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Implementation of the African Geodetic Reference Frame (AFREF) Project Proposal

AFREF Project Proposal – Summary

Title:	Implementation of the African Reference Frame (AFREF)
Implementing agencies:	Economic Commission for Africa
Major partners:	Regional Centre for Mapping of Resources for Development (RCMRD) Regional Centre for Training in Aerospace Surveys (RECTAS) African Organization for Cartography and Remote Sensing (AOCRS) International Association of Geodesy (IAG) International GNSS Service (IGS) National Mapping Organizations
Development sectors:	Surveying and mapping Infrastructure development Science and technology
Execution period:	24 months
Estimated cost:	$1,001,000

The AFREF Concept

1. The African Geodetic Reference Frame (AFREF) was conceived as a unified geodetic reference frame for Africa, fully consistent with the International Terrestrial Reference Frame (ITRF), which will form the foundation of national and regional three-dimensional reference networks. AFREF will be composed of a network of control points where precise observations will be made and used to define an African reference frame that will produce the best filling datum for Africa. The density of the network will be such that positioning professionals (surveyors, engineers, environmentalists, agriculturalists, mineral prospectors, etc.) would always be within a reasonable distance of at least one such control point from anywhere in Africa. The relevant parameters of the network will be made freely available to practitioners.

2. AFREF will be based on current satellite positioning technologies, and will form the geodetic infrastructure for multinational projects requiring precise geo-referencing (e.g. three-dimensional and time-dependent positioning, geodynamic, precise navigation, and geo-information projects). Like other continental geodetic reference frames, it will be part of the global geodetic infrastructure. As such, it will be implemented and maintained in close cooperation with international partners with expertise and an interest in geodetic reference frames, notably the International Association of Geodesy (IAG), the International GNSS Service (IGS), and the United Nations Office for Outer Space Affairs (UNOOSA).

Justification and rationale

3. To be able to determine whether services such as land allocation and development permits, water connections, waste management, electricity and transportation, schooling and health provision, accessible markets, and security are being delivered properly to citizens, households and businesses, clear linkages must be established between the source of these services and the place where they are delivered. Therefore, all development projects, applications, services and products need to be geo-referenced. Such geo-referencing requires uniform coordinate systems defined by the geodetic reference frame.

4. So far, every African country has maintained its own national geodetic reference frame for producing maps and other geoinformation products. These reference systems are usually based on local origins or datums, which restrict their use to particular countries and make it difficult to accurately represent cross-border features on subregional maps. For example, roads, watersheds and ecosystem boundaries and wildlife reserves do not necessarily stop at national borders and may appear disconnected when national maps are joined together for regional planning and decision analysis. Work on transnational infrastructure projects is normally undertaken in sections and a uniform mapping surface is required to ensure that the sections are actually connected.

Figure 1. Yikes!!

5. All African countries have embraced global navigation satellite system (GNSS) technologies, particularly Global Positioning system (GPS), in the various geo-information applications, services and products. GPS positions are defined in the datum of the World Geodetic System of 1984 (WGS-84). This datum is also used for several international applications involving Africa. For instance, the International Civil Aviation Organization (ICAO) has adopted WGS84 as the system for specifying the absolute geographic coordinates of aerodrome reference points (ARP), various airport facilities and radio navigational aids. Yet these features need to be shown with other features on cadastral and topographic maps for national and local planning and service delivery. With the increasing use and application of GNSS, there is an urgent need to establish and determine the transformation parameters to relate positions derived with GNSS technologies in the global reference frame to other features in appropriate national mapping systems. By determining the translation parameters between existing traditional national reference frames and the ITRF, all legacy geospatial data and information based on traditional reference frames will not be lost or discarded. This implies determining the parameters for the best-fitting datum for Africa and establishing a network of points to realize the associated terrestrial reference frame – the twin objectives of the AFREF project.

