



AFRICAN GEODETIC REFERENCE FRAME (AFREF)-NEWSLETTER

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

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AFREF Newsletter No.3

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May 2007

Introduction

The purpose of this newsletter is to create a forum for discussions and exchange of information and experiences in the implementation of AFREF. The objective of the AFREF initiative is to unify and modernize the geodetic reference frame for Africa and the national and regional reference networks. When fully implemented, it will consist of a network of permanent GNSS/GPS stations whose generated data would be freely available to users anywhere in Africa.

I am pleased to welcome you to read the third edition of the AFREF newsletter. In this issue we report on the AFREF activities in Namibia, Egypt, Ethiopia, Tanzania, Ghana, Kenya and Angola. There is a report of the AFREF steering Committee to the CODI V meeting and information on training courses. We thank Prof Salah, Dr. Wolabi, Dr. Eric Calais and Mr. Stephen Djaba 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 which is scheduled to come out in September 2007.

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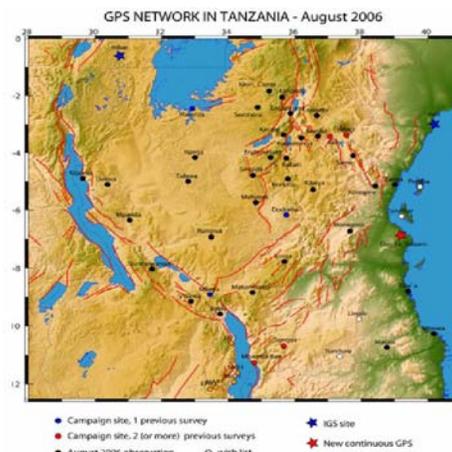
AFREF Permanent Stations Guidelines Released

A document prepared by the AFREF Scientific Advisory Group was released for use by participants in AFREF. The document describes the necessary requirements and procedures that should be considered by interested organizations in order to qualify their stations to the part of the AFREF network. It covers both installation and operational aspects that should be considered during the planning of a new AFREF station or submission of data of an existing station .

This document is mainly based on the IGS guidelines (<http://igsb.jpl.nasa.gov/network/guidelines/guidelines.html>) since new AFREF stations will also qualify to be part of the IGS network. The document can be obtained from the AFREF website <http://geoinfo.unece.org/afref> or at <http://www.rcmr.org>. We thank Prof. Salah Mohamoud and Prof. Rui Fernandez for preparing the document.

Tanzania Starts AFREF Implementation

Purdue University, in collaboration with NASA/JPL and the University College for Land and Architectural Studies, Dar es Salaam (and with support from UNAVCO) installed a continuous operating GPS station in Dar es Salaam, Tanzania, in August 2006. Data is freely available on the UNAVCO data server (www.unavco.org). Two additional stations are planned in Tanzania over the next 2



years in Mbeya and Dodoma, collocated with broad band seismic sites.

With the additional collaboration of the Department of Geology, University of Dar es Salaam, and the Tanzania Department of Survey and Mapping, a 35 point survey network was established and observed for the first time in August 2006. Subsequent observations of the network will take place in 2008 and 2010 to determine reliable positions and velocities. This network also constitutes the new first-order GPS network for Tanzania. Further details can be obtained from Dr. Eric Calais.

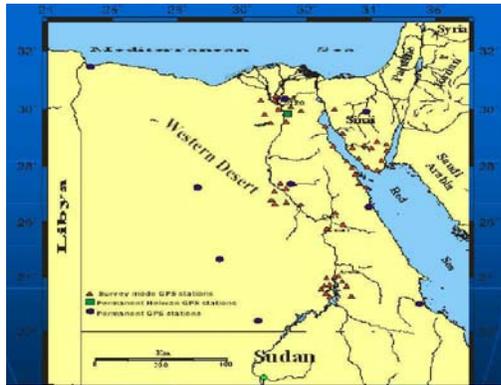
IGS Station Starts Operations in Namibia

An AFREF station has started operations in Windhoek. The Continuous Operating Reference Stations (CORS) is registered with the International GNSS Service (IGS) under the name WIND. The station is a concrete pillar equipped with Ashtec Z12 receiver, choke ring antenna and radom. The station records observations at 30 seconds epoch rate. User can freely access the data from the IGS web site (<http://igsb.jpl.nasa.gov/>). Real time data is also available at the web site <http://www.igs-ip.net/home>. For more information please contact Dr. Karim Owolabi (labi@mweb.com).

Egypt Establishes a CORS Network

A network of nine CORS has been established by the National Research Institute of Astronomy and Geophysics (NRIAG) in Egypt. Five of the stations are already operating while the other four are currently being installed. Further information can be obtained from Prof. Salah Mohamoud (salahm@nriag.sci.eg).

We are also pleased to report that the Survey Research Institute in Giza, Egypt, now contributes to Real-time data to IGS. Thanks to the efforts of our colleagues, a GNSS data stream 'GIZA0' is continuously uploaded to the web site <http://www.igs-ip.net/home>.



RCMRD- NASA Agreement Signed

An agreement between Regional Centre for Mapping of Resources for Development (RCMRD) and National Aeronautical and Space Agency (NASA) was signed on 6th February 2007. NASA and RCMRD agreed to cooperate in space geodetic research in recognition of the fact that geodetic networks are vital for understanding global change phenomena, assessing natural hazards, providing support for local geodetic control and supplying ground support to space missions.

As part of this cooperation, NASA and RCMRD will establish permanent Global Positioning System (GPS) ground stations in the eastern Africa region. The cooperative support of one or more permanent GPS stations by NASA and RCMRD will provide useful geodetic reference points in region. The inclusion of these stations within the global geophysical network will significantly improve the accuracy of the global and regional geodetic measurements. The objective of this cooperation is also to encourage scientists to develop joint research programs based on local network data along with geodetic data available from the global networks.

