Technical Seminar on Reference Frames in Practice

Reference Frames, Kinematics and Dynamic Datums

Istanbul, Turkey
4-5 May 2018

Venue: Hilton Bosphorus, Istanbul

Introduction

The Technical Seminar on Reference Frames in Practice was held in Istanbul on 4-5 May 2018. The main focus was on reference frames in general, kinematics and dynamic datums which reflects geodetic priorities for all regions suffering from natural disasters such as earthquakes. Participants mostly come from countries where there is a strong need to model deformation to maintain their accurate spatial reference frames. So, this Seminar has been a good platform to share knowledge and resources for their mutual benefits. We believe that this Seminar series have been a geodesy's classics and should be continued also in future under the umbrella of FIG.

The Seminar was organised by FIG Commission 5, in conjunction with the International Association of Geodesy (IAG), the United Nations International Committee on GNSS (UN ICG) and the Turkish Chamber of Survey and Cadastre Engineers (HKMO).

The seminar was held in Hilton Bosphorus Hotel in conjunction with the FIG2018 Congress&GA at the Istanbul Congress Center. Primary organisers were Muzaffer KAHVECİ (HKMO-LOC), Volker Schwieger (FIG Comm. 5), and Li Zhang (FIG Comm. 5).

Participants

There were 37 participants, including presenters, from around the world. Countries represented were Austria, Australia, Congo, Denmark, Finland, France, Germany, Mongolia, Nepal, New Zealand, Nigeria, Papua New Guinea, Russia, Saudi Arabia, Sweden, Uganda, USA and Turkey. Attendees represented a mix of academic, government and commercial institutions. List of participants is given as appendix-1 to this report.

Organisational representatives in Istanbul were as follows:

Volker Schwieger (FIG)
Daniel Roman (IAG)
Sharafat Gadimova (ICG)
Muzaffer Kahveci (HKMO)

Group photo of attendees

Technical Content

The seminar focussed on the theory and practice of 3D reference frames. Topics covered were:

- Introduction to 3D Reference Frames
- Introduction to Vertical Reference Frames
- Kinematic Frames and Deformation Modelling
- Dynamic Datum and Modelling of Crustal Deformation
- GNSS and Geodetic Software
    - o RTKLIB
    - o SNAP
- Case Studies
    - o Iceland
    - o Europe (ETRS89 and ERVS)
    - o USA
    - o Russia
    - o New Zealand
    - o Turkey
- International Geodesy Initiatives
    - o ICG at UN
    - o UN-GGIM

The presentations are available on the FIG website at http://www.fig.net/fig2018/rfip.htm
A full copy of the RFIP final technical programme is given as appendix-2 to this report.

Besides, a technical tour was organized to Kocaeli Municipality where the big earthquake (M_w=7.4) had happened on 17 August 1999 causing the deaths of thousands of people (North Anatolian Fault Zone) on 5 May 2018 in the afternoon. There, people from the municipality has made presentations regarding the current status of the city and realized technical&social projects after the earthquake until now. Below are some pictures about Kocaeli technical visit.

Networking and Social Events

There were excellent opportunities to network and socialise during the lunch and tea breaks, which the participants took advantage of. One of the highlights of the seminar was the dinner held on the first evening. Dinner was held in Midpoint Restaurant at Nisantasi and provided an opportunity to sample a number of local dishes and continue the networking.

Sponsorship

The seminar was well supported by Leica and Trimble, in terms of both financial support and attendance. The ICG provided financial support to several participants from developing nations. The organisers FIG, IAG, UN ICG and HKMO would like to thank and acknowledge the sponsors for their generous support of this event.

Appendix-1:List of Participants:

NAME	LAST NAME	COUNTRY
FATIH	UYSAL	TURKEY
GADIMOVA	SHARAFAT	AUSTRIA
HASAN	YILDIZ	TURKEY
YELDA	ADEMOGLU	TURKEY
ELDAR	RUBINOV	AUSTRALIA
KEVIN	AHLGREN	UNITED STATES OF AMERICA (USA)
HALUK	OZENER	TURKEY
EKREM	TUSAT	TURKEY
ALI İHSAN	KURT	TURKEY
CHRIS	PEARSON	NEW ZEALAND
CHRISTOPHER	OGUNOBO	NIGERIA
DAVID	MULINDWA	UGANDA
GRAEME HILTON	BLICK	NEW ZEALAND
HAKAN	BICAKCI	TURKEY
IGOR	GUSEV	RUSSIA
KIRILL	DUNAEV	RUSSIA
KRISTIAN	EVERS	DENMARK
LEONID	LIPATNIKOV	RUSSIA
LI	ZHANG	GERMANY
MARTIN	LIDBERG	SWEDEN
MUKASA MATONDO	GUYLAIN	CONGO (DEM. REP. OF)
MUZAFFER	KAHVECI	TURKEY
NIC	DONNELLY	NEW ZEALAND
NICOLAS	DE MOEGEN	FRANCE
NIRAJ	MANANDHAR	NEPAL
OTGONJARGAL	TERBISH	MONGOLIA
OTHMAN	ALKHERAYEF	SAUDI ARABIA
PASI	HAKLI	FINLAND
PETER IMOKHADE	OSUNDE	NIGERIA
RICHARD	STANAWAY	PAPUA NEW GUINEA
ROMAN	DANIEL	UNITED STATES
ROSSEN	GREBENITCHARSKY	SAUDI ARABIA
RYAN	RUDDICK	AUSTRALIA
SEGMEN	AKKAS	TURKEY
SUELYNN	CHOY	AUSTRALIA
VOLKER	SCHWIEGER	GERMANY

