International Federation of Surveyors
Fédération Internationale des Géomètres
Internationale Vereinigung der Vermessungsingenieure
Commission 5
Positioning and Measurement (2007-2010)
http://www.fig.net/commission5/index.htm

The XXIV FIG International Congress Sydney 2010
Facing the Challenges – Building the Capacity
FIG Commission 5 Report

Introduction

The XXIV FIG International Congress was convened in Sydney, Australia during 11-16 April, 2010. More than 2200 persons from 100 countries participated in this memorable event. This was the largest FIG gathering ever! There were over 800 presentations, 10 parallel technical sessions, numerous meetings, seminars, work shops and social events. An Exhibition supporting the technical symposium was also organised for the week with at least 100 major international and local Australian vendors.

Overall, the Congress was well-organised at the Sydney Conference Centre which had the beautiful Darling Harbour as a background setting. From a Commission 5 perspective, the general feeling after the Congress was that this was another great occasion to 'catch up' with colleagues and to discuss the state-of-the-art concepts and workings pertaining to international geodesy and work within FIG.

The Technical Programme

For Commission 5 the primary purpose of FIG events is to provide operational surveyors the opportunity to present and interact with scientists, academics and public and private organisations on many different and contemporary survey related topics. To achieve this FIG Commission 5 facilitated over 30 technical and flash sessions, and numerous discussion forums that were relating to "Positioning and Measurement" during the Congress! Over 150 presentations / papers were delivered in Commission 5 only and joint sessions with Commission 4 and 6. In most Commission 5 sessions there was 'standing' room only which meant on many occasions there were 100 plus delegates in attendance. With respect to papers and presentations the quality was good and there were only a few presenters who were 'no shows'. To review the entire Commission 5's technical program and to view papers / presentations refer to the FIG Congress website or web location – http://www.fig.net/pub/fig2010/index.htm

To summarise, Commission 5 have prepared and complied the following comments from technical session Chairs and Rapporteurs to highlight the Congress proceedings –

- At various technical sessions, it was clear that other FIG Commissions consider our work as the very important geospatial infrastructure to underpin their activities that is the provision of 'common' reference systems as well as effective positioning services.
- Even though there appeared to be a limited number of new ideas or results from the various technical sessions at this Congress, the outcome was very good as it gave a good summary on the hot topics within geodesy at the moment.
- It was clear that many questions and issues raised are 'universal', that is the same questions and issues are discussed in many countries. The solutions are of course slightly different but in general they seemed to be in agreement on which direction national or regional geodesy should move.

- Paper 4526 – Simon Kwok, What Makes the Positioning Infrastructure Work – The Experience of the Hong Kong Satellite Positioning Reference Station Network provided a good overview of a unified positioning infrastructure in a small but 'influential' region.
- Paper 4554 - James Millner, Martin Hale, Jacqueline LeLievre, Hayden Asmussen and John Gallagher, Positioning Infrastructure Used for a Sustainable Future: Case Study from Victoria Australia. This paper provided a good overview of the use and value of the GNSS CORS in the state of Victoria with good examples in the agricultural and mining areas.
- The discussion on static, semi-dynamic or dynamic reference systems was interesting and due to plate tectonics the solutions varied in different countries. This topic will provide challenges for Commission 5 to consider as many countries are considering future options for and adoption of semi-dynamic or dynamic datums such as has been implemented in New Zealand.
- Numerous overview and status reports of GNSS CORS networks, their related services and technical issues were presented in several sessions – namely TS 3C, 4C, and 8F, FS 1H and 2H. It is always interesting to see the development in different countries and the different business model solutions for applications connected to GNSS CORS, from a commercial or private perspective, and the operations managed by the national mapping agencies.
- Numerous presentations discussed new GPS applications, however only a few discussed the future and the impact when other GNSS such as Glonass, Compass, and Galileo become fully operational or are overhauled.
- The development of accurate 'cm' geoid models and the move towards the adoption of national vertical datums based on these accurate geoid models were presented and discussed at numerous sessions (TS 1C, FS 1C, and TS 10I). In particular, the initiatives being undertaken by the US to gather new airborne gravity data for the development of their new 'cm' geoid model and possible implementation of this for a new vertical datum for North America.
- There was significant discussion around the development and current status of Asia Pacific Reference Frame (APREF) project in several sessions. These sessions, namely TS 6C and 7C, also provided a number of good papers and interaction amongst delegates around the development of the Global Geodetic Observing System (GGOS). This project and the development of a global 'mm' accurate reference frame will provide an important platform for studying global change such as rising sea level, climate change and the deforming earth.
- There were a number of interesting sessions related to measurement quality and standards. To highlight a few papers the reviewers have recommended reading the following:
    - Paper 4438 - Darren Burns and Rob Sarib, Standards and Practices for GNSS CORS Infrastructure, Networks, Techniques and Applications that gave solid practical advice on the establishment of GNSS CORS infrastructure.
    - Paper 3772 - William Henning, Real Time Network Guidelines from NOAA's National Geodetic Survey, gave a nice overview of NGS guidelines.
    - Paper 4226 - Robert Odolinski, Swedish User Guidelines for Network-RTK, gave a very interesting overview of guidelines for Network-RTK in Sweden.
    - Paper 4145 and 4151 - Simon Fuller, Eldar Rubinov, Phil Collier and Seager James, Integrated Quality Indicators and Stochastic Modelling for Real-Time Positioning: Overview and Implementation, and Implementation of Real-Time Quality Control Procedures for Network RTK GNSS Positioning. Presentation was an interesting and novel talk on QA for RTK as it used a straw to demonstrate the fixed and variable errors in GPS measurements!
    - Paper 3873 - Jorma Jokela, Pasi Hakli, Rupert Kugler, Helmut Skorpil and Michael Matus, Calibration of the BEV Geodetic Baseline.
    - Paper 3910 - David Martin, Instrument Calibration at the ESRF.
    - Paper 4308 - Philipp Zeimetz and Heiner Kuhlmann, Validation of the Laboratory Calibration of Geodetic Antennas based on GPS Measurement. A presentation of the ongoing GNSS antennae calibration work.
- The session TS 2C - Low Cost GNSS and New Positioning Techniques was an outcome of two Commission 5 activities and was well introduced by Volker Schwieger. First Neil Weston provided an overview of the FIG publication No. 49 Cost Effective GNSS Positioning

