



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

**FIG Commission 5 Positioning and Measurement
July 2016 eNewsletter and FIG Working Week
Christchurch Report**

Dear Colleague,

In this edition you will read about the activities of our Commission at the FIG Working Week and 39th General Assembly as well as the joint FIG/IAG/ICG/ZZIS/UN-GGIM-AP Workshop from 1 to 6 May in Christchurch, New Zealand.

We had a great FIG Working Week in Christchurch and, following the Technical Seminar on Reference Frames in Singapore last year, a very well attended and organized Technical Seminar focussing on Kinematic Reference Frames. Besides high quality presentations, papers, panel discussions and personal discussions, we all enjoyed the hospitality and friendliness of the Kiwis.

Apart from that, the six Working Groups of FIG Commission 5 are working hard to achieve the targets of the work plan of this period.

For example, Working Group 5.4 'GNSS' Chair Suelynn Choy currently published the paper 'Uncovering common misconceptions in GNSS Precise Positioning and its future prospect' in the Journal 'GPS Solutions'. This publication is one of the tasks in the work plan of this working group and will inform the scientific and technical public about the newest developments in the GNSS domain. Working Group 5.6 'Cost-effective Positioning' is preparing a workshop on this topic for April 2017 and the series of Technical Seminars on Reference Frames will be continued in the future in collaboration of the Working Groups 5.2 '3D Reference Frames', 5.3 'Vertical Reference Frames' and 5.4 'GNSS'.

Kind Regards

Volker Schwieger (Volker.Schwieger@ingeo.uni-stuttgart.de),
Chair of FIG Commission 5



Technical Seminar on Reference Frames in Practice -Reference Frames, Datum Unification and Kinematics

1-2 May 2016 at Rydges Latimer, Christchurch, New Zealand



Introduction

The Technical Seminar on Reference Frames in Practice was held in Christchurch on 1-2 May 2016. There was a particular focus on deformation modelling and datum unification, which reflects geodetic priorities for the Asia-Pacific region. Many of the participants come from countries situated on the Pacific “ring of fire”, where there is a strong need to model deformation to maintain accurate spatial references. The theme of datum unification reflects the desire of Pacific Island nations, amongst others, to work more closely together to share knowledge and resources for their mutual benefit.

The workshop was organised by FIG Commission 5, in conjunction with the International Association of Geodesy (IAG), the International Committee on GNSS (ICG), the United Nations Initiative for Global Geospatial Information Management for Asia-Pacific (UN-GGIM-AP) and the New Zealand Institute of Surveyors (NZIS).

The seminar was held in conjunction with the 2016 FIG Working Week at the Rydges Latimer Hotel. Primary organisers were Nic Donnelly (New Zealand) and Li Zhang (Germany), both members of FIG Commission 5.

Participants

There were 53 participants, including presenters, from around the world. Countries represented were Australia, Bulgaria, Fiji, Germany, Indonesia, Japan, Nepal, Malaysia, New Zealand, the Philippines, Poland, Russia, Singapore, Sweden and the United States. Attendees represented a mix of academic, government and commercial institutions.

Organisational representatives in Christchurch were as follows:

- Volker Schwieger and Nic Donnelly (FIG)
- John Dawson (UN-GGIM-AP)
- Rachelle Winefield (NZIS)
- Chris Rizos (IAG) and Sharafat Gadimova (ICG) helped organise the seminar but were unable to attend in person.

The sponsors were represented by:

- Graeme Blick (LINZ)
- Neil Ashcroft (Leica)
- Paul Drummond (Trimble)



Group photo of attendees

Technical Content

Key topics covered were:

- Introduction to 3D Reference Frames
- Introduction to Vertical Reference Frames
- Kinematic Frames and Deformation Modelling
- International Geodesy Initiatives
 - APREF and UN-GGIM
 - Geodetic Initiatives at ISO
- Geodetic Infrastructure
 - Template for Developing a National Reference Frame
 - International GNSS Service
 - Multi-GNSS
- Geodetic Software
 - SINEX Manipulation
 - RTKLIB
 - SNAP
- Case Studies
 - Australia
 - Fiji
 - Japan
 - Nepal
 - New Zealand
 - Philippines
 - Poland
 - USA

The final technical programme and the presentations are available on the FIG website at <http://www.fig.net/fig2016/commission5.htm>.

