

**Report to the 32<sup>nd</sup> General Assembly  
FIG Working Week in Eilat, Israel 2009**

**FIG Commission 5 – Positioning and Measurement**

**Annual Report of Activities 2008-2009**

**1. General**

Commission 5 – Position and Measurement has had another solid year. Our primary focus for 2008 has been to build on the foundations set in 2007 and to facilitate the needs of grass root surveyors and our members. As a result we have seen the continued interest and popularity in the development of GNSS positioning applications, associated infrastructure; standards for such measuring devices; and new positioning technologies. Furthermore it is becoming more evident that these GNSS and positioning technologies are become more prevalent and integral components of fundamental infrastructure to support existing and emerging land and spatial information systems.

At FIG related symposia in 2008, various technical sessions and discussion forums have been held on these topics and have attracted large audiences and quality participation. From the analysis of delegate's comments and feedback, it appears in 2009 Commission 5 will need to convene similar forums but with also an emphasis and involvement of 'mass market' positioning technology such as mobile phone communications and indoor positioning systems.

**2. Working Groups**

**WG 5.1 – Standards, Quality Assurance and Calibration**

Chaired by David Martin

- One session concerning Calibration of Instruments and two sessions with WG 5.4 were organised at the Stockholm working week. Two of the sessions came under the banner of "*Standards, Quality Assurance and Calibration*" and concerned GNSS Antenna Calibration and GNSS Standards. The latter session was distinguished by its lively debate over the important subject of standards in surveying and in GNSS in particular. It can be noted that one of the papers issued from this session "*Review of Standards, Best Practice, Testing and Calibration in Global Navigation Satellite System*" was reprinted as FIG Article of the Month for September 2008. Standards also resurfaced in the sessions dedicated to New Positioning Techniques Forum.
- Work is progressing on the organisation of a repository of standards information related to GNSS.

## **WG 5.2 – Reference Frame in Practice**

Chaired by Mikael Lilje

- The working group was heavily involved in several sessions at FIG Working Week in Stockholm. Sessions as “*Development in GNSS Measurement Technologies and Techniques*”, “*Geodetic Networks, Reference Frames and Systems I and II*”, “*GNSS Reference Stations*”, “*Reliability of Positioning and Measurement Technologies*”, “*Deformation Monitoring – Techniques and Case Studies*”, “*Processing of Geodetic Data*” and “*Geoid*” were successfully organised. All sessions had quality papers, good attendance and interesting discussions. The working group was also involved in the Poster session on “*Real Time GNSS CORS*”. Note: most of the presentations on real time networks can be found under the title “*Permanent GNSS Networks*”, at website location - <http://www.fig.net/commission5/wg52/reframe.htm> .
- The working group has also continued to updated its webpage and the location is <http://www.fig.net/commission5/wg52/>
- By 2010, the working group hopes to add and update the ‘fact sheet’ archive and will base the additions or changes on the forums and technical papers from 2008/09.

## **WG 5.3 – Integrated Positioning, Navigation and mapping Systems**

Co-chaired by Andrew Hunter and Naser El-Sheimy

- Working Group 5.3 was preparing the 6th International Symposium on Mobile Mapping Technology, which will be held in July 2009 at the São Paulo State University, Brazil.

## **WG 5.4 – Global Navigation Satellite Systems**

Chaired by Volker Schwieger

- Working Group 5.4 was very active at the Working Week in Stockholm. The sessions about Real Time GNSS CORS networks were successful and were facilitated in partnership with Working Group 5.2 “*Geodetic Reference Frames in Practice*”. A poster session and a discussion forum regarding this topic were successfully launched. The feedback from the participants on the content and format was very positive.
- Two joint sessions with Working Group 5.1 “*Standards, Quality Assurance and Calibration*” on the topic of “*GNSS Calibration and Check*”, were also convened in Stockholm.
- In Stockholm there were several GNSS sessions relating to new GNSS positioning methods and another dedicated to “*New Positioning Techniques Forum*”. Both forums prove to be highly sought after by the FIG community, as the attendance was high and the discussion extremely fruitful. GNSS positioning using mobile phones, other inertial positioning systems, and the provision of digital 3D-indoor maps were major issues of the discussion.
- The work for a “*Report on possibilities of cost-effective GNSS techniques for developing countries*” is ongoing. It is scheduled to be published in a FIG Report for the FIG Congress in Sydney 2010.
- Working Group 5.4 supports German Aerospace Centre (DLR) to acquire kinematic GPS tracks that will be used to evaluate the TanDEM-X digital elevation model. Due to the required global coverage of the GNSS tracks, different tracks shall be acquired on different continents. During the last months a large number of e-mails reached the organisers at DLR, and this has been due to FIG disseminating such a request to their

