



International Fédération of Surveyors  
Fédération Internationale des Géomètres  
Internationale Vereinigung der Vermessungsingenieure

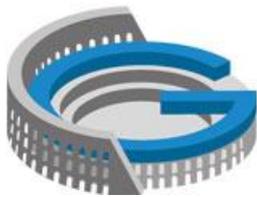
## **FIG Commission 5 Position and Measurement e Newsletter – March / April 2012**

Dear Colleague,

Welcome to FIG Commission 5's first e-Newsletter for the year 2012. On behalf of Commission 5 we hope you all had a very festive season. In this edition you will read about the proposed technical program for our Commission at the Working Week in Rome, an "appeal" from IGS for GNSS CORS, and also a report on the working group's 2011 activities. Please feel free to distribute this newsletter to colleagues and friends.

Regards Mikael Lilje, ([Mikael.Lilje@lm.se](mailto:Mikael.Lilje@lm.se))  
Chair of FIG Commission 5

## **FIG Working Week 2012 - Rome, Italy, 6-10 May 2012**



### **The Event**

The FIG Working Week and 35<sup>th</sup> General Assembly will be held at the Rome Cavalieri, Waldorf Astoria Hotels & Resorts. The theme of the event is "Knowing to manage the territory, protect the environment, evaluate the cultural heritage". It is being jointly organized by FIG and the governance body for the Italian survey profession, the National Council of Surveyors and Graduate Surveyors (Consiglio Nazionale Geometri e Geometri Laureati, CNGeGL).

We urge all Commission 5 delegates to attend and contribute by actively participating in all activities. Online registration to the Working Week is available at the following web site:

<https://www.fig.net/registrations/regform.asp?eventid=82>

### **Technical Program**

It is expected that over 1000 surveyors from all over the world will attend this event. Commission 5 has prepared a technical program that comprises of 17 technical sessions and almost 100 papers and presentations. To view the preliminary program please refer to website –

[http://www.fig.net/fig2012/technical\\_program.htm](http://www.fig.net/fig2012/technical_program.htm)

The relevant Commission 5 technical sessions are –  
Monday 7 May 2012

- TS01B - Geodetic Datum I
- TS02B - Geodetic Datum II

- TS03D - Multi-Sensor Systems

Tuesday 8 May 2012

- TS04B - Heights, Geoid and Gravity
- TS04H - Measurement Applications of Unmanned Vehicles
- TS05B - GNSS CORS Infrastructure and Applications I
- TS05H - Remote Sensing I
- TS06E - GNSS CORS Infrastructure and Applications II
- TS06I - Remote Sensing II

Wednesday 9 May 2012

- TS07A - Laser Scanners I
- TS07H - GNSS Measurement Devices
- TS08B - The Impact of Earthquakes and Geodynamics on Geodetic Ref Frame
- TS08C - Laser Scanners II
- TS08D - Vertical Reference Systems
- TS08I - Low Cost Surveying and Mapping
- TS09B - Precise Point Positioning
- TS09D - Laser Scanners III

### **Meetings**

It is planned that Commission 5 will have numerous administrative meetings at this event for the Vice Chairs and their participants. There will also be an Open Commission meeting which is primarily for all Commission 5 delegates to ask questions and raise issues relevant to the Commission and its work plan. This meeting has been scheduled for Sunday 6 May 2012 at 1600. A room has not been allocated so please refer to the meeting program when it is released.

### **Reference Frame in Practice Technical Seminar**

The IAG, (International Association of Geodesy), FIG (Fédération Internationale des Géomètres) and ICG (International Committee on GNSS) are holding a technical seminar prior to the Working Week, on 4-5 May 2012. This event will be held at the Cassa Geometri (Cassa Italiana Di Previdenza Ed Assistenza Dei Geometri Liberi Professionisti).

