



International Federation of Surveyors
Fédération Internationale des Géomètres
Internationale Vereinigung der Vermessungsingenieure
Commission 5

Positioning and Measurement (2002-2006)

www.fig.net/figtree/commission5

Newsletter - November 2006 Edition

MESSAGE FROM THE NEW COMMISSION 5 CHAIR

Dear Colleagues,

As the new chair of Commission 5 I welcome you and present our Commission's Newsletter November 2006 Edition. The new working period starts officially in January 2007. Nevertheless I take this opportunity now to invite you to actively participate within our Commission for the coming years. Enjoy our newsletter, which has been prepared and edited by our Vice Chairs Rob Sarib and Mikael Lilje.

If you have any comments, suggestions for improvements, topics, which myself or the Steering Committee should consider please let us know

Regards Rudolf



COMMISSION 5 REPORT ON MUNICH

Introduction

The FIG Congress in Munich "Shaping the Change" has been touted as the biggest ever in FIG history! There were 1300 FIG registrants; 1700 InterGeo, Geodetic Week and other participants; 19,500 visitors to the InterGeo trade fair which is the world-wide largest international trade fair for geodesy, geo-information and land management; and 90 technical sessions comprising of 500 papers and 100 posters.

Technical Program and Forums

The technical sessions and trade fair were held at the International Congress Centre Munich (ICM).



This facility was located to the east of Munich City and accessed by a pleasant 15 min train ride to station Messestadt.

Commission 5's program consisted of a joint workshop, 13 technical sessions (including combined or joint sessions with other Commissions), 8 poster sessions and combined forums with IAG on Geodesy and Positioning. There were approximately 60 presentations, papers and posters on Commission 5 topics. To view these proceedings navigate to website www.fig.net/pub/fig2006.

Generally the content of the technical sessions were of a good standard and matched the quality of previous FIG symposiums. Commission 5 were however disappointed with the larger than normal 'no shows', that is presenters not be able to attend the session to orally deliver their paper. In addition, Commission 5 have acknowledged comments from delegates that there are too many papers in sessions therefore in some cases the quality of presentations and discussion suffer due to the lack of time. Despite this, Commission 5 do however always aim at high quality presentations but also believe that FIG have a role / responsibility to allow presentations from all parts of the world and from different categories of surveyor (ie University, Governmental agencies, Private companies, young surveyors, experienced / inexperienced etc).

Ultimately, these issues have been noted and will be brought to the attention of ACCO (Advisory Committee of Commission Officers) when discussions on how to improve technical / poster sessions occur early next year.

The RTK / CORs Users and Providers forum proved to be a very successful event. The sessions provided excellent overview presentations from Sweden, UK, Ireland, Turkey, Serbia, Brazil, Germany, Australia and Israel on their geodetic networks, infrastructure and the future.



A panel comprising of Matt Higgins (FIG), Ruth Neilan (IGS), Chris Rizos (IAG), Herbert Landau (Trimble), Joel VanCranenbroeck (Leica) and Graeme Blick (Chair of the forum) then facilitated discussions on RTK CORs network issues, such as

- connecting networks to ITRF;
- contribution of data to IGS / Global Geodetic Observing System;
- IGS station specifications
- best practices guidelines and standards covering RTK CORs networks and the need for other standards;
- the need for coordination of such networks;
- possible roles for IAG and FIG in any such coordination.
- ownership and management of RTK CORs networks
- service, management, business models
- level and type of services provided by RTK CORs networks
- new positioning technologies and infrastructure





In summary, this RTK CORs network forum enabled a list of potential roles, actions and issues to be established for the Commission 5 Steering Committee to consider including them into the 2007-10 work plan, and they are -

- Facilitate development of standards / guidelines- site, monumentation, hardware, fundamental (IGS) vs RTK CORs sites and other, density, how many stations to be IGS
- Provide best practice guidelines, surveying methodologies, field operations for RTK CORs users and providers
- Facilitate the collation of data, experience, information, providers, and users via a database.
- Educate and promote to surveyors RTK CORs through information exchange forums, technical sessions, workshops and internet. That is conduct forums on technical or related issues with respect to RTK CORs, in particular ambiguity resolution, antenna, multi-pathing, atmospheric, heighting, relating RTK CORs networks to a reference frame, operations etc.
- Facilitate forums on overcoming communication issues - ie GPRS, GSM, NTRIP connections
- Facilitate forums on overcoming complex IT issues - ie external users access to services and also from a providers installation and maintenance perspective.
- Facilitate the compilation of the 'why and how' to connect RTK CORs networks to ITRF
- Facilitate forums on the legal issues (cadastre) with respect to RTK CORs networks ie legal traceable measurements, calibration, verification

of points, best practice, validation networks to check software and techniques.

- Facilitate discussions on the roles / involvement of private, public and other agencies.
- Facilitate discussions on the development of business cases for establishing RTK CORs networks and business models.
- Facilitate representation for RTK CORs providers / users to 'voice' or lobby their wants / needs to GNSS owners, telecommunication agencies, GNSS equipment and software manufacturers / suppliers, IGS

Commission 5 wish to thank all who participated in the RTK CORs open forum.

Another session followed by a panel discussion was on 'Next Generation GNSS'. Larry Hothem (USA) presented the next generation GPS, Matt Higgins (Australia) presented on behalf of Sergey Revniviykh (Russia) the developments on GLONASS and Wolfgang Söhne (Germany) presented the coming GALILEO.



The future is looking very interesting with the following major improvements-

- more GPS frequencies,
- GLONASS to have a full constellation within a few years and
- GALILEO becoming a firmer reality in a number of years.

From a users perspective the plan to have all the systems connected to ITRF is good news. That is, they will be operating in the same reference system and thus users will be able to use all the systems at the same time as the industry will (hopefully) provide us with GNSS

receivers capable of accessing the signal from all three systems.

