



# International Association of Geodesy

## Newsletter

June 2013

Editor: Gyula Tóth

IGAG Communication and Outreach Branch  
Department of Geodesy and Surveying  
Budapest University of Technology and Economics  
H-1521 Budapest, Hungary

Information Service of the International Association of Geodesy

<http://www.iag-aig.org>

[newsletter@iag-aig.org](mailto:newsletter@iag-aig.org)

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The *IAG Newsletter* is under the editorial responsibility of the *Communication and Outreach Branch* (COB) of the IAG.

It is an open forum and contributors are welcome to send material (preferably in electronic form) to the IAG COB ([newsletter@iag-aig.org](mailto:newsletter@iag-aig.org)). These contributions should complement information sent by IAG officials or by IAG symposia organizers (reports and announcements). The *IAG Newsletter* is published monthly. It is available in different formats from the IAG new internet site: <http://www.iag-aig.org>

Each *IAG Newsletter* includes several of the following topics:

- I. news from the Bureau Members
- II. general information
- III. reports of IAG symposia
- IV. reports by commissions, special commissions or study groups
- V. symposia announcements
- VI. book reviews
- VII. fast bibliography

Books for review are the responsibility of:

C.C Tscherning  
University of Copenhagen  
Dept. of Geophysics  
*Copenhagen, Denmark*  
Fax: +45 35365357  
E-mail: [cct@gfy.ku.dk](mailto:cct@gfy.ku.dk)

## General Announcements

### *Summary of the Fourth Meeting of the IAG EC 2011-2015*

*Place:* Techn. University, Inst. Geodäsie & Geophysik, Gusshausstr. 27-29, Vienna, Austria

*Time:* Sunday, April 7, 2013, 09:00 – 17:00

*Attendees (voting):* Ch. Rizos (IAG President), H. Schuh (IAG Vice-President), H. Drewes (IAG Secretary General), M. Sideris (Immediate IAG Past President), T. van Dam (President Commission 1), U. Marti (President Commission 2), J. Ádám (President of the COB), R. Barzaghi, T. Herring (Representatives of the Services)

*Attendees (non-voting):* N. Sneeuw (ICCT President), G. Beutler (Past President), H. Hornik (IAG Assistant Secretary)

*Guests:* P. Wielgosz (Commission 4 substitute), R. Klees (Editor in Chief of J. of Geodesy)

*Regrets:* R. Gross (President Commission 3), D. Grejner-Brzezinska (President Commission 4), H. Kutterer (Chair of GGOS), R. Neilan (Representative of the Services), C. Brunini, R. Wonnacott (Members at Large)

### *Summary of Agenda Items:*

#### **1. Welcome and adoption of agenda**

*Chris Rizos* welcomed the members of the IAG Executive Committee (9 out of 15 voting members, 3 non-voting members and 2 guests). The meeting took place on occasion of the EGU General Assembly, Vienna, April 7-12, 2013. The agenda had been distributed previously by e-mail and was unanimously adopted after the inclusion of a marginal additional topic (see 18. AOB).

#### **2. Organisational reports of the IAG Scientific Assembly, Potsdam 2013**

*H. Schuh*, as the chairman of the LOC, reported on the organisational arrangements for the Assembly (venue, locations, etc.). He recommended reserving accommodation soon because the capacity in Potsdam is rather limited. But also Berlin offers plenty of suitable hotels and the connection by public traffic is good. *Ch. Rizos* proposed putting a map on the Website.

The scientific programme is divided into 6 themes, i.e.

1. Definition, Implementation and Scientific Applications of Reference Frames
2. Gravity Field Determination and Applications
3. Observing, Understanding and Assessing Earth Hazards
4. Science and Applications of Earth Rotation and Dynamics
5. Observation Systems and Services
6. Imaging & Positioning Techniques and Applications

The schedule is arranged such that in general three parallel sessions will be held, except during the opening, closing and historical sessions. In the historical session on Wednesday, September 4, three review contributions highlighting the past 150 years will be presented by *W. Torge*, *C. Boucher* and *I. I. Mueller*. Details may be seen at <http://www.iag2013.org>.

*Ch. Rizos* referred to the SOC arrangements. There were some changes in the convenors list which have to be put on the Webpage. He reminded the convenors to think about the invited talks. As we are celebrating the 150th anniversary, there should be at least one paper on historical developments in each theme. Other speakers may be invited.

*H. Drewes* urged the convenors to do the attribution to oral or poster presentations only according to their suitability, not according to some measure of quality (posters are not necessarily worse). For the submission of abstracts a fee has to be paid. This fee will be deducted from the registration fee, however only one per author. He informed the EC that about ten IAG Travel Awards can be granted. IUGG is also providing financial support.

*Ch. Rizos* said that the IAG EC will meet, as usual, on the occasion of the IAG Scientific Assembly. The meeting is scheduled for the day before the opening, i.e. Sunday, September 1, whole day. A meeting of the IAG Council will be held on Tuesday, September 3, 6-8 pm.

### 3. *IAG Mid-term reports (Travaux de l'AIG)*

*H. Drewes* stated that the mid-term reports are imperative in order to verify that all groups of the IAG structure are working. This will be done at the EC meeting in Potsdam. The reports should be written in a way that the important activities and the progress in the corresponding field are documented. Non-active groups will be dissolved by the EC. The Component Presidents (Commissions, ICCT, Services, GGOS, and COB) have to prepare the complete report including information on all sub-components. The deadline for submission is July 1, 2013. In order to organise the work efficiently, the IAG Office distributes templates of the format and style. The final report is published on the Website before September. After adoption it will be distributed to the IAG Council (also in a printed version).