It is anticipated that distinguished geodesists from different organisations and disciplines will provide attendees with informative technical presentations and material on reference frame issues. Some of the topics are -

- The Role of Geodesy– GGOS and Future Trends
- Global Terrestrial Reference Systems and Frames
- Regional and National reference systems
- IGS services and other initiatives
- Four dimensional deformation models for Terrestrial Reference Frames"
- Geoids, Gravity and World Height System
- Worked examples of Terrestrial Reference Frame realisations
- Multi GNSS Environment
- Standards and Traceability of Terrestrial Reference Frames / GNSS

For more information about this technical seminar and how to participate please refer to the website – <http://www.fig.net/fig2012/commission5.htm> or send an email to [Mikael.Lilje@lm.se](mailto:Mikael.Lilje@lm.se) .

## IGS GNSS Reference Frame Station Appeal

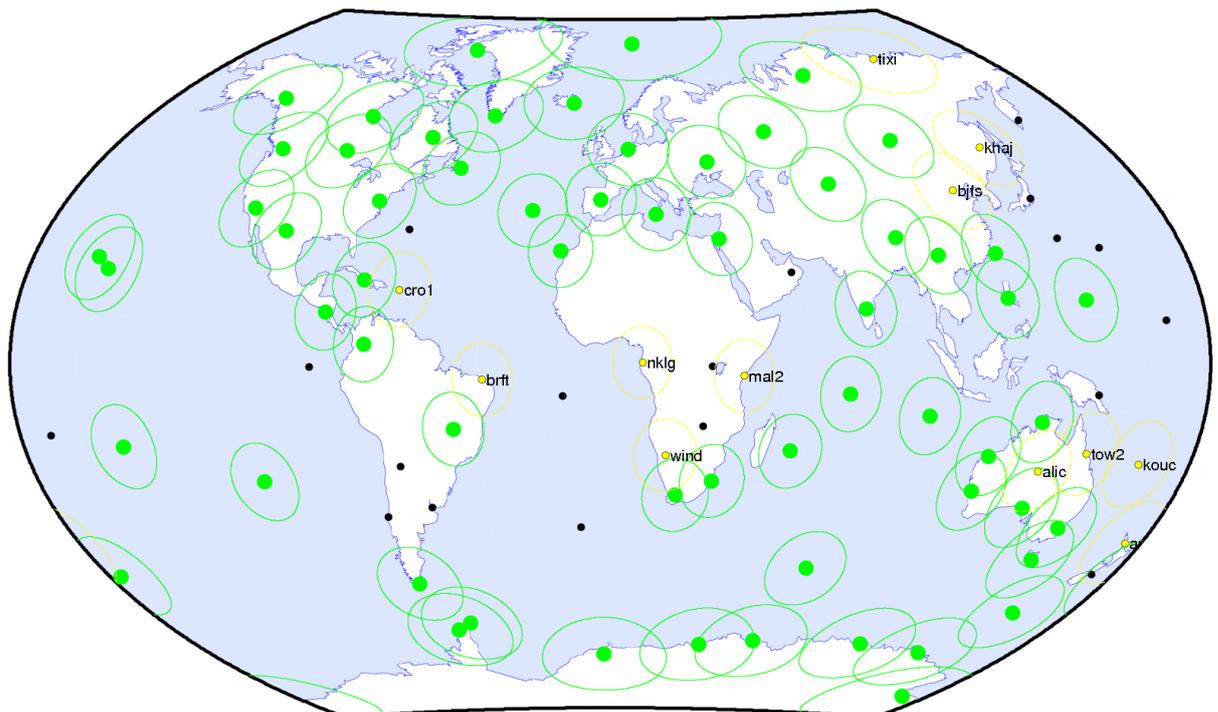
Even though the IGS Network has increased over the last 10 yrs in reliability, capabilities, coverage and overall numbers, the reference frame definition using the GNSS stations continues to be a challenge. Due to earthquakes, antenna changes and monumentation or environmental problems many stations cannot be relied on for reference frame definition, and after each subsequent ITRF update there is significant decay rate of GNSS stations available for RF definition leaving large gaps in world coverage. Note in the map below in green are the current stations that we can rely on in the IGS for RF definition each week (we have to thank the IGS Reference Frame Working Group for the plot). The green stations continue to have coordinates stable enough from the reference epoch up to now, many others, in black, have dropped out for the reasons stated above.