Commission 5 will continue to follow the GNSS developments and plan to have at least presentations on this hot topic during the coming Working Weeks and Conferences. The International Association of Geodesy (IAG) organised, in parallel to the FIG Congress, the conference 'GRF 2006'. One day was common with FIG. The day started with a plenary session on "Global Change" focussed on new technologies with speakers Reiner Rummel, Permanent Secretary of the German Geodetic Commission, Hermann Drewes, President of IAG Commission 1 and Hans Haubold, United Nations Office for Outer Space Affairs (UN-OOSA).

The close collaboration between FIG and IAG for the last four years was highlighted several times and it was clear that there is a need for the organisation to develop the co-operation in the future.

In the afternoon there were two combined sessions - "Geodesy Forum" and "Positioning Forum". IAG is currently focussing on a project called GGOS (see www.ggos.org). GGOS integrates different geodetic techniques, different models, different approaches in order to ensure a long-term, precise monitoring of the geodetic observables in agreement with the Integrated Global Observing Strategy (IGOS). GGOS provides the observational basis to maintain a stable, accurate and global reference frame and this function is crucial for all Earth observation and many practical applications. It was clear that the geodetic community has an important role to play for climate and environmental research since all observations should be based using a common, accurate and stable global reference frame.

IAG has managed to be recognized also on UN level for its work within this field and recognized by others as an important partner. An important step concerning the global reference frames are the ITRF-solutions.

ITRF 2005 has now been released and was presented both at the GRF 2006-symposium as well as during the common FIG/IAG-day.

Other FIG and Social Events

General Assembly

The FIG General Assembly met in two sessions on Sunday 8 October and on Friday 13 October 2006. Major decisions of the General Assembly affecting the FIG Council include:

- Stig Enemark (Denmark) was elected as the new President of FIG 2007-2010.
- Matt Higgins (Australia), also former chair of Commission 5, and Dalal S. Alnaggar (Egypt) were elected as Vice Presidents for 2007-2010.
- Paul van der Molen was elected as Vice President for the two years term of office (2007-2008) that became open after Stig Enemark was elected as the new President.
- The fourth Vice President is Mr. Ken Allred who will continue in the new Council for next two years.
- Dr. Chryssy Potsiou has been appointed as the ACCO representative in the Council for 2007-2008.



The new Council will start its work on 1 January 2007 and Commission 5 look forward to working with this new Council. Commission 5 is also proud to point out that both Matt and Dalal, who both have been involved in FIG Commission 5, are now also part of the Council. Also with the inclusion of Paul and Stig in the Council means now that majority of the Council has its roots or origins from the Commissions (the engine room of FIG !). Hopefully this will make

the work of the Commissions more of a highlight in the future for FIG.

Future event locations were also decided. The FIG Working Week 2011 was awarded to ONIGT - Morocco and to be held in Marrakech in April/May 2011. The 6th FIG Regional Conference will be organised in San Jose, Costa Rica, 11-15 November 2007.

Opening and Closing ceremony

At the opening ceremony the welcome address was given by Edmund Stoiber, Bavarian Minister President. Holger Magel, FIG President gave the Presidential Address "Shaping the Change 2002 to 2006 - The German Period of FIG" focussing on the policies and achievements of FIG during the German presidency. The keynote address at the opening ceremony was given by Klaus Töpfer, long-time Executive Director of the United Nations Environment Programme (UNEP).

At the closing ceremony President Magel presented the Conference Summary. Apart from the impressive number of participants he could report that many young professionals attended the congress and that FIG has now a plan to integrate a students' / young surveyors' forum. The relations with sister organisations and international partner organisations are and will be strong. Many new delegates from several countries were welcomed during the congress.

More information on the opening and the closing ceremonies can be found on FIG-website

http://www.fig.net/news/fig2006/munich_index.htm

In conclusion President Magel summarised: "Surveyors can shape the change by collaboration, communication and cooperation. Surveyors can shape the change with Passion, energy and enthusiasm by working in many dimensions. Surveyors need wings for flying in"

Social Activities

A good Congress must always have a full schedule of the social activities! The Congress week started with the Welcome Reception at the Holiday Inn after the General Assembly. About 700 delegates arrived in time to attend this successful get together party - tasteful food and drinks encouraged people to enjoy the reception long beyond the closing time.



Some also attended the more formal functions such as the Reception of the Lord Mayor of Munich at the City Hall; and the Reception of the Bavarian State at the "Residenz". For those who were lucky enough to attend were treated to elegant European affairs.



In the evening of the opening of FIG 2006 and INTERGEO the traditional INTERGEO-Treff was organised in the Löwenbräukeller, one of the most famous breweries in Munich. This time the "geodätentreff" was also an FIG Foundation event. The evening with Bavarian music, food and beer gathered more than 1,800 participants.



The congress was concluded with the Farewell Dinner at the famous Hofbräuhaus. About 600 participants followed the invitation to enjoy the Bavarian hospitality once more, discuss the experiences of the week and make friends with new surveyors from all over the world.



The very final social event was organised by FIG 2010 that will be organised in Sydney in April 2010. This reception at the Holiday Inn after the closing ceremony gave a taste of "Aussie" hospitality and food and allowed delegates to meet with the Australian team and their young ambassadors (young surveyors) who were actually 'in focus' during the whole FIG 2006 event. Their impact was however overshadowed by the ever present oversized koala.



Commission 5 has learnt much about the Aussies over the past at least eight years and are now looking forward to Sydney -after experiencing the delights of Hong Kong, Stockholm and Eilat.



Commission 5 Meetings

An Open Commission Meeting was held in Munich and attracted 32 participants. The items discussed were the Munich program, 2007-10 work plan, and the coming Working Week in Hong Kong, 13-17 May 2007. Matt Higgins, the out going Chair of Commission 5, also provided an overview of the 2002-06 Commission 5 workings and achievements. A copy of his report is included in this edition of the Newsletter for your perusal.