Project objectives

6. The main objective of the project is to coordinate ongoing and new activities aimed at computing the parameters of an African geocentric datum, implementing and maintaining the AFREF network of points described above, and making relevant data freely available to users. As a first step, there is expected to be at least one IGS station in every country. When completed, it is envisaged that users anywhere in Africa would be at most 1,000 km from any such station, which that distance later falling to 500 km or less. Emphasis will be on developing and maintaining guidelines for reference stations and peripheral components and protocols for data collection and management; and strengthening the management structure and coordinating several relevant initiatives to increase the pool of stations available for positioning and other scientific uses.

7. The formal objectives of AFREF are to:

- Define the continental reference system of Africa; Establish and maintain a unified geodetic reference network as the fundamental basis for national three-dimensional reference networks fully consistent with the ITRF global reference frame.
- Realize a unified vertical datum and support efforts to establish a precise African geoid, in concert with the African Geoid project activities.
- Establish continuous, permanent GNSS stations such that each nation or each user has free access to, and is, at most, 1,000 km from such stations.
- Determine the relationship between the existing national reference frames and the ITRF in order to preserve the legacy geospatial data and information based on the existing reference frame.
- Provide a sustainable development environment for technology transfer, so that these activities could enhance national network and numerous applications with readily available technology.
- Assist in establishing in-country expertise for the implementation, operation, processing and analysis of modern geodetic techniques, primarily GNSS.

Ongoing activities

8. This proposal is not an entirely new project, but rather a revamping of an ongoing initiative. The concept of a unified reference frame for Africa has been recognized since the 1980s and the African Doppler Survey (ADOS) project was intended to provide it. The ADOS project ended in 1986 without fully achieving its objectives, mainly because of the difficulty of performing the simultaneous observations required by the Doppler Satellite technology used at the time.

9. However, the concept was kept alive mainly by the International Association of Geodesy (IAG) and the United Nations Office for Outer Space Affairs (UNOOSA). It was discussed in 2000 during the meeting of the Global Spatial Data Infrastructure (GSDI) in Cape Town. The African Organization for Cartography and Remote Sensing (AOCRS) conducted several workshops and meetings on the establishment of a North African Reference Frame (NAFREF).

10. In 2001, the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) established an Action Team on Global Navigation Satellite Systems (GNSS) to help improve the efficiency and security of transport, search and rescue, geodesy and other activities by promoting universal access to and compatibility of space-based navigation and positioning systems. The Action Team on GNSS (38 Member States and 15 inter-governmental and non-governmental organizations) recommended that an International Committee on GNSS (ICG) should be established to promote the use of GNSS infrastructure on a global basis and to facilitate exchange of information. This ICG finally became operational in 2006.

11. In 2002, one of a series of workshops on the use of GNSS technology in Africa organized by UNOOSA and the Government of the United States of America was held in Lusaka, Zambia. This workshop further highlighted the need for an African reference frame (AFREF) and its compatibility with GNSS technology. The workshop recommended that an African institution with an appropriate geoinformation mandate should take the lead in coordinating the project, which had hitherto been driven by IAG and UNOOSA. Following

the workshop, the Regional Centre for Mapping of Resources for Development (RCMRD), during the Conference of Ministers of its contracting members in Windhoek, Namibia, convened a preparatory workshop to define a uniform and modern coordinate reference system for the continent. The workshop participants started by reviewing past efforts to establish a unified geodetic datum for Africa before discussing the status of various geodetic projects in some countries in Africa. The outcome of the workshop was a declarative document called "Windhoek Declaration on an African Reference Frame", which outlined the concepts and principles of a native geodetic coordinate reference for Africa (the AFREF project).