From the IGS we are making this appeal for contributions of GNSS stations to help us shore up the reference frame definition into the future on a more solid basis by adding long running good GNSS stations from your national geodetic networks (3+ years of operations). The main geographical areas of interest for now are Africa and Central and Eastern Asia and Russia, but you can see the coverage gaps in other parts of the world, so all useful contributions are needed.

The Reference Frame is the backbone of much of the modern global Earth research and it is in need of your help. The proposed station data and SINEX solutions, if available, will be analysed in the IGS for stability and then the regular station data will be invited into the IGS for processing with the aim of producing weekly coordinates as part of the IGS processing.

National Geodetic Agencies are asked to please contact the IGS Infrastructure Committee Chair (Ignacio.Romero@esa.int) and the IGS Reference Frame Working Group Chair (bruno.garayt@ign.fr). Thanks.

Ignacio (Nacho) Romero  
IGS Infrastructure Committee



## FIG Commission 5 report on 2011 Activities

During 2011, the Commission 5 team made progress towards achieving our 2011- 14 work plan outcomes for our FIVE missions, which are -

- FOCUS on modern technologies, technical developments and applications
- FACILITATE and follow technical developments through collaborations with other FIG Commissions and like organisations
- FOSTER and support research and development and stimulate new ideas in the fields of expertise represented within the commission.
- FORMULATE and formalise collaboration with manufacturers on the improvement of instrumentation and associated software.
- FIG EVENTS - present and promote the work of the Commission and its working groups through technical events and necessary media

We also focused our efforts to ensure the FIG 2011 Working Week in Marrakech was a success; effectively collaborated with our sister organisations at events to promote and fulfill the objectives of our work plan, especially at events such as the General Assembly for the International Union of Geodesy and Geophysics (Melbourne, Australia) and ICG-6 (Tokyo, Japan). In addition to this, the Commission has been involved in the preparations for the upcoming FIG Technical Seminar on Reference Frames in Practice in conjunction with the FIG Working Week in Rome.

Working group chairs and members from Commission 5 have been actively representing FIG at numerous related symposia around the world as well as progressing the work of the working groups. A summary of the activities for each work group are as follows:

### **WG 5.1 – Standards, Quality Assurance and Calibration - Chaired by David Martin ([david.martin@esrf.fr](mailto:david.martin@esrf.fr))**

Standards remain a very important part of surveying – even more so in the modern black-box world where the details of instrumentation and techniques are often opaque for the average practicing surveyor. They are very reliant upon standards underpinning the correct functioning of their instruments.

Working Group 5.1 was active at the FIG Working week in Marrakech. One session was dedicated to GNSS CORS Infrastructure and Standards. The main item at Marrakech was a meeting to discuss future actions regarding FIG publication No. 9 Recommended Procedures for Routine Checks of Electro-Optical Distance Meters - ([http://www.fig.net/pub/figpub/pub09/FIG-Publication\\_Nr9\\_english.pdf](http://www.fig.net/pub/figpub/pub09/FIG-Publication_Nr9_english.pdf)). Attendees of the meeting were provided with background information to the subject document and then primarily focused their discussion on the scope and the following review options:

1. maintain the guide as it is,
2. re-edit it with minor or major modifications,
3. consider withdrawing it definitively; and
4. depending on what option chosen, how FIG should proceed.

At the meeting in Marrakech it was decided that the publication should be revised with additions for recommendations for hand held distance-meters and reflector-less instruments.

An important initiative is underway to submit to ISO a proposal for a standard related to ITRS. The French standardization agency AFNOR has established at national level an ad hoc committee chaired by Claude Boucher for this purpose. After several discussions, the committee has decided:

- That France propose to ISO to establish an ad hoc structure dealing with standardization on geodetic references;
- That this structure should be established within the ISO TC 211 on Geospatial Information;
- That this structure should take care of the establishment of the standard related to ITRS as one of its future work items.

The first step proposed by France is to undertake a preliminary work (stage 0) on Geodetic references within ISO TC211. The purpose of this work will be to re-assess at international level and within the frame of ISO TC211 the initial work done by France through the AFNOR committee. A strong liaison with FIG, as well as IAG and other international organizations is an important part of this stage 0 work.