The Commission 5 Steering Committee had several 'breakfast' meetings and informal discussions during the Congress. Discussions occurred on standing agenda items such as reports from ACCO, GA and the working groups and general administration. The highlights from the board room were -

- acceptance to review and revamp the Commission 5 website
- decision to continue to improve and build on current liaisons with IAG and

other groups working on projects such as the African Reference Frame (AFREF)

- to develop new relationships with ISPRS, ION and US NGS (NOOA)
- further refinement of the 2007-10 work plan
- consensus to concentrate efforts on facilitating quality symposia.
- to engage more Commission 5 delegates.

Matt, Rudolf and Rob also attended the ACCO meeting.



Summary

FIG Congress showed that Commission 5 is still one of the strongest Commissions within FIG as once again we were one of the top three that attract the most papers and attendance to the technical sessions and forums.

There were however, an unexpected large number of presenters who dropped-out or did not show up for technical sessions. This, along with other administrative issues, need to be addressed and some good ideas must be developed to prevent this from occurring in the future and to keep improving FIG symposia.

This congress also highlighted GNSS-developments, RTK CORs networks and especially the usage and application of these systems for the users as important technologies for the future. This must also include how a surveyor verifies their instrument's quality against a standard. These and others are some of the tasks and issues to be facilitated and examined by this Commission in the term 2007-10.

COMING EVENTS

13-17 May 2007, Hong Kong SAR, China
 FIG XXX General Assembly and Working Week.
 Web site: www.fig.net/fig2007

Commission 5 are proposing the following sessions / forums for Hong Kong and *seek comment from the delegates* -

- RTK CORs providers and users forums - focussing on issues, status of networks and other pertinent topics specific to the region
- GNSS - sessions on 'Next Generation GNSS' but focusing on satellite systems and their impact for the region ie Beidou (Compass), QZSS, and India's satellite system ; Applications of GNSS
- Laser Scanning and Deformation - sessions on laser scanning deformation projects in the region with an emphasis on China. (joint session with Commission 6)
- Geodetic Theory - sessions on algorithm development, infrastructure
- Imagery and Photogrammetry - sessions on the digital imagery industry and its developments in the region
- Strategic Surveying Issues- sessions concerning the status and issues relating to education, managing technology change, capacity building, resourcing, challenges in the region.
- Positioning Infrastructure - sessions concerning any new ground based augmented positioning, mobile phone positioning (Nokia), combination of satellite/pseudo lites etc
- Mobile mapping - sessions concerning - integration of more sensors, lidar, WIFI
- Joint session with Commission 4 with respect to hydrography, positioning and monitoring.

Commission 5 also urge delegates (especially from the Asia Pacific region) to submit abstracts to this Working Week in Hong Kong.

If you have any comments regarding the proposed Commission 5 topics please email -

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OR

Rob Sarib
robert.sarib@nt.gov.au

28-31 May 2007, Padova, Italy
 5th International Symposium on Mobile
 Mapping Technology. Organised by FIG
 Commission 5, IAG and ISPRS.
 Mobile Mapping Summer School May 28, 2007
 and the 5th MMT Symposium May 29-31, 2007.
 Contact: naser@geomatrics.ucalgary.ca
 Web site:
http://www.cirgeo.unipd.it/sitocirgeo/mmt_frst.html

Dear Colleagues,

We wish to remind you that the MMT '07 will be held in May 2007 and that abstract submission deadline is coming up. Below is some information on the symposium. For complete information please visit the webpage at <http://www.cirgeo.unipd.it/cirgeo/convegni/mmt2007/index.html>

Location:

Padua, Italy. It is located 20 km south-west of Venice; it has the second oldest university in Europe and is a very interesting tourist spot for culture and history, as well as a must for food and wine connoisseurs.

Dates:

- November 30, 2006 - Deadline for abstract submission
- December 30, 2006 - Communication to the authors for abstract acceptance
- March 30, 2007 - Deadline for full paper submission
- May 28, 2007 - Mobile Mapping Summer School
- May 29-31, 2007 - Symposium MMT '07

Topics:

- Wireless positioning techniques
- Mobile Mapping applications
- Image sequence processing
- Automated and semi-automated image segmentation and object
- Extraction/recognition
- Sensor calibration (orientation, integration, reliability)
- Mobile Mapping Technology (system components, platforms, etc.)
- Direct Geo-referencing
- Large datasets: management, query and transmission
- 3D Mobile Mapping and GIS integration
- LIDAR and SAR mapping systems
- Estimation and optimization algorithms

Registration fees:

- Full registration* 300 Euro before 30 January 2007, 350 Euro after that date (one registration per paper)
- Student (max. 30 years old) 120 Euro
- Accompanying person 100 Euro Mobile Mapping,
- Tutorial only 100 Euro

Registration page:

https://portal.cca.unipd.it/pls/portal/cca_servi_zi.Gc_Convegni_Pkg.main?P_CO DICE_CONVEGNO=5&P_LINGUA=USA&P_PAGINA_RITORNO=www.unipd.cirgeo

*Notes: Full registration includes Proceedings, Conference Bag, Coffee Breaks, Welcome Party. Student includes Proceedings CD, Coffee Breaks, and Welcome Party. Dinner Gala Party is 40 Euro.

Local organizers

CIRGEO - Inter-department Research Centre for Geomatics

Convenors:

Prof. Antonio Vettore, University of Padua - antonio.vettore@unipd.it
 Prof. Naser El-Sheimy, University of Calgary - elsheimy@ucalgary.ca

Scientific Committee:

Chair:

Naser El-Sheimy (University of Calgary, Canada)

Co-Chairs:

Ron Li (USA)
Dorota Brzezinska (USA)
Vincent Tao (Canada)
Charles Toth (USA)

29 October - 1 November, Christchurch, New Zealand
9th South East Asian Survey Congress
incorporating the 119th New Zealand Institute of Surveyors Conference, the 6th Trans Tasman Surveyors Conference and CASLE General Assembly
Contact: email: nzis@surveyors.org.nz and <http://www.surveyors.org.nz/>

COMMISSION 5 WORKPLAN 2007-10 Version Nov 06 DRAFT

1. Title

Positioning and Measurement.