### 4. *Reports of the Commissions*

*T. van Dam* stated that almost all groups within the Commission 1 “Reference Frames” are working well. In continuation of the Commission Symposia 2006 in Munich and 2010 in Paris, another Symposium is planned for 2014 in Luxembourg. On this occasion the work of Commission 1 will be presented in detail. She then presented the activities of the Sub-commissions and Joint WGs. *H. Drewes* encouraged *T. van Dam* to announce the planned symposium a.s.a.p. because there will be a COSPAR Meeting in August 2014 in Moscow. Although the topics of COSPAR are more space orientated, the programmes might have similar topics and overlaps could occur. As IAG Commission 1 is identical with COSPAR Sub-commission B2 and COSPAR is a Commission of ICSU, these meetings are important to advertise the work of the IAG within the ICSU community.

*U. Marti* reported on some minor organisational changes within the Commission 2 “Gravity Field”. Among several meetings the main event in the last period was the Gravity, Geoid and Heights Systems (GGHS2012) Symposium in Venice, October 9-12, 2012 (140 participants, 89 oral presentations and 64 posters available at Commission 2 webpage if the author’s permission has been given, proceedings in the Springer Series in preparation). Moreover, he presented an overview of the coming events till the next IUGG General Assembly, especially the joint Symposium with the IGFS, in Shanghai, autumn 2014. He informed the EC about a project on geoid determination in Africa (sponsored by IUGG, together with IASPEI). Finally *U. Marti* asked the question whether IAG should have a representative in the BIPM Consultative Committee for Mass and Related Quantities (CCM) like IUGG has it in the Consultative Committee for Time and Frequency (CCTF).

*H. Schuh* gave an overlook on activities of Commission 3 “Earth Rotation and Geodynamics” by slides of *R. Gross* mentioning in particular the past and coming symposia. The next event is the 17<sup>th</sup> International Symposium on Earth Tides, Warsaw, Poland, April 15-19, 2013. The Journées 2013 “Systèmes de référence spatio-temporels” will be held in Paris, France, September 16-18, 2013. The Journées are co-sponsored by the IAU. *H. Drewes* informed the EC on the request to IAG to co-sponsor it (see Agenda Topic 15). The International Symposium “Reconciling Observations and Models of Elastic and Viscoelastic Deformation due to Ice Mass Change”, Ilulissat, Greenland, May 30-June 02, 2013, is co-sponsored by the IAG. The activities of Sub-commissions, the Joint Study Group and Joint Working Group were then highlighted. A new Joint Working Group of IAU and IAG on “Theory of the Earth Rotation” was proposed (see Agenda Topic 5).

*P. Wielgosz* presented the report of Commission 4 “Positioning and Applications” acting for *D. Brzezinska*. There were several symposia and workshops in 2012 organised or sponsored by the Commission, and there are many conferences, symposia, and workshops planned in 2013. He then explained in detail the results and planned activities of the Sub-commissions with new SGs and WGs. Concerning the installation of three new WGs and one new SG, *H. Drewes* requested the Commission to submit a detailed overview on the formation as well as the ToR. The EC has then to decide on the adoption of these groups.

Summarising the Commissions' reports, *H. Drewes* requested all Commissions to submit important information on the activities and meetings to the Secretary General for compiling the meetings calendar and the annual report to the IUGG. *J. Adam* asked all colleagues to consider the monthly IAG Newsletter and to send all relevant information to the IAG COB to be published in this periodical. Especially for all IAG symposia and conferences a short report should be delivered to inform the international community on the activities.

### 5. *Adoption of new Working Group 3.1 “Theory of the Earth Rotation”*

The draft ToR for this new Joint Working Group of IAU and IAG had been posted on the IAG Office Homepage previous to the EC meeting. *H. Schuh* explained that within the recent decade the theory has been revised, nevertheless the progress turned out to be not sufficient. In order to promote the development, three Sub-Working Groups (Precession/Nutation, Polar Motion and UT1, Numerical Solutions and Validation) have been installed. *H. Drewes* moved for adoption of the WG, *Ch. Rizos* seconded, and the EC adopted the new Sub-WGs under the condition, that IAG is correctly mentioned in all aspects especially when products are issued.

### 6. *Report of the ICCT*

*N. Sneeuw* reported the VIII Hotine-Marussi Symposium to be held in Rome, June 17-21, 2013. Altogether 85 abstracts have been submitted to be presented in the 8 sessions. *H. Schuh* recommended watching the dates of all symposia so that they do not overlap with other events. Concretely he proposed to shift the Hotine-Marussi Symposia to the even years in order to separate them from the General Assemblies in the odd years. *N. Sneeuw* agreed, announcing that the next Hotine-Marussi Symposium will then take place in three years; afterwards the period is planned for each 2 years.

## **7. Report of the GGOS**

By slides of *H. Kutterer*, *H. Schuh* reported on the progress of GGOS. All structure components within GGOS have now been established and elections have been finalised. The main entities of the structure are the Consortium, the Coordinating Board and the Executive Committee. The Consortium meets annually, the CB semi-annually, and the EC monthly by telephone conferences. The GGOS 2020 Project is a central activity, the timeline was conceptually fixed. GGOS 2020 is proposed to be a System of Systems. Another important activity is within the UN GGIM, where in February 2013 the Doha declaration was released. *H. Schuh* said that GGOS has organised a Unified Analysis Workshop and other activities which are indeed useful. It was recommended to improve the GGOS homepage especially to give more clear information also to visitors who are not intensively engaged in Geodesy.