delegates and the scientific community. 20 scientists and companies from all over the world are now registered. Most of them will join the TanDEM-X calibration and validation group. In the meantime first tracks have been acquired e.g. in Europe and China as well as partly already successfully evaluated. The work is on going and will be presented at the following FIG events.

### **3. Cooperation**

#### 3.1 Cooperation with Other Commissions

In 2008, Commission 5 continued to work with Commission 4 and 6 on topics relating to deformation measurement, calibration of instruments, long range measurement, satellite and terrestrial imagery measuring techniques, and vertical datum / reference frame issues for hydrography.

#### 3.2 Cooperation with Sister Organisations

The Commission 5 Steering Committee consolidated our relationship with various organisations such as the US National Geodetic Survey-NOAA, IAG and ION in 2008.

In Stockholm IAG President Prof. Chris Rizos, IAG Commission 4 Chair Dr Sandra Verhagen, and representatives from National Geodetic Survey - Mr Neil Weston, Mr Dave Doyle and Mr Dave Zilkoski participated extensively at many technical sessions and meetings. Their support and efforts helped the Stockholm Working Week to be a great success.

As a result of discussions with ION officials Dorota Brzezinska and Patricia Doherty, Mikael Lilje (Chair Elect of Commission 5) will now be representing and presenting at the ION International Technical Meeting in Anaheim, late January 2009. At this event Mr Lilje will meet more ION representatives and explore opportunities to develop our relationship further.

#### 3.2 Cooperation with UN

The International Committee on Global Navigation Satellite Systems (ICG), met in Pasadena, California, USA, from 8 to 12 December 2008. Vice President Matt Higgins attended representing FIG and Commission 5.

The ICG has been formed as a result of recommendations of the UN Committee on the Peaceful Use of Outer Space (COPUOS), as ratified by the General Assembly of the UN. The United Nations Office for Outer Space Affairs (UN OOSA) acts as the secretariat for the ICG. It should be noted that FIG has a MoU with UN OOSA.

A major development for the surveying and geodesy community at ICG-3 was the formation of a Task Force on Geodetic References. The proposed membership of the Task Force means that for the first time ever, there will be a single forum where experts from the user community (including FIG and IAG) can meet directly with experts from the GNSS providers who are responsible for:

- World Geodetic System 84 (WGS84) used for GPS;
- PZ-90.02 used for GLONASS;

- Galileo Terrestrial Reference Frame (GTRF) used for Galileo, and;
- China Geodetic System (CGS`2000) used for Compass.

The goals for the Task Force will include:

- To bring together all interested ICG participants (experts from the system and service providers, key user communities, etc);
- To review the present situation (existing documents, resolutions or practices);
- To discuss and agree upon a consistent terminology for geodetic references and related understanding;
- To prepare recommended practices for the realization of each GNSS Geodetic Reference and its alignment to ITRF;
- To outline and encourage implementation plans in each relevant user community;
- To propose mechanisms for informing users of the current realization of a particular Geodetic Reference and any changes that may occur from time to time.

For a full report by Vice President Matt Higgins please refer to website - [http://www.fig.net/news/news\\_2008/icg\\_3\\_pasadena\\_december\\_2008.pdf](http://www.fig.net/news/news_2008/icg_3_pasadena_december_2008.pdf)

### 3.3 Cooperation with ISO

Prof. Hans Heister (Munich) is representing FIG and our Commission at the ISO-Committee 172-SC6 (Geodetic Instruments). He was not only hosting the last meeting 28-29<sup>th</sup> April 2008 in Munich, but he was also heavily involved in the finalisation of the ISO- guidelines 17123-8 “*Field procedures for testing geodetic and surveying instruments -GNSS field measurement systems in real-time kinematic (RTK)*” published last year.