2. Terms of Reference

- The science of measurement (instrumentation, methodology and guidelines)
- The acquisition of accurate and reliable survey data related to the position, size and shape of natural and artificial features of the earth and its environment and including variation with time.

3. Mission statement

- Focus on modern technologies and technical developments and assist individual surveyors, through guidelines and recommendations, to choose and utilise

those methods, technologies and instruments that are most appropriate to different applications.

- Follow technical developments through collaboration with other FIG commissions and other international organisations; participation in appropriate meetings; and the preparation of appropriate publications.
- Support research and development and stimulate new ideas in the fields of expertise represented within the commission.
- Collaborate with manufacturers on the improvement of instrumentation and associated software.
- Present and promote the work of the commission and its working groups on an ongoing basis at FIG working weeks and other relevant technical meetings and in appropriate FIG and other media.

4. General

This work plan covers the development, use and integration of technologies for positioning and measurement and the associated standardisation, best practice and fundamental reference frame issues. Many of the issues are global in nature and Commission 5, working with like-minded Sister Associations, is well placed to deal with them. FIG Council has also asked the Commissions to cooperate with United Nations Agencies to address global problems such as sustainable development and humanitarian needs. The disciplines covered by Commission 5 are at the heart of delivering solutions for the spatial aspects of these important global problems. Specific activities aimed at developing countries include examination of Low Cost Surveying Technologies and contribution to appropriate Continuing Professional Development programs.

5. Working Groups

WG 5.1 - Standards, Quality Assurance and Calibration

Policy Issues

- Influence the development of standards affecting positioning and measurement

instruments and methods, in collaboration with the FIG task force on standards and through participation in the relevant technical committees (TCs) of the International Standards Organisation (ISO) and other appropriate bodies.

- Acceptance controls, quality assurance and certification and their impact on the surveying profession.
- Checking and calibration of measuring instruments.
- Assist other Commission Working Groups to implement Standards from ISO TC211 as appropriate.

Chair: David MARTIN, France:

Specific project(s)

- Transform the existing recommendations on the Use and Calibration of EDM (FIG-Publication 7/1994) in a digital document and make it available on the FIG-Website
- Actualise the above mentioned EDM-Standards
- Present and promote the use of standards and guidelines to the surveying community.
- Establish guidelines and recommendations for... (Requires updating for relevant instruments taking into account progress during past four years).
- Guidelines and Recommendations for the ISO Guide to Uncertainty of Measurements.
- Review Standards coming from ISO TC211 for relevance to Positioning and Measurement.

Workshop(s)

- Participation in FIG Working Weeks and other major Commission events (see events section below) with dedicated Technical Sessions and/or Workshops as appropriate.

Publication(s)

- Recommendations for the Use and Calibration of EDM

- FIG Working Weeks will include Technical Papers on specific issues and presented by Working Group Members and other invited experts.
- Guidelines for... (Requires updating for relevant instruments).

Timetable

- Draft publications will be presented at FIG Working Weeks during the term of this plan and according to a timetable to be developed by the Working Group Chair.
- Working group final report: dedicated session, FIG Congress, 2010.

Beneficiaries

- FIG member associations, manufacturers and users of survey equipment, governments, standardisation organisations, decision makers, GIS developers and users, surveying businesses, individual surveyors.

Working Group 5.2 - Reference Frame in Practice

Policy issues

- Work to bring together all organisations involved in defining or using reference frames to develop common approaches and avoid duplication. Such organisations include FIG, IAG, ISO, groups of national mapping agencies, other influential national agencies (such as the US DoD's NIMA) and alliances of commercial organisations (such as Open GIS Consortium and the European Petroleum Survey Group).
- Continue the existing co-operation with IAG on AFREF as well as facilitate similar actions on other continents as South America and ASIA.
- Provide background technical information on relevant issues written in a way that is accessible to the surveying practitioners.
- Develop an inventory of approaches to reference frame issues in different countries (including transformation

methodologies) that is accessible to surveying practitioners.

- Examine the concepts of dynamic and semi-dynamic datums.
- Examine how surveying practitioners are changing how they access the reference frame, through less emphasis on networks of ground monuments and more emphasis on Global Navigation Satellite Systems (GNSS) base stations.
- Examine global positioning services as Omnistar and the use of them for positioning in a national reference frame
- Examine the increased use of GNSS for height determination as well as the use of geoid models for connection to local height datums.
- Examine the role that the satellite missions GRACE, GOCE and CHAMP will have on global geoid models
- Examine the increasing role of aerial and space based imagery in the realisation of reference frames.

Chair Mikael LILJE, Sweden.

Specific project(s)

- Initiate, contribute and facilitate meeting(s) of all organisations involved in defining or using (regional) reference frames to develop common approaches and avoid duplication.
- Continue development of Technical Fact Sheets that briefly explain basic concepts, practical applications and issues and which summarise the activities of organisations with specific responsibilities in the field.
- Ensure terminology used in above publications conform to and give substance to the relevant Standards coming from ISO TC211.
- Ensure that the working group web page is running and updated.

Workshop(s)

- Participation in FIG Working Weeks and other major Commission events (see events

section below) with dedicated Technical Sessions and/or Workshops as appropriate.

- Seminars and meetings involving key organisations involved in defining or using (regional) reference frames will be convened at a venue, time and date to be confirmed by the Working Group Chairs.
- Symposium on Applications of Permanent GPS/GNSS Networks. WG 5.2 and WG 5.3 event.