The Steering Committee

12. In 2003, the Windhoek Declaration, together with the recommendations of the UNOOSA/USA Lusaka workshop, were submitted for adoption to the third session of the Subcommittee on Geoinformation of the Committee on Development Information (CODI-Geo), which is composed of heads of national mapping agencies. CODI-Geo adopted the two documents and set up a working group comprising the following:

1. Regional Centre for Mapping of Resources for Development (RCMRD), represented by the Director General, Co-Chair;
2. African Organization of Cartography and Remote Sensing (AOCRS), represented by the Secretary-General, Co-Chair;
3. Regional Centre For Training In Aerospace Surveys (RECTAS), represented by the Executive Director;
4. Representative of the North African Reference Frame (NAFREF): represented byTunisia, Head of National Surveys & Mapping Organization;
5. East African Reference Frame (EAFREF), represented by Tanzania, Director of Surveys & Mapping;
6. West African Reference Frame (WAFREF), represented by Nigeria, Surveyor-General of the Federation;
7. Southern African Reference Frame (SAFREF), represented by Namibia, Director of Surveys & Mapping;
8. Central African Reference Frame (CAFREF), represented by Congo Republic, Director of the Geographic Research and Mapping Centre.

13. This working group plus the Chair of the International Association of Geodesy, sub Commission on Reference Frames, Africa (SC 1.3d), constitutes the International Steering Committee on AFREF (ISCA).

Current status

14. A sparse of GNSS network continuous operating reference stations (CORS) has been established and is managed by some member States, IGS and other partners. This network includes at least one station in the following countries: Algeria, Egypt, Mozambique, Ghana, Kenya, Benin, Morocco, South Africa, Namibia, Zambia, Côte d'Ivoire, Uganda and Nigeria. Other countries such as Malawi, Angola, Mauritius, Cameroon and Nigeria are expected to establish CORS soon. Some data from the established CORS are already being received by the Hartebeesthoek Radio Astronomy Observatory (HartRAO) data centre in South Africa and the International GNSS Service (IGS).

15. While the Windhoek Declaration envisaged that the stations would be owned and managed by national authorities responsible for geodesy, it also recognized that some countries might need various forms of assistance to install and/or operate the stations. A call for participation was therefore prepared and distributed to various organizations, including national mapping organizations, universities, research organizations, GNSS hardware and software vendors and the donor community, inviting them to indicate the support they could provide to the AFREF project.

