AFREF
African Reference Frame

AFRICAN GEODETIC REFERENCE FRAME (AFREF)-NEWSLETTER

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Introduction

The objective of this newsletter is to create a forum for discussions and exchange of information and experiences in the implementation of AFREF project. AFREF was conceived as a unified and modern geodetic reference frame for Africa to be the fundamental basis for the national and regional 3D reference networks fully consistent and homogeneous with the International Terrestrial Reference Frame (ITRF) Standards. When fully implemented, it will consist of a network of continuous, permanent GPS stations such that a user anywhere in Africa would have free access to the generated data and would be, at most, 1000km from such stations.

I am pleased to welcome you to the second edition of the AFREF newsletter. In this issue we report on the AFREF activities in Mozambique, Sao Tome and Principe, Malawi, Ghana and Algeria. There is a report on the discussions held during workshops by the International Association of Geodesy (IAG), the Steering Committee of the IAG's Global Geodetic Observing System (GGOS) project and the International Federation of Surveyors (FIG) held in October 2006 in Germany. We thank Mr. R. Wonnacott, Rui Fernandes and H. Oukachi for their contributions. We appeal to you all to send your reports on AFREF and related activities to us to be included in the next issues of this newsletter.

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AFREF Implementation Strategy

The implementation is expected to be carried out at national level preferably in collaboration with National Mapping Organizations. It is expected that AFREF shall be implemented at two levels. The first level will be composed of a network of CORS, spread over the African continent. Every African state is expected to establish at least one CORS station which will act as national connection to AFREF network. Data from such station will be forwarded to AFREF processing centers for the computation of AFREF.

The second level will be the establishment of GNSS based National geodetic networks. Networks of both active and passive stations are expected to be established.

Call for participation (CFP)

The AFREF Steering Committee is inviting organizations to participate by providing the resources to implement AFREF. The participation is open to a broad range of organizations such as National Mapping Organizations, Universities and research organizations dealing with earth and environmental sciences including geo informatics, seismology, geophysics, meteorology, GNSS hardware and software vendors and donor community.

Call for participation documents are available at AFREF web site **http://geoinfo.uneca.org/afref**

Continuous Operating Reference Stations (CORS) established in Mozambique and Sao Tome and Principe.

The Center of Geophysics of University of Lisbon, Portugal (CGUL), contributed to the densification of the AFREF network in 2006 by installing the first permanent GPS stations in two countries: Mozambique and Sao Tome and Principe. Both stations were installed in collaboration with the Hartebeesthoek Radio Astronomy Observatory (HartRAO) Space Geodesy Program of South Africa, and the National Mapping Agencies of Mozambique and Sao Tome and Principe.

The station in Mozambique is located in Nampula and was installed in the framework of a scientific project dedicated to study the geodynamics of the Nubia-Somalia tectonic plate boundaries. Nampula is considered to be located on the Somalian plate, which still lacks a dense coverage of GPS stations. The station is already being used by the Mozambican Mapping Agency (CENACARTA) as a reference station to connect their national network to ITRS.

The station in Sao Tome and Principe was installed in the framework of a project funded by the Portuguese Cooperation. It will constitute the fundamental point of the new national geodetic network of Sao Tome and Principe, which was already observed after the installation of the new station. The installed receiver, besides receiving the GLONASS signals, will also be able to track the new GPS signals, namely L2C and L5. Real-time data of this station is available via internet.

Installation of CORS planned in Malawi, Ghana, Angola and Mauritius

In 2007, CGUL will continue to carry out efforts to promote AFREF and to contribute for the densification of the available network, in collaboration with several other institutions (in particular, HartRAO). Currently, the location of a new station in Malawi was already identified in collaboration with the national authorities. The station will be installed soon. Three other stations, two in Mozambique and one in Ghana are also planned to be installed this year that will be collocated with tide-gauges.

Finally, there are additional plans to install stations in Angola, Mauritius and Morocco.

Further information can be obtained from Rui Fernandes (rmanuel@di.ubi.pt)

IAG, GGOS and FIG workshops in Munich Germany –October 2006

The week of 8 to 13 October 2006 was a busy one for the International Association of Geodesy (IAG), the Steering Committee of the IAG's Global Geodetic Observing System (GGOS) project and the International Federation of Surveyors (FIG). All three groups held workshops, symposia or conferences during this period in Munich, Germany. The Steering Committee for GGOS held a two day workshop. Commission 1, "Reference Frames", of the IAG organized a symposium on Geodetic Reference Frames (GRF2006) from 9 to 14 October 2006. The XXIII FIG Congress was organized during the same period.

GGOS Workshop

The Global Geodetic Observing System (GGOS) is to provide the geodetic infrastructure necessary to support the monitoring of the earth system and global change research through the bigger Group on Earth Observation (GEO) and the Integrated Global Observing Strategy Partnership (IGOS-P) projects. Under GGOS, the three pillars of geodesy, namely geometry and kinematics, earth orientation and rotation, and gravity field and dynamics, will be integrated to achieve the maximum benefit for the scientific community and society in general. (http://geodesy.unr.edu/ggos/ggosws_2006/).

The primary purpose of the workshop was to facilitate communication between the scientific users and those who will provide the geodetic products such as the IAG Services eg IGS, IERS, IVS, ILRS, BGI, IGeS etc. In addition to this, the workshop attempted to further develop the scientific role of GGOS to provide a consistent and fundamental geodetic frame of reference for the GEO family of programmes and projects. (http://geodesy.unr.edu/ggos/ggosws_2006/)

The workshop was divided into five sessions as follows:

- Status and Future of GGOS;
- The Science of Earth System Dynamics;
- Targeting the 0.1 ppb accuracy level for GGOS data and products;
- Towards a Combined Analysis of Geodetic Observations Across the Three Pillars of Geodesy; and
- Towards a strategy for the future GGOS.

The last session was essentially a summary of the four previous sessions in which rapporteurs presented summary reports on the position papers and discussions. The ideas emanating from the position papers and vigorous general discussion and debate will be woven into a larger guiding document for GGOS which the GGOS Steering Committee is currently preparing for publication in 2007.

GRF 2006 Symposium

The IAG Commission 1, "Reference Frames", organized the Geodetic Reference Frame 2006 (GRF2006) symposium with the aim to "report on latest results of the definition and realization of geodetic reference frames and to give the opportunity to present new ideas, discuss improved models and approaches" (http://iag.dgfi.badw.de/). The symposium was held from Monday 9 October until Friday 13 October 2006. Approximately 160 geodesists participated in the symposium.

The general topics covered in the symposium sessions were:

- Combination of space techniques;
- Interaction of celestial frames;
- Global reference frames and Earth rotation;
- Ionosphere modeling and analysis;
- Use of GNSS for reference frames;
- Global reference frames;
- Satellite altimetry;
- Vertical reference frames; and
- Regional reference frames.

Perhaps the most significant overall topic of the symposium was the presentation of the results of the new ITRF2005 reference frame. A number of papers throughout the symposium covered various aspects of the ITRF2005 which is derived from a combination of results from VLBI, SLR, GPS and DORIS. There was concern over the effect of the strengths and weakness' of each technique on ITRF and the quality of the co-location surveys between technique specific sites have on the combination of techniques. There was much debate on the influence of a scale drift in the SLR results and whether or not these should be included in solution of the ITRF2005 scale estimate.

The sessions on regional reference frames included papers from all over the world such as North and South America, New Zealand, Europe, Antarctica as well as a progress report on the AFREF project.

IAG/FIG Plenary session on Global Change

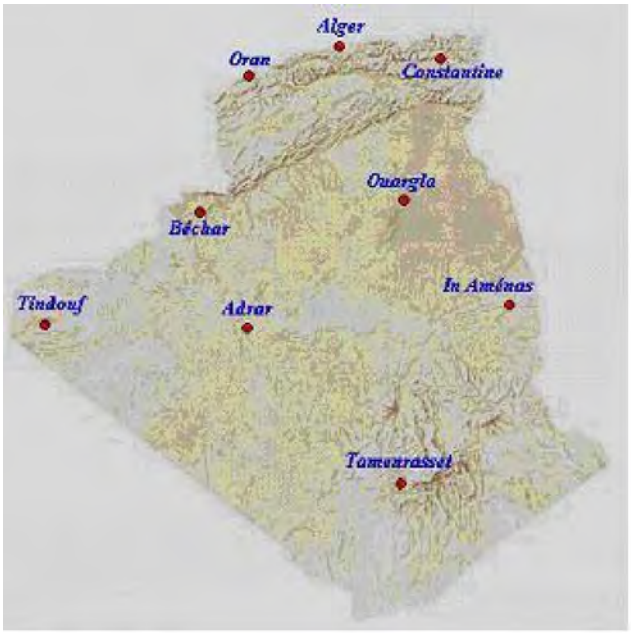
A combined IAG/ FIG plenary session on "Global Change" was held on the 12 October 2006 at the International Congress Centre in Munich. The general theme for the presentations was the contribution that geodesy and GNSS can make to measuring and detecting changes in and on the Earth and in the Earth's atmosphere. The presentations covered all aspects of the three pillars of geodesy.

General Comments

In all three of the above events, the paucity of well-distributed global coverage of geodetic observing techniques such as VLBI, SLR and GNSS was highlighted. Numerous presenters made these comments which are to be taken seriously. Of particular concern is lack of coverage in Africa. Apart from the primary objective of the AFREF project which is to create a uniform co-ordinate reference frame for Africa, a major outcome will be the establishment of a network of permanent GNSS base stations in Africa which will, to a certain extent, address these concerns.

Algeria Starts AFREF activities

The first phase of the project is to install five (05) continuous operating reference stations for data acquisition. These permanent stations are located at Algiers, Oran, Constantine, Ouargla and Tamenrasset. Algiers will also serve as data processing and archiving centre. This network will be reinforced by four (04) other stations located at Béchar, Amenas, Adrar and Tindouf. (see map opposite).The transfer of data from the stations to the processing center will be done by the establishment of interconnected network WAN or modems. Three GPS receiver (Aschtech micro Z) provided with Choke Ring antenna model and Bernese 5.0 and micro Mgr software have already been acquired.



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