



AFREF



AFRICAN GEODETIC REFERENCE FRAME

A Modern and Unified Reference Frame for Africa

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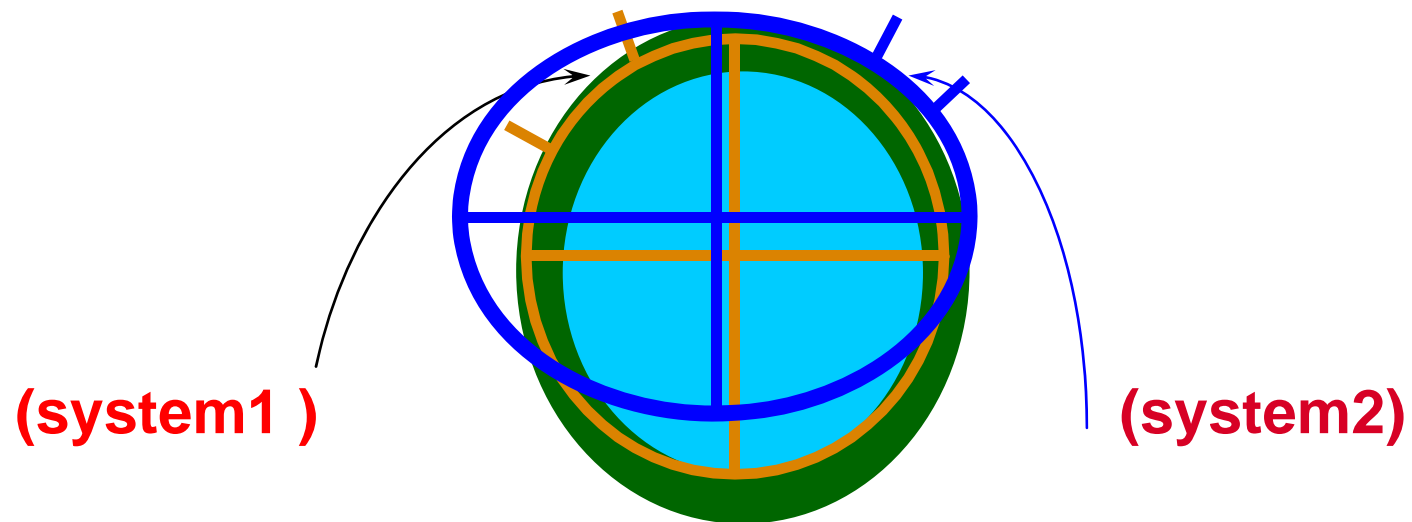
Introduction

- **Development approaches in Africa are geared towards continental and regional economic and political integration**
 - AU
 - NEPAD
 - COMESA
 - SADC
 - EAC
 - ECOWAS
- **This requires uniform geo-spatial information**



