

Joint UN/USA GNSS Meeting, December 2003:

Working Group on Surveying, Mapping and Earth Sciences

Chair: I. Fejes (Hungary), co-chairs: W. Martinez-Dias (Colombia), R. Moyo (Zambia), R. Neilan (USA), Chee Hua Teng (Malaysia),

Introduction.

In the first part of the report 16 recommendations were made and were arranged in 3 categories: Projects (4), Standards (4), and General Policy (4). Part of these proposals were made by the expert meeting in 2002 but some new ones were added according to the responses of the follow up survey by OOSA

In the second part of the report proposals for specific actions for the UN OOSA are listed. These were the direct outcome of the working group meetings where teams for the regional projects were set up. The team leaders were for Africa - Mr. R. Moyo, for CE-Europe - Prof. G. Milev, for South America - Mr. Martinez- Dias and for the Asia-Pacific region Mr. Chee Hua Teng. In this section 8 recommended actions are listed which are related to the recommendations in the first section but were worked out in more detail according to the guidelines given by OOSA.

The attendance of the WG meetings was high, occasionally reached 20 participants or more. Interactions and feed back were on very high level.

The WG report

Part 1

The working group reviewed the survey report and the earlier recommendations made by the Expert Meeting in 2002. After rearrangements reformulations and additions the WG agreed upon the following

RECOMMENDATIONS

Recognizing, that GPS based ground geodetic networks (reference frames) are the backbone and basic preconditions of most GNSS applications, not

only in the area of surveying, mapping, earth sciences, but also transport, environmental protection, agriculture and other areas

and

recognizing that regional development of such networks (reference systems, e.g. ETRS89) precisely tied to the ITRF should be given priority

The support of the following projects and actions are recommended

1. Projects

- a. Establish a permanent continental reference system for Africa, AFREF, consistent with ITRF to achieve a unified spatial reference frame, including geoid determination, for Africa, to aid the implementation of national and regional socio-economic development programmes under the NEPAD initiative.
- b. Develop integrated DGNSS "full scale accuracy, multifunctional" infrastructures with well-defined unified standards on regional levels. Establish the European Position Determination System's (EUPOS) active reference stations to allow the large variety of users to determine their position with high accuracy in real time and post-processing.
- c. Densify the Continuous Operating Reference Stations (CORS) for the SIRGAS area (the Americas)
- d. Ensure all countries in the Asia Pacific region participate in the Asia Pacific Regional Geodetic Project (APRGP) under the Permanent Committee for GIS Infrastructure for Asia and the Pacific (PCGIAP).

2. Standards

- a. Develop and use co-ordinate systems consistent with the International Terrestrial Reference Frame (ITRF)
- b. Ensure Spatial Data Infrastructures (SDI) supported by consistent geodetic reference frames enabled by GNSS
- c. Protect GNSS frequency bands, monitor and report harmful interference

- d. Support regional collaborations and projects on precise geoid determination and unification of levelling networks using GPS technology

3. General policy

- a. Establish coordinating bodies on GNSS applications on regional/national levels.
- b. Establish regional/national plans for GNSS infrastructure and applications.
- c. Coordinate national plans with regional and global GNSS initiatives and projects. Participate in regional GPS networks and developments.
- d. Governments should take the responsibility for and support the design, development and operation of the ground based GNSS infrastructure on national levels

Part 2

Recommended UN OOSA actions

1. In relation with AFREF project:

- a. Support five (5) sub-regional and one (1) regional (Africa) preparatory and technical meetings on the AFREF project, to encourage and sensitize all African countries to participate in the AFREF project activities. It is recommended that the preparatory and technical meetings take place during 2004. Following the above meetings, it is also recommended that five (5) short-term training courses be organized and conducted for geodesists to be involved in the AFREF project implementation.
- b. Technical and financial assistance will be required for the AFREF project for project components/activities:
 - Preparatory and Technical Meetings at regional and sub-regional levels
 - Short-term training Courses
 - Establishment of permanent GPS observation stations;
 - Acquisition of telecommunication facilities and logistics; and
 - Establishment of data processing, archival and dissemination centres.

