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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). 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

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General Announcements

New Year's Message from the IAG President

Dear Friends and Colleagues,

it is not unusual that presidents of Associations like the IAG try to summarize the important events in the Association's life of the elapsed year. In an attempt to be brief I will focus only on few topics, which I believe to be noteworthy.

Business as usual (?)

In 2005 the new structure of IAG really started functioning. From my perspective, most elements are now performing well, today. Let me therefore express my thanks to all Commission and Intercommission Committee presidents, and to the heads of the services for their excellent work in support of IAG.

I would like to express my personal gratitude to our Vice-president Michael Sideris, who serves (among other) as the interface of the Executive with the IAG Communications and Outreach Branch and as IAG's representative in the scientific organizing committee of next year's Scientific Assembly with the theme "Monitoring and Understanding a Dynamic Planet with Geodetic and Oceanographic Tools". The assembly is a common symposium of IAG, IAPSO, and IABO. More information about this important upcoming event may be found at <http://www.dynamicplanet2005.com>.



Let me also cordially thank Jozsef Adam, the head of our Communications and Outreach Branch. It is amazing how efficiently Jozsef and his Hungarian crew assumed their role to the benefit of IAG. It is also a remarkable achievement, and probably to a great extent thanks to the Outreach Branch, that IAG has now more than 200 individual members, including students and retired geodesists.

Last, but not least, I would like to express my sincere gratitude to Christian Tscherning, our Secretary General. It is essential for the Association that it can rely on his many years of experience as a secretary general with a high scientific and administrative profile. It is, by the way, not really appropriate to mention Christian's work for IAG under the title "business as usual": Christian had a pacemaker implanted in the fall and, very recently, he broke his arm. It is more than remarkable that his work for IAG remained (almost completely) unaffected by these health problems.

IUGG Matters

The IUGG Executive usually meets in its new configuration in the year following an IUGG General Assembly. This year's IUGG Executive Committee Meeting was hosted by the IUGG General Secretary, Jo Ann Joselyn, early in September in Boulder, Colorado. From my perspective the creation of (or the plan to create) a new IUGG Association was the outstanding topic. ICSI, the International Commission on Snow and Ice (till 2004 an entity of the IAHS - International Association of Hydrological Sciences), made the proposal to become a new association of IUGG (under a new name). This is a very unusual step – the current seven IUGG associations are all "well established" (all considerably older than fifty years).

It was decided in Boulder to "upgrade" the ICSI right away to an IUGG Inter-Union body and to postpone the decision to create the 8th Association of the IUGG to the 2007 IUGG General Assembly.

The GGOS Project

IAG Projects are, according to the bylaws of IAG, of broad scope and of highest interest for the entire field of geodesy. They serve as the flagships of the Association for a long period of time (a decade or longer).

Under the leadership of Proffs. Christoph Reigber (President) and Hermann Drewes (Secretary) the steering committee of GGOS showed an amazing amount of initiative. GGOS established itself as the interface of IAG and the GEO-Group (Group on Earth Observation). I could only follow these activities from the distance and I

am deeply impressed by the impact the group made on the official GEO documents. We now sincerely hope that the initiative will lead to, among other things, a much stronger and safer global geodetic infrastructure (among other things).

The group also tries to establish geodesy (and/or GGOS) as a theme in the United Nations' Integrated Global Observing Strategy, IGOS. This work is in progress.

The two aspects mentioned above are rather of a political nature. Traditionally, policy has not had too high a standing within IAG. It is, however, important or even vital to establish IAG as THE partner for all UN activities involving geometry and gravity on a global level. Often (too often!) geodesy is not viewed as a science, but "only" as a tool in some of these circles...

Science of course matters in geodesy as much as in the other geosciences. It will, e.g., only be possible to establish a geodesy-related theme in IGOS, if a strong science case can be made. The GGOS group will invest a lot of work in this area in 2005. My cordial thanks go to Chris Reigber and his team.

FIG and IAG

FIG views itself as the international organization for the surveying community. This assessment is certainly correct. On the other hand, IAG has a strong link to application, as well; think of Commission 4, for example. To me it seems that geodesy and surveying engineering (i.e., IAG and FIG) are too closely related to go separate ways. This is why I invested personally quite some time in the attempt to bring the two associations closer together. This was a rather "easy" task because I experienced a lot of support from Matt Higgins (FIG), Chris Rizos (IAG) and the president of FIG, Prof. Holger Magel. It seems that we will be able to sign a new, more concrete and substantial MoU between the two associations at the Cairns Scientific Assembly.