Publication(s)

- Web page
- FIG Working Weeks will include Technical Papers on specific issues and presented by Working Group Members and other invited experts.
- Technical Fact Sheets as outlined above.
- Working group final report will be presented at FIG Congress, 2010.

Timetable

- Draft publications will be presented at FIG Working Weeks during the term of this plan and according to a timetable to be developed by the Working Group Chairs.
- Working group final report: dedicated session, FIG Congress, 2010.

Working Group 5.3 - Integrated Positioning, Navigation and Mapping Systems

Policy issues

While this is a new focus, it includes the topics covered by the previous Working Groups 5.3 and 5.4 and extends to cover technology generally.

- Issues associated with ongoing and rapid developments in Integrated Positioning, Navigation, and Mapping systems, including performance and applications of such systems and guidelines for their use.
- Ensuring FIG input to planning associated with programs of GPS Modernisation and GNSS Development.

Chair: Andrew HUNTER and Naser El-SHEIMY, Canada.

Specific project(s)

- Report on the development, possibilities and limitations of new technologies.
- Prepare guidelines for practitioners on making the best use of systems to achieve the results required for particular applications.
- Develop FIG input to GPS Modernisation and GNSS Development.
- Collaborate with other Commissions and other international organisations (including IAG and ISPRS) and with equipment, software and service providers.
- Continue commitment to relevant inter-disciplinary events including the series of Symposia on Mobile Mapping (joint with IAG and ISPRS).

Workshop(s)

- Participation in FIG Working Weeks and other major Commission events (see events section below) with dedicated Technical Sessions and/or Workshops as appropriate.
- 4th International Conference on Mobile Mapping Technology, Mid-August, 2003, Kuming, China

Publication(s)

- Guidelines on making the best use of emerging systems.

Timetable

- Draft publications will be presented at FIG Working Weeks during the term of this plan and according to a timetable to be developed by the Working Group Chair.
- Working group final report: dedicated session, FIG congress, 2006.

Beneficiaries

FIG member associations, manufacturers and users of survey equipment, governments, standardization organizations, decision makers,

GIS developers and users, surveying businesses, individual surveyors.

Working Group 5.4 GNSS - Global Navigation Satellite Systems

Policy issues

- Cooperation with all organisation involved in the field of GNSS e.g. IAG and ISO.
- Keeping in contact with GNSS receiver and equipment manufactures to provide state-of-the-art information to the users.
- Cooperation with Commissions 3, 4, 6 and 8 regarding GNSS integration into GIS respectively ; GNSS for disaster risk management ; GNSS applications in hydrography and engineering surveys.
- Providing technical GNSS background information on relevant issues for surveying practitioners through web-page, tutorials and workshops.
- Development of recommendations regarding procedures to check GNSS equipment.
- Contribute to FIG input to GPS modernisation and GNSS development
- Prepare the surveying profession for GNSS-mass-markets (e.g. location based services (LBS), traffic applications) as well as required technologies (e.g. assisted GPS, car navigation technology).

Chair : Volker Schwieger

Task Forces (proposed)

Task Force 5.4.1 Cost-effective GNSS

Chair: NN

- Analysis of current "low-cost" GNSS markets (e.g. LBS, traffic) including additional necessary technologies like e.g. odometers, mobile phones
- Recommendations for surveyors to infiltrate these markets
- Development of methods to use "low-cost" GPS for precise applications
- Report on cost-effective GNSS

Task Force 5.4.2 GNSS networks (together with WG 5.2)

Chair: NN

- Analysis and review of GNSS network technologies for practitioners
- Analysis of the importance of site calibrations of permanent networks
- Analyse and compare different commercial and non-commercial GNSS networks
- Organise Workshops(s) on GNSS networks

Task Force 5.4.3 Precise GNSS

Chair: NN

- Develop and publish methods for GNSS heighting
- Develop and publish investigations regarding the GNSS/tachometer combinations
- Contact with GNSS equipment manufacturers
- Provide newest technical background information to the practitioners
- Develop of input for GPS modernisation and GNSS development

Task Force 5.4.4 GNSS calibration and check (together with WG 5.1)

Chair: NN

- Development of procedures and recommendations for the checking of GPS equipment
- Recommendations for the calibration of GPS antennas and permanent GPS sites
- Cooperation with standard organisations (ie ISO)
- Organisation of scientific workshops and tutorials for practitioners
- Discussion with GNSS equipment manufacturers about procedures

Workshops

- Participation in FIG Working Weeks, Regional Conferences as well as other major

commission 5 events in special technical sessions

- GNSS tutorials (fundamentals and practise relevant information, possibly including practical training) e.g. at Working Weeks and Regional Conferences in cooperation with local organizers, especially for "surveying practitioners"
- International Workshop on GNSS for practitioner (engineering geodesy companies, state survey, cadastral administration,..) together with all WGs of Commission 5)
- Specialised International Workshops on GNSS calibration (antenna, site, multipath) and on GNSS networks (together with WG 5.2).

Publications

- Technical Papers at Working Weeks, Regional Conferences and Commission 5 Symposia and Workshops
- Recommendations for Calibration of GPS antennas and Check of GPS Measurement Systems (together with WG 5.1 and further institutions like e.g. ISO)
- Report on possibilities of cost-effective GNSS techniques for developing countries.

Timetable

Report and recommendations should be presented (and published) on next FIG Congress 2010.

6. Co-operation with Sister Associations

Commission 5 is committed to cooperation with Sister Associations, especially those with which FIG has a Memorandum of Understanding. Commission 5 has specific liaison interest with the International Association of Geodesy (IAG) and the International Society for Photogrammetry and Remote Sensing (ISPRS). The Commission 5 Steering Committee will ensure that Working Group activities and Commission 5 events further these goals of cooperation with Sister Associations.