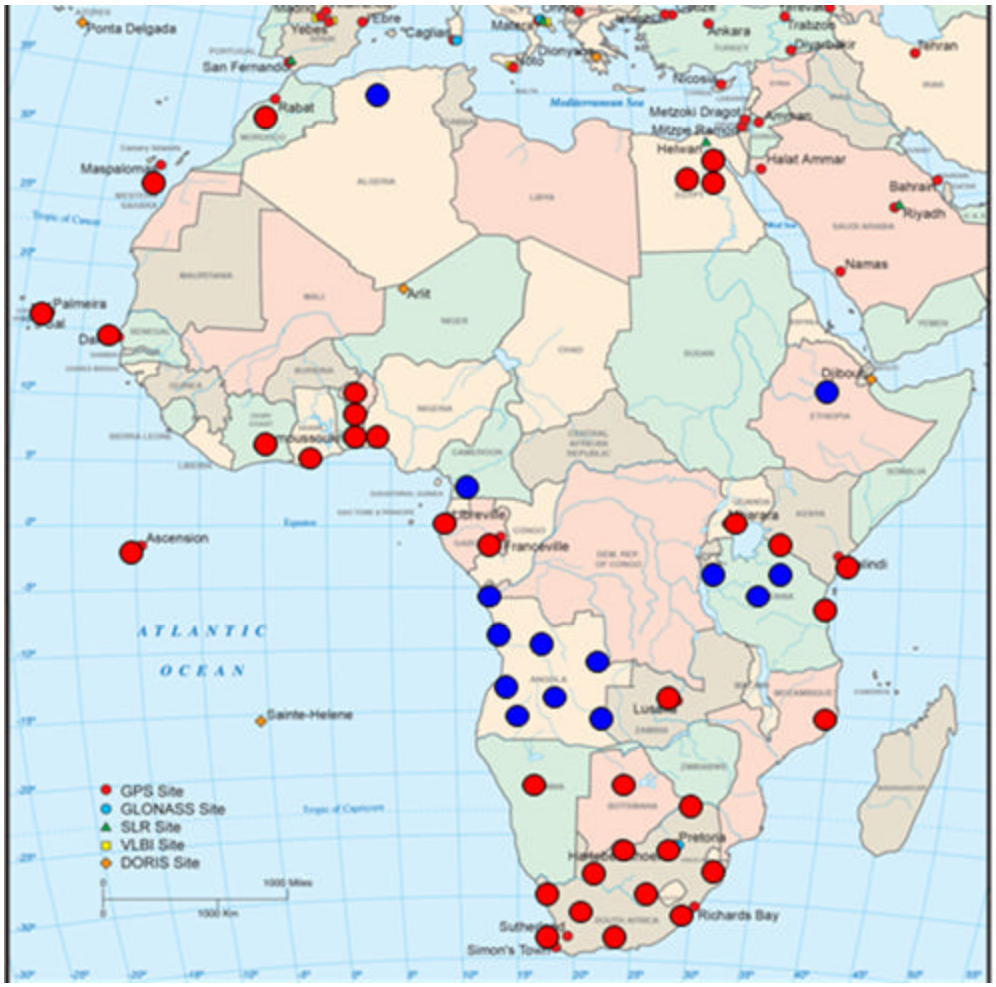
16. In response to the call for participation and contacts by members of the International Steering Committee, Leica and Trimble have donated three and five reference stations respectively. Each Leica system consists of a Leica GRX1200 Pro GG receiver, a Leica AT504 GG Choke Ring antenna and the Leica GPS Spider software and site server as well as the Leica GNSS QC software for permanent quality control and data analysis. Two Leica receivers have been installed at RCMRD and the Regional Centre for Training in Aerospace Surveys (RECTAS), while the third will be installed in Ghana. Each Trimble system consists of a Trimble® NetR5™ reference station with Zephyr™ Geodetic II antenna and Trimble® Integrity Manager™ software license; and real-time and post-processing modules supporting 10 reference stations. Two of these will be installed at the premises of the ECA subregional offices in Niger and Cameroon, the third will be installed in Botswana, and the location of the remaining two will be determined by the International Steering Committee.

Multi-disciplinary aspects of GNSS in Africa

17. Global navigation satellite systems (GNSS) were first introduced in the late 1960s primarily for navigation purposes. As the name of the first such system implies - the United States Navy Navigation Satellite System (US NNSS) - the system was primarily for military navigation applications. Since then, GNSS has become widely used by civilian users and scientists not only for navigation purposes but also for a wide variety of non-navigation applications such as geodesy, surveying, geophysics, meteorology, geohydrology, space weather, timing and disaster mitigation and monitoring. Although AFREF was originally established as a geodetic project, numerous non-geodetic organizations have installed GNSS equipment throughout Africa to serve their own observation needs for scientific and development purposes, resulting in duplication of effort and resources. The map in figure 2 shows the positions of some of the known or planned installations of GNSS equipment as at September 2007, and some of them are not purely for geodetic applications. On the map, red dots indicate established stations and blue dots indicate planned stations. However, the information shown thereon is not to be regarded as definitive, but merely as an indication of the increased density of permanent GNNS base stations. For ease of reference, only a representative sample of installed stations has been shown; for instance, there are seven stations in Benin and 44 in South Africa. There may also be other countries whose installed or planned stations may not have been counted due to a lack of coordination and information.

18. The installation of such equipment will no doubt be of benefit to AFREF, and the AFREF stations will be of benefit to the other projects. If all groups currently installing GNSS equipment in Africa could coordinate and collocate their installations with other instrumentation such and seismographs, ionosondes, tide gauges and meteorological equipment, the limited resources available for such installations could be used to increase the overall coverage of permanent GNSS reference stations for the benefit of all groups.