Problem

- Traditionally each country has its own geodetic reference system

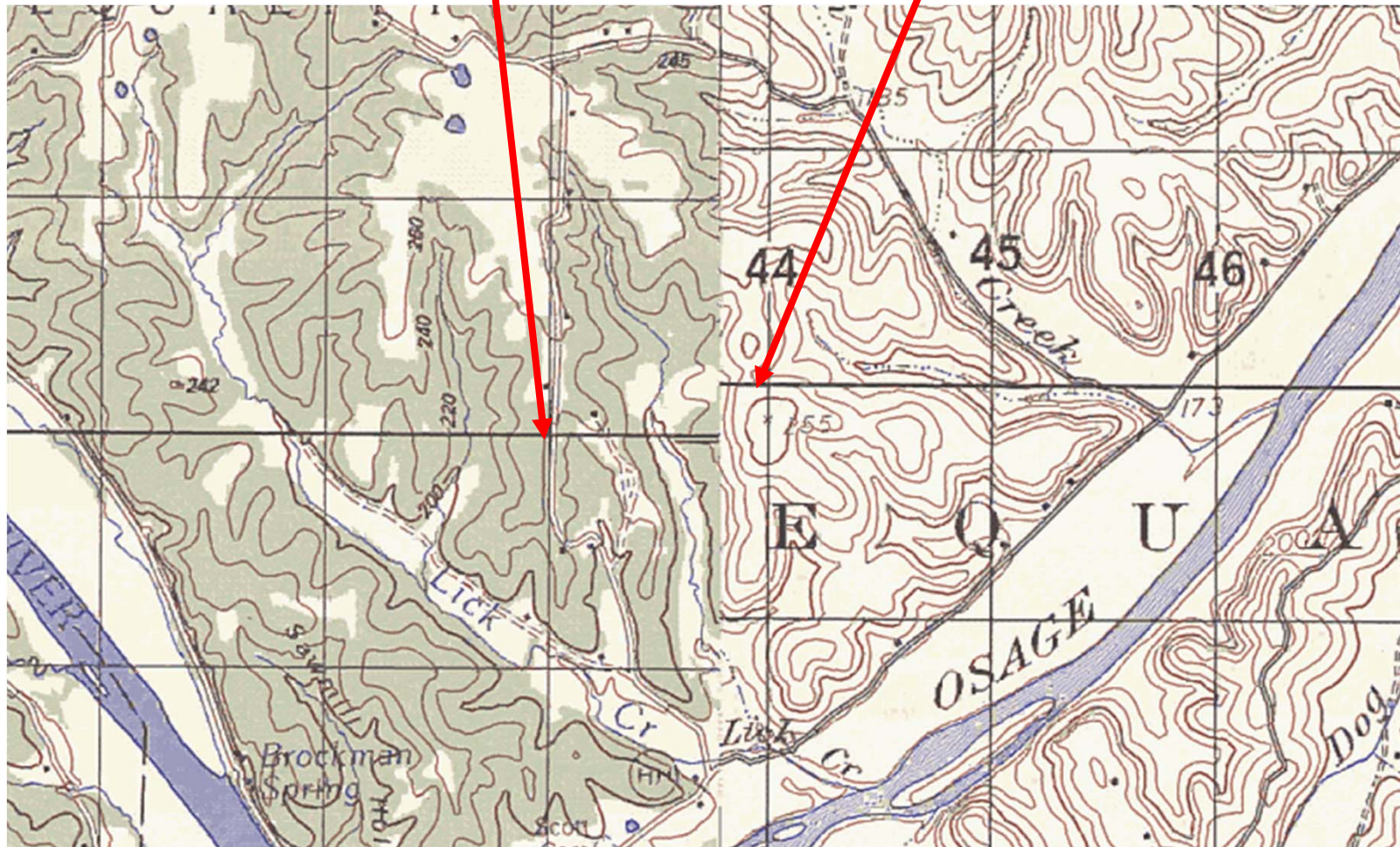


- Maps in neighbouring countries do not match at the national boundaries

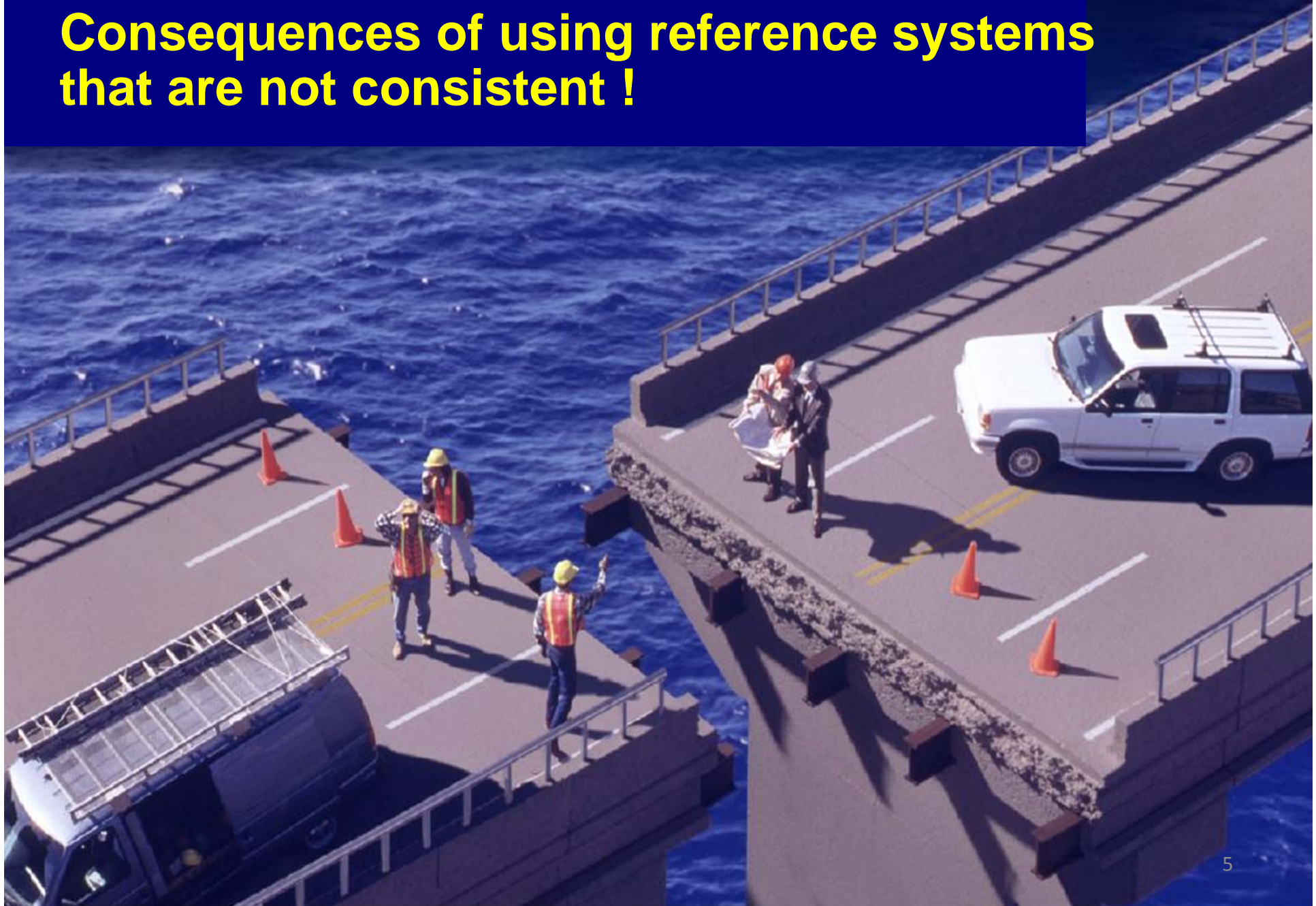
Impact of Reference Mismatch

Map dated 1989
WGS-84

Map dated 1957
NAD-27



Consequences of using reference systems that are not consistent !



❖ **PROBLEM - CONSEQUENCES :**

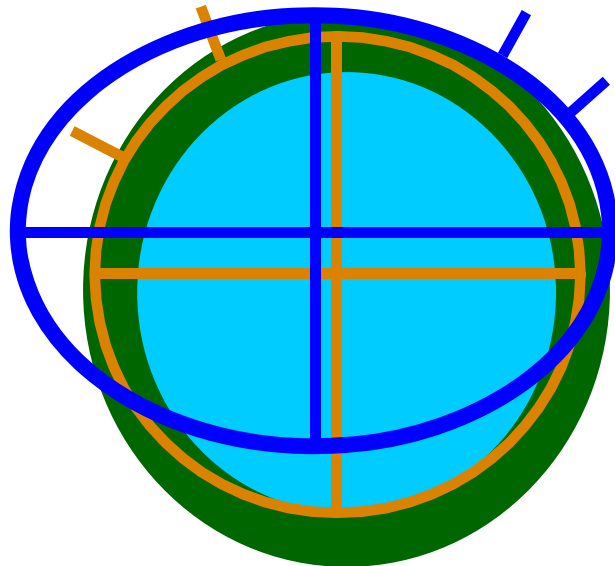
- ◆ **A multitude of different datums, different ellipsoids and different projections**
- ◆ **Confusion within countries as to appropriate datums, projections and transformations to use**
- ◆ **Confusion and delays in cross-border projects: - transport corridors, mapping projects, conservation and environment, exploitation of mineral resources**
- ◆ **Confusion and conflict regarding international borders**