A detailed technical proposal and budget for the AFREF project is proposed to be prepared jointly by Economic Commission for Africa (ECA), the Sub-regional centres in collaboration with UN OOSA, after the approval of the recommendations for UN OOSA Actions.

The sub-regional Centres identified to participate in organization of the above activities are as follows:

- Regional Centre for Training in Aerospace Surveys (RECTAS), Ile-Ife, Nigeria (for West and Central African sub-regions);
- African Organization for Cartography and Remote Sensing (AOCRS), for North Africa sub-region, and
- Regional Centre for Mapping of Resources for Development (RCMRD), Nairobi, Kenya (for East and Southern African sub-regions).

The target audiences for the intended activities shall include at least two (2) participants from national mapping agencies and/or other specialized institutions.

c. Technical and collaborative assistance is also sought from international geodetic and scientific organizations such as:

ICSU, IAG/IGS, NIMA, IGN, DGFI, HartRao and other international geodetic and scientific institutions/organizations to be identified.

	<u>Project Component/Activities</u>	<u>Responsible Organization</u>	<u>Contact Person</u>	<u>Address</u>
1	Regional Coordination of Preparatory and Technical Meetings	UN Economic Commission for Africa, Addis Ababa, Ethiopia	Ms. Karima Bounemra Ben-Soltane, Chief	P.O. Box 3001 Addis Ababa, Ethiopia Tel.: 251-1-51-08-14 Fax: 251-1-51-05-12 Email: bounemra.uneca@un.org
2	Sub-regional Coordination Meetings, training & project activities	Regional Centre for Mapping Resources for Development (RCMRD) for East and Southern Africa sub-regions	Dr. W. K. Otichillo, Director-General	RCMRD, P O Box 18118, Nairobi, Kenya Tel. + 254 20 860654 Fax. + 254 20 802767 Email : rcmrd@rcmr.org Nairobi, Kenya
		Regional Centre for Training in Aerospace Surveys (RECTAS) for West and central Africa Sub-regions	Dr. J. Kufoyini Director-General	RECTAS, Obafemi Awolowo University, Ile-Ife, Nigeria
		African Organization for Cartography and Remote Sensing (AOCRS), for North Africa sub-region	Mr. Muftah Youness Director-General	BP 102 - Hussein Dey - 16040 – Alger – Algérie Tel. + 213 21 23 17 17 Fax.+ 213 21 23 33 39 Email : oact@wissal.dz
3	National Coordination of project activities	National Mapping agencies/ space agencies	Director-Generals	All African Countries
4	Technical Support to meetings, training & project activities	IAG/International GPS Service (IGS)	Dr. Ruth E. Neilan, Director IGS Central Bureau	C/o JPL, MS 238-540 4800 Oak Grove Drive Pasadena, CA 91109 USA Email: Ruth.neilan@jpl.nasa.gov
5	Technical Support to meetings, training & project activities	Other International Geodetic and Scientific Organizations		
6	Overall facilitation, technical and financial support	UN OOSA	Director, UN OOSA	Vienna, Austria

7	WG – Suverving, Mapping & Earth Sciences AFREF sub WG members 8-12 Dec. 2003 UN Vienna Workshop Commitment Person	Mr. R M Moyo, Zambia Survey Department, Zambia	P O Box 50397 Lusaka, Zambia Telefax +260 1 253640 Email: rmmoyo@zasurvey.org.zm
		Ms. L Rasmy, Royal Center for Remote Sensing, Morocco	Avenue Allal El Fassi, Hay Riad, Rabat-Morocco Tel. +212 37 71 54 49 Fax. +212 37 71 14 35 Email: rasmy@crts.gov.ma
		Prof. S Mahmoud, National Research Institute of Astronomy and Geophysics, Egypt	Helwan, Cairo, Egypt Tel. +202 55 60046 Fax. +202 55 48020 Email: salahm55@yahoo.com
		Dr. K. Owolabi, Office of the Surveyor-General, Namibia	45 Robert Mugabe Avenue PB 13182, Windhoek, Namibia Tel. +264 61 24 50 56 Fax. +264 61 24 98 02 Email: kowolabi@namibia.com.na
		Martins Chodota, Senior Surveyor, RCMRD, Kenya	RCMRD, P O Box 18118, Nairobi, Kenya Tel. + 254 20 861671 Fax. + 254 20 802767 Email: chodota@rcmrd.org