Another important standard under development under the supervision of ISO TC211 is Geographic information – Calibration and validation of remote sensing imagery sensors – Part 1: Optical sensors:

“Imaging sensors are one of the major data sources for geographic information. The image data capture spatial and spectral measurements and are applied for numerous applications ranging from road/town planning to geological mapping. Typical spatial outcomes of the production process are a vector maps, Digital Elevation Models, and 3-dimensional city models. There are typically 2 streams of spectral analysis data, that is, the statistical method, which includes image segmentation and the physics-based method which relies on characterisation of specific spectral absorption features.

In each of the cases the quality of the end products fully depends on the quality of the measuring instruments that has originally sensed the data. The quality of measuring instruments is determined and documented by calibration.”

Several other standards under Technical Committee ISO/TC 172/SC 6 "Geodetic and surveying instruments" standards grouping are also presently under discussion and/or revision:

- Optics and optical instruments -- Field procedures for testing geodetic and surveying instruments -- Part 4: Electro-optical distance meters (EDM measurements to reflectors)
- Optics and optical instruments -- Field procedures for testing geodetic and surveying instruments -- Part 5: Total stations
- Optics and optical instruments -- Field procedures for testing geodetic and surveying instruments -- Part 6: Rotating lasers
- Optics and optical instruments -- Ancillary devices for geodetic instruments -- Part 1: Invar levelling staffs.

A principal aim of Working Group 5.1 over the coming year remains the examination and promotion of guidelines and recommendations for standards and quality in survey measurements based on the ISO Guide to Uncertainty in Measurement (GUM) and its supplements.

## **WG 5.2 – Reference Frames - Chaired by Graeme Blick ([gblick@linz.govt.nz](mailto:gblick@linz.govt.nz))**

One of the focuses of this group has been to work on issues around the establishment of 4 dimensional datums, i.e. those including a time variable component to account for the effects of crustal deformation. A small sub-group met in Sydney in July 2011 and has been discussing ideas, some of which will be presented during the Technical Seminar on Reference Frames in Practice in Rome. Following on from this seminar it is hoped that presentations can be brought together in what might be the beginning of a technical document on Reference Frames in Practice. Another area of investigation is looking at geodetic data models and data transfer formats and standards and this will be reported on at future meetings.

## **WG 5.3 – Geodetic and Positioning Infrastructure - Chaired by Neil D. Weston ([Neil.D.Weston@noaa.gov](mailto:Neil.D.Weston@noaa.gov))**

One of the big projects the IGS is gearing up for is "repro2" which will involve the re-processing all the GNSS data collected at the IGS reference stations. Supplemental data will be included from a number of regional networks to strengthen the ties around the globe. Completing repro2 by 2012 does not seem feasible and therefore plans to have something complete by the end of 2013 seem more appropriate. The following milestones will need to be met to complete the re-analysis of the GNSS data.

1. Agree to and finalize a set of analysis standards (mid 2012),
2. Implementing all software enhancements (late 2012),
3. Begin the reprocessing effort -all ACs and
4. Combine the results of the individual analyses (late 2013).

Another area with significant interest is in the real-time sector. In the United States, the National Geodetic Survey will hold a symposium of all the real-time network operators to discuss how each party can benefit by following an agreed upon set of standards and guidelines. The goal is to ensure network providers are tied to the national reference frame and the coordinates they produce in their software packages are consistent from one regional network to the next. The symposium is set to take place in the summer of 2012.

Probably the biggest endeavour the geodetic agencies in the United States are working on is to move to a geometric datum that is aligned to the ITRF. The initial plans are to switch the current horizontal datum in the United States (NAD83) sometime in 2020. Although final implementation is a long way off, a significant amount of work has to be performed on the legislative side. A grass-roots effort will begin soon to educate the positioning communities about the impacts and benefits to switching to a 3-D geometric datum.