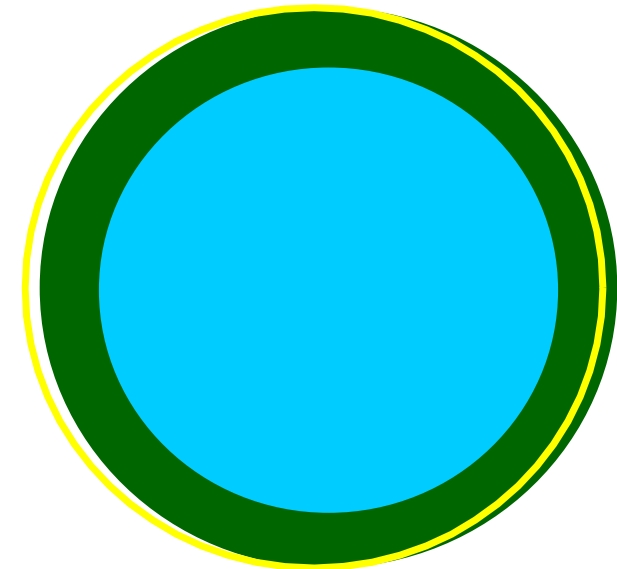
Solution

- Move from National Reference Systems to Regional or Global Reference Systems

National Systems

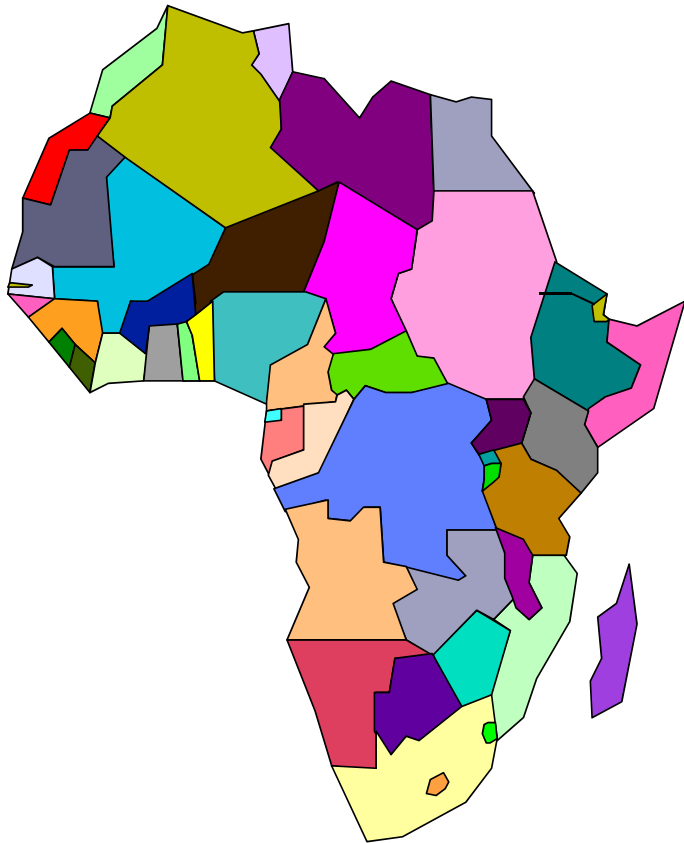


Global Systems

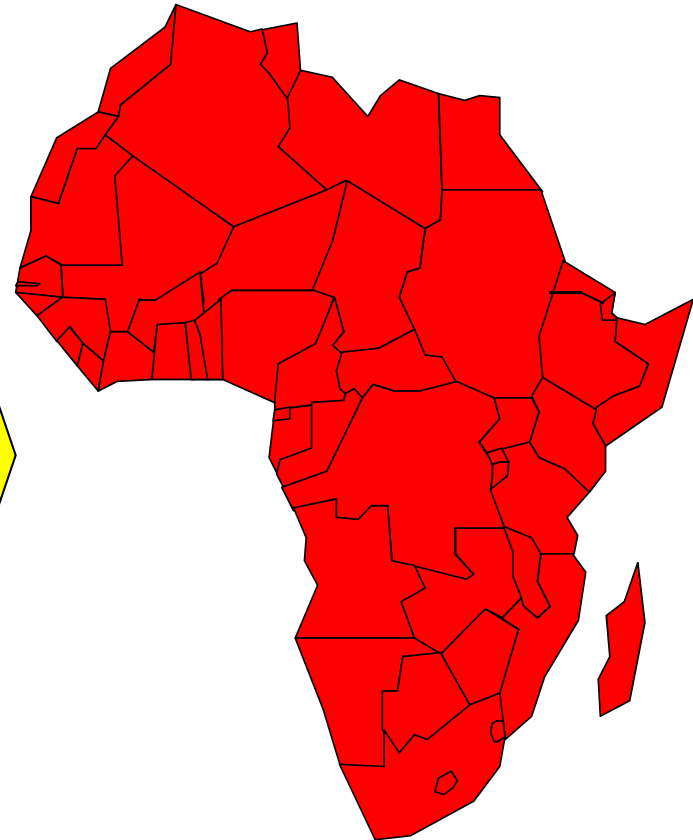


Solution

Non-uniform systems



Uniform system



**GNSS
+
ITRF**

Objectives of AFREF

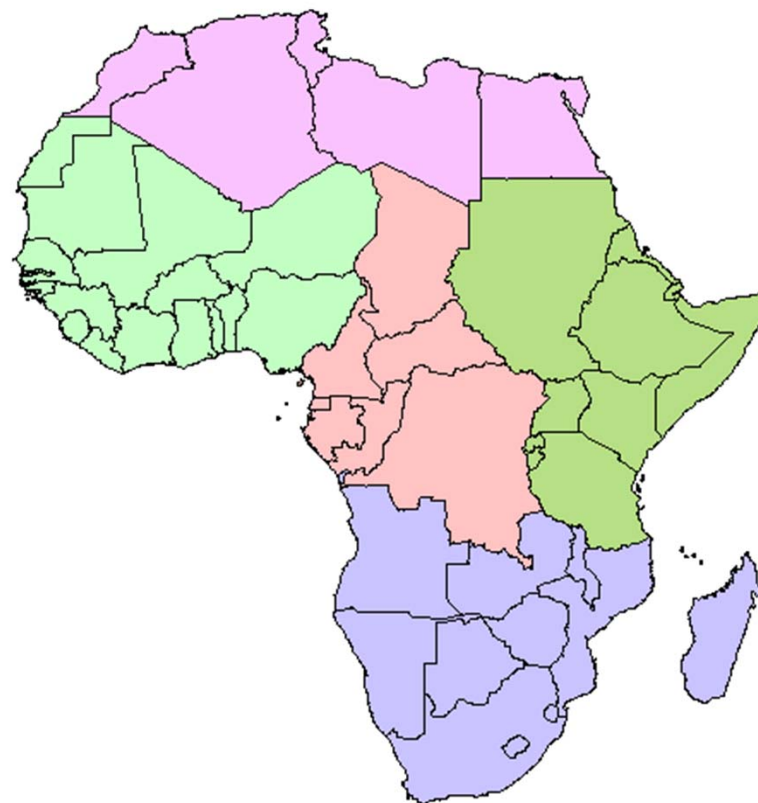
- **To establish a continental reference system as a basis for national reference networks.**
- **To establish permanent GNSS base stations such that users will be within 500km of a base station and that data is freely available to all users.**
- **To realize a unified vertical datum and to support efforts to establish a precise African geoid.**



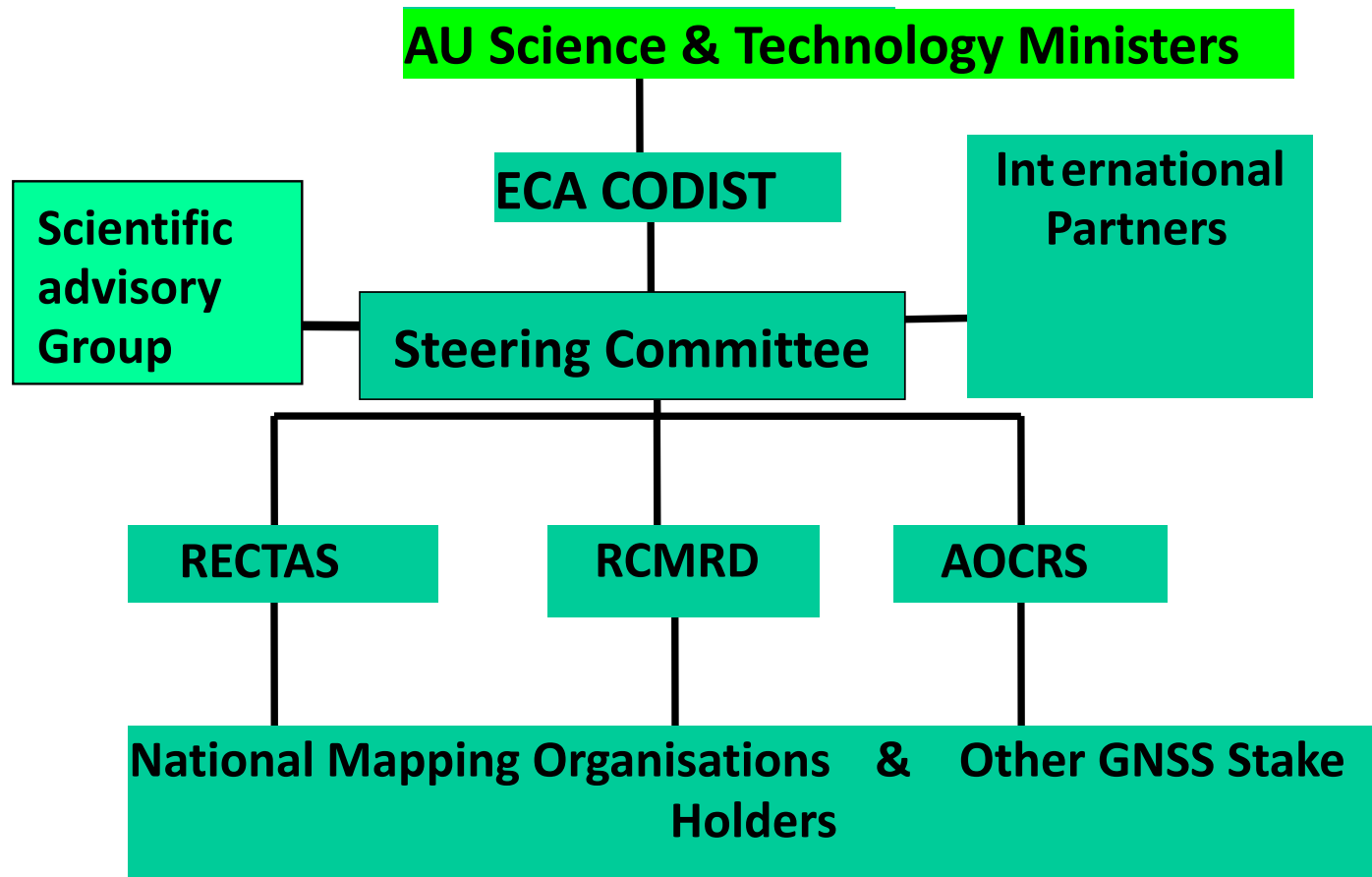
Organizational Principles

The structure reflects the broad concepts of AFREF that:

- It is to be designed, managed and executed from within Africa;
- It is to be organized on a regional basis;
- It is to be executed at the national level