	March 2004	Sept. 2004	Budget Estimate	Remarks
AFREF Sub-regional Meeting (1 Week Duration)			US\$50.000	
			US\$50.000	
			US\$50.000	
Africa Regional Meeting (1 Week Duration)			US\$50.000	
			US\$50.000	
			US\$100.000	
	March 2005	Sept. 2005	Budget Estimate	Remarks
AFREF Short-term Training Courses (2 Weeks Duration)			US\$100.000	
			US\$100.000	
			US\$100.000	
Course Evaluation W/shop (1 Week Duration)			US\$100.000	
			US\$100.000	
			US\$50.000	
AFREF Project Component Activities (2 Yr Duration) 2005-2007	Establishment of permanent GPS observation stations Determination of the geoid Acquisition of telecommunication facilities and logistics Establishment of data processing, archival and dissemination centres <i>(Total number of GPS station and data centres to vary per country and to be determined during sub-regional and regional meetings)</i>		US\$ 65,000/ GPS station US\$ 10,000/ Telecom station US\$ 10,000/ Computing Centre	

2. In relation with the EUPOS project

Commitments:

G. Milev (Bulgaria) (milev@bas.bg),
G. Rosenthal (Germany) (gerd.rosenthal@senstadt.verwalt-berlin.de)
and representatives of 14 CEE participating countries.

Activities:

1. Preparation of the umbrella project for the EUPOS
 - Duration - 1,5 years
 - Organization - 1 symposium, 1 workshop (EUR 40,000 each), 3 ISC(International Steering Committee) meetings (EUR 13,000 each, including travel costs for participants). Total organizational preparation and others costs - EUR 300,000
 - Funding sources
 - OOSA - for 2 ISC meetings (EUR 26,000) in 2004
 - EC Program INTERREG
 - Other sources should be identified
 - The Pilot project realization will be of great importance.
2. As a regional ground based GNSS infrastructure, EUPOS will be able to support GALILEO and EGNOS.

3. Popularization of EUPOS

In the frame of popularization of the EUPOS project the following actions are foreseen:

- Informing a large scope of specialists by respective publications and reports,
- Calling attention of different national, international and other organizations to the OOSA recommendations,
- Informing respective decision-makers about EUPOS activities.

Finding sources and funds for EUPOS realization

1. Further contacts with EC representatives
2. Explore and submit applications in the following European Commission programs:
 - ERDF - for all countries which become members of EU from 01.05.2004
 - ISPA - for EU candidate countries Bulgaria and Romania
 - CARDS - for West-Balkan countries
 - TACIS - for the Russian Federation
 - etc.

Support requested from UN OOSA:

- a. A letter of support (endorsement) of the EUPOS project addressed to one of the EU promotional programs (specified later) and to the project coordinator (Rosenthal).
- b. Financial support for the organization of the 5th EUPOS Steering Committee Meeting in Bratislava, Slovakia June 2004 and the 6th EUPOS Steering Committee Meeting in November 2004. Proposed funding EUR 26 000.
- c. OOSA is requested to explore and identify other financial sources for support of EUPOS

3. In relation with SIRGAS project:

Activity 1: " Workshop on Capacity Building for the Development of Regional/National Reference Frames" will be organized

Contact: William Martinez-Diaz wamartin@igac.gov.co

Details:

- a. Institutions committed:
 - SIRGAS COMMITTEE
 - INTERNATIONAL ASSOCIATION OF GEODESY
 - INTERNATIONAL CARTOGRAPHIC ASSOCIATION (ICA)
 - INTERNATIONAL FEDERATION OF SURVEYORS (FIG)
 - OPEN GIS CONSORTIUM
 - GLOBAL SPATIAL DATA INFRASTRUCTURE (GSDI)
- b. Issues addressed:
 - Adopt common sources of scientific and spatial data management definitions and strategies for the implementation of national geocentric reference frames based on the International Terrestrial Reference Frame (ITRF).
- i. To assess the statements of the AGENDA 21 and RIO +10 Summits focused on reference systems as basis for Earth Observation Technologies
- ii. Aspects of the workshop:
 - a. Objectives:
 - i. Provide a stronger capacity (on basic/applied Geodesy and Mapping) to the countries of the Americas that are migrating their national reference systems and/or cartographic production to ITRF.
 - ii. Disseminate the basic concepts on reference systems and frames, practical applications on Positioning and Mapping and spatial information management under the concepts of capacity building: research and development, cooperation networks and technology transfer.

- b. Number of participants: 40 - 50 people. Beneficiaries: Developing countries of South, Central America and The Caribbean Area. Venue: Colombia. Timeline December 2004.
- c. Likely audience: Technicians and Scientifics of the area involved in the determination and maintenance of national reference systems.

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Specific actions required from OOSA:

- iii. Linking among institutions and countries: participate in the invitation to the workshop all national mapping agencies of the Americas
- iv. Funding support: It is considered that a fund of USD 30 000 will be needed to accomplish the travels of designates to the workshop

Activity 2: "SIRGAS CORS PROJECT"

Contact: William Martinez-Diaz wamartin@igac.gov.co

Details:

- a. Institutions committed:
 - SIRGAS COMMITTEE
 - INTERNATIONAL ASSOCIATION OF GEODESY
 - INTERNATIONAL CARTOGRAPHIC ASSOCIATION (ICA)
 - INTERNATIONAL FEDERATION OF SURVEYORS (FIG)
- b. Issues addressed:
 - Increase the number of GNSS permanent stations in the Americas as a source of core data for the geographic information community
- c. Aspects of the project:
 - a. Objectives:
 - i. Provide 7 days/24 hours GNSS data to the geographic information community of the Americas
 - ii. Improve and/or develop multi-purpose Earth related models
 - iii. Modernization of the basic and thematic Cartography production in the Americas

Acquisition of Equipments: A found of USD 3 500 000 could be needed to cover, with spare fundamental stations, the Areas of Latin America and Caribbean.

Specific actions required from OOSA:

- Support in seeking for funds: through PNUD to establish contact with Inter American Development Bank (IADB)

4. In relation to the APRGP project:

- a. Support for the Asia Pacific Regional Geodetic Project (APRGP) under the Permanent Committee for GIS Infrastructure for Asia and the Pacific (PCGIAP) is recommended.

Activity:

PCGIAP Working Group 1 on Regional Geodesy is responsible for the APRGP project. It is already established to coordinate Geodetic Activities in the Asia Pacific Region. This recommendation is in relation to improving the resources available to the existing Working Group.

Commitment: Teng Chee Hua (tengcheehua@jupem.gov.my) from the Survey and Mapping Department of Malaysia is the initial point of contact and will brief the Chair of PCGIAP Working Group 1 in relation to the following.

Support requested from OOSA:

1. Providing USD 30 000 seed funding for an expert meeting, which should be convened during 2004 in a suitable central location to be decided. It is estimated that more than 50 participants would attend the meeting. A significant part of the funding will be required to support attendance by those countries in the region that do not have sufficient resources to participate in the project.
2. Providing USD 30 000 funding for a feasibility study to identify how many permanent GPS reference stations are required in the APRGP area, to identify existing stations that meet requirements and to identify gaps in the network. It is estimated that such a feasibility study could be completed within six months after the expert meeting.
3. Subject to the results of that feasibility study, provide financial assistance to set up the required permanent GPS reference stations. Given the size of the Asia Pacific region (running from West Asia to the width of the Pacific Ocean) it is expected that more than 20 stations will be required. It should be noted that the capital investment cost for each single station is estimated at USD 35 000. Therefore, the overall investment required will be significant and may need to be phased over 3 years.
4. Providing funding for capacity building and training for countries not currently running permanent reference stations. The estimated cost is USD 5 000 per trainee and there could be as many as 20 people requiring training in the region (estimated total USD 100 000).