## **8. Report from the Services**

*R. Barzaghi* reported on the Services BGI, IGFS, IGeS, ICGEM, ICET and IDEMS. The structure of the IGFS has changed in some aspects and a new chairman, *R. Barzaghi*, has been elected. The IGeS will submit a proposal for a restructuring to be discussed in Potsdam. The next Geoid School will be held in October 2013 in Loja, Ecuador. Future events are foreseen in Trieste in 2014, and contacts with the University of Cairo have started to organise a further event. The situation of the IDEMS is unfortunately still rather annoying. The EC congratulated *R. Barzaghi* on his election as IGFS Chairman. On the question of *J. Adam* concerning the plans to install a new Service for absolute gravity, *R. Barzaghi* answered that this work should be done by the BGI where the relevant data could be appropriately stored.

*T. Herring* gave a summary report on the BIPM, IERS, IVS, IBS and PSMSL. *A. Nothnagel* has been elected recently as the new Chair of the IVS Directing Board. The IBS seems no longer to be active. *H. Drewes* explained that BKG is discontinuing the IBS and there is a suggestion to transfer it to the COB. *J. Adam* answered that this transfer might be difficult due to the lack of personnel.

## **9. Report of the COB**

*J. Adam* reported that the monthly IAG Newsletter is distributed among about 900 addressees. The complete version is sent by e-mail, a reduced version is submitted for publication in the Journal of Geodesy. The IAG Website is visited by 60 to 70 users per day. The COB and IAG Office have met in Budapest in November 2012 to discuss the IAG Website, the Potsdam Assembly and the Geodesist's Handbook. *H. Drewes* added that the 2012 Geodesist's Handbook has been distributed among the IUGG EC, further together with the IAG 2009 Scientific Assembly to all IAG National Correspondents. The price for these publications is rather high and numerous colleagues, especially in developing countries cannot afford to buy these issues. Moreover *H. Drewes* strongly recommended improving the IAG Website so that it is less overcrowded and making it more attractive, especially for non-geodesists.

## **10. Editor's Report of the Journal of Geodesy**

*R. Klees* remembered the conclusion of the 2011 Melbourne session to reduce the number of members of the JoG Editorial Board. Consequently the Board comprises now altogether 15 persons. The number of submitted articles is rather constant over the last three years; however, an increasing number of articles are rejected. It turned out that a number of rejected articles are later submitted to other journals and published there without any revision. He claimed that especially the rejected articles as well as those which are principally accepted but have to be revised by the authors cause enormously much work for the Editorial Board. Therefore it had been concluded in Melbourne to allow only one revision, if the paper then is not yet sufficient it will be rejected. Although the members of the Editorial Board try to handle their workload as efficiently as possible, the average time span between the first submission of an article and the final acceptance is rather long; moreover the editing time is considerable. Despite many attempts to accelerate the publication process, the time span till the digital publication is still about 140 days, for the publication as the printed version even about 400 days, i.e. more than one year.

## **11. Young Author's Awards 2011 and 2012**

*R. Klees* informed the EC that all articles coming into consideration have been checked and a large number of proposals been submitted. Finally four articles have been selected, one for the year 2011 and three for 2012. The relevant texts can be downloaded from the IAG Office Website. It is up to the EC to add further articles if it would seem reasonable. *H. Drewes* pointed out that according to the "Rules for the IAG Young Authors Award" the price may be awarded once per year if adequate candidates are nominated. The list of the winners is published in the Journal of Geodesy. Seconded by *Ch. Rizos*, *H. Schuh* moved to accept the only one proposed article for the year 2011 immediately. The EC accepted unanimously. Further it was decided to vote via internet on the selection of the 2012 awardee.

## **12. Status Report of the Cassinis Committee**

*M. Sideris* informed the EC that the Committee has discussed the IAG Statutes and Bylaws intensively and worked out a list of proposed changes in the texts. The IAG Office will distribute the texts among the IAG Council Members to be prepared for the discussion in Potsdam. Based on this discussion final proposals will be worked out to be concluded at the next IUGG General Assembly in Prague 2015. As a topic for the next EC Meeting *N. Sneeuw* proposed to recommend officially the continuation of the ICCT and further to include the ICCT President into the circle of voting members. According to the other bodies the time period of the President should then be limited to two periods.

## **13. Report on the IAG Symposia Series**

*Ch. Rizos* presented slides of *P. Willis* giving an overview of the volumes of the IAG Symposia Series recently published and in preparation or planning. The ranking is quite high but some proposals for improvement were made. For the volume of the Melbourne General Assembly altogether 109 articles have been submitted, 80 of them accepted for publication. In order to keep a high ISI factor of the series, *U. Marti* emphasised that the highest quality for all published articles should be maintained although the rejection rate is already high.

