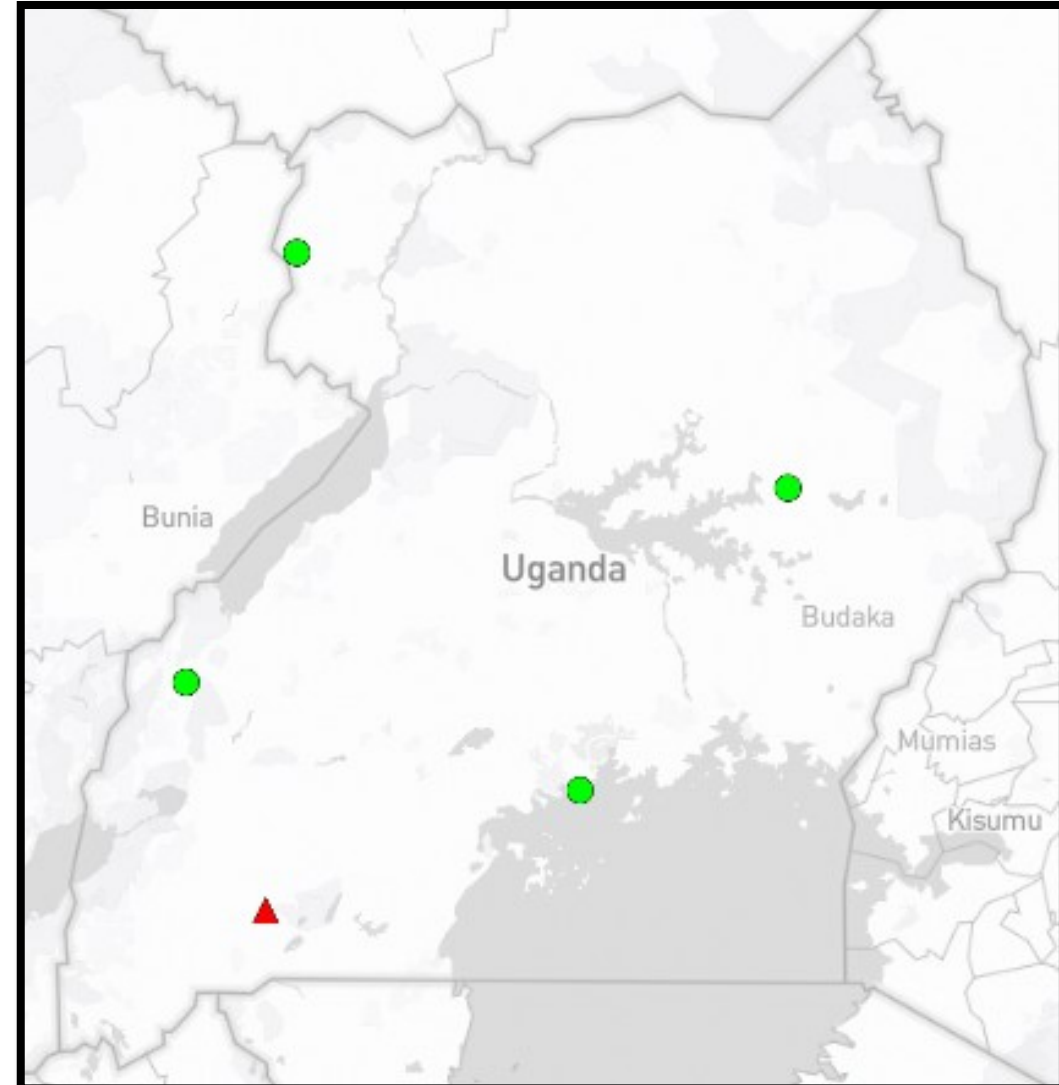
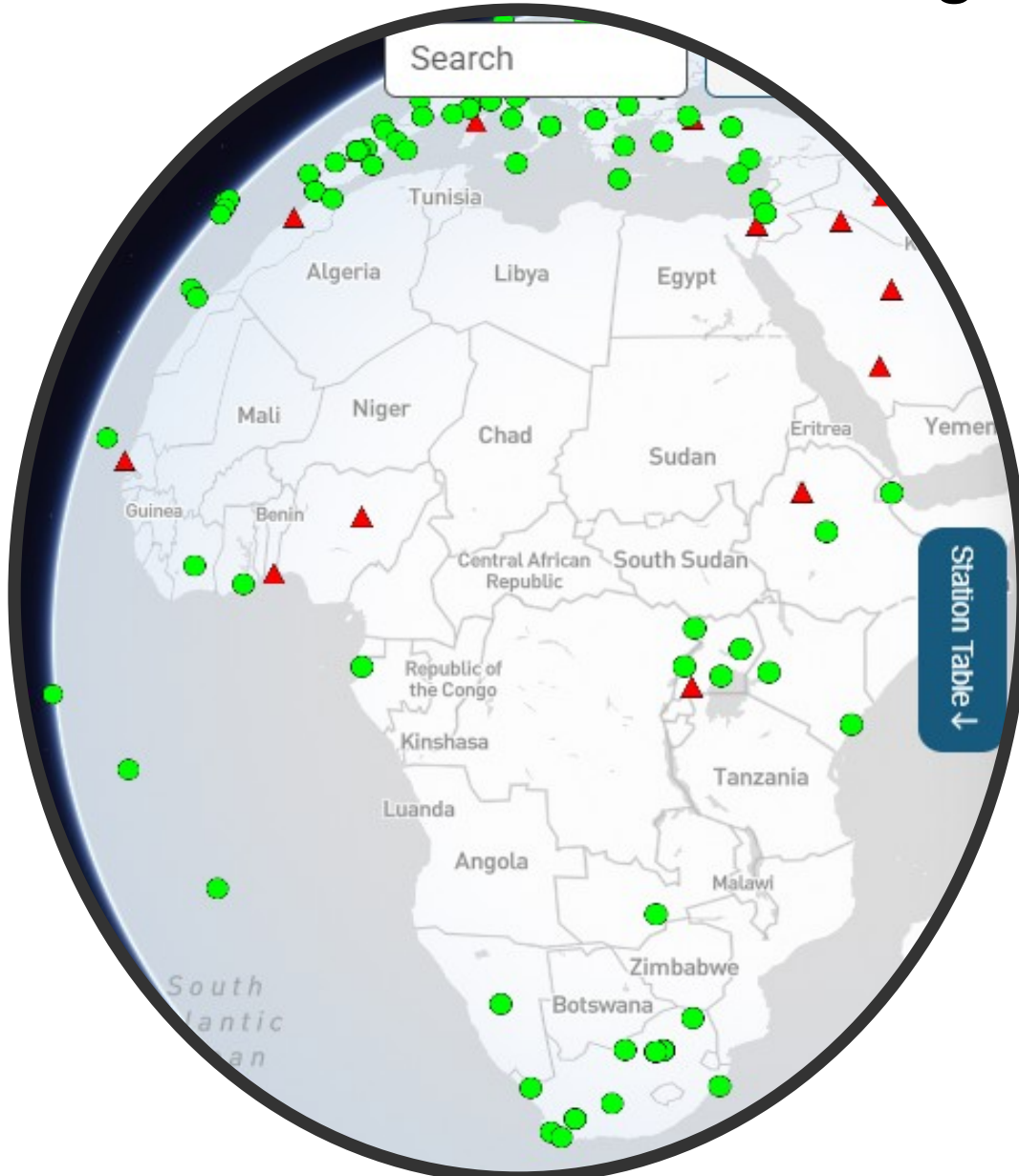


Eagle CORS



UGRF's usefulness to the whole international geodetic community.

Some stations in the UGRF network were integrated into the International GNSS Service (IGS).



Acknowledgments

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3. Institution of Surveyors of Uganda



**Thank you for
listening**

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