Let me mention that I represented IAG at the FIG working week in Athens and at the FIG regional conference in Jakarta (after the bombings and before the earthquake ...). It seems that AFREF can be established as a common project of IAG and FIG. This is of particular importance in view of FIG's links with the national mapping and surveying agencies.

MoU with ION and planned MoU with UN-OOSA

Thanks to Dorothea Brzezinska and Ruth Neilan we have today an MoU between ION and IAG (ready to be signed) clarifying the relationships between the two organizations. I would like to thank Dorothea Brzezinska for her initiative and Ruth Neilan for her assistance.

FIG signed an MoU with the UN Office of Outer Space Affairs (UN-OOSA) at the UN/USA International meeting on the Use and Applications of Global Navigation Satellite Systems, December 13-17 2004, in Vienna, Austria. IAG and UN-OOSA plan to sign a similar document in spring 2005 (hopefully on the occasion of the EGU Spring Conference). In view of IAG's contribution to all high-accuracy applications of all operational GNSS systems, and in particular through the International GPS Service (IGS), but also the IERS, it is very important that IAG's work is recognized also in this context.

Earthquake in the Indian Ocean

While preparing this review, the tragic news of the earthquake off the coast of Sumatra and the devastating tsunami affecting the entire region was received. On behalf of IAG I offer our deeply felt sympathy to the suffering people in the countries of the region. IAG, as a scientific organization, does not have much to offer to relieve the current situation. Ruth Neilan's end of the year message as director of the IGS Central Bureau indicates, however, that strong links exist to countries and individuals of the region. These links should be fully exploited and if possible improved in order to relieve the situation. This event certainly underlines the importance of the global geodetic infrastructure. Only with such infrastructure it will be possible to keep track of all the local and regional displacements, which took place as a consequence of the earthquake.

Concluding Remarks

From the above report one can conclude that 2004 was a very busy year for IAG, despite the fact that there was neither a General Assembly nor a Scientific Assembly. Nevertheless, many important developments were initiated.

We have every reason to be optimistic regarding the future development of our Association. With this positive undertone I would like to conclude, hoping that you had a Happy Holiday Season. I wish all of you A HAPPY NEW YEAR!

GERHARD BEUTLER
PRESIDENT OF IAG

IUGG Resolution following the great earthquake off the west coast of northern Sumatra

A RESOLUTION of the INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS Adopted by the IUGG Bureau 10 January 2005

Whereas, A magnitude 9 great earthquake that occurred on 26 December 2004 off the west coast of northern Sumatra, South Asia, triggered tsunamis that inundated the coastal zones around the Indian Ocean resulting in tragic and historic loss of life and property;

The International Union of Geodesy and Geophysics (IUGG)

Recognizing, That tsunami warning systems in the Pacific Ocean have proved to be effective over several decades; and

Noting, That existing technology such as Synthetic Aperture Radar Interferometry (InSAR) observations for topography, real-time monitoring of marine activity, satellite observations from space, and natural hazard prediction models (e.g., tsunami propagation models) could prevent loss of life if predictions were timely and warnings were heeded; and

2. That the economic impact of natural disasters exceeds the cost of mitigation; and

3. That in the aftermath of a natural disaster, existing technology could provide rescue agencies and civil defense managers immediate quantitative estimates of the extent and severity of the disaster; and

4. That the reduction of predictive uncertainty is the most important scientific agenda in natural hazards reduction;

Recommends, That systems and procedures be prescribed for early warning, public awareness, regional evacuation routes and shelters based on charts of natural hazards, vulnerability, and risk assessments; and

2. That regional disaster management centers be established where they do not now exist to catalog information on the population and infrastructure at risk, and to monitor land, ocean and atmosphere in relation to all kinds of natural hazards; and

3. That regional tsunami warning systems be set up in order to generate and disseminate timely and accurate information needed by decision makers and the public; and

4. That multidisciplinary and multinational research programs and research networks on geophysical hazards and risks be developed to integrate diverse data streams, to improve understanding of the natural phenomena associated with the disasters, and to develop predictive modeling capability; and

Resolves, To promote the development and application of scientific expertise and experience in modeling and visualization of physical, technological, biological and social processes and their implications to the mitigation of natural disasters; and

2. To share this critical information to the greatest extent possible with government officials, emergency planners, the insurance industry, policy makers, and the public.

