



United Nations
Global Geodetic
Centre of Excellence



UN-GGIM
UNITED NATIONS
COMMITTEE OF EXPERTS ON
GLOBAL GEOSPATIAL
INFORMATION MANAGEMENT

PROGRESS - AFREF

**Second Meeting of the UN-GGCE International Advisory Committee Fourth Plenary Meeting of
the Subcommittee on Geodesy
20th March 2024**

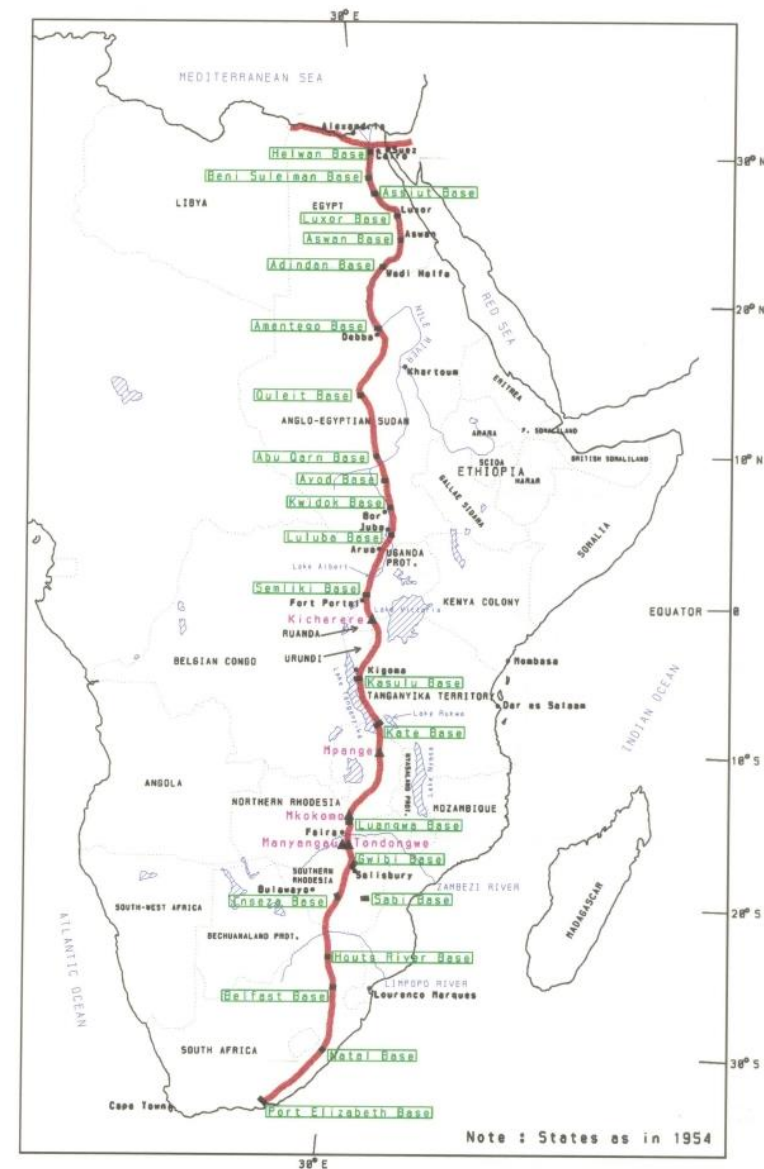


Aslam Parker;

Chief Directorate: National Geospatial Information; Republic of South Africa

Previous Attempt at AFREF 😊

- 30th Arc of Meridian
- The *Arc of the 30th Meridian* is known to surveyors worldwide as a triangulation system that stretches from South Africa northwards all the way to Cairo.