Copies of the geodetic software discussed were included on memory sticks provided to each of the participants.



Nic Donnelly presenting at the seminar

The reports and more photos of this technical seminar can be found on:

http://www.fig.net/news/news_2016/2016_05_rfip_comm5.asp.

Networking and Social Events

There were excellent opportunities to network and socialise during the lunch and tea breaks, which the participants took advantage of. The seminar dinner was held on the first evening, at the Rydges Hotel.

Sponsorship

The seminar was well supported by all three sponsors, Land Information New Zealand, Leica and Trimble, in terms of both financial support and attendance. The ICG provided financial support to several participants from developing nations. The sponsorship enabled registration fees to be kept to a low level at 150 euro for the two days, including the dinner.

FIG Working Week – Christchurch, New Zealand, 2-6 May 2016



FIG Working Week 2016

CHRISTCHURCH, NEW ZEALAND
2-6 May 2016



Recovery
from disaster

The Event Overview



The 78th FIG Working week and 39th General Assembly (GA) was held at Horncastle Arena and Addington Raceway on 2-6 May, 2016 in Christchurch, New Zealand.

About 700 surveyors from about 70 different countries participated in this working week, including large representations from Australia, New Zealand, China, and Nigeria. There were about 250 presentations in 3 excellent plenary sessions focussing on the topic of the Working Week 'Recovery from Disaster' and 86 technical sessions.

Technical Program Summary



Commission 5 had 10 technical sessions and 2 of them were joint with Commission 6. The chairs and rapporteurs of each session have provided the summary and highlights. All the sessions of Commission 5 were well-attended, from 30 to 100+ participants. The rooms were fully filled with audience.

TS01B -Contribution of Geodesy to Disaster Management

Chair: Graeme Blick, New Zealand

Rapporteur: Volker Schwieger, Germany

This special session of Commission 5 highlighted different aspects of geodetic contributions to disaster management. The six presentations dealt with a wide range from geodetic datums and deformation models to monitoring using GNSS and remote sensing. The main focus was on the development of reference frames in tectonically unstable regions like New Zealand, Nepal or Japan. The session showed only high-quality papers including one peer-review paper by Christopher Pearson et al., so it makes no sense to compliment one explicitly. The session was very well attended by around 100 delegates.



TS02B –CORS

Chair: Nic Donnelly, New Zealand

Rapporteur: Dan Roman, United States

The session was very well attended, and all authors were present. It focused on the application, requirements, and refinement of CORS networks. The results focused on how to generate improved positions from multi-GNSS and infrastructure improvements.





TS03B - Earthquake Monitoring and GNSS Applications (Joint Commission 5 and 6 Session)

Chair: Leonid A. Lipatnikov, Russian Federation

Rapporteur: Li Zhang, Germany



Five presenters presented in this technical session. This session had two foci. The first three presentations focussed on a disaster well-known to everybody in the region: earthquakes. So an important task of geodetic engineers is the monitoring of earthquakes as well as pre-seismic and post-seismic movements. Louie Balicanta from the Philippines and Murni Sulastris from Indonesia presented the results of analysis positional displacement after the earthquake in Bohol Island and in the Palu areas. Yong Chien Zheng from New Zealand gave a presentation about consequences of the great Northern Sumatra earthquakes in 2012. The long GPS time series between 1999 and 2014 were analysed and the velocity field of the Sundaland plate was modelled.

The second focus of this session was on GNSS applications mainly in the emerging transportation domain. Joong-hee Han from Korea presented the performance analysis of on-board vehicle sensors (a multi-sensor system) on positioning in the environment of GNSS signal blockage. Oluropo Ogundipe from the United Kingdom gave an interesting presentation about the public transport buses equipped with GNSS receivers . The GNSS position of the buses can e.g. provide accurate timetable "countdown" information to awaiting passengers at bus stops or via mobile apps.

There were about 40 delegates in this technical session.