Figure 2: GPS, GLONASS, SLR, VLBI, and DORIS Sites in Africa



19. So far, ISCA has developed guidelines for permanent reference stations based on the IGS standards and organized several technical and capacity-building workshops, including a two-week training session on GNSS data processing held in Nairobi in 2007.

Planned Activities

20. As shown by the above discussion, the AFREF project is ongoing. However, it had previously only been in a demonstration phase showing its installation, operation, data dissemination and analysis capabilities. This demonstration phase was ended in 2007, and the project has now moved into the implementation phase. The activities to be undertaken in this phase are as follows:

1. **Organize regular management meetings of the Steering Committee.** The Steering Committee has been conducting its work mainly through electronic communication and occasional, opportunistic side meetings during workshops and geoinformation events. Though electronic exchanges have been found to be very useful and almost indispensable, there are issues that cannot be dealt with conclusively through virtual meetings and communication. The side meetings have also been useful, but most of

the time, only a few members of the Committee would be present at any one event, making it difficult to deal conclusively with issues. The result has been a backlog of pending decisions to be made. For effective coordination of the project, regular in-person meetings of the Steering Committee are required, say, semi-annually. For maximum effectiveness, it is also proposed that a dedicated AFREF network coordinator should be engaged to oversee the day-to-day activities of AFREF.

2. **Organize an experts' implementation symposium.** Though several technical workshops have been organized by the Steering Committee, a focussed implementation symposium of the experts and implementers is now necessary. The participants should include all the stakeholders and experts from Africa and outside, as well as national officials with a mandate to maintain the geodetic infrastructure of their countries, and African universities involved in teaching and research in geodesy and allied disciplines. The outcome of the symposium should include a definitive map and inventory of all existing GNSS stations and other geodetic infrastructure in Africa, showing their current operational status and their suitability for the AFREF initiative; a definitive map of the optimum locations of the first phase of the network stations and gaps; and the parameters of the best-fitting datum for the African Terrestrial Reference Frame, including the appropriate period for the first computation (e.g., 2009) and vendor-independent equipment specifications for standardization purposes.

3. **Organize policymakers' workshops.** The technical workshops organized by the Steering Committee have so far been targeted at professionals who are expected to participate in the establishment of the stations or computing of the data products. While this has reinforced the existing capacity for the technical implementation of the project, the policymakers who would make the ultimate decision to fund the project have not yet been addressed. An awareness campaign directed at policymakers is required to secure the necessary political and financial support for the project.

4. **Identify ongoing GNSS projects.** At the time of preparing the Windhoek Declaration, it was expected that national authorities would object to foreign organizations installing and maintaining GNSS stations in their sovereign territories. However, as the GNSS technologies have become widespread, those initial security worries have been allayed and countries have allowed several foreign entities to maintain GNSS installations for various scientific purposes. These include the International Heliophysical Year/Scintillation Network Decision Aid (SCINDA), the International Research Group in Geophysics: Europe – Africa (GIRGEA), the African Monsoon Multidisciplinary Analysis (AMMA), and the Millennium Challenge Account (MCA) projects. It is expected that the positioning and data reporting needs of some of these projects would be similar to those of the AFREF project, or if not, that the marginal effort required to make them compatible would be small.

5. **Develop a data contribution and dissemination policy.** An important aspect of the AFREF project is making the raw data from the stations available to the designated computing centres, and thereafter making the data products available to the community of users. A data sharing policy is necessary to spell out the type and standards of data required from the stations, the conditions for a station to contribute its data to the computing centre, and the procedure for processing and disseminating

the data to users. This will help reduce and even remove lingering reluctance to contribute data to the continental effort.

6. **Develop full participation protocol.** Given the national implementation/maintenance model, a protocol should be developed for countries, organizations and projects to have their stations included in the AFREF network Such a protocol should include specifications for the receivers and antennae, physical environment, data content and supply frequency, and minimum length of operation of the station. The protocol should provide for different levels of participation, from station maintenance and supply of data, through to complete computation and data dissemination. So far, RCMRD and HartRAO have been identified as two potential computing and data centres based on their facilities and experience. Once this protocol is finalized, a memorandum of understanding (MoU) would need to be signed between ECA and these facilities, as well as with others currently involved in different aspects of the AFREF project, to formalize and spell out their various roles.