WWW.IUGG.ORG

New ILRS Working Group Chairs and Co-Chairs

New ILRS working group coordinators and deputies have been selected following the recent ILRS Governing Board elections in October and discussions held at the board meeting in December:

Working Group

Analysis
Data Formats and Procedures
Missions
Networks and Engineering
Signal Processing

Coordinator

Ron Noomen
Wolfgang Seemueller
Hiroo Kunimori
Georg Kirchner
Graham Appleby

Deputy

Graham Appleby
Randy Ricklefs
Peter Shelus
Ulrich Schreiber

CAREY NOLL
SECRETARY, ILRS CENTRAL BUREAU

Peter Schwintzer died

Peter Schwintzer, 54, Head of Section 'Gravity Field and Earth Models' at GeoForschungsZentrum Potsdam, GFZ, Germany, died unexpectedly on 24 December 2004.

Meeting Announcements

IGAG Sponsored Meetings

International IGeS Geoid School

31 January- 5 February 2005, Budapest, Hungary

The next International IGeS School on "The Determination and Use of the Geoid" will be at Budapest, Hungary. The preliminary program and related information is available at <http://www.iag-aig.org>.

International Symposium on Geodetic Deformation Monitoring - From Geophysical to Engineering Roles

17-19 March, 2005, Jaén (Spain)

The International Symposium on Geodetic Deformation Monitoring: From Geophysical to Geodetic Roles will be held at the University of Jaén (Spain) from 17th to 19th March 2005. The Symposium will be hosted by the Geodesy Research Group of the University of Jaén. For more information please visit the workshop web site at <http://www.ujaen.es/huesped/gdeforma/>.

International Workshop on "Deformation and Gravity Change: Indicators of Isostasy, Tectonics, Volcanism and Climate Change"

1-4 March 2005, Lanzarote, Canary Islands, Spain

The International Workshop on "Deformation and Gravity Change: Indicators of Isostasy, Tectonics, Volcanism and Climate Change" will be held at Casa de los Volcanes (a scientific and cultural meeting place) on Lanzarote, Canary Islands, Spain. Organizers are José Fernández (jose_fernandez@mat.ucm.es) and Detlef Wolf (dasca@gfz-potsdam.de).

EUREF Symposium 2005 Vienna

1-4 June 2005, Vienna, Austria

The next regular EUREF 2005 Symposium will be held in Vienna, Austria, June 1-4, 2005. More detailed information please find updated on the Symposia homepage <http://euref2005.oeaw.ac.at/>.

Dynamic Planet 2005

"Monitoring and Understanding a Dynamic Planet with Geodetic and Oceanographic Tools"

A Joint Assembly of the IAG, IAPSO and IABO

22 - 26 August 2005, Cairns, Australia

Scientists from all countries are invited to participate in this unique conference – a joint assembly of the International Association of Geodesy (IAG), International Association for Physical Sciences of the Oceans (IAPSO), and the International Association for Biological Oceanography (IBO). For further information, please visit the Dynamic Planet website <http://www.dynamicplanet2005.com>.

7th conference on Optical 3-D Measurement Techniques

3-5 October 2005, Vienna, Austria

The 7th conference on "Optical 3-D Measurement Techniques" will be held from October 3-5, 2005 in Vienna, Austria and is co-sponsored by the ISPRS Commission V, the FIG Commission 5 and 6, and the IAG Sub-commission 4.2. The conference website is: <http://info.tuwien.ac.at/ingeo/optical3d/o3d.htm>. The first announcement in pdf format can be downloaded from the conference website at: <http://info.tuwien.ac.at/ingeo/optical3d/o3d1st.pdf>.

IAG Related Meetings

INTERGEO East

7-9 March 2005, Zagreb, Croatia

The second Trade Fair and Conference for geodesy, geoinformation, land management, building industry and environment this year is taking place in Zagreb – Croatia. Please visit <http://www.intergeo-east.com/> for more information.

Munich Satellite Navigation Summit 2005

8-10 March 2005, Munich, Germany

The Munich Satellite Navigation Summit 2005 is the unique conference of invited high-ranking speakers from industry, science and governments. In 2005 the main focus will be on the worldwide co-operation in satellite navigation. What are the new possibilities of GPS and Galileo which can be established after the EU-US Agreement and what is the main impact for the application of satellite navigation, in combination with telecommunications and geo-information technology. The webpage of the conference is <http://www.munich-satellite-navigation-summit.org/index2.htm>.