TS04B -Recent Crustal Movements

Chair: David Martin, France

Rapporteur: Nic Donnelly, New Zealand



This session focussed on the modelling of crustal dynamics, as well as the impact of crustal dynamics on surveying. Presenters covered issues such as vertical motion due to Glacial Isostatic Adjustment and co-seismic and post-seismic deformation. The varied nature of the crustal dynamics issues covered in the presentations highlights that a variety of approaches to modelling may be required, but in the end the challenges faced by the surveyor are very similar. Of particular interest to the local audience was a peer-reviewed paper presentation highlighting the challenges of operating Networked RTK services in a dynamic environment such as New Zealand, where the complexity of some deformation makes accurate modelling very challenging. The presenter showed how individual station models can be used to account for the non-linear movement of reference stations.

TS05B -National Datum

Chair: Nic Donnelly, New Zealand

Rapporteur: Suelynn Choy, Australia



Five presentations were organised for this session, but only three presenters were present in the technical session. The three presenters were: Graeme Blick, Leonid Lipatnikov, Susilo Susilo.

All presentations were interesting and educational. They were relevant to the theme of the technical session. Graeme provided a historical overview of the definition of New Zealand national datum. Leonid provided an introduction to the new Russian reference frame GSC-2011. Susilo provided an overview of the development of the semi dynamic Indonesian Geospatial Reference System 2013. The presentations were engaging with a productively Q&A session, indicating that the audience was engaged and interested in the topic. There were about 30 people in this technical session.

TS06B -Multisensor Systems (Leonid)

Chair: Günther Retscher, Austria

Rapporteur: Leonid A. Lipatnikov, Russian Federation



The session was devoted to multisensor systems - one of the most intensively developed and promising subject areas in precise surveying instrumentation. There was a wide range of topics covered by the session including application-specific studies and developments, such as GNSS-based high-precision velocity estimation for outdoor sports, UAV and total station application for estimating stockpile volumes, building floor levels and verticality surveys. There were two very interesting presentations on accuracy improvement of indoor Wi-Fi-based positioning using differential approach and intelligent checkpoint sequences. All presentations were relevant and substantial. They were delivered and discussed in a highly professional and lively manner.

TS06D - Laserscanning (Joint Commission 5 and 6 Session)

Chair: Li Zhang, Germany

Rapporteur: Desislava Staykova, Germany



Terrestrial Laserscanning is one of the emerging technologies in surveying. It allows the acquisition of surfaces and bodies as a regular grid and in a fully automated way. There were six presentations in this session. Wallace Mukupa from China gave us a presentation about the change detection and assessment of fire-damaged concrete by using TLS. Michael Olsen from the United States provided a very interesting application of TLS for deformation analysis. Different ground techniques were developed to improve the resilience of new or rebuilt houses in earthquakes. These different techniques were evaluated by a simulated earthquake which was induced via explosives in the ground to generate ground

shaking. The deformation was measured by TLS, so that the performance of the ground techniques could be evaluated.

Andrew Sinclair from New Zealand and Nia Haerani Haerani from Indonesia showed different applications of TLS for deformation analysis: for earthquake recovery projects, for volcanic and landslide hazard assessment. Vanda Kadlecikova and Rowan Hallam from New Zealand presented many interesting projects using high definition scanning.

A highly scientific presentation was provided by Stephanie Kauker from Germany, in her presentation, the first result of analysing and modelling of correlations and deformation using TLS was introduced.

The session presents sophisticated modelling approaches as well as applications in disaster management. The session is joint commission 5 and 6 session, and it was extremely well-attended. There were about 70 delegates, the room was completely full.

TS07B – GNSS

Chair: Suelynn Choy, Australia

Rapporteur: Volker Schwieger, Germany

There were seven presentations on GNSS in this technical session and the room was filled with audience.



Xu Tang from China kicked-off the technical session with a presentation on the performance of BeiDou positioning. Suelynn Choy from Australia presented the performance of real-time precise point positioning using the Japanese QZSS/MADDOCA corrections in New Zealand. Basara Miyahara from Japan gave the next presentation on biases that are present in combining multi-constellation multi-frequency GNSS observations. Dirk Kowaleski from Germany gave us an introduction on the open GNSS receiver protocol (OGRP), which he and his team have developed. Reha Metin Alkan from Turkey provided a nice overview of the performance of different online GNSS processing services. Neil Ashcroft from Singapore presented Leica's new product – VADASE, which is suited for monitoring fast movement using a standalone GNSS receiver. The final presentation was given by Shien Kwun Leong from Malaysia, whereby the performance of single frequency GNSS positioning using different ionospheric error mitigation methods was discussed.