PLEASE provide comments on the draft
Commission 5 WORK PLAN to
rudolf.staiger@uni-duisburg-essen.de

CALL FOR WORKING GROUP MEMBERS for 2007-10

There are four (4) main working groups and two (2) joint working groups being proposed for the term 2007-10 and they are -

- Working Group 5.1 - Standards, Quality Assurance and Calibration ;
Nominated Chair David Martin
martin@esrf.fr
- Working Group 5.2 - Reference Frame in Practice ;
Nominated Chair Mikael Lilje
Mikael.Lilje@lm.se
- Working Group 5.3 - Integrated Positioning, Navigation and Mapping Systems ;
Nominated Chairs Naser El-Sheimy
naser@geomatics.ucalgary.ca and
Andrew Hunter
ahunter@ucalgary.ca
- Working Group 5.4 - Global Navigation Satellite Systems ;
Nominated Chair Volker Schwieger
volker.schwieger@iagb.uni-stuttgart.de
- Joint Working Group with Commission 4 (Hydrography) on Vertical Reference Frame for Hydrography ;
Nominated representative Mikael Lilje
Mikael.Lilje@lm.se
- Joint Working Group with Commission 6 (Engineering Surveys) on Laser Scanning ;
Nominated representative Rudolf Staiger
rudolf.staiger@uni-duisburg-essen.de
- Note this Commission's Vice Chair of Administration is Rob Sarib
robert.sarib@nt.gov.au

If any of these working or joint working groups are of interest to you then there are two levels

in which you could actively contribute and they are -

- The first level of participation is as a "core member" of a working group contributing directly to discussions, publications, meetings, and facilitate technical sessions etc.
- The second level of participation is as part of a "reference group" to review publications, technical papers, provide feedback on issues and general assistance etc.

People interested in being involved in one of the working groups should contact the Chair of the relevant Working Group and send a copy to the Vice Chair for Administration.

All responses should indicate the desired level of participation, either as a "core member" or as part of a "reference group" and also include a one or two paragraph biography of your professional career to date.

COMMISSION 5 2002-2006 OVERVIEW OF ACTIVITIES

Report to the 29th General Assembly
FIG Congress in Munich, October 2006

FIG Commission 5 - Positioning and
Measurement Activities 2002-2006

By Matt Higgins
Chair of FIG Commission 5, 2003 to 2006.

1. General

The work of Commission 5 on Positioning and Measurement deals with the acquisition of accurate and reliable data related to the position, size and shape of natural and artificial features of the earth and its environment and including variation with time. The Commission's work includes the science of measurement (instrumentation, methodology and guidelines).

Positioning and Measurement answers our clients questions involving the word, "where?"
As such, the discipline of Positioning and

Measurement is at the core of the surveying profession and legitimizes our claim as a major player in all things spatial.

During my term as Chair, the Commission 5 Steering Committee has built on the excellent work of my predecessor Jean-Marie Becker by continuing core activities related to Standards, Calibration, Geospatial Reference Frames and Integrated Positioning and Mapping Systems. We have also given the Commission a more strategic focus by deepening and better organising our cooperation with sister associations and to develop a new area of cooperation with a United Nations organisation relevant to Commission 5.

2. Achievements

Commission 5 achievements during the period from 2003 to 2006 can be summarised as:

- Fulfilment of the Commission Work Plan through significant Working Group achievements outlined below;
- Creation of a new MoU with the United Nations Office for Outer Space Affairs;
- Re-invigoration of the existing MoU with the International Association of Geodesy, including the establishment of a joint liaison committee to oversee ongoing cooperation;
- Development of a Cooperation Agreement with the US based Institute of Navigation;
- For 2005 and 2006, I was a member of FIG Council representing the Advisory Committee of Commission Officers (ACCO - all ten Commissions)
- Throughout this period, Commission 5 consistently ranked in the top 3 Commissions for the number of papers submitted to Working Weeks and Regional Conferences.

2.1 Working Groups

During the period 2003 to 2006, all the Working Groups made excellent progress towards the objectives of the Work Plan. In doing so, a useful approach to Working Group

membership was to offer two levels of possible participation:

- The first level of participation was as a "core member" of a Working Group contributing directly to discussions, publications etc;
- The second level of participation was as part of a "reference group" to review publications, provide feedback on issues etc.

All Commission 5 Working Groups were also very well represented with at least one relevant technical session or workshop at all FIG and allied events during this term. The following outlines some of the notable achievements of each of the Working Groups.

2.1.1 Working Group 5.1 - Standards, Quality Assurance and Calibration

The Working Group Chair was Professor Rudolf Staiger from Germany. Rudolf was also Commission Chair Elect for 2004-2006 and will be Commission Chair for 2007-2010.

Major achievements of Working Group 5.1 in the period 2003 to 2006 include:

- FIG continues to have excellent involvement in the International Standards Organisation (ISO) Technical Committee 172, Sub-Committee 6, which deals with Geodetic and Surveying Instruments. For example, the Working Group was well represented by Professor Hans Heister (Germany) at a meeting of Sub-Committee 6 in Washington DC, USA in September, 2004;
- The Working Group has also begun participating in a new ISO Work Item on Surveying with GPS;
- The Working Group has begun to capture a digital version of the previous FIG publication on EDM Calibration, which was available in paper form only. The plan is to capture the existing content then update and republish it on the FIG web site to be freely available in electronic form;
- A questionnaire on "Certification of Instruments" was developed, circulated

and analysed by Vaclav Slaboch (Czech Republic).

2.1.2 Working Group 5.2 - Reference Frame in Practice

The Working Group was jointly Chaired by Mikael Lilje from Sweden and Cyril Romieu from France. Cyril took over from Michel Kasser in December 2004. The Commission's Vice-Chair for Administration, Robert Sarib from Australia, has also been very active, applying his technical knowledge to assist the Chairs in this Working Group.