The 2nd International Specialized Forum GeoForm+

14-17 March 2005, Moscow, Russia

The major Geo event on Russian market. The forum unites four exhibitions: GeoMap - Geodesy, cartography, geoinformation and control systems, navigation; GeoTech - Technologies and equipment for exploring natural resources; GeoTunnel - Technologies and equipment for tunnel construction; GeoMineral - Industrial Minerals - mining, extracting, preparation, recycling. The conference website can be reached at the following address: <http://www.geoexpo.ru/defaulteng.stm>.

EGU General Assembly

24-29 April 2005, Vienna, Austria

The General Assembly of the European Geosciences Union (EGU) is held at the Austria Center Vienna (ACV) in Vienna, Austria, from 24 - 29 April 2005. The assembly is open to the scientists of all nations. The scientific programme of the General Assembly includes Union Symposia, Oral and Poster Sessions on disciplinary and interdisciplinary topics covering the full spectrum of the geosciences and the space and planetary sciences. The conference website can be reached at the following address: <http://www.copernicus.org/EGU/ga/egu05/index.htm>.

AOGS 2nd Annual Meeting 2005

20-24 June 2005, Suntec, Singapore

The Asia Oceania Geosciences Society (AOGS) will hold its 2nd Meeting on 20 to 24 June, 2005 at the Singapore Suntec City Convention Centre. In all, over 100 sessions in Solid Earth, Solar Terrestrial, Planetary Science, Hydrological Science, Oceans & Atmospheres and Interdisciplinary Working Groups. Additionally, nearly all sections have an Open Category for garnering submissions of its own class. For more details please visit <http://www.asiaoceania-conference.org/>.

IAMAS 2005

2-11 August 2005, Beijing, China

The International Association of Meteorology and Atmospheric Sciences (IAMAS), will hold its biennial Scientific Assembly in Beijing, China from 2-11 August 2005. The theme of the conference is The Fascinating Atmosphere: Changeable and Changing, and will cover all areas of meteorology and atmospheric sciences, including dynamics, radiation, chemistry, electricity, clouds and precipitation, and climate variability and change. Further details can be found on the IAMAS 2005 web site <http://www.iamas2005.com>.

12th International Symposium on Deformation Measurement

12-15 September 2005, Qingdao, China

You are cordially invited to the 12th International Symposium on Deformation Measurements organized by Commission 6 of the International Federation of Surveyors (FIG) to be held in Qingdao, China, 12-15 September 2005. Please visit the conference website for further information: <http://www.fig.net/isdm12>.

4th Congress of the Balkan Geophysical Society

9-12 October 2005, Bucharest, Romania

The International Conference and Exhibition "Geophysics Without Frontiers" is organized and hosted by the Romanian Society of Geophysics in cooperation with EAGE, SEG, EGU and AGU, under the auspices of the IUGG. The Congress focuses the attention of the whole community of geophysicists on Balkans. The conference webpage is www.bgs-bucharest2005.ro.

IAG Sister Societies' General Assemblies

FIG Working Week and GSDI-8 – "From Pharaohs to Geoinformatics"

16-21 April 2005, Cairo, Egypt

Read more about technical and social programme, pre-conference workshops etc. at <http://www.fig.net/cairo>. The event is organized together with GSDI-8. Please visit the web site also for pre-conference workshops like the "Virtual Academy and the Surveying/Geoinformatics Community" to be held April 16, 2005.

ICC2005 Conference

9-16 July 2005, A Coruña, Spain

The XXII International Cartographic Conference (ICC) is the most important event in the International Cartographic Association (ICA) calendar. Please visit <http://www.icc2005.org> for details.