Problem\Consequences

- A multitude of different datums, different ellipsoids and different projections, authoritative and published information not readily available for many countries
- Confusion within countries as to appropriate datums, projections and transformations to use
- Confusion and delays in cross-border projects: - transport corridors, mapping projects, conservation and environment, exploitation of mineral resources
- Confusion and conflict regarding international borders



Introduction: UN-GGIM: AFRICA AFREF WG

- AFREF has been within structures of UN Economic Commission for Africa (UNECA) since 2004, (20 years ago).
- A resolution on GGRF for SD was passed by the 69th UNGA in February, 2015.
- The GGRF system is realized at three (3) levels;
 - Global level – Global Geodetic Reference Frame (GGRF);
 - Regional level – the African Geodetic Reference Frame (AFREF); and
 - Local level – National Geodetic Reference Frame e.g. Hartebeesthoek94; South Africa
- AFREF WG formed in November 2015 among other four (4) WGs for Africa. Membership: Kenya - Chair, Botswana, Nigeria, Morocco, Gabon; RCMRD, AFRIGIS, UNECA, **currently not active**



Introduction ...Main Objectives of AFREF (WG)

- To develop regional reference frame, AFREF, in line with UN-GGRF to enable direct and seamless application of GI.
- To establish a continental reference system, AFREF, as a basis for national reference networks.
- To establish permanent GNSS base stations such that users will be within 500km of a base station and that data is freely available to all users.
- To realize a unified vertical datum and to support efforts to establish a precise African geoid.
- To align AFREF to UN-GGRF.



Terms of Reference of WG – AFREF

- Provide justification, communication and publicity for the project to political groupings, in particular the Africa Union (AU), stakeholder, international organization and other users;
- Provide advice and relevant assistance to member States, in conjunction with the regional centres, IAG and other stakeholders, for the improvement and maintenance of appropriate national geodetic infrastructure, to enhance the AFREF;
- Co-ordinate the implementation of the AFREF project at the continental level, including the establishment, densification and monitoring of the AFREF Data Centers and Data Analysis Centres;
- Ensure the alignment of AFREF with the Global Geodetic Reference Frame (GGRF)
- Set guidelines and standards for the AFREF **in coordination** with International Association of Geodesy (IAG)



Terms of Reference ...continued

- Secure funding, equipment and other resources to ensure the success of the AFREF;
- Liaison with international organizations, in particular the IAG and UN-GGIM SoG, for guidance, human and infrastructure capacity development in conjunction with the regional centres to organize training, workshops, seminars etc;
- To assist member States, in conjunction with the regional centres, to develop and implement outreach programmes for societies to appreciate the utility values of the national, regional and global geodetic reference frames.
- Undertake any other activity that may be deemed relevant to the activities of the WG.