7. **Convene a partners' forum.** It has already been recognized in the Windhoek Declaration that countries may require assistance to install and/or manage their stations. Accordingly, a partners' forum should be organized to bring together the potential contributors and beneficiaries of the assistance.

8. **Compute transformation parameters.** Once the first computation of the datum has been completed, parameters would need to be computed for transforming new GNSS observations and other geo-information products to the new system. The parameters would need to be computed for all the national reference frames currently in use, but only after national mapping organizations (NMOs) have conducted short-term GNSS campaigns to identify points whose coordinates are known in existing national reference frames. The NMOs will be totally responsible for the processing and computation of campaigns which will have to be used within their jurisdictions for the estimation of parameters for transformation to an ITRF reference frame. Emphasis in this activity for the AFREF project will therefore be on developing the methodology and continental standards and building the capacity to undertake such campaigns and to estimate transformation parameters and their use, with progress being reported through appropriate intergovernmental bodies.

Methodology, timing and cost estimate for the biennium 2008 – 2009

Activity and timing	Methodology and timing	Cost estimates
1. Steering Committee meetings • Ongoing	• Appoint AFREF network coordinator and small network management committee (two-three persons) • Agree on frequency and timing of meetings • Send notices and reminders • Service meetings and document outcome	• Travel and DSA for 10 participants for four meetings (two each in 2008 and 2009) **$120,000** • Two years salary for the AFREF network coordinator @ $1,000/month **$24,000**
2. Implementation symposium • Preparation: Qtr 1, 2008; • Symposium: Qtr 2, 2008	• Engage a consultant to prepare a research paper, with recommendations on the issues to be addressed • Prepare a task brief with details of the objectives of the symposium • Prepare vendor-independent specifications and CORS implementation guide (as input document for the symposium) • Distribute widely and call for abstracts • Organize symposium and document agreed parameters	• Four-month work for category B consultant @ $7,000/month **$28,000** • Travel and DSA for 53 national geodetic officials, average of $3,000 each **$159,000** • 20 Scientists and experts from universities and other research institutions @ $3,000 each **$60,000** • Interpretation and translation **$50,000**
3. Policymakers' workshops • Whole of 2008	• Prepare information booklet for policymakers of no more than five pages • Liaise with African Union Division of Science and Technology to include an agenda item on AFREF in meeting of Bureau of AMCOST • Two workshops for national officials that the heads of NMOs report to – one English-speaking, one French-speaking	• Printing of 500 copies of booklet **$5,000** • Travel & DSA for two experts or staff to attend two meetings **$12,000** • Travel & DSA for 53 national participants from member States **$159,000**
4. Ongoing GNSS projects • Qtr 2, 2008	• Prepare and disseminate a data collection form • Follow up with phone calls • Organize coordination meeting with heads of identified projects	• Postage and communication costs **$5,000** • Travel & DSA for 10 participants **$30,000**
5. Data policy • Qtr 1 – 2, 2008 **6. Participation protocol** • Qtr 1 – 2, 2008	• Review data policy from similar continental reference frame projects • Draft policy/protocol and validate at meeting of Steering Committee • Disseminate document	• Staff time
7. Partners' forum • Qtr 3, 2008 and Qtr 1, 2009.	• Prepare task brief and disseminate to potential partners • Follow up with phone calls • Invite national officials of potential beneficiary countries • Invite African experts • Document agreements and follow up on delivery of pledged support	• 2 x travel and DSA for about 10 national officials @ $3,000 each **$60,000** • 2 x travel and DSA for about 5 experts @ $3,000 each **$30,000**
8. Transformation parameters • **Qtr 4, 2009**	• Prepare and disseminate booklet • Organize validation workshop	• Travel & DSA for 53 national participants from member States **$159,000**
Grand Total (2008-2009)		**$1,001,000**