## **WG 5.4 – Kinematic Measurements - Chaired by Volker Schweiger ([volker.schwieger@iagb.uni-stuttgart.de](mailto:volker.schwieger@iagb.uni-stuttgart.de))**

The geodetic world and therefore the surveying profession are moving from static to kinematic measurements, consequently Commission 5 established this new Working Group (WG) for the term 2011-14. The main activity for this WG in 2011 was to find active group members and define the fields of activity more in detail. Up to now a small but active group of practitioners and academics from four continents have converged. New group members are still welcome. The two technical main points identified are; multi-sensor-systems related to monitoring and machine guidance. Covered topics are e.g. synchronisation of measurement

and modeling of movements. The main task is to facilitate the interchange of knowledge about kinematic measurements among practitioners and researchers at FIG Working Weeks and Regional Conferences. For the Working Week in Rome a dedicated session is planned. Also joint conferences with other organisations like the Mobile Mapping Technology and the Machine Control and Guidance are also the focus of the WG.

**WG 5.5 – Ubiquitous Positioning – Chaired by Allison Kealy**  
([akealy@unimelb.edu.au](mailto:akealy@unimelb.edu.au))

Ubiquitous positioning systems typically rely on the fusion of multiple sensors, signals or measurements to deliver a position solution in environments that are 'difficult' for Global Navigation Satellite System (GNSS). To fully deliver a ubiquitous positioning capability requires an understanding of the performance capabilities of the sensors used to augment or replicate that of a GNSS. These activities were the focus of Working Group 5.5 in 2011.

Working Group 5.5 was active at the FIG Working week in Marrakech. One session was dedicated to Alternatives and Backups to GNSS. Four of the six papers in this session were delivered based on outcomes generated collaboratively by members of Working Group 5.5. The members of the working group took this opportunity to discuss the objectives of the group's activities for 2011/2012. These discussions included:

1. a redefinition of ubiquitous positioning systems,
2. provision of complete and representative data sets for use by the positioning user community via a dedicated web portal,
3. a focus on collaborative positioning techniques; and
4. broadening the use of sensors beyond MEMS inertial sensors to include other alternative positioning technologies.

The working group also maintained a strong and active presence at the following international events.

- Mobile Mapping Technology (MMT) Symposium, Krakow Poland. This included participating as part of the scientific program committee, presentation of working group outcomes as well as the coordination of two pre symposium tutorials;  
Title: *Mobile mapping technology: paradigm shift and future trends*  
Title: *Applications of MMT in land transportation systems and infrastructure*
- 2011 International Union of Geodesy and Geophysics (IUGG) General Assembly, Melbourne, Australia. Presentations and posters as part of our on-going collaborations with the International Association of Geodesy (IAG). Working group co-chair Allison Kealy and member Dorota Brzezinska are the current vice president and president of IAG Commission 4, Positioning and Applications. This will continue to strengthen links between the two organisations.
- ION GNSS 2011: 24th Institute of Navigation GNSS Conference, Portland, Oregon. Participation with papers, program chair (Dorota Brzezinska) and track chair (Allison Kealy)
- International Symposium on Location-Based Services, Vienna, Austria. Co-chair Guenther Retscher played an important role in involving the FIG in this event which offers a wealth of knowledge for FIG members interested in alternative positioning technologies.

- International GNSS Symposium, Sydney, Australia. Papers presented on behalf of the working group on emerging issues in collaborative navigation.
- Members of working group 5.5 undertook major collaborative endeavours at Ohio State University, USA and the University of Melbourne, Australia. These field based collaborations have generated significant data sets the analysis of which will form the basis of work in 2012. A priority of the group for the first quarter of 2012 is to have publications and data set available on the FIG official website.