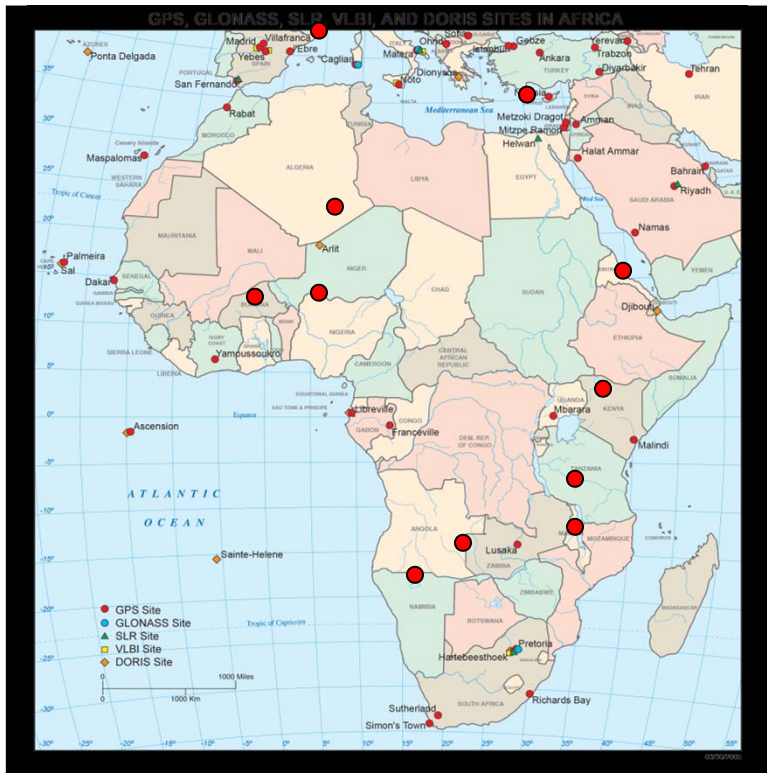


Organizational Structure



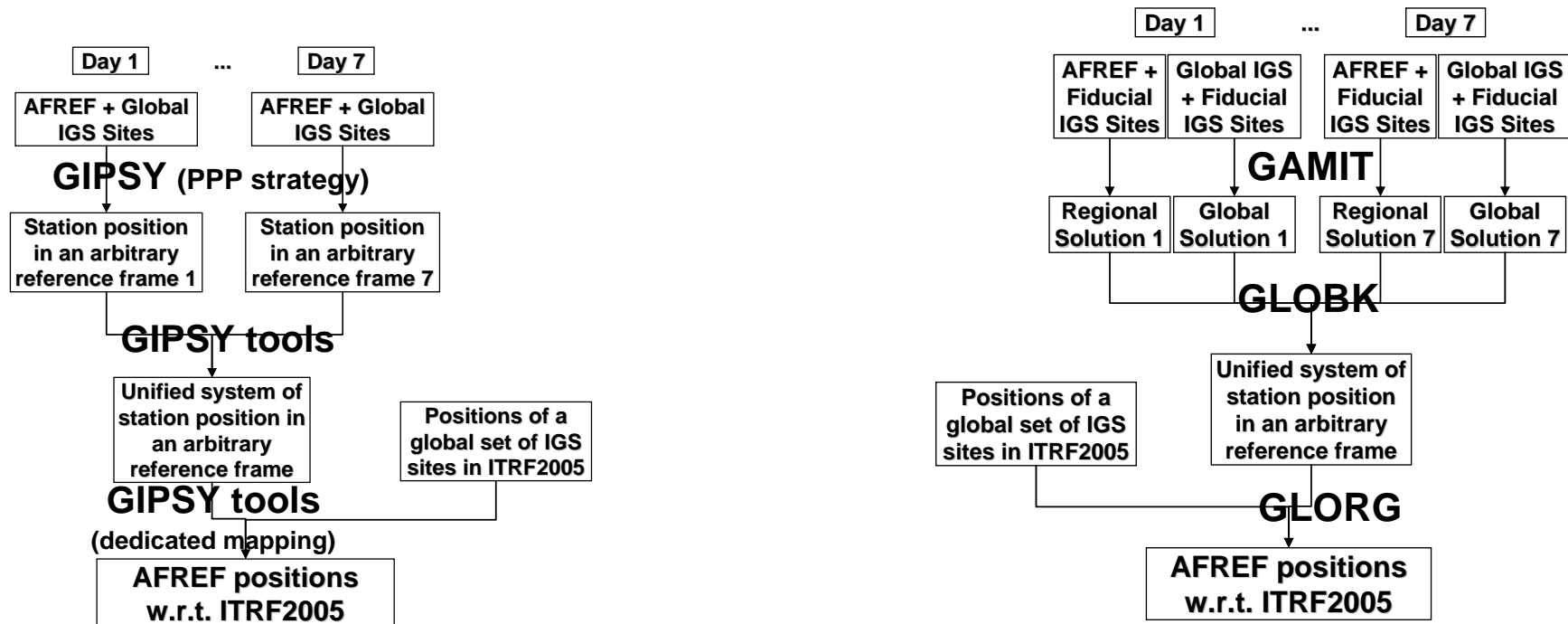
IMPLEMENTATION STRATEGY

- The establishment of a frame work of active GNSS stations

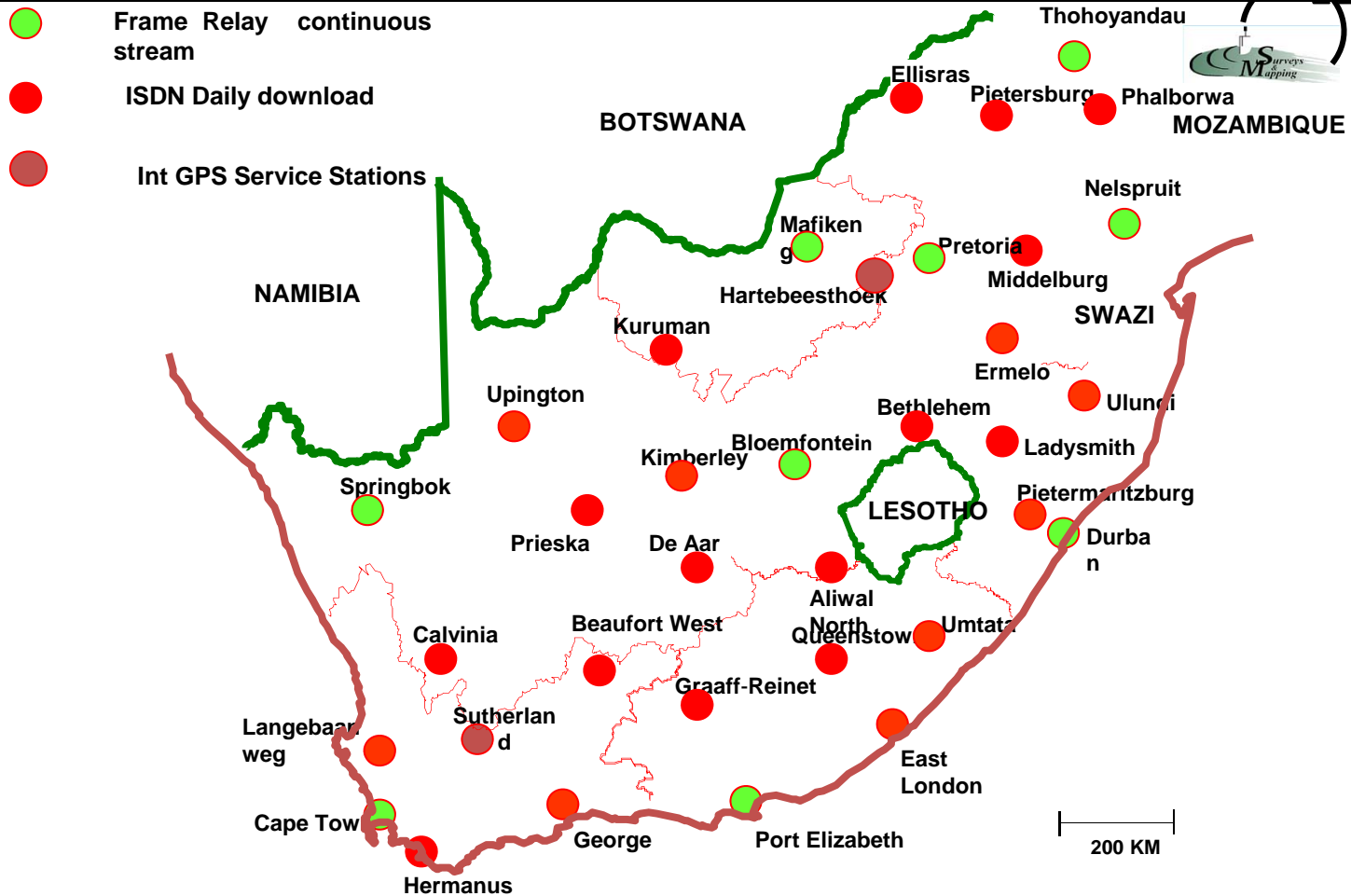
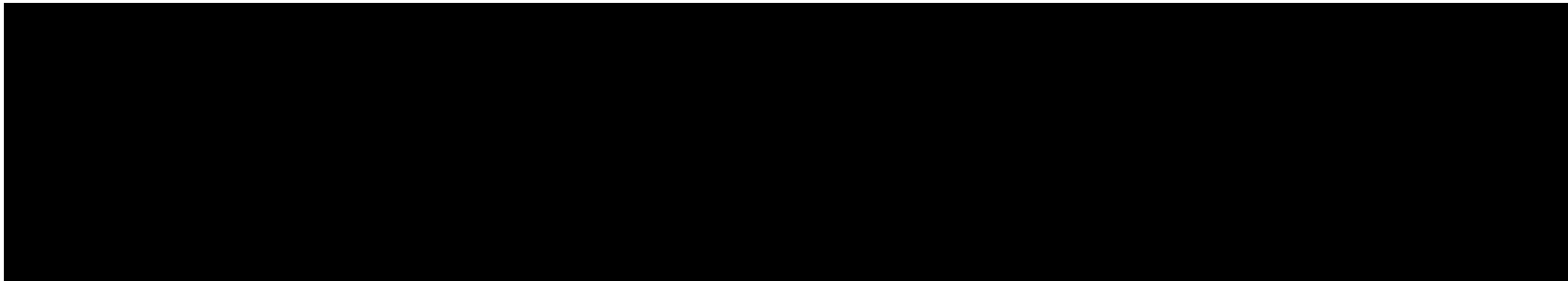