Major achievements of Working Group 5.2 in the period 2003 to 2006 include:

- A major focus for 2003 to 2006 has been strong involvement in the African Reference Frame (AFREF) project, which is aimed at developing a unified geospatial reference frame for the African continent. Our involvement has been in close cooperation with the International Association of Geodesy (IAG) and the AFREF Steering Committee. Our contributions included convening technical and workshop sessions on AFREF at FIG events in Marrakech, Morocco (2003), Cairo, Egypt (2005), Accra, Ghana (2006) and at the IAG Scientific Assembly in Cairns, Australia (2005). The most recent workshop in Ghana was facilitated by Commission 5 with the support of UN Economic Commission for Africa, the UN Regional Centre for Training in Aerospace Surveys, IAG and key members of the AFREF Steering Committee;
- Another major focus for Working Group 5.2 has been to redesign the content on the FIG web pages for this Working Group. That has made the web content more user focussed and relevant to practising Surveyors by presenting practical information on reference frame issues and giving links to key web sites and other resources on the topic. The content for the updated web pages will go live in the lead up to the FIG Congress in Munich.

2.1.3 Working Group 5.3 - Integrated Positioning, Navigation and Mapping Systems

The Working Group Chair was Professor Naser El-Sheimy from Canada.

Major achievements of Working Group 5.3 in the period 2003 to 2006 include:

- Continued collaboration with Commission 4 of IAG and Commission II of the International Society for Photogrammetry and Remote Sensing (ISPRS) ensuring the ongoing success of the Mobile Mapping Technology symposia series;
- MMT 2004 was held successfully in Kunming, China in 2004;
- Planning is well advanced for the 2007 MMT Symposium in Padova, Italy;
- As part of the cooperation with UN Office for Outer Space Affairs, the Working Group Chair also drafted a curricula on GNSS for the UN Space Technology Education Centres;
- We have also established Sub-Group 5.3.3 on Developments and Modernization of Global Navigation Satellite Systems (GNSS). The Sub-Group Chair is jointly Chaired by Larry Hothem from the USA and Georgia Fotopoulos from Canada;
- The goal is to present current information to FIG members about international efforts on the development and improvement of GNSS (eg GPS, GLONASS, GALILEO and others). The Sub-Group will also act as a forum to raise issues that can then be taken to the new International Committee on GNSS (ICG - see UN Cooperation below). The intention is to give FIG members a voice in and feedback on deliberations about the future of this key technology, which is used by many thousands of surveyors around the world;
- The web pages for the sub-group are being used to publish up to date information of relevance for surveyors;
- There is also an agreement between Professor Chris Rizos (President of

IAG Commission 4) and myself to use relevant events around the world to present a regularly updated version of a paper on "New GNSS Developments and their Impact on Survey Service Providers and Surveyors".

2.1.4 Working Group 5.4 - Cost Effective Surveying Technology and Techniques for Developing Countries

The Working Group Chair was Dan Schnurr from the United Kingdom. This was a joint activity with Commissions 3 and 7.

Major achievements of Working Group 5.4 in the period 2003 to 2006 include:

- Work on this topic did not commence in earnest until some way into this work period but progress has been made;
- A draft structure for a proposed FIG publication on the topic has been developed;
- Feedback has been sought from UN Habitat and other stakeholders on that draft document structure;
- There have been meetings and technical sessions at FIG events, especially the Regional Events, where there is strong participation from UN Agencies and FIG Members from developing countries.

2.1.5 WG 4.2 Vertical Reference Frame (Joint WG with Commission 4)

This was a Joint Working Group led by Commission 4. Commission 5 has been actively involved in relevant workshops at FIG and IAG events. Commission 5 has also been contributing technical content for the development of a White Paper on the topic.

2.2 Cooperation

2.2.1 Cooperation with Other Commissions

A significant factor for our cooperation with other commissions was that I was a member of FIG Council representing the Advisory Committee of Commission Officers (ACCO - all ten Commissions) during 2005 and 2006.

General cooperation with all Commissions has also been achieved through strong participation in ACCO meetings and through many joint technical sessions at FIG events. Commission 5 has had particularly close cooperation with Commissions 3, 4 and 7 through joint Working Groups 4.2 and 5.4 (outlined above).

2.2.2 Cooperation with FIG Standards Network

Commission 5 continues as a key participant in the important work of the Standards Network through Working Group 5.1.

2.2.3 Cooperation with Sister Organisations

A major focus for Commission 5 from 2003 to 2006 was to re-invigorate the relationship with the International Association of Geodesy (IAG). The strengthened cooperation has been greatly assisted by the strong commitment and encouragement by the Presidents of both organisations. Highlights of the cooperation with IAG include:

- I initiated a document to better identify potential areas for liaison between the FIG and IAG. It is designed as a reference document giving substance to the MoU. Professor Chris Rizos (President of IAG Commission 4) was a key player from the IAG side. The fact that Chris and I are both based in Australia has helped that development;
- A clear topic for strong cooperation was the African Reference Frame Project (see Working Group 5.2 Report above);
- There has also been strong three-way collaboration with IAG associated with our GNSS based cooperation with the United Nations Office for Outer Space Affairs (UN OOSA - see below);
- There was also excellent cooperation at IAG's 4-Yearly Scientific Assembly at the Dynamic Planet 2005 Symposium in Cairns, Australia in August 2005. That included IAG/FIG Open Forums on Dynamic Datum and on Vertical Reference Frames. These discussions were attended by a mix of participants from theoreticians to practicing

hydrographers and surveyors and resulted in very fruitful discussions on making the transition from conventionally defined (static) vertical reference frames to a modern approach that incorporates the effects of dynamic Earth systems.

It should also be mentioned that the International Society for Photogrammetry and Remote Sensing (ISPRS) and the International Cartographic Association (ICA) have also been involved in the AFREF work and in the UN OOSA work on future GNSS.