### **Cooperation with Other Commissions**

In 2011, Commission 5 continued to work with the other FIG Commissions as required. This work was primarily with Commission 6 on topics relating to deformation measurement, calibration of instruments, long range measurement, satellite and terrestrial imagery measuring techniques (in particular mobile and static laser scanning). This cooperation involved holding joint technical sessions and meetings at FIG related events as well as co-sponsoring symposiums. Examples of the latter are;

- Quality of Geodetic Measurements (Munich, Germany)
- Geo-Siberia (Novosibirsk, Russia)
- 7th International Symposium on Mobile Mapping Technology (Krakow, Poland)
- Innovative Technologies for an Efficient Geospatial Management on Earth (Ulanbaatar, Mongolia)

### **Cooperation with Sister Organisations**

Commission 5 has continued to put in a lot of effort in maintaining a successful working relationship with the International Association of Geodesy (IAG), the Permanent Committee for GIS Infrastructure Asia-Pacific (PCGIAP) and the International Committee on GNSS (ICG). We achieved this by convening joint technical sessions and holding joint administrative meetings during the FIG Working Week and the IUGG General Assembly on significant issues such as geospatial and positioning infrastructure and the upcoming joint technical seminar on Reference Frame in Practice scheduled for Rome prior to the Working Week.

During 2011, the following events were held with sister organisations or where the Steering Committee held discussions with our sister organisations;

- General Assembly for the International Union of Geodesy and Geophysics, IAG (Melbourne, Australia)
- ICG-6, International Committee on GNSS (Tokyo, Japan)
- The Geodetic Infrastructure in Europe, CLGE (Umeå, Sweden)
- 3rd International Colloquium - Scientific and Fundamental Aspects of the Galileo Programme (Copenhagen, Denmark)
- UAV-g, ISPRS (Zurich, Switzerland)

For more detailed reports or news from these events please refer to our Commission websites.

- <http://www.fig.net/commission5/newsletters/newsletters.htm> ,
- <http://www.fig.net/commission5/reports/reports.htm> and
- [http://www.fig.net/commission5/news/news\\_1.htm](http://www.fig.net/commission5/news/news_1.htm)

## Cooperation with UN

The International Committee on Global Navigation Satellite Systems (ICG), met in Tokyo, Japan during 5 - 9 September 2011. Mikael Lilje attended representing FIG, and Matt Higgins as Co-Chair of Working Group D of the ICG. Mikael Lilje was also at the meeting as our Commission's representative on Task Force D1 on Geodetic References. A full report can be found on our Commission website.

Note - the ICG was formed several years ago as a result of recommendations of the UN Committee on the Peaceful Use of Outer Space (COPUOS). At these meetings reports are given on the status of major GNSS sub-systems and the activities of task forces on geodetic and timing references.

## How to Participate in Our Commission

Commission 5 Vice Chairs of the working groups are continually developing the membership for their working groups. There is still opportunity for you to join any of the previously mentioned working or joint working groups. If you are interested 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 facilitates 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 Vice Chair of the relevant Working Group and send a copy to our Vice Chair for Administration, Rob Sarib (Australia) email: [robert.sarib@nt.gov.au](mailto:robert.sarib@nt.gov.au) .

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.

There is also another way to assist Commission 5 with their work and that is to become a National Delegate to Commission 5. Please note, we recommend that before you consider this option you will need to check with your FIG member association whether they already have a National Delegate for Commission 5 and if it has been officially listed on our website, location <http://www.fig.net/comm/natdel5.htm> .

Briefly, the role of a National Commission Delegate is to -

- establish networks within their countries to communicate information and obtain feedback for the Commission,
- be actively involved in commission activities, including responding to questionnaires or correspondence and identifying topics and authors of papers for Commission symposia and FIG congresses,
- seek and encourage funding support to attend FIG activities, including commission meetings, and
- write at least one annual report for publication in a local newsletter or technical journal or for dissemination by some other means to individual members of their member association or organisation.

If you wish to be a National Delegate for Commission 5 your FIG member association must formally submit in writing to the FIG Office the name,

professional title, address, telephone and fax numbers and email address of the nominated person.

Commission 5 looks forward to your response and please do hesitate to ask any questions or if you have any further queries.

## **FIG Commission 5 e-Newsletter**

If you would like to circulate Commission 5 NEWS to all our members please email your item for consideration to the Vice Chair Administration – [robert.sarib@nt.gov.au](mailto:robert.sarib@nt.gov.au) or to the Chair of Commission 5 - Mikael Lilje [Mikael.Lilje@lm.se](mailto:Mikael.Lilje@lm.se)