IMPLEMENTATION STRATEGY

- Computation of AFREF solution

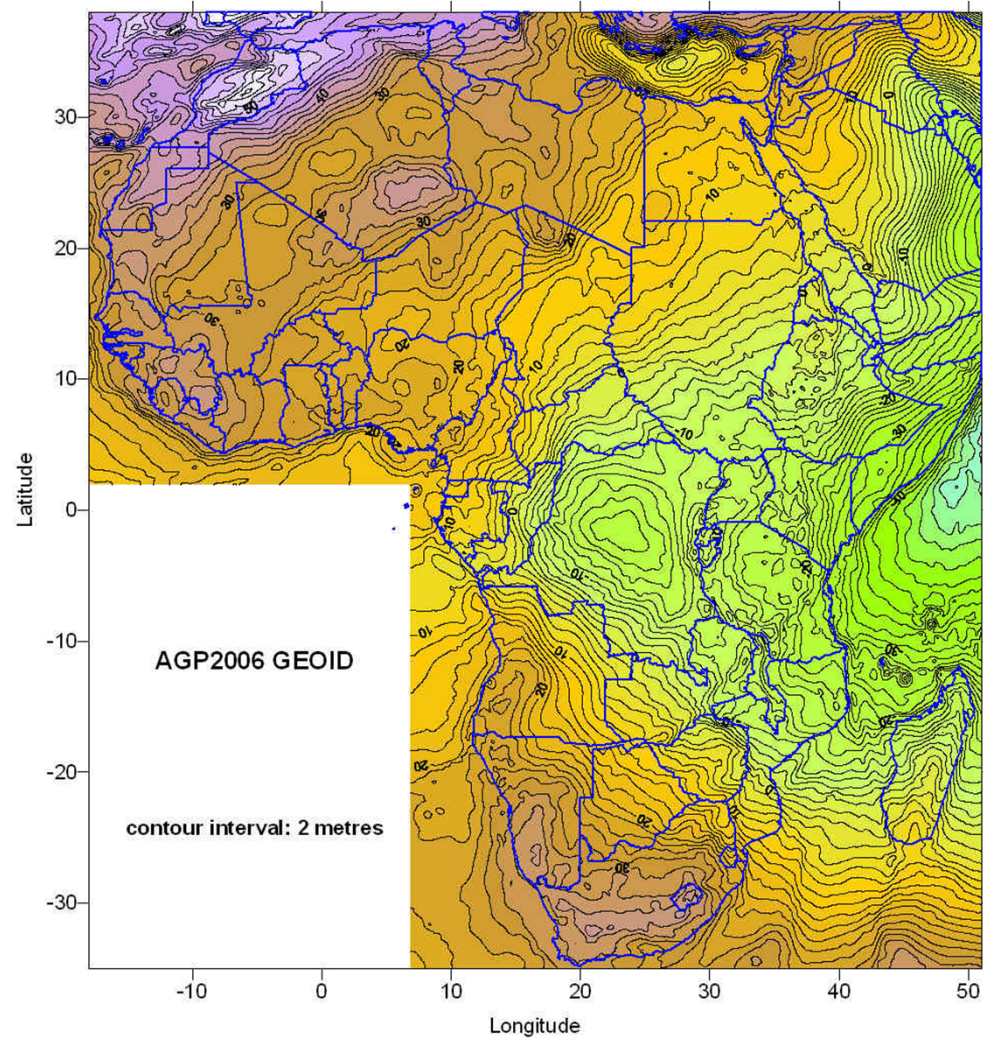


IMPLEMENTATION STRATEGY

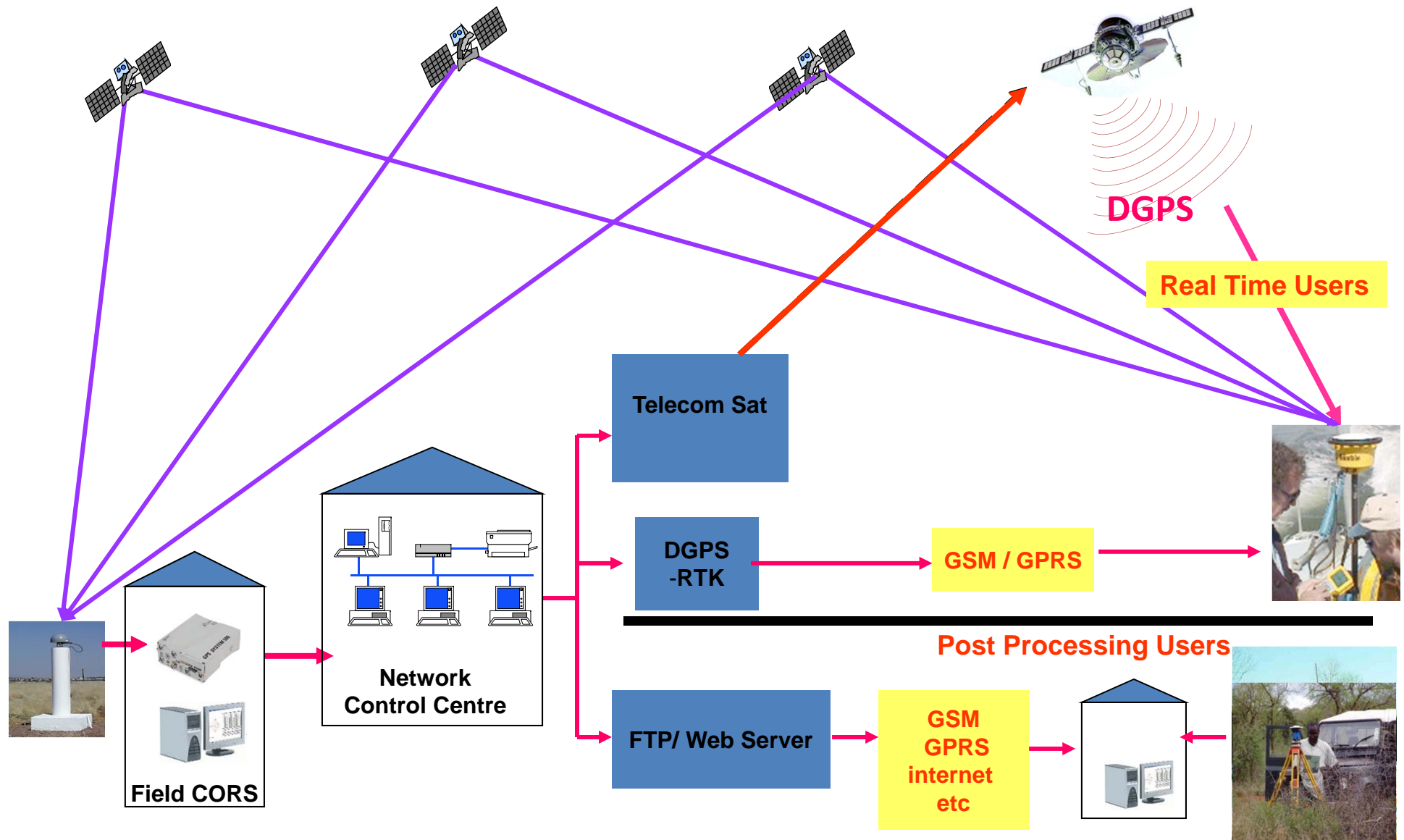


IMPLEMENTATION STRATEGY

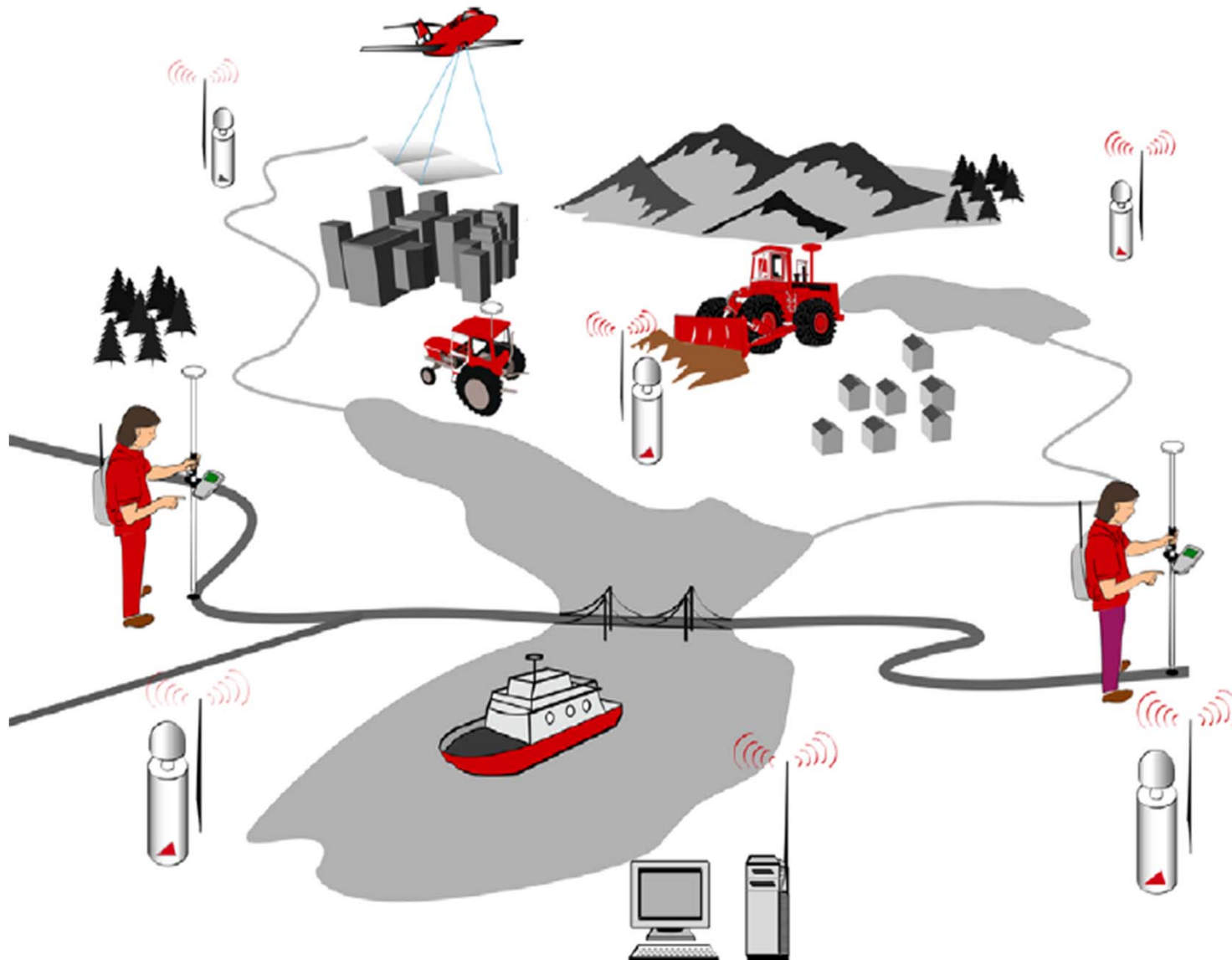
- The development of a refined geoid model for Africa