## **4. Events**

### **2008**

A summary of the Commission 5 activities at events in 2008 can be found on our website <http://www.fig.net/commission5/index.htm>, however the highlights were:

- The premier event for Commission 5 – Position and Measurement in the year 2008 was the Working Week held in Stockholm. There were eighteen (18) Commission 5 related technical sessions, comprising of almost 100 related technical papers and poster presentations. The symposium was well attended by Commission 5 delegates from around the world and the Swedish Surveyors were fantastic hosts. A full report from this technical event can be found at web site <http://www.fig.net/commission5/reports/reports.htm>.
- Vice President Matt Higgins attended Munich Satellite Navigation Summit - Munich, Germany, 19-21 February 2008. This summit focused on the status and policy developments relating to all major providers of GNSS, including the EU, USA, Russia, India, Japan and China. For a full report by Vice President Higgins please refer to website [http://www.fig.net/news/news\\_2008/munich\\_summit\\_february\\_2008\\_higgins\\_rep.pdf](http://www.fig.net/news/news_2008/munich_summit_february_2008_higgins_rep.pdf)
- FIG Vice President, Matt Higgins attended the 4th International Exhibition and Scientific Congress “*GEO-Siberia-2008*” in Novosibirsk, Russian Federation from 22 to 24 April 2008. GEO-Siberia-2008 was organised by the Siberian State Academy of Geodesy

(SSGA) and the International Exhibition Centre “*Siberian Fair*”. The event is modelled on INTERGEO in Germany with a large exhibition and an associated technical conference. There were some 3,000 participants overall with approximately 100 companies in the exhibition. In the conference there were 18 technical sessions with 450 presentations. More details from Matt's report on the event are available at:

[http://www.fig.net/news/news\\_2008/novosibirsk\\_april\\_2008.htm](http://www.fig.net/news/news_2008/novosibirsk_april_2008.htm)

- In June, Volker Schwieger the Chair of WG 5.4 attended the 1st International Conference on Machine Control & Guidance in Zürich, Switzerland. The conference was co-sponsored by FIG Commissions 5 and 6 and the Institute of Navigation Switzerland. The conference attracted more than 130 practitioners and scientists from all over the world. The first attempt to bring together manufactures of geodetic instruments as well as of construction and agricultural engines, the respective software companies, users of both sectors as well as researchers of different disciplines was very successful. It is planned to rerun the conference 2010 in Bonn, Germany.
- In October, Vice President Matt Higgins and Vice Chair of Administration for Commission 5 Rob Sarib attended the 14<sup>th</sup> Australian Remote Sensing and Photogrammetry Conference in Darwin, Australia. At this event they represented our Commission, presented papers and held a workshop on GNSS, CORS and their effect on the spatial science and imagery industries. This event showcased the best of Australasia's technical and application driven remote sensing and photogrammetry research and the future directions of the industry.

## 2009

In 2009 Commission 5 will endeavour to send representatives to the following conferences however from a Commission 5 Steering Committee perspective we will be focussing our attention on the FIG Working Week in Eilat and the Regional Conference in Hanoi.

- 26-28 January, Anaheim, California  
ION International Technical Meeting (ITM) 2009  
at the Disney's Paradise Pier Hotel  
Web Site: <http://www.ion.org/meetings/#itm>

**Please note** - FIG have a MoU with ION, and one of the initiatives is for us to participate at each others symposia. Mikael Lilje will be attending this forum on behalf of FIG and Commission 5.