Techniques, which was written by both Neil and Volker (Paper 4685). In this session Joel van Cranenbroeck presented a paper on Advanced Development in RFID Technology to Provide Solutions for Structural Health Monitoring Operations that showed a remarkable technology for the future (Paper 4508). Another paper dealing with low-cost GNSS and recommended for reading in this session is Paper 4208 - Reha Metin Alkan: Development of a Low-cost Positioning System Using OEM GPS Receivers and Usability in Surveying Applications.

- Paper 3768 - Daniel Roman, Yan Wang, Jarir Saleh and Xiaopeng Li, Geodesy, Geoids, and Vertical Datums: A Perspective from the U.S. National Geodetic Survey. This paper demonstrated a high level of competency and represented the topic very well
- Paper 3912 - Munkhtsetseg Dalkhaa, Geodetic Network and Geoid Height Model of Mongolia. A simple concise presentation and paper that showed real progress in a developing country in the field of geodesy.
- It was apparent that many organisations and / or surveyors are utilising GNSS for more monitoring.
- Paper 3786 - John Hannah's presentation and paper titled, The Problems and Challenges in Using Tide Gauges to Monitor Long-term sea Level Change, was nominated as a highlight paper from the Vertical Reference Frame session TS10I.
- Another session that was an direct outcome of Commission 5 activity, in this case the cooperation with the German Aerospace Centre (DLR) with respect to the TanDEM-X satellite project was TS 8C - New GNSS Applications and Developments. Here different presentations regarding the Digital Elevation Model as an outcome of the project and the evaluation by kinematic GPs tracks are presented by different presenters. We recommend for reading:
    - Paper 4030 - Detlev Kosmann, Birgit Wessel and Volker Schwieger: Global Digital Elevation Model from the TanDEM-X and the Calibration/Validation with Worldwide Kinematic GPS-Tracks and
    - Paper 4045 - Juergen Schweitzer, Bimin Zheng, Volker Schwieger and Detlev Kosmann: Evaluation of the TanDEM-X Digital Elevation Model by PPP GPS - Analysis and Intermediate Results.

Another highlight for Commission 5 was Vice President Matt Higgins presenting a keynote on "The Role of Positioning Infrastructure in the Technological Future of our Profession" in Plenary Session 4 on Technological Futures. The presentation outlined the latest developments in Positioning Infrastructure and the significant economic and environmental benefits enabled by the infrastructure. The presentation then covered future technological trends and their expected impact, such as how the real-time nature of precise positioning will create a next wave of spatial enablement, the need to deal with increasingly demanding users and the changing relationship between Positioning Infrastructure and Spatial Data Infrastructure.

Co-operation Between FIG and IAG and PCGIAP

FIG Commission 5 has been working intensively with the International Association of Geodesy (IAG) over the last few years and at this Congress these liaisons continued. FIG and IAG representatives (Chris Rizos, Ruth Neilan, and Markus Rothacher) held several meetings to define the structure of workings and future projects for the coming years. The result of such discussions were to continue joint focus on GGOS, the regional reference frame project – APREF, and to re-invigorate FIG's role in the AFREF (African Reference Frame) project via the next FIG Working Week in Marrakech. Other joint projects with tangible outcomes that needed to be developed concerned joint publications and work shops or schools at symposiums on topics such as ubiquitous positioning and reference frames.