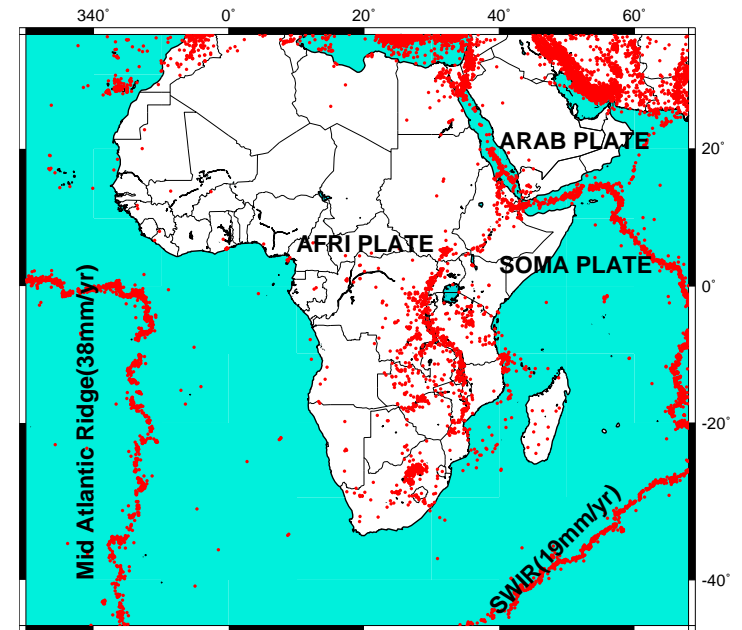
AFREF STRUCTURE ON REALIZATION



Applications



Applications in crustal dynamics



GPS data from AFREF base stations will be used to continuously monitor:

- Earth crustal movements
- Atmospheric physics
- Meteorological studies.