## **14. Review of Services**

*H. Schuh* gave an overview on the general structure and duties of the IAG Services. § 15 of the IAG Bylaws defines the tasks. The Services are rather free in defining their structure and work plans as far as compatible with the aims of the IAG. Some Services are together with the IAU. The history of the Services is rather inhomogeneous, several ones have been founded in the recent past, others however are based on institutions which partly have been founded already at the end of the 19th / beginning of the 20th century. He pointed out that up to now the Services never have been evaluated concerning their efficiency as a backbone of the IAG or whether they fulfil their task in contributing to the GGOS. A time schedule for an evaluation as well as the procedure was presented. The core evaluation group should comprise 4 – 5 persons with strong involvement in GGOS, 2 – 3 referees for each Service (including "cross-referees") then should be nominated. Basing on their findings the future structure of the Services should be discussed at the IUGG General Assembly in Prague 2015. In case of need structures should be improved or, if it turns out that a Service absolutely does not fulfil its tasks, even be dissolved. In the discussion it was interjected that all Services are based on voluntary contributions. It might be more efficient to ask external referees to review the Services. In particular the long term work of the Services can be investigated. Moreover it has to be considered carefully that the IAG just cannot dissolve some Services as they may be governmental organisations or/and joint ventures. Finally the EC established a group consisting of *H. Schuh*, *H. Drewes*, *R. Barzaghi*, *T. Herring* and *R. Neilan* to handle this task and report to the Potsdam Assembly. They should define the goals and criteria, and prepare the Services for the evaluation exercise.

## **15. Adoption of IAG (sponsored) Symposia**

*H. Drewes* presented a list of upcoming IAG Symposia (see <http://iag.dgfi.badw.de> under "Meetings Calendar"). The EC approved the complete list.

## **16. IAG Representative to the Advisory Board on the Law of the Sea (ABLOS)**

*Ch. Rizos* and *H. Drewes* explained that ABLOS is a joint Board of IAG and IHO. It represents an important institution treating questions on the definition of boundaries of maritime zones. Up to now the IAG representatives in ABLOS were *S. Bisnath* (Canada), *G. Blick* (New Zealand), *S. Sutisna* (Indonesia) and *N.*

*Andersen* (Sweden). Recently *S. Bisnath* has been elected President of ABLOS, so he has to be replaced in his function as a representative. *J. C. Baez*, Concepción/Chile has been nominated. *H. Drewes* moved to approve this nomination, *Ch. Rizos* seconded, and it was unanimously adopted by the EC.

#### **17. Next IAG EC meeting**

The next EC meeting has to be held during the Scientific Assembly (September 2-6, 2013). The EC agreed to schedule the meeting for Sunday, 1<sup>st</sup> September, over the whole day.

#### **18. Any other business**

*U. Marti* informed the EC that he and several other colleagues have received an invitation to become members of the Advisory Editorial Board / Section Editors Board for the planned edition of an "Encyclopaedia Geodesia". The plan has been initiated by *E. Grafarend* (editor) and *P. v. Steenbergen* (Springer Publishing House). The Encyclopaedia should comprise about 200 articles on geodesy which are to be delivered by the end of 2014. The EC decided unanimously that this is not a responsibility of the IAG EC.

#### **19. Adjourn**

*Ch. Rizos* thanked the participants for their contributions and closed the session at 17:15.

Respectfully submitted  
H. DREWES, Secretary General  
H. HORNIK, Assistant Secretary

## **Meeting Announcements**

### *IAG Scientific Assembly 2013*

Online registration is now possible via the link on the webpage [http://www.iag2013.org/IAG\\_2013/Registr.html](http://www.iag2013.org/IAG_2013/Registr.html). The online registration will be closed on **28 August 2013**, 23:59 h. After that, only on-site registration in Potsdam and the (more expensive) on-site payment will be possible. Themes as well as detailed description of themes of the IAG Scientific Assembly 2013 are available from the webpage [http://www.iag2013.org/IAG\\_2013/Themes.html](http://www.iag2013.org/IAG_2013/Themes.html). For further conference information, please visit our homepage <http://www.iag2013.org>.

The IAG Committees would like to thank cordially all authors for their scientific contributions. Nearly 500 abstracts were received. Notifications of acceptance will be sent to all authors per e-mail at the end of May. All abstracts accepted and presented at the Assembly (oral or poster) may be submitted as papers for publication in the peer-reviewed IAG Symposia Series at Springer Publisher within one month after the Assembly.

IAG 2013 will offer you an interesting and comprehensive scientific program together with a variety of unique cultural events.

IAG 2013 LOC

### *G021 Solid Earth Geodesy, 2013 AGU Fall Meeting*

Dear colleagues

I cordially invite you to participate in Session

G021. Solid Earth Geodesy: Exploring the interpretation limits of current satellite-only and combined Earth Gravity Models

to be held in the forthcoming AGU Fall Meeting in San Francisco, 9-13 December 2013.

The session description is:

The availability of new sources of satellite and terrestrial data for the Earth's shape and gravity field has led to the release of an abundance of Earth Gravity Models over the last decade. The session welcomes applications which highlight the contribution of these models to the interpretation and understanding of the Earth's gravity field. Of special focus are geophysical applications which identify characteristic features of the models in terms of representing the observed field and include but are not restricted to dynamic ocean topography, crustal structure, and elastic thickness of the lithosphere.

with Index terms

[1218] GEODESY AND GRAVITY / Mass balance

[1219] GEODESY AND GRAVITY / Gravity anomalies and Earth structure

[4556] OCEANOGRAPHY: PHYSICAL / Sea level: variations and mean

[4562] OCEANOGRAPHY: PHYSICAL / Topographic/bathymetric interactions

On behalf of my Co-conveners

Dan McKenzie (University of Cambridge),  
Sarah Gille (University of California San Diego) and  
Nikolaos Pavlis (National Geospatial-Intelligence Agency)

I would be happy to receive your contributions and welcome you in San Francisco. The AGU Abstract submission system is now open with deadline for all submissions August 6.