The audience was engaged and interesting questions were asked at the end of the technical session to stimulate discussion. In summary, it was an excellent technical session.

TS08B -Advance in Photogrammetry and other Measurement Methods

Chair: Volker Schwieger, Germany

Rapporteur: Li Zhang, Germany



This last Commission 5 session of this conference, consisting of 4 contributions and attended by approximately 70 delegates, mainly dealt with photogrammetric methods and their application on Unmanned Aerial Vehicles, for land administration and for detection of pavement cracks. Additionally recent advances in high accuracy positioning were presented that cover among others photogrammetric methods. This session again showed that photogrammetry is an essential contribution to Commission 5 but also to Commissions 6, 3 and 7. This should be reflected in the future work plans more intensively.

TS08D-Geoid Determination and Vertical Datum

Chair: Dan Roman, United State

Rapporteur: Scott King, New Zealand

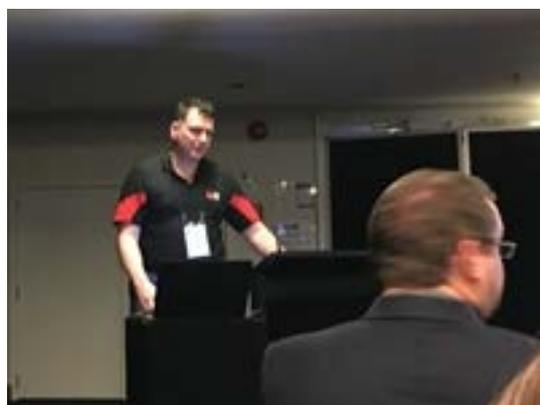
Countries are moving towards or are implementing geoid based vertical datums and away from traditional levelling based datums. Developing an accurate national geoid model enables the establishment of an accurate heighting system easily accessible from all regions.

For more information about all the technical sessions, please refer to website - http://www.fig.net/resources/proceedings/fig_proceedings/fig2016/techprog.htm to review the all the presentations and technical papers as well as the reports of the task forces.

Commission 5 Meetings

One of the primary purposes of FIG conferences is to provide working group members the opportunity to meet, resolve and formulate strategies 'face to face', both formally and informally. Commission 5 is very supportive of such meetings and convened various administrative meetings during this event.

The **Commission 5 Open Meeting** was well-attended with about 50 participants. At the beginning, Commission Chair Volker Schwieger generally introduced the FIG and Commission 5. The Working Group chairs then introduced their working groups, the content and working plan 2015-2018. This initialized a heated discussion in the audiences. The audiences showed great interest on participating in the commission. Commission 5 is continually developing the membership for its working groups, the contributions and the membership of WG are strongly welcome. The contacts will be collected, the participants can write down their interested WG.



Commission 5 Steering Committee Meetings

Two steering Committee Meetings were held, to discuss the technical seminar and to do the last preparations for the technical sessions and open meeting. The first one was directly after the technical seminar on Reference Frame on 2 May in the Hotel Rydges Latimer and the second was during lunch time on 3 May in the Horncastle Arena. Volker Schwieger reported about the ACCO meeting with focus on the "Task Force on Commission Structure". Since the technical seminars are

very successful, more technical seminars are planned in 2017; details will be finalized soon.

A summary of the discussions from the **steering committee meeting** can be found in respective Minutes, and are available via the web location –

http://www.fig.net/organisation/comm/5/activities/steering_committee/2016_steering_meeting.pdf.

General Assembly and ACCO Meeting

As per other Congresses or Working Weeks, the 39th FIG General Assemblies (GAs) was split on two days, before and after the technical program. The yearly ACCO (Advisory Committee of Commission Chairs) Meeting of the Commission Chairs and the FIG Council takes place just before the first General Assembly.