Role of the Economic Commission for Africa

21. The installation and continuous maintenance of at least one CORS facility in each African country requires the active participation of the national authorities responsible for mapping and geological/geophysical surveys. Though individual stations will be funded and maintained by individual countries, all national offices need to act collectively, due to the need for consensus on several issues discussed above. This group involvement is best realized through an established forum of the national offices and other stakeholders, as is supported by examples from other continents:

- The European Reference Frame (EUREF) is maintained in close cooperation with EuroGeographic – organization of the European national mapping and cadastral agencies (NMCA).

- The South American Geocentric Datum (SIRGAS – Sistema de Referencia Geocéntrico para America del fur) was defined and is being maintained in close cooperation with the Pan-American Institute of Geography and History (PAIGH).

22. There is no such pan-African institute or organization through which national mapping authorities can undertake such collective activity. The only forum that brings together heads of geo-information offices (mapping, remote sensing, cartography, spatial data infrastructures, etc.) is the Committee on Development Information, subcommittee on geoinformation (CODI-Geo, now CODIST-Geo). CODIST is the intergovernmental body that oversees and coordinate the ECA programme on harnessing information for development, which meets every two years.

23. The subcommittee on geoinformation performs the functions of the former United Nations Regional Cartographic Conference for Africa, and also fulfils the role of permanent committees on spatial data infrastructures that exist in other regions. It provides a forum for designated officials to meet and share lessons and ideas with one another. It also has the legislative function of proposing and adopting guidelines for harmonizing practice in Africa. CODIST-Geo has working groups that deal with very specific topics, one of which is the AFREF Working Group, which has been expanded into the AFREF Steering Committee, as discussed above.

24. CODIST-Geo is not a legal body or substantive entity and therefore cannot enter into agreements. As such, correspondence on AFREF issues are usually sent on behalf of the Steering Committee either by RCMRD as the secretariat of AFREF, or by the Geo-information Systems Section of ECA as the overall secretariat of CODIST-Geo. Legal agreements and memorandums of understanding are also signed with ECA. The programme of work of ECA for the biennium 2008-2009 includes a field project activity on AFREF, and as such more time and resources can now be devoted to the AFREF project than in past years. For example, until a decision is reached and resources allocated for the proposed AFREF Network Coordinator, ECA will assign one of its GIS Assistants to dedicate 50 per cent of her time on AFREF coordination. Eventually, when the coordinator position is established, ECA will provide office space and administrative support for the post.

Potential role of NEPAD and the African Union

25. The New Partnership for Africa's Development (NEPAD) is an economic development programme of the African Union (AU) which sets out the principles and priority areas for Africa's development. Many of the programmes of NEPAD and the African Union cannot be undertaken without adequate geo-information support. As already established, all geoinformation products need to be based on a uniform geodetic reference frame. AFREF, as a project to create this geodetic foundation, should therefore be aligned with the NEPAD objectives and priorities. Since the bulk of the work of establishing a geodetic datum and the associated reference frame derives from the physics and mathematics of the Earth, AFREF should therefore be aligned to the NEPAD programme on science and technology, as contained in the "Science and Technology Consolidated Action Plan," particularly Programme Cluster 4 on "Information and Communication Technologies, and Space Science and Technologies." The AU Commission has recently (April 2008) set up an "African Cluster on Science and Technology" (ACST) to coordinate activities of the CPA to eliminate duplication and focus efforts and resources towards accountable and successful implementation. ECA would discuss with the AU Commission's Directorate of Human Resources, Science and Technology to bring the activities of AFREF into the AMCOST structures through ACST, as part of the contribution of ECA to the United Nations Science and Technology Cluster, of which it is a vice-convener.