With best regards

DIMITRIS TSOLIS

## *Meetings Calendar*

### *International Symposium on Planetary Sciences (IAPS2013)*

*July 1-4, 2013, Shanghai, China*

URL: <http://202.127.29.4/meetings/iaps2013/>

### *GI Forum 2013 – Creating the GISociety*

*July 2-5, 2013, Salzburg, Austria*

URL: [www.daca-13.org](http://www.daca-13.org)

### *2013 Beacon Satellite Symposium*

*July 8-12, 2013, Bath, UK*

URL: <http://people.bath.ac.uk/ee3jarr/beaconsatellite2013/>

### *Joint IAMAS-IACS Assembly*

*July 8-12, 2013, Davos, Switzerland*

Davos Atmosphere and Cryosphere Assembly 2013, Ice & Air – Process Interactions

URL: [www.gi-forum.org](http://www.gi-forum.org)

### *ESA International Summerschool on GNSS 2013*

*July 15-25, 2013, Davos, Switzerland*

URL: <http://www.congrexprojects.com/13m07>

### *Joint IAHS-IAPSO-IASPEI Scientific Assembly*

*July 22-26, 2013, Gothenburg, Sweden*

URL: <http://www.iaspei.org/meetings/forthcoming.html#iaspei2013>



Workshop on Mathematics of climate change, related hazards and risks

July 29 – August 2, 2013, Guanajuato, Mexico

URL: <http://www.mca2013.org/en/programme/satelite-activities/workshop-on-mathematics-of-climate-change.html>

26th International Cartographic Conference

August 25-30, 2013, Dresden, Germany

URL: <http://www.icc2013.org/>

ISDE 2013

August 26-29, 2013, Kuching, Sarawak, Malaysia

8<sup>th</sup> International Symposium on Digital Earth 2013

URL: <http://isde2013.utm.my/>

12th IAGA Scientific Assembly

August 26-31, 2013, Mérida, Mexico

URL: [www.iaga2013.org.mx](http://www.iaga2013.org.mx)

IC-MSQUARE 2013

September 1-5, 2013, Prague, Czech Republic

2<sup>nd</sup> International Conference on Mathematical Modeling in Physical Sciences

URL: <http://www.icmsquare.net>

IAG Scientific Assembly

September 1-6, 2013, Potsdam, Germany

URL: <http://www.iag2013.org>

2nd Joint International Symposium on Deformation Monitoring (JISDM)

September 9-11, 2013, Nottingham, UK

URL: [www.nottingham.ac.uk/ngi/documents/events-pdfs/jisd2013.pdf](http://www.nottingham.ac.uk/ngi/documents/events-pdfs/jisd2013.pdf)

ESA Living Planet Symposium 2013

September 9-13, 2013, Edinburgh, UK

URL: <http://www.livingplanet2013.org/>

TGSMM 2013

September 11-20, 2013, St Petersburg, Russian Federation

IAG Third Symposium "Terrestrial Gravimetry: Static and Mobile Measurements - TGSMM-2013"

Scientific developments from highly accurate space-time reference systems

September 16-18, 2013, Observatoire de Paris, Paris, France

URL: <http://synte.obsparis.fr/jsr/journees2013/>

ION GNSS 2013

September 16-20, 2013, Nashville, TN, USA

URL: <http://www.ion.org/meetings/?conf=gnss>

ITU/BIPM Workshop on the Future of the International Time Scale

September 19-20, 2013, Geneva, Switzerland

URL: <http://www.itu.int/ITU-R/go/itu-bipm-workshop-13/>

Statusseminar der DFG-Forschergruppe Referenzsysteme (FOR1503)

September 19-20, 2013, Berlin, Germany

URL: <http://www.referenzsysteme.de/>

7th Coastal Altimetry Workshop

October 7-8, 2013, Boulder, USA

URL: <http://www.coastalaltimetry.org/>

11th International School of Geoid Service: Heights and Height Datum

October 7-11, 2013, Loja, Ecuador

URL: <http://www.11iges.utpl.edu.ec/>

Geodätische Woche and INTERGEO

October 8-10, 2013, Essen, Germany

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

Ocean Surface Topography Science Team (OSTST) Meeting

October 8-11, 2013, Boulder, USA

URL: <http://sealevel.jpl.nasa.gov/science/ostscienceteam/scienceteammeetings/>

2013 Asia-Pacific Space Geodynamics Symposium

Ohio State University, Oct 17-19, 2013

URL: <http://apsg2013.geodeticsscience.osu.edu> (available soon)

School on Reference Systems, Crustal Deformation and Ionosphere Monitoring

October 21-23, 2013, Panama City, Panama

URL: <http://www.sirgas.org/index.php?id=233&L=0>

SIRGAS Meeting 2013

October 24-26, 2013, Panama City, Panama

URL: <http://www.sirgas.org/index.php?id=193&L=2>

ICAG 2013

November 5-13, 2013, Walferdange Underground Laboratory, Luxembourg

International Comparison of Absolute Gravimeters

GRMSE2013

November 8-10, 2013, Wuhan, China

International Conference on Geo-Informatics in Resource Management & Sustainable Ecosystem

URL: <http://www.ggers.org/>

18th International Workshop on Laser Ranging

November 11-15, 2013, Fujiyoshida, Japan

URL: <http://geo.science.hit-u.ac.jp/lw18>

6th European Workshop on GNSS Signals and Signal Processing

December 5-6, 2013, Munich, Germany

URL: <http://ifen.bauw.unibw.de/gnss-signals-workshop/>

Gi4DM 2013

December 9-11, 2013, Hanoi, Vietnam

9th International Conference on GeoInformation for Disaster Management; Theme: Earth Observation for Disaster Management.