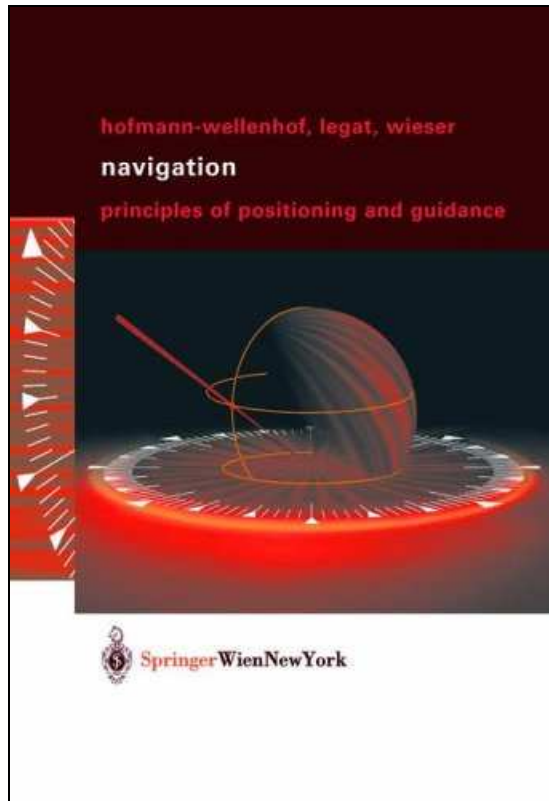
ISPRS Workshop Laser scanning 2005

12-14 September 2005, Enschede, the Netherlands

The workshop, held at the ITC in Enschede, will bring together an interdisciplinary group of researchers, system developers, data providers and end users to discuss and demonstrate recent developments in laser scanner data processing, the potential of the technique and future trends in sensorics and data processing. Further information on the workshop can be obtained from <http://www.itc.nl/isprswgIII-3/laserscanning2005/>.

Book Review

B. Hofmann-Wellenhof, K. Legat, M. Wieser: Navigation



Title: Navigation
Principles of Positioning and Guidance
Authors: Hofmann-Wellenhof, B., Legat, K., Wieser, M.
Publisher: Springer Verlag, Wien New York
ISBN: 3-211-00828-4
Year: 2003
Price: EUR 54,00
Pages: xxix, 427 pages. 99 figures
Details: softcover

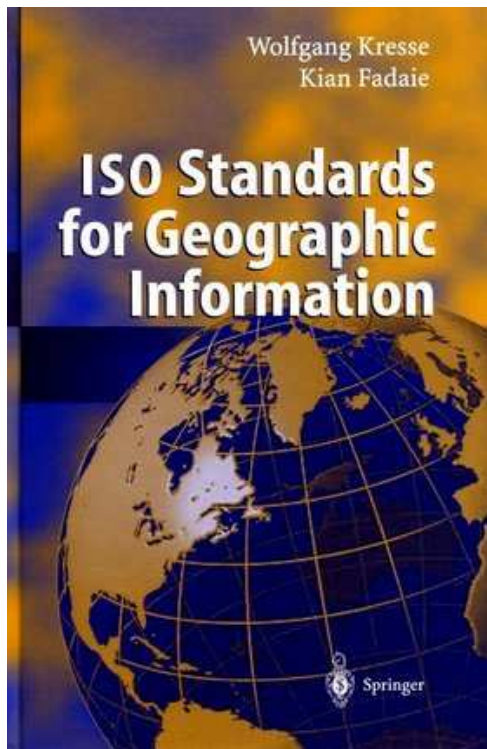
When thinking casually about navigation, one might imagine the adventures of historic seafaring explorers or the modern routing of commercial aircraft and ships, or even the newest recreational novelties in fishing and hiking. This book covers these and much, much more, opening a panorama of navigation not readily envisioned by the ordinary layman. Even the navigation-savvy engineers and practitioners doubtlessly will learn something from this book. The authors describe it best, as “encyclopedic”, touching on every aspect of navigation, from its historical beginnings and current conventional sensor technologies to the complexities of route planning, image-based methods, and traffic management. By reading this book, one obtains an awe-inspiring appreciation for the breadth of techniques and applications that navigation encompasses today. The authors apologize for presenting the material from a “geodetic viewpoint”, being themselves well-known geodesists, but this reviewer (also a geodesist) sees a clear advantage of this perspective since it enables and permits a blending of geodetic principles and techniques in positioning with modern sensor technologies that broadens the field of navigation beyond the classical treatments. Indeed, with the newest imaging sensors and integrated sensor suites, navigation in the past decade has taken an evolutionary leap comparable to the advancements during and immediately after World War II with the invention of accurate gyroscopes and accelerometers, or radio navigation techniques later on.

The book with 16 chapters may be viewed as comprising four relatively distinct navigation parts. The first includes an introduction followed by a review of historical navigation techniques, mathematical background material, and electromagnetic waves. The second concentrates on classical navigation methods using celestial observations and radio systems. A complete review of instrumentation for ranging and direction finding and developed systems (such as Loran-C and aircraft instrument landing systems) precedes a fairly extensive review of GPS and other satellite navigation systems (the Russian GLONASS and the upcoming European Galileo system). Autonomous navigation is also covered with a much more mathematical treatment of inertial navigation using accelerometers and gyros. The third distinguishable part of the book concerns image-based navigation. Unfortunately, the actual navigation aspects of optical and multi-spectral imaging are treated only briefly while image analysis, such as photogrammetry, and feature