Required resources

- **Trained technical staff – 2 per station.**
- **Positioning equipment – GNSS receivers – USD 20,000 per station.**
- **Reliable power supply.**
- **Computing facilities.**
- **Communication facilities –Internet, VSAT, telephone.**



Present status

- **Call for Participation sent out (28 responses received)**

**CALL FOR PARTICIPATION
in the
UNIFICATION OF AFRICAN REFERENCE FRAMES
The AFREF Project
2005-2010**

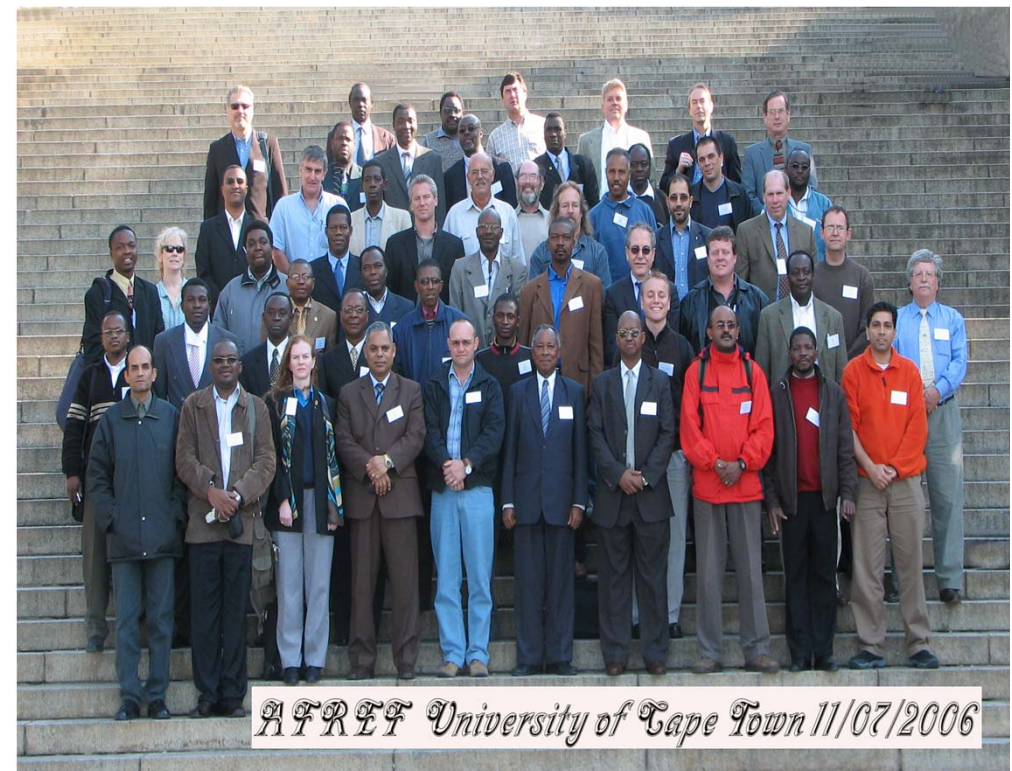
Committee on Development Information, Geo-
Information Subcommittee
(CODI-GEO)

United Nations Economic Commission for Africa (UNECA)
<http://geoinfo.uneca.org/afref/>

Endorsed by:

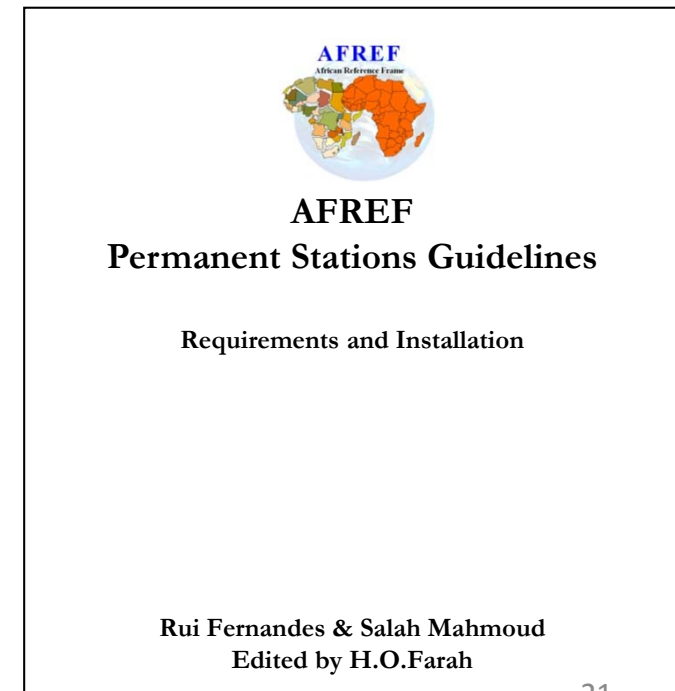
**International Association of Geodesy (IAG) International
Global Navigation Satellite System Service (IGS)
United Nations Office of Outer Space Affairs (UNOOSA)
Federation of International Surveyors (FIG)
August 2005**

First technical Workshops



Present status

- Two training courses held.
- Two Expert Group Meeting held
- AFREF Station Guidelines published.



Present status

- AFREF Web site established



<http://geoinfo.uneca.org/afref>

- AFREF quarterly Newsletter launched



AFRICAN GEODETIC
REFERENCE FRAME (AFREF)-
NEWSLETTER

Secretariat: Regional Centre for Mapping of Resources for Development (RCMRD)