- 3-8 May, Eilat, Israel  
FIG Working Week and XXXII General Assembly  
New Horizons across the Red Sea - Surveyors Key Role in Accelerated Development.  
Web site: [www.fig.net/fig2009](http://www.fig.net/fig2009)

**Please note** - Positioning and Measurement Topics –

- Establishing quality and reliable survey or geodetic infrastructure to underpin and support land development
- Standards, quality assurance and calibration
- Reference frame in practice

- Network adjustments
  - Geodetic observing systems
  - Integrated positioning, navigation and mapping systems
  - GNSS and GNSS measuring devices
  - Cost-effective GNSS
  - GNSS networks and the impact of permanent GNSS networks and their applications in geodetic practice
  - Precise GNSS
  - GNSS calibration and check
  - New positioning techniques
  - Geodetic infrastructure
  - Case studies on the above
  - Vertical control networks based on precise spirit levelling, and its substitute alternatives.
- 1-3 July, Vienna, Austria  
The 9th Conference on Optical 3-D Measurement Techniques.  
Co-sponsored by FIG Commission 5 and 6, IPRS Commission V and IAG Sub-Commission 4.2.  
Web site: <http://info.tuwien.ac.at/ingeo/optical3d/>
  - 21-24 July, Presidente Prudente, São Paulo State University, Brazil  
6th International Symposium on Mobile Mapping Technology - MMT2009.  
Serving the Information Society  
Jointly organized by IPRS, FIG, IAG, and UNESP, Brazil.  
Web site: [www.fct.unesp.br/eventos/simposio/mmt09](http://www.fct.unesp.br/eventos/simposio/mmt09)

**Please note** - The main objective of the conference is to discuss the most recent technology and its application, to exchange experiences and to promote future research aiming at the development and the production in the fields related to mobile mapping. The topics of interest are focused on the state-of-the-art in many important scientific and technological, and also cultural, issues related to the MMT'09, with the major objective of making human life safer, easier, and more comfortable in the near future.

- 2-15 August, Rio de Janeiro, Brazil  
XXVII General Assembly of the International Astronomical Union.  
Web site: [www.iau.org](http://www.iau.org)
- 4-7 August, Bali, Indonesia  
10th South East Asian Survey Congress (SEASC '09).  
Hosted by Bakosurtanal.  
Web site: [www.seasc2009.org](http://www.seasc2009.org)
- 31 August - 4 September, Buenos Aires  
Geodesy for Planet Earth - IAG2009. International Association of Geodesy Scientific Assembly IAG 2009. Co-sponsored by FIG Commission 5.  
Web site: <http://www.iag2009.com.ar/>

- 19-22 October, Hanoi, Vietnam  
7th FIG Regional Conference.  
Spatial Data Serving People. Surveying & Mapping for Land Administration and Environment Management.  
Organised by FIG and the Vietnam Association of Geodesy, Cartography and Remote Sensing.  
Web site: [www.fig.net/vietnam](http://www.fig.net/vietnam)  
First invitation: [www.fig.net/events/2009/vietnam\\_flyer.pdf](http://www.fig.net/events/2009/vietnam_flyer.pdf)

**Please note** - The Commission 5 Steering Committee are seeking suggestions for possible technical session or forum topics and ‘contacts’ in the region for this conference. If you would like to assist or have some ideas please contact Rob Sarib, [robert.sarib@nt.gov.au](mailto:robert.sarib@nt.gov.au).

## 5. Communication and Publications

Commission 5 have issued numerous reports and periodic newsletters to our delegates. These communiqués can be found on the website <http://www.fig.net/commission5/index.htm>.

Modifications to make the Commission 5 website more dynamic and the ‘norm’ for disseminating information to it’s delegates has progressed slowly, however it will be a major objective for the team in 2009.

## 6. Other Highlights

The selection of Mr Mikael Lilje from Sweden as the Chair Elect for Commission 5 was a significant occasion in 2008. Mr Lilje has been an active Commission 5 representative since 1998 and has made many important contributions. Mr Lilje will be in this position for the term of office 1 January 2009 to 31 December 2010 and will then be elected as Chair of Commission 5 for the term of office 1 January 2011 to 31 December 2014. Congratulations to Mikael, a well deserved and supported appointment!

Prof. Rudolf Staiger  
Chair of FIG Commission 5

January 2009