In relation to the APREF sessions in Sydney, the Permanent Committee for GIS Infrastructure Asia – Pacific (PCGIAP) Regional Geodesy Working Group once again assisted both FIG and IAG to organise invited speakers as well as presentations. From meetings with PCGIAP representative (Dr

John Dawson) it was agreed that this relationship with FIG should also continue into the 2011-14 term.

Social functions

The Congress Steering and Organising Committee arranged several social functions that many Commission 5 delegates attended with pleasure. They included:

- Welcome Reception at the Sydney Town Hall - a great historical location for old and new FIG delegates to greet each other.
- Foundation Dinner – a delightful evening boat cruise in the famous Sydney Harbour with Captain Cook Cruises
- Gala Dinner – an elegant formal dinner at the Dockside Cockle Bay
- FIG Farewell Reception – at the Parkside Foyer of the Sydney Convention Centre.

For Commissions 4, 5 and 6 the highlight function was their combined gathering of the 'technical' Commissions. This very popular traditional event was held at the "The Dunkirk" and was attended by almost 130 FIG delegates and friends of Commissions 4, 5 and 6. The participants enjoyed nice food, beverages of course, a "Quiz" night that was easily won by Commission 5, and the great comradeship amongst the technical crew. Special thanks to the University of New South Wales, C R Kennedy / Leica Geosystems, Professor Chris Rizos and Dr Craig Roberts for their assistance to make this gathering another memorable one.

General Assembly

From a Commission 5 perspective the General Assembly highlights were –

- The proposal to develop a FIG members database
- Acknowledgement of Commission 5 Publication No. 49 Cost Effective GNSS Positioning Techniques.
- Endorsement of the new Working Group on "Ubiquitous Positioning Technologies and Techniques" under Commission 5 (joint with Commission 6) that will be a collaborative working group with IAG. This working group will continue its work in 2011-2014. Allison Kealy, FIG (Australia) and Günther Retscher, IAG (Austria) have been appointed as co-chairs.
- Recognition of the FIG participation and work with the International Committee on Global Navigation Satellite Systems (ICG)
- The selection of Kuala Lumpur, Malaysia for the FIG Congress 2014.
- The election of -
    - Mr. Teo CheeHai from Malaysia as the FIG President for 2011- 2014
    - Dr. Chryssy Potsiou from Greece for the first position of Vice President for 2011-2014
    - Prof. Rudolf Staiger from Germany for the second open position of Vice President for 2011- 2014.
    - Prof. Dalal S. Alnaggar was then appointed for Vice President for a two year period 2011- 2014.

Commission 5 Administration

Rudolf Staiger, Mikael Lilje, David Martin (Standards Network) and Rob Sarib attended ACCO. The Commission 5 Steering Committee held its last 'face to face meetings' and 'Open Commission' meeting for the term 2007-10. Minutes, detailing the meeting discussions from Sydney, (and previous meeting minutes of the current and past term) can be viewed at web location - http://www.fig.net/commission5/steering_committee/steeringcommittee.htm . In summary, there was constructive discussion about the future workings of Commission 5 in the next term 2011-14, however the Steering Committee also reflected on what could have been done better and / or needed

improvement. Overall the Steering Committee believed they had accomplished most of the objectives as outlined in the work plan.

Concluding Comments from Chair Rudolf Staiger

On behalf of the Commission 5 Steering Committee I wish to thank all who participated, contributed and attended the technical sessions and symposium to make this another successful Congress for Commission 5. I also take this opportunity to express my sincere gratitude to my hard working team for their professional contribution, and more importantly their friendship that they have displayed over the last 4 years. Their dedication to FIG and the Commission 5 has been exemplary and I wish Mikael Lilje all the best for the term 2011-14.

Picture Gallery from FIG 2010

"The Stig" and Commission 5

Refer to the following website location for the Commission 5 Sydney Congress Picture Gallery - http://www.fig.net/commission5/gallery/index.htm

Important Future FIG Commission 5 Events

- 2010: IGS workshop, Newcastle, England
- 2010 : IWAA, DESY Hamburg Germany
- 2011: FIG Working Week, Marrakesh, Morocco.
- 2011: Mobile Mapping Symposium, Krakow, Poland
- 2011: CLGE-seminar; European Reference System, Umeå, Sverige
- 2011: IUGG, Melbourne, Australia
- 2011: Deformation Measurement Symposium
- 2012: Machine Control and Guidance, Stuttgart, Germany
- 2012. FIG Working Week, Rome, Italy
- 2013: FIG Working Week, Abudja, Nigeria
- 2014: FIG Congress, Kuala Lumpur, Malaysia