URL: <http://www.gi4dm2013.com>

AGU 2013 Fall Meeting

December 9-13, 2013, San Francisco, CA, USA

URL: <http://sites.agu.org/meetings/>

### 17. Internationaler Ingenieurvermessungskurs

January 14-17, 2014, Zurich, Switzerland

URL: <http://www.igp.ethz.ch/iv2014/>

### ION International Technical Meeting (ITM) 2014

January 27-29, 2014, San Diego, CA, USA

URL: <http://www.ion.org/meetings/?conf=itm>

### SPACOMM 2014

February 23-27, 2014, Nice, France

URL: <http://www.iaria.org/conferences2014/SPACOMM14.html>

### IVS General Meeting

March 2-7, 2014, Shanghai, China

URL: <http://ivs2014.csp.escience.cn/>

### Munich Satellite Navigation Summit 2014

March 25-27, 2014, Munich, Germany

URL: <http://www.munich-satellite-navigation-summit.org/>

### Third International School on "The KTH Approach to Modeling the Geoid"

March 31-April 4, 2014, Johor Bahru, Malaysia

URL: <http://www.infra.kth.se/geo/events/geoidschool.html>

### European Geosciences Union General Assembly 2014

April 27 – May 2, 2014, Vienna, Austria

URL: <http://www.egu2014.eu/>

### 40th COSPAR Scientific Assembly

August 2-10, 2014, Moscow, Russia

URL: <http://www.cospar-assembly.org/>

### AGU 2014 Fall Meeting

December 15-19, 2014, San Francisco, CA, USA

URL: <http://sites.agu.org/meetings/>

### XXVI IUGG General Assembly

June 22 – July 2, 2015, Prague, Czech Republic

URL: <http://www.iugg.org/assemblies/>

## Reports

### *EUREF2013 Symposium – Budapest, 29-31 May 2013*

EUREF, the 1.3b sub-commission of the IAG Commission 1 on Reference Frames held its annual symposium at 29-31 May 2013 in Budapest. The event was organized by the Institute of Geodesy Cartography and Remote Sensing (FÖMI) and hosted by the Ministry of Rural Development.

More than 100 participants from 30 countries were attended the symposium, representing the National Mapping and Cadastral Agencies (NMCAs) and university research groups.



Photo of participants

The scientific program consisted of 35 oral and 12 poster presentations and National Reports from all participating countries, where recent activities covering the development of the geodetic networks and the related services were presented and discussed. The scientific program consisted of 6 sessions (GNSS Now; GNSS for Earth Sciences; ETRS89: present and future; ETRS89 and EVRS for geo-information; Height and Gravity; National Reports). The detailed scientific program and all the presentations are accessible via the symposium website: <http://euref2013.fomi.hu/>.

Thanks to Carl Calvert's generous offer the Young Scientist Presentation Award had also been announced, which has been received this year by Eszter Szűcs, who works at the Geodetic and Geophysical Institute of the HAS Research Centre for Astronomy and Earth Sciences (Sopron, Hungary).

The next symposium was also announced, which will be held in Vilnius, Lithuania, 4-6 June, 2014. On 1 June a Technical Excursion was organized to the Satellite Geodetic Observatory (SGO), where the main activities, ongoing projects and future plans of the SGO were presented and the recently opened exhibition on the 40 years history of SGO was displayed.

The symposium participants have been formulated the following resolutions:

**Resolution No. 1.**

The IAG Reference Frame Sub-commission for Europe (EUREF)

*noting* that the IERS conventions 2010 have been introduced

*and recognising* that therefore existing products evaluated in the EPN-Repro1 campaign are no longer consistent with the new conventions

*encourages* the EPN Local Analysis Centres to take part in the EPN Special Project on Reprocessing in order to start a second re-computation (EPN-Repro 2) of the entire EPN to provide a set of products consistent with the new conventions

**Resolution No. 2.**

The IAG Reference Frame Sub-commission for Europe (EUREF)

*Recognising* recent and upcoming EUREF generated changes in EPN standards and guidelines

*encourages* the EUREF community to keep up to date with current guideline

**Resolution No. 3.**

The IAG Reference Frame Sub-commission for Europe (EUREF)

*Noting* the activity of the IAG working group on the Integration of Dense Velocity Fields into the ITRF  
*and recognising* the good work and results of the previous IAG working group on Regional Dense Velocity Fields

*encourages* continued submission of SINEX solutions from national active GNSS networks

**Resolution No. 4.**

The IAG Reference Frame Sub-commission for Europe (EUREF)

*Recognising* the preparations for the European Plate Observing System, EPOS and other similar upcoming projects

*and also considering* the recent developments and increased amount of observations, particularly of the temporal and secular variations of gravity within Europe

*encourages* the inclusion of gravity data for use in EPOS and similar activities whenever appropriate

**Resolution No. 5.**

The IAG Reference Frame Sub-commission for Europe (EUREF)

*Noting* that some of the INSPIRE data specifications currently under development may not fully comply with the established principles for data specifications relating to coordinate reference systems