5. Given that PCGIAP has limited administrative ability, funding for the above activities should come directly from UN OOSA in liaison with PCGIAP Working Group 1. UN Contribution would assist the Working Group to source additional funding from other donor organizations.

Beneficiaries: Spatial Data Infrastructure users in the Asia Pacific Region, GNSS users in general.

Milestones by 2005:

- Expert meeting successfully convened.
- Feasibility Study completed.
- Training program established.
- Densification of GNSS Permanent Reference Station network commenced.

5. In relation with site quality, integrity and interference monitoring:

- a. The establishment of an international working group on site quality, integrity and interference monitoring is recommended.

Activity of the WG:

Set up standards and work out methodology for monitoring network quality and integrity. Collect information, organize regional or national actions on this area.

Interference monitoring will be an ongoing long term task in the interest of all GNSS users. The monitoring should be GNSS user oriented. The findings on harmful interference will be reported to frequency management officials or bodies, but also make public for users in the region affected. The group report on its activity and finding to the GCB.

Committed: I. Fejes, FOMI, SGO. Hungary (fejes@sgo.fomi.hu)

Support requested from OOSA:

A call for participation and logistical support. Integration into the GNSS organizational structure. Also financial support to organize meetings of the WG once a year. Preparatory meeting in 2004 is foreseen, next meeting in 2005. The expected number of participants are 10-20. Funding necessary is in the order of 30 000 USD (???) for each meeting.

Beneficiaries: GNSS users in general,

Milestones by 2005:

- the group established,
- terms of references worked out,
- data base structure defined.

6. Establish working relations with IAG, FIG and ICA to commonly promote international GNSS standards (e.g. RINEX, RTCM SC-104) and standards of international organisations dealing with geographic data (ISO/TC 211, CEN TC 287), Web services (W3C, OGC) and standards for survey equipment (ISO/TC59/SC4 and TC172/SC6).

Committed: M. Konecny, President, ICA; P. Rapant (both Czech Republic)
Action: Common workshop on commonly promote international standards

Participation: ICA, IAG, FIG + GNSS experts
Datum: Autumn 2004
Place: Czech republic

Support requested from OOSA:

a call for participation and financial support in the order of 40.000 USD

Beneficiaries: whole geoinformation community

Milestones by 2005:

Workshop successfully convened
Working relations with ICA, IAG and FIG established

7. Establish working relations with Spatial Data Infrastructure Organizations in order to promote the same basic standards in this very broad and perspective area.

Committed: M. Konecny, President, ICA; P. Rapant (both Czech Republic), W. Martinez-Diaz (Colombia)
Action: Common workshop on commonly promote international standards for users communities represented by SDI and related organisations and initiatives

Participation: GSDI, Global Map, Int. Society on Digital Earth, INSPIRE, ANZLIC, FGDC, EUROSPEC, etc. + GNSS experts
Datum: Spring 2005
Place: Czech republic

Support requested from OOSA:

a call for participation and financial support in the order of 50.000 USD

Beneficiaries: whole geoinformation community

Milestones by 2005:

Workshop successfully convened
Working relations with , Global Map, Int. Society on Digital Earth, INSPIRE, ANZLIC, FGDC

8. Develop metainformation system on GNSS applications, research, education and training activities.

Action: Metainformation system will be based on ISO standards for metadata and will be developed as a web service. It will be possible to add new records and edit existing records of metadata interactively by web browser, query database by fields of applications, etc. (Example of existing system developed for GINIE project can be seen on <http://gis.vsb.cz/webcastle>).

Committed: Petr RAPANT, Czech Association for Geoinformation, VSB-Technical University of Ostrava, Czech Republic (e-mail: petr.rapant@vsb.cz)

Support requested from OOSA:

- Information to GNSS community about this metainformation system,
- link to this system from OOSA web page,
- funding in the order of 35.000 EUR as a contribution to development of tailor-made application based on existing technology, and two years maintenance of metainformation system.

Beneficiaries: GNSS users in general

Milestones by 2005:

- the metainformation system developed (2004)
database filled with metadata