Expected outcomes

1. **Formalized coordinating arrangements.** A revamped or restructured management system with regular meetings would be established, still under the auspices of CODIST-Geo, but with additional reporting to the appropriate AU structures.

2. **Operational participation protocol.** A protocol detailing levels of participation would be adopted and signed by participating member States and other organizations and institutions. The protocol should include data sharing/contribution agreements, site maintenance responsibilities and data processing, archiving and information dissemination.

3. **Network of permanent GNSS reference stations.** The reference frame would be realized by a network of permanent GNSS reference stations maintained by NMOs and other organizations and projects that have signed the AFREF Operational Participating Protocol. Such stations will serve as reference stations for further network densification and short-term GNSS campaigns. A user anywhere in Africa should not be more than 1,000 km from any such station, with at least one in every country.

4. **An African continental reference frame.** A uniform reference frame would be established based on the International Terrestrial Reference Frame (ITRF) realized through observations derived from the network of permanent GNSS reference stations.

5. **Awareness among policymakers.** Policymakers responsible for science and technology, surveying and mapping, infrastructure development and other related fields would be made aware of the importance and role of the reference frame in their sectors, so that they will support the relevant national activities, both politically and financially.

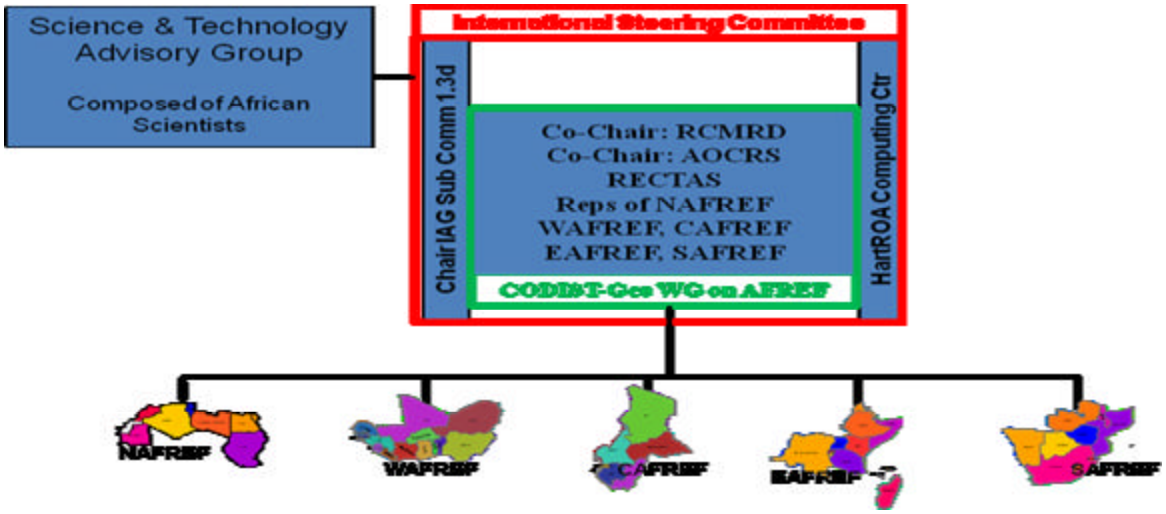
6. **Skills development and capacity-building.** Technical staff to be involved in the installation and maintenance of the reference stations would be trained and equipped with appropriate knowledge, skills and expertise to undertake the necessary activities.

7. **Partnerships.** Partnerships would be developed with other projects and initiatives for the installation of GNSS and other **observational** equipment to pool and share resources, data and information.

Funding issues

26. ECA has the general mandate to support geo-information activities in Africa, and has been working on the AFREF project as an extension of its work on spatial data infrastructures, because the geodetic reference frame provides the basis for geo-referencing of all services and development activities. AFREF has now been programmed explicitly, but only as a field project that is not included in the regular budget. Extrabudgetary resources are therefore being requested to fund the implementation phase that the project has now entered.

Current AFREF management structure



Proposed AFREF management structure