Appendix-2: Full RFIP Technical Programme

Technical Seminar on Reference Frames in Practice

Reference Frames, Kinematics and Dynamic Datums

Istanbul, Turkey
4-5 May 2018

Venue: Hilton Bosphorus Instanbul

PROGRAMME

Friday 4 May 2018

08:30 – 09:00 Welcome and Opening Remarks

Prof. Dr. Muzaffer Kahveci (Convenor)
Prof. Dr. Volker Schwieger (International Federation of Surveyors-FIG)
Ms. Sharafat Gadimova (International Committee on Global Navigation Satellite Systems-ICG)
Dr. Dan Roman (International Association of Geodesy-IAG)

09:00 – 10:00 Session 1: Introduction to 3D/Vertical Reference Frames

1) **Introduction to 3D Reference Frames**
   Mr. Nic Donnelly, Land Information New Zealand

2) **Introduction to Vertical Reference Frames and Datums**
   Dr. Dan Roman, NOAA National Geodetic Survey National Oceanic& Atmospheric Administration

10:00 – 10:30 Morning Tea

10:30 – 11:30 Session 2: Kinematic Frames and Deformation Modelling

3) **Kinematic Frames and Deformation Modelling**
   Dr. Chris Pearson, University of Otago

4) **Practical implementation of time-dependent reference frames**
   Mr. Richard Stanaway, UNSW Sydney

11:30 – 12:30 Lunch

12:30 – 13:30 Session 3: Dynamic Datum and Modelling of Crustal Deformation

5) **Development of deformation models to support Dynamic and semi-dynamic Datums**
Dr. Chris Pearson, University of Otago

6) **Crustal deformations in Fennoscandia, and Dynamic reference frames: case study Iceland**
Mr. Kristian Evers, Danish Agency for Data Supply and Efficiency

13:30 – 14:30 Session 4: Case Studies 1

7) **Case Study of Europe (ETRS89 and ERVS)**
Dr. Martin Lidberg, Lantmäteriet – the Swedish Mapping Cadastral and Land registration Authority

8) **Case study of USA**
Dr. Dan Roman, NOAA National Geodetic Survey National Oceanic& Atmospheric Administration

14:30 – 15:00 Afternoon Tea

15:00 – 16:00 Session 5: Case Studies 2

9) **Case Study of Russia**
Dr. Leonid Lipatnikov, Siberian State University of Geosystems and Technology

10) **Case study of New Zealand**
Mr. Graeme Blick, Land Information New Zealand

16:00 – 17:30 Session 6: 3D&Vertical Control Networks and Earthquakes in Turkey

11) **Height Reference System Modernization in Turkey: Current Status and Future Plans**
Assoc. Prof. Dr. Hasan Yildiz, General Command of Mapping

12) **Semi-Dynamic Reference Frame Realization in Turkey: Towards an Improved Velocity Field Model**
Dr. Ali İhsan Kurt, General Command of Mapping

13) **Monitoring Seismo-geodetic Behaviour of Earth's Crust in Marmara Region: KandilliNet**
Prof. Dr. Haluk Ozener, Bogazici University, Kandilli Observatory and Earthquake Research Institute

17:30 – 19:00 Session 7: International Geodesy Initiatives and Geodetic Infrastructure

14) **ICG at UN**
Ms. Sharafat Gadimova, United Nations Office for Outer Space Affairs

15) **United Nations Global Geospatial Information Management (UN-GGIM)**
Dr. Dan Roman, NOAA National Geodetic Survey National Oceanic& Atmospheric Administration

16) **Sponsor presentations**

19:30 Seminar Dinner

Saturday 5 May 2018
09:00 – 10:00 Session 8: GNSS and Geodetic Software **17) Introduction of RTK-LIB** ***Mr. Ryan Ruddick,*** *Geoscience Australia,* ***Dr. Suelynn Choy,*** *RMIT University* **18) Introduction to the SNAP least squares computation software** ***Mr. Nic Donnelly,*** *Land Information New Zealand*
10:00 – 10:30 Morning Tea
10:30 – 11:30 Software Demonstration ***Mr. Ryan Ruddick,*** *Geoscience Australia,* ***Dr. Suelynn Choy,*** *RMIT University,* ***Mr. Nic Donnelly,*** *Land Information New Zealand*
11:30 Closing Remarks – *FIG Commission 5, IAG*
12:00 – 12:30 Lunch (Lunch Box)
Afternoon: Technical Tour in North Anatolian Fault Zone

The organisers FIG, IAG, UN ICG and HKMO would like to thank and acknowledge the following sponsors for their generous support of this event.

Leica Geosystems Trimble