*FIG Vice President **Diane Dumashie** and Commission Chairs during ACCO-Meeting*

The main outcomes or highlights from the GAs were –



*Two new Vice Presidents **Mikael Lilje** and **Orhan Ercan***

- First two new Vice Presidents had to be elected, replacing Dr. Pengfei Cheng, CSSMG, China and Bruno Razza, CNGeGL Italy, who have served in FIG Council since 2013. Mikael Lilje (Lantmäteriet of Sweden) won the first voting, the second voting was won by Orhan Ercan (Chamber of Surveying and Cadastre Engineers of Turkey)
- Regarding the hosting of FIG WW 2020, there was a very close neck-and-neck race between Amsterdam, the Netherlands, presented by GIN and Interlaken, Switzerland presented by Geosuisse. The voting showed a close run and ended with a victory for Amsterdam, the Netherlands.
- Task Force on Commission Structure was discussed in GA and also in a special lunch meeting. The comments are now taken into consideration in order to find the next steps.

For more details about the General Assemblies, please refer to the FIG website.

Web location –

http://www.fig.net/news/news_2016/2016_05_ga_report.asp .

Social Activities

There were several social events organized for the delegates –

Welcome Reception

The Welcome Reception was held at the Transitional Cathedral in Christchurch. The Transitional Cathedral was built after the original Christchurch Cathedral was badly damaged in the earthquake in February 2011.





Opening Ceremony

The opening Ceremony took place in the same room as the 39th General Assembly, at Horncastle Arena.



Foundation Dinner

The foundation Dinner took place at Horncastle Arena, too.



Gala Dinner

The Gala Dinner was held at the Air Force Museum of New Zealand, entertained with music and dance.



Commission 4, 5, 6 Dinner

The traditional Commission 4, 5, 6 Dinner was held at the upper Dux at Dux Central. It was a perfect occasion to get to know many experts and share knowledge and discuss with them in a very pleasant atmosphere.



For more photos of the Congress, please refer to the FIG Picture Galleries at the FIG Congress website. Web location –

http://www.fig.net/images/conference/2016_gallery_1.asp

Upcoming events

IWAA 2016 (International Workshop o Accelerator Alignment), 03-07 October 2016, Grenoble, France

Web: <http://www.esrf.eu/iwaa2016>

MCG (Machine Control & Guidance), 05-06 October 2016, Vichy, France

Web: <http://mcg2016.irstea.fr/>

Intergeo 2016, 11-13 October 2016, Hamburg, Germany

Web: <http://www.intergeo.de/>

13th International Conference on Location-Based Services, 14–16 November 2016, Vienna, Austria

Web: <http://lbsconference.org/>

IGNSS (International Global Navigation Satellite Systems 2016, 06-08 December 2016, Sydney, Australia

Web: <http://www.ignss2016.unsw.edu.au/>

UAV-Seminar, 09-10 February 2017, Stuttgart, Germany

GeoSiberia, 19-21 April 2017, Novosibirsk, Russia

FIG Working Week 2017, 28 May - 01 June, 2017, Helsinki, Finland

Web: <https://www.fig.net/fig2017/>

FIG XXVI Congress 2018, 06-11 May, 2018, Istanbul, Turkey

Web: <http://www.fig.net/>

FIG Working Week, 2019, Hanoi, Vietnam

Web: <http://www.fig.net>

FIG Working Week, 2020, Amsterdam, the Netherlands

Web: <http://www.fig.net>

How to Participate in Our Commission

Commission 5 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 working or joint working groups.

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 of Administration – Li Zhang li.zhang@ingeo.uni-stuttgart.de.

All responses should include a one or two paragraph biography of your professional career to date.

There is also another way to assist Commission 5 with its 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 it already has a National Delegate for Commission 5 and if it has been officially listed on our website, location <http://www.fig.net/organisation/comm/5/delegates/index.asp>.

Briefly, the role of National Commission Delegates 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 is looking forward to your response. Please do not hesitate to ask any questions or contact us 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 of Administration – Li Zhang li.zhang@ingeo.uni-stuttgart.de or
- Chair of Commission 5 - Volker Schwieger volker.schwieger@ingeo.uni-stuttgart.de

More Information can be found on

Web: <http://www.fig.net/organisation/comm/5/>