AFREF News Letter

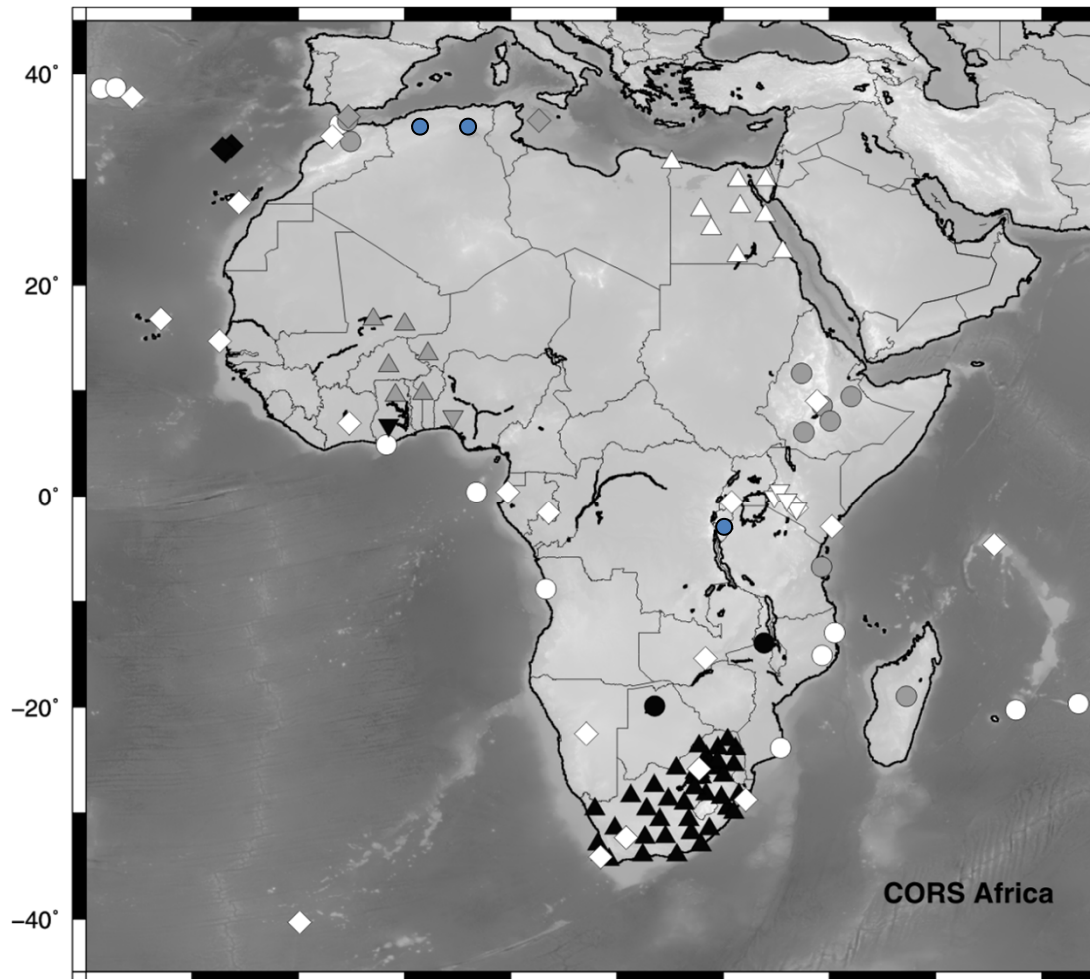
No.8

e-mail: afref@rcmrd.org

January 2009

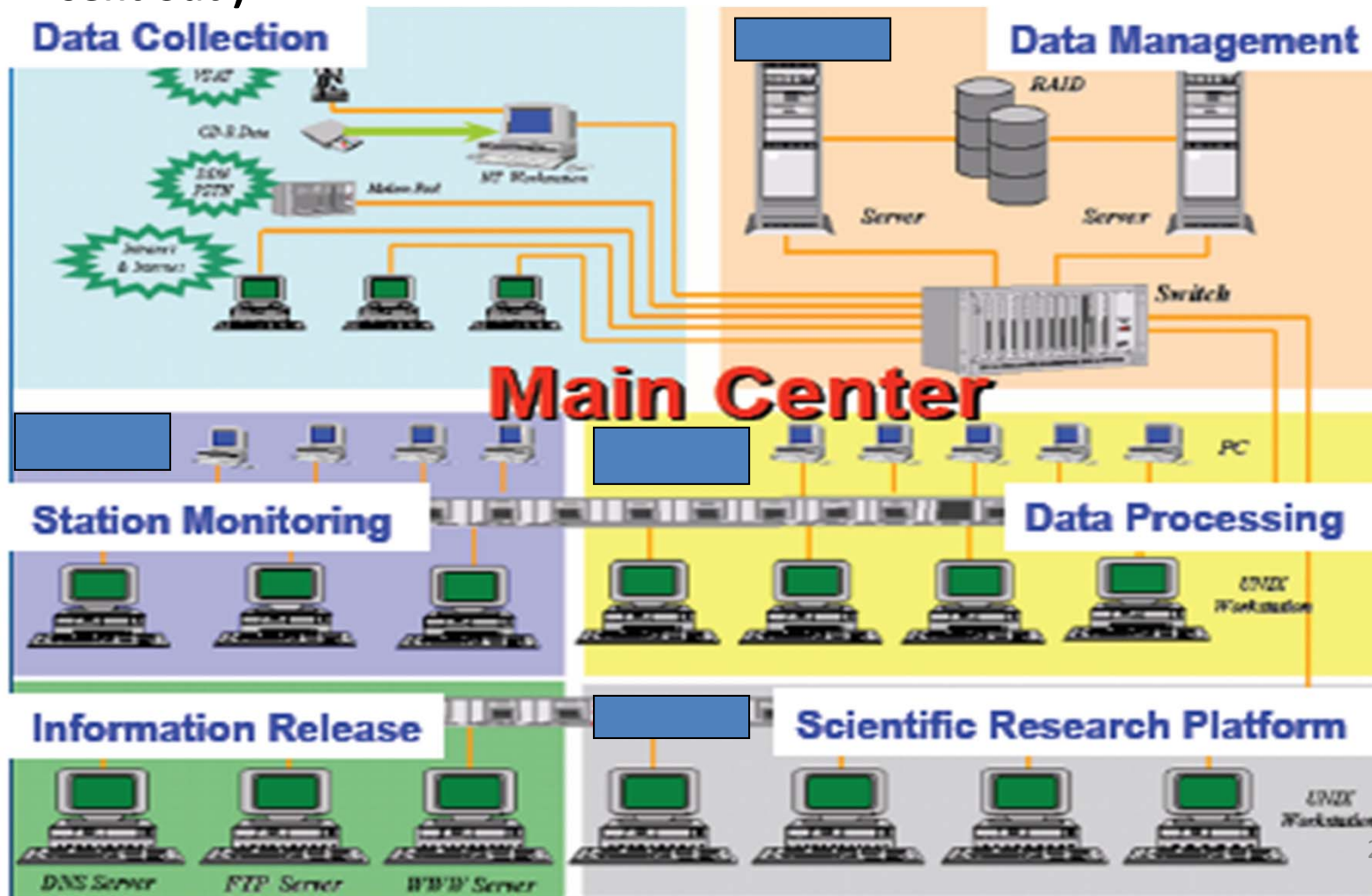
Present status

- 22 Countries have established GNSS permanent stations
- 50 permanent station are sending data to AFREF ODC



Present status

- One Operational Data Centre established
- Data Holding and Analysis Centers to be established (Cfp to be sent out)



Present status

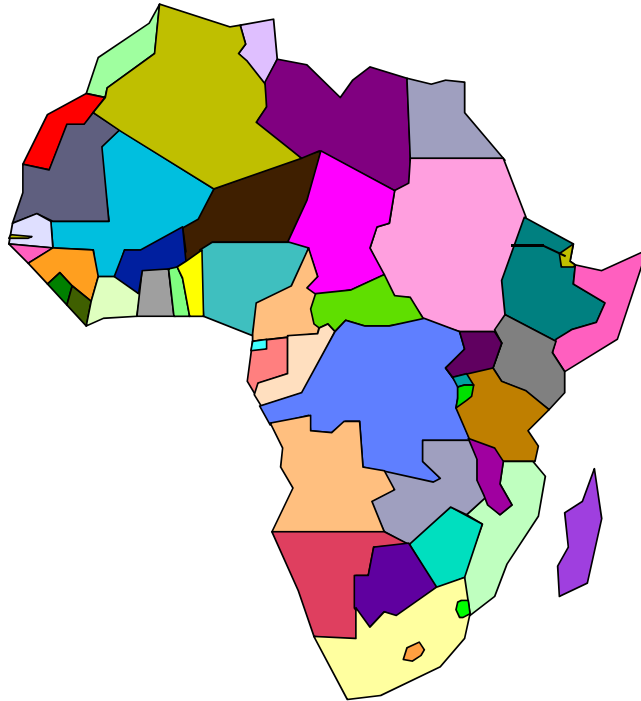
- ECA and AUC proposed implementation Plan approved in 2009
- New Management Structures to be put in place
- Coordination between partners and stakeholders to be formalized
- Capacity building programmes to be undertaken

Requirements to Move Forward

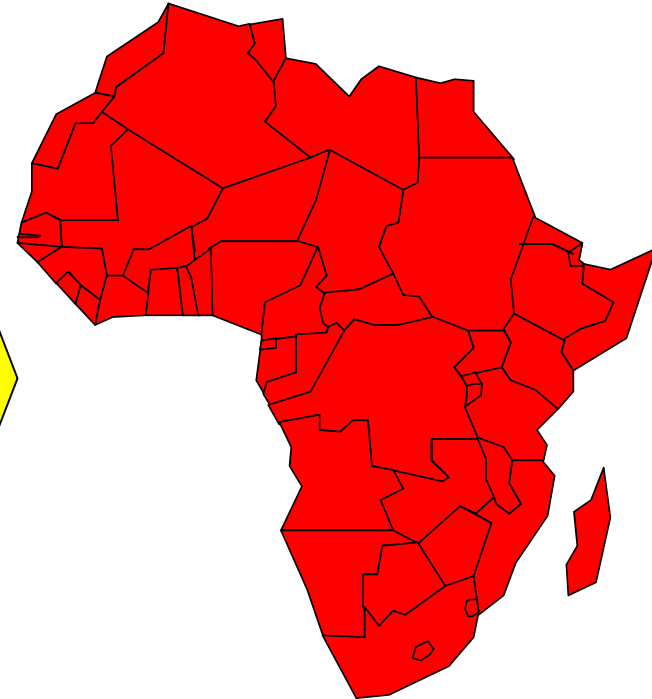
- **More Publicity of AFREF initiative.**
- **commitment from Countries thro' National Mapping Organizations .**
- **Capacity building – manpower and equipment at national level .**
- **Support from international partners.**
- **Build capacity in AFREF data holding & analysis centres.**
- **Compute first official AFREF Coordinates**



Non-uniform systems



Uniform system



**GNSS
+
ITRF**

THANK YOU

<http://geoinfo.uneca.org/afref>