*asks* the EUREF members of the NMCAs to continuously monitor the development of such data specifications and report any inconsistencies to both their national INSPIRE contact person and to the EUREF TWG in order to ensure that the necessary actions are taken to guarantee the integrity of INSPIRE data specifications

**Resolution No. 6.**

The IAG Reference Frame Sub-commission for Europe (EUREF)

*Recognising* the important role of coordinating the activities of the EUREF Local Analysis Centres

*expresses* its heartfelt thanks to the former Analysis Centre Coordinator Heinz Habrich, from the Federal Agency for Cartography and Geodesy (BKG), for more than 10 years of excellent work

*and accepts* the joint proposal from the Military University of Technology, Poland and Warsaw University of Technology, to take on the duties and responsibilities of the Analysis Centre Coordinator

**Resolution No. 7.**

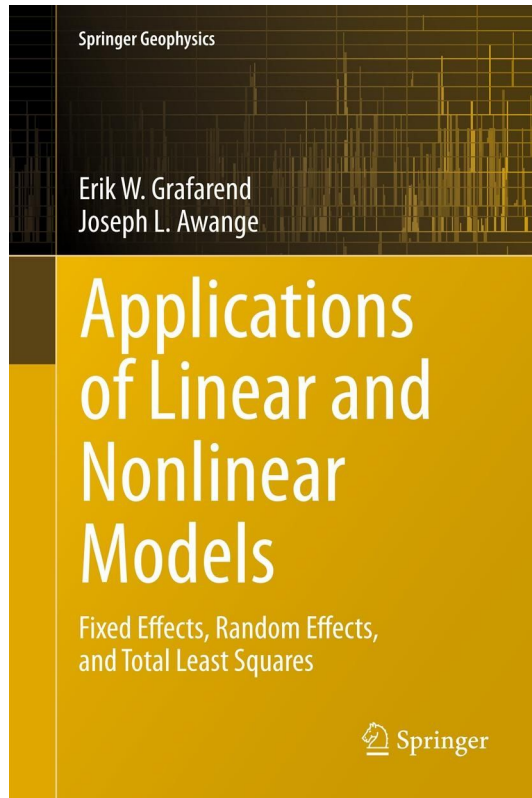
The IAG Reference Frame Sub-commission for Europe (EUREF) which held its twenty third symposium in Budapest from May 29 – 31, 2013

*Expresses* its heartfelt thanks to the Local Organising Committee: Ambrus Kenyeres, Diana Fényes, Tamás Jámbor and András Fábíán for organising the symposium and for the excellent arrangements resulting in a very successful meeting and for the support given by the Ministry of Rural Development and the Institute of Geodesy, Cartography and Remote Sensing and also sponsors Leica Geosystems, Alberding GmbH, Topcon and Trimble.

AMBRUS KENYERES

## Book Review

Erik W. Grafarend, Joseph L. Awange: *Applications of linear and Nonlinear Models. Fixed Effects, Random Effects and Total Least Squares*



Title: Applications of linear and Nonlinear Models. Fixed Effects, Random Effects and Total Least Squares  
Authors: Erik W. Grafarend, Joseph L. Awange  
Publisher: Springer Verlag Heidelberg – Dordrecht – London – New York  
ISBN: 978-3-642-22240-5 (hardcover)  
978-3-642-22241-2 (eBook)  
Year: 2012  
Price: 213.95 €(hardcover) / 166.59 €(eBook)  
Details: XXI, 1016 p. 111 illus., 8 illus. in color.

The title refers to models for variables which are observable and possibly other variables, called parameters; the first are collected in a vector  $\mathbf{y}$  of dimension  $n$  and the others are collected in a vector  $\mathbf{x}$  of dimension  $m$ . Such models can be purely deterministic or stochastic; the variables themselves can be deterministic or stochastic.

Overall the book is a monumental summary of least squares theory and its many variations, interpretations and developments, to be applied according to the will and/or the skill of the modeller. It covers a large part, but of course not all, of the historical development from the heroic times of Gauss and Legendre up to the theory of Total Least Squares which is still engaging present researchers in Geodesy and, more generally, in Statistics.

The backbone of the theoretical reasoning developed in the book is to look first at models from the pure algebraic point of view and then to look at the resulting estimators in terms of their statistical properties, to be possibly optimized. This is particularly effective for linear models, which are the major object of the book, while non linearity is basically studied in the form of the so called weak non linearity, i.e. one where functional models can be Taylorized and solutions obtained via iteration. For this reason we shall refer mostly to models where relations between variables are linear, which constitute the bulk of the book. The subject is articulated with six distinct problems, not all of which have the two counterparts.

The first problem is the analysis of the undetermined problem where  $n = \dim(\mathbf{y}) \leq m = \dim(\mathbf{x})$  and the design matrix  $A$ , transforming  $\mathbf{x}$  into the space of observables, is full rank. The deterministic “solution” is basically to describe what is the kernel or null space of  $A$ , thus allowing to write the general solution of the equation  $\mathbf{y} = A\mathbf{x}$ .

In the linear (in this case) manifold of the solutions within the  $y$  space of parameters  $x$ , one can also find the minimum norm solution. As far as a linear model is involved the span of  $Ax$  is the whole space of observables,  $Y$ . The probabilistic counterpart is a uniformly minimum bias solution, where the matrix in  $X$  space is controlled by the inverse a “substitute” matrix  $S$ , which, in a Bayesian context, would be interpreted as the covariance of  $x$  considered a random variable, with some prior distribution. Fourier-Legendre truncated series and the problem of coefficients estimation is used as an example.