During this period, I have had meetings with Professor Dorota Brzezinska (US Institute of Navigation - ION) to develop a Cooperation Agreement between Commission 5 and ION. ION is a key organisation globally in GNSS development and runs the best recognised annual international Conference on GNSS. Commission 5 Vice Chair, Naser El-Sheimy and I also met with Dorota and Chris Rizos (IAG Commission 4) in Melbourne in 2005. This enabled discussions toward possible 3-way cooperation between FIG, IAG and ION, especially on GNSS matters. Discussions are continuing with ION and it is hoped that the Cooperation Agreement can be finalised in the lead up to the FIG Congress in Munich.

2.2.4 Cooperation with the United Nations

I am especially happy to be able to report that during my term as Chair, Commission 5 has developed a strong relationship with the UN Office for Outer Space Affairs (UN OOSA).

This culminated in December 2004 with the signing of a MoU by Sergio Camacho, the Director of UN OOSA and Holger Magel, the President of FIG. Three main topics were identified as areas for cooperation:

- Issues associated with GNSS (see below);
- Space Science and Technology Education, and;
- Space Technology for Disaster Management.

The progress towards the MoU grew out of my participation in a series of meetings and workshops on the use and applications of Global Navigation Satellite Systems (GNSS) hosted by UN OOSA and also supported by the US Department of State. Those meetings came from recommendations of the UN Committee on the Peaceful Use of Outer Space (COPUOS), as ratified by the General Assembly of the UN.

A major outcome has been the establishment of the International Committee on GNSS (ICG) under the auspices of the UN. For the first time in the more than 40 years history of GNSS, the ICG will allow organised, global input by civilians. The ICG will involve the key players delivering GNSS components including:

- The USA's Global Positioning System (GPS), represented by the US Directorate for Position, Navigation and Timing and by the Department of State and Department of Transport and Interagency GPS Executive Board;
- Russia's GLONASS, represented by Satellite Navigation Department of the Federal Space Agency, and;
- Europe's planned Galileo system, represented by the European Commission (EC) and European Space Agency (ESA).

The global user community will also be represented with major players in the many application areas, including key organisations for the surveying and mapping community:

- The International Association of Geodesy (IAG) represented by the President (Gerhard Beutler) and Chair of Commission 1 on Reference Frame (Herman Drewes)
- The IAG's International GNSS Service (IGS), represented by the President of the Board (John Dow) and the Director of IGS Central Bureau (Ruth Neilan);
- The International Cartographic Association (ICA) represented by the President (Milan Konecny)
- I will represent FIG.

A feature of the meetings leading up to the formation of the ICG has been a strong focus on improving infrastructure and capacity

building for GNSS use in developing countries and countries in transition. Many countries have been represented, including: Austria, Brazil, Bulgaria, Colombia, Czech Republic, Egypt, Hungary, India, Italy, Japan, Kenya, Malaysia, Nigeria, Peru, Poland, Romania, Russian Federation, Slovakia, South Africa, Syrian Arab Republic, Ukraine, United Kingdom, United States of America and Zambia.

2.3 Events

Commission 5 continued to be very well represented at FIG and allied events during this term. The following are some of the many events where Commission 5 participated. Reports on many of these events were made available on the Commission 5 Web Site.

2003

- FIG Working Week, Paris, France 2003;
- 7th SEASC, Hong Kong, November 2003;
- 2nd FIG Regional Conference, Marrakech, Morocco December 2003;
- United Nations/United States of America International Workshop on the Use and Applications of Global Navigation Satellite Systems, Vienna, Austria, December 2003.

2004

- The 4th International Symposium on Mobile Mapping Technology (MMT 2004), Kunming, China, March 29-31, 2004;
- FIG Working Week in Athens, Greece May 2004;
- 3rd FIG Regional Conference, Jakarta, Indonesia October 2004;
- United Nations/United States of America International Workshop on the Use and Applications of Global Navigation Satellite Systems, Vienna, Austria, December 2004.

2005

- FIG Working Week in Cairo, Egypt, 16-21 April 2005;
- SE Asian Survey Congress, Brunei, November 2005;
- United Nations sponsored meeting to consider formation of the International

Committee on GNSS, Vienna, Austria, December 2005;

- International Symposium on GPS/GNSS in Hong Kong, SAR China, December 2005.

2006

- 5th FIG Regional Conference, Accra, Ghana March 2006;
- Combined 5th Trans Tasman Surveyors Conference and 2nd Queensland Spatial Industry Conference 2006, Cairns, Australia September 2006;
- FIG XXIII Congress, Munich, Germany October 2006.

2.4 Publications

At Working Weeks and Regional Conferences, Commission 5 consistently ranks in the top 3 Commissions in terms of numbers of papers submitted. A search of the FIG Surveyors Reference Library for proceedings of FIG Events from the Working Week in Athens in May 2004 to the FIG Regional Conference in Ghana in March 2006 shows 204 papers related Commission 5 sessions or joint sessions.

There are also several special purpose publications under development by the Working Groups as outlined above.

An important trend in Commission 5 during this period was to continue to change the emphasis from paper publications to making more and more of the technical and promotional material available via the Commission web pages.

2.5 Acknowledgments

In submitting this report to conclude my term as Commission Chair, I thank the General Assembly, the members of the FIG Council, my fellow Commission Chairs and Chairs Elect, the National Delegates to Commission 5 and all the excellent staff of the FIG Office. I also thank my Colleagues and Management in the Queensland Department of Natural Resources Mines and Water, without whose support my participation in FIG would not be possible.

I especially thank my colleagues in the Commission 5 Steering Committee for the

generous donation of their valuable time to do an excellent job guiding their Working Groups, for their active participation in FIG and allied events and for their friendships, which I know will last forever.

Finally, I thank my wife, Jane and my children, Emma, George and Joseph for putting up with my global wanderings.



Regards Matt Higgins

If you would like to circulate Commission 5
NEWS to all our members please email your
item for consideration to the Vice Chair
Administration -
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