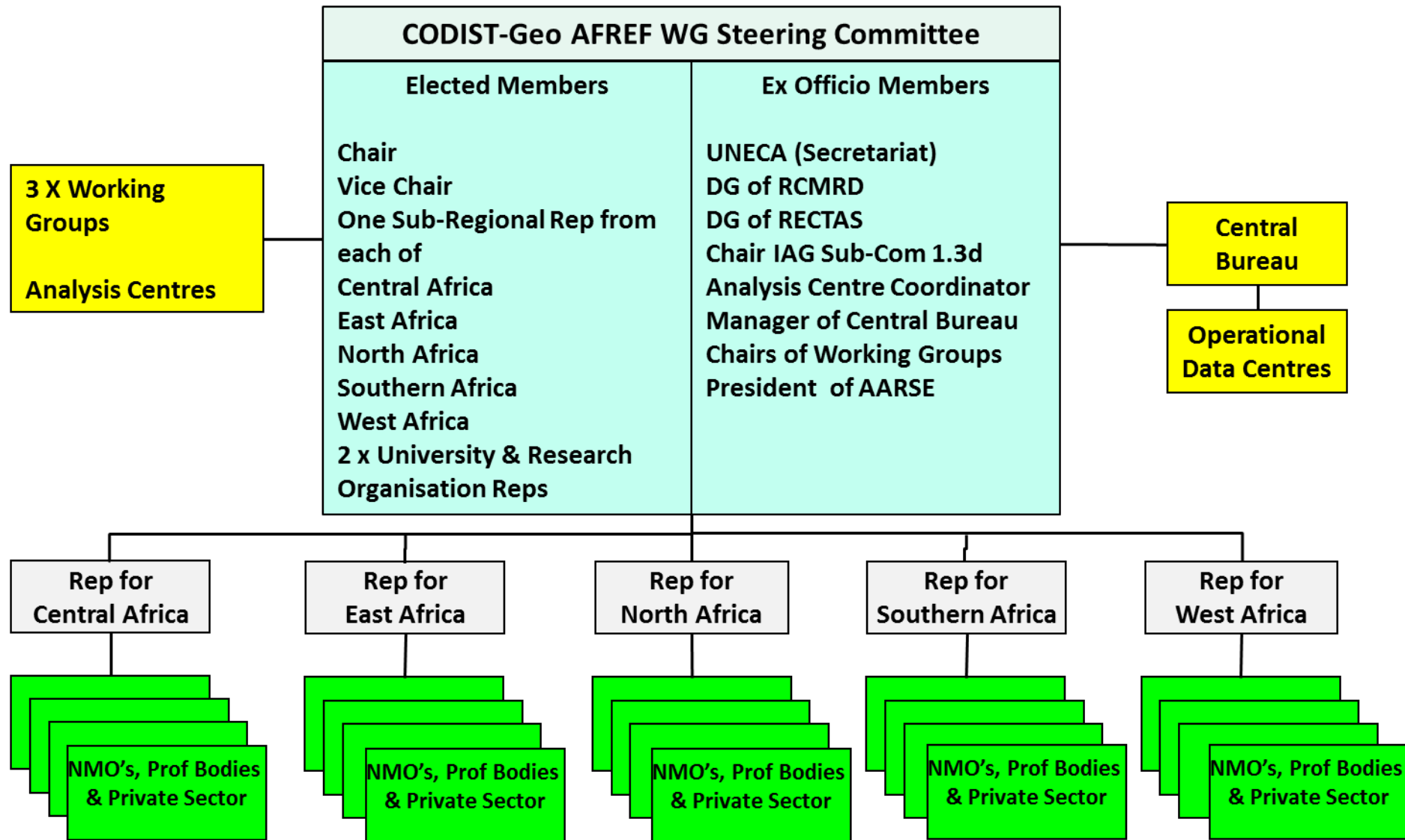
Meetings of AFREF Working Groups

- The concept of using GNSS to unify the reference frames in Africa was first proposed at the Global Spatial Data Infrastructure (GSDI) meeting held in Cape Town, South Africa, in 2000.
- Since then, many meetings and workshops have been held to address AFREF.
- In 2002, AFREF was formalised as a project within UNECA .. Windhoek Declaration.
- 1st AFREF WG Meeting held in April 2016 during 4th High Level Forum UN-GGIM at UNECA
- 2nd AFREF WG Meeting held in Nov. 2017 during Africa GIS2017 at UNECA
- 3rd AFREF WG in in April 2018 at UNECA, Addis, where proposal was made for revised governing structure
- Then , Covid.... No subsequent meetings nor progress reports.



2018 Proposal Revision for AFREF Steering Committee

(being revised to incorporate SoC, GGCE and other structures)





Review of AFREF Progress so far...

Achievements on the recommendations and actions of the previous meetings include : -

- GI4SD African action plan highly commendable
- Raising awareness of AFREF benefits thro' GI4SD
- Networking among institutions and practitioners
- AFREF Permanent Stations Guidelines published
- Capacity building on AFREF done every year at RCMRD
- AFREF Newsletter published and distributed quarterly by RCMRD (stalled)
- Established AFREF Data Holding Centre at NGI, South Africa



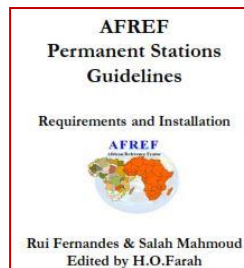
African Action Plan (AAP) on GGIM)

- This implementation tool of UN-GGIM for Africa proposes the following on AFREF under section A2.2.1.1 to A2.2.1.4:
 - Undertaking an inventory of already established COR in every country through a questionnaire/online;
 - Designing a regional CORS network to optimize the design of national networks;
 - Designing national networks to guide second administrative levels in locating CORS in their jurisdictions;
 - Establishing about 44 additional CORS to ensure at least 1 per country.



Distribution of GNSS Stations in Africa

- Some African countries with GNSS CORS are not sharing the data.
- In spite of recent progress on GNSS site distribution, the current CORS gap in Africa exceed 50%, Nubian plate being mainly affected
- Different methods can be used to determine optimal number of GNSS to meet AFREF criteria. However, there is need to come up with a practicable way that can be achievable.
- Many countries are expected to establish GPS networks soon while following the AFREF guidelines.
- Operational funding biggest challenge



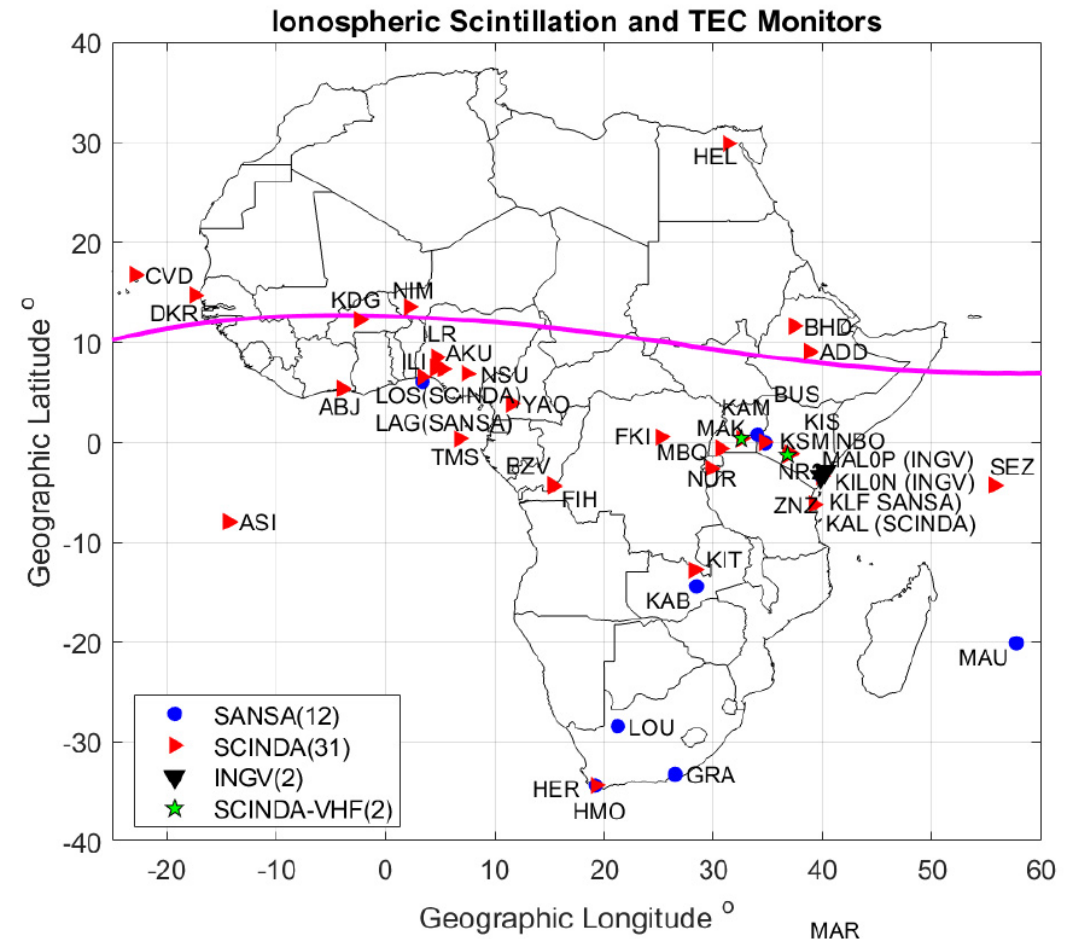
AFREF Hosting

- GNSS data from AFREF CORS is currently being achieved at AFREF Operational Data Centre, (AODC), <http://www.afrefdata.org> currently being hosted by National Geo Information (NGI) agency in South Africa.
- Other documents relating to AFREF can be found at AFREF website at UNECA and at RCMRD
- One may check the current status of AFREF.



Leveraging off Scientific and other Infrastructure

- Significant infrastructure unknown to NMO's
- Eg : AfricaArray, Iono, TIGA





Conclusion

- Most countries needs roadmap to modern reference frame
- Urgent need to revive structures that will coordinate AFREF activities.
- In the interim, the SoG Africa members are expected to play a coordinating role in Africa. (Burkina Faso, Cameroon, Côte d'Ivoire, Madagascar, Morocco, Nigeria, South Africa, Tanzania, Tunisia)
- The support of the UNGGCE and UNECA is critical.

THANK YOU