The second problem analyzed is that of inconsistent observation equations of the overdetermined type. Here the design matrix  $A$  is such that  $n = \dim(y) > m = \dim(x)$  and still  $A$  is full rank, namely  $\text{rank}(A) = m$ . From the algebraic point of view here the interesting part is the definition of the (linear) manifold of the vectors in  $Y$  consistent with the model, namely the range of  $A$ ,  $R(A)$ ; if  $y$  is an inconsistent vector of observations then we have to find a way to minimize the inconsistency between  $y$  and  $R(A)$ . This is indeed a least squares principle, in algebraic sense, where the solution does depend from the arbitrary choice of the norm in the  $Y$  space. Such an arbitrariness can be reduced already on the pure algebraic ground, by a criterion of Second Order design optimization. If we call  $G_y$  the metric tensor of  $y$ , the Fisher information on  $x$ , namely  $A^T G_y A$ , can be chosen to approximate a given target matrix by suitably tuning  $G_y$ . The problem is analyzed under different view angles, including spectral analysis by singular value decomposition of the relevant matrices. The probabilistic counterpart of the second problem comes by studying the covariance propagation of the equation inconsistencies to the various estimators, and its optimization. Here the best uniformly unbiased estimator theory is the central argument. While the second order design algebraic theory, becomes now the theory of invariant quadratic estimators of the variance covariance components, which are unknown parameters in the probabilistic model of the observables.

The third problem is a generalization of the second to the case that  $A$  is not full rank. This is a very important case for Geodesy where some rank defect related to datum indetermination is a pervasive problem. From the algebraic point of view the discussion of the possible solutions with minimum inconsistencies of the observation equations and minimum bias, leads to the Tykhonov-Phillips regularization theory with its inherent ambiguity on the norm choice problem. The probabilistic counterpart of the problem solves this ambiguity, at least for norm in the  $Y$  space.

The fourth problem lives only on the probabilistic side and is in fact one where both the observable  $y$  and the parameter vector  $x$  are stochastic. The case is called random effects and a chief example is that of linear regression, where regressor variables are random too. The theory of homogeneous predictors derived from the minimum mean square estimation error principle is developed. As always in this case a bias term (unknown) enters into the minimization principle, which becomes then solvable only if the term (bias  $x$  bias transpose) is changed into a suitable “artificial” positive definite substitute matrix  $S$ .

The fifth problem seems to loose somehow the parallelism of the first 3 problems. In fact the algebraic fifth problem is that of observables that should satisfy, in the mean, condition equations and the corresponding observations that are not compliant with such constraints. As a matter of fact this is, from the geometric point of view, just another representation of the second algebraic problem where the manifold of mean values has a pure parametric representation. Naturally the algebraic elaboration of the problem is different and is worked out in the present context. The fifth problem in the stochastic interpretation however seems to be different in nature; actually it is referred to as the Gauss-Markov model with mixed effects. This means that observables and part of the parameters have a stochastic characterization, while another part of the parameters is just deterministic. The book then tries to discuss the item of collocation, or Wiener-Kolmogorov prediction theory, and krieging by framing it into the above model.

The sixth problem in the stochastic version is the so called error in variables or total Least Squares problem. In this case the problem is linear in the parameter vector but the design matrix is stochastic. A typical example for such problem is that of a linear regression where both dependent and independent variables (regressors) are observed. The case is worked out on the bases of least squares principles and examples are displayed. A notable application of the above theory is the non linear problem of the 3D geodetic datum adjustment. This occupies a full section in the book. Curiously the sixth problem from the algebraic point of view is defined to be the variance-covariance components estimation in the various types of least squares models, including the most general linear model. In a sense this problem and its corresponding section is a generalization to complete linear models of the third probabilistic problem. The important case of multivariate 1-way and 2-ways classification, including interactions, is treated in an ad hoc section.

The rest of the book, in fact about 40% of it, is devoted to conspicuous appendices covering general items like: A) matrix algebra and multilinear algebra; B) sample theory and their statistical distributions; C) random fields and stochastic processes; D) Groebner basis algebra. Obviously they are instrumental to the main body of the book. As for Appendices A) and B) we don't need a particular explanation. As for Appendix C), several examples treated in the book are taken in the realm of random fields and random processes. The Appendix contains an introduction to such items. Finally Appendix D) refers to a method (also referred to as Buchberger algorithm) to reduce a system of polynomial equations (in many variables) to a unique equation, of higher order, in one variable only. One can say that this is the non-linear equivalent to the Gauss elimination technique, as

applied to linear systems. The idea is applied in the book to the case of truly non-linear overdetermined systems of observation equations which can then be solved by identifying subsets of equations, solving them for the parameters and then suitably combining the solution, taking into account the error covariance propagation.

As one can see the book is really monumental, covering a wide range of items in statistical estimation theory. The reading of the book is not immediate due to a particular symbolism used and the rather strict style; however after the first sections, reading and understanding go on faster. Examples are instrumental to catching the theoretical concepts. The References and their discussion are a precious tool for any researcher dealing with statistical modelling of the data. An accurate correction of misprints will certainly improve future editions.

Note: the author of the review is aware that there is an international legal action about the intellectual property of the material contained in the book. However he thinks that the review is about the book and not about intellectual property. Moreover he believes that such a huge effort should not be left without comments.

FERNANDO SANSÒ