Seminar on Installation of GNSS permanent network held in Angola

The Seminar was organized by the Cadastral Geographic Institute of Angola (IGCA) and was held in March 2007. The seminar was opened by the Angolan Minister of Urbanization and Environment. The Minister informed participants that there was a plan to install a network of

reference stations based on GNSS in Angola. The aim he said, was to adapt a unique geodetic reference frame for Africa which is linked to the International Reference Frame. He added that the utilization of the network will also be useful for the definition of the limits of the country's maritime and land boundaries. (Source: Angola Press Agency and GSDI Africa Newsletter).

One CORS Established in Addis Ababa, Ethiopia

The Geophysical Observatory of Addis Ababa University (GOA), and the Institute of Physical Geodesy (IPGD) of Darmstadt University of Technology Germany, signed a memorandum of understanding to install a permanent GPS tracking site at the GOA ground in Addis Ababa. The station has already been installed and is operating well. It is intended to integrate this station into the AFREF Project and to submit the data to the IGS. Real-time data is available at the web site <http://www.igs-ip.net/home>. For more information please contact Dr. M. Becker (becker@ipg.tu-darmstadt.de).

AFREF Steering Committee Report at CODI V meeting

The Chairman of AFREF Steering Committee, Dr. W. Ottichilo presented a report on AFREF on 30th April 2007 during CODI V meeting held in Addis Ababa, Ethiopia. The report highlighted AFREF activities during the period 2004-2006. The main activities during the reporting period were creating awareness and requesting organizations to join the AFREF project, technical workshops and preparation of technical documents for the implementation of AFREF. A web site for AFREF was created in May 2006 by UN-ECA. The web address is <http://geoinfo.uneca.org/afref>. All papers and presentations relating to AFREF and the Call For Participation documents are available on this web site.

The demonstration phase of AFREF has already started. The objective of this phase is to show the installation, operation, data dissemination and analysis capabilities. The following countries have already established at least one CORS; Algeria, Egypt, Mozambique, Ghana, Kenya, Benin, Morocco, South Africa, Namibia, Zambia, Ivory Coast and Uganda. Countries that plan to establish CORS in 2007 are Malawi, Angola, Mauritius, Cameroon and Nigeria. Some data from the established CORS is already being received by HarTRAO data Centre in South Africa and the IGS. The Scientific Advisory Group of AFREF will start analyzing the data received during the demonstration phase. The next phase is to densify the CORS and realize the Africa Reference Frame that can be adapted by African Countries.

CORS Established at RCMRD

In March 2007, RCMRD established the first permanent reference station in Kenya as part of the AFREF initiative. The Minister for Natural Resources, Environment and Lands officially launched the station. During the ceremony the Minister stated "As we move toward regional integration and adopt regional approaches to peace and security, environmental management, trade and industry, we require maps that are accurate- both within each country and also across national boundaries. This will now be possible through the establishment of a common geodetic reference frame".

Leica Geosystems supports the AFREF initiative with both its knowledge, and financial sponsorship by donating the complete system at RCMRD. The 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 quality control and data analysis.

Mr. Joel van Cranenbroeck, Business Development Director GNSS at Leica Geosystems says: "AFREF will serve both the sub-Saharan region and the international community. It will increase capacity, modernize and harmonize geodetic reference networks in the country, thus strengthening survey work and providing accurate data to support the private sector as well as business and policy makers. As a global acting company, it is within our interest to help establish a geodetic network for Africa with the most advanced technology!"



AFREF GNSS Station at RCMRD,
Nairobi Kenya

The station, named RCMN, produces both GPS and GLONASS daily data and Real-Time GNSS Multi-Stream NTRIP data. The daily RINEX data is available at IGS data centers including HARTRAO(South Africa); <ftp://geoid.hartrao.ac.za/rinex/>, CDDIS(USA); <ftp://cddis.gsfc.nasa.gov/gps/data/>, IGN(France); <ftp://igs.ensg.ign.fr/pub/igs/data/>, and KASI(Korea); <ftp://nfs.kasi.re.kr/gps/data/> among others. The daily and 6 hourly RINEX data files are also available from RCMRD AFREF site; www.rcmrd.org/AFREF_DATA/. Real-Time data is available at the web site <http://www.igs-ip.net/home>

Two CORS Established in Ghana

Two CORS stations are now operating in Ghana. There are plans to have a third one installed in the northern part of Ghana. There are also discussions under way with Sokkia company for support to install one CORS each in Senegal, Burkina and Nigeria. The data from the two stations in Ghana can be accessed freely from the following sites:

1. <ftp://80.87.88.56> user name is free and password is also free
2. <ftp://83.229.103.138:8080> user name is admin and password is admin123

The data from the stations are under test but can be used for studies and projects. If you have any suggestions please do not hesitate to forward them to Mr. Stephen Djaba(stephen@ghana.com)

AFREF and GNSS data processing Training to be held at RCMRD, Kenya

A two-week AFREF and GNSS data processing training will be held at RCMRD from 30th July 2007 to 10th August 2007. The course will be conducted jointly by RCMRD and the Center of Geophysics of the University of Lisbon, Portugal.

The purpose of the course is to provide technical skills in base station installation, data handling and dissemination and precise analysis using scientific GNSS processing software. The target group are Land surveyors, Geodesists, Engineers, Researchers and Cartographers from African countries with some experience in Global Navigation satellite System (GNSS) technologies. Tuition is free but participants have to meet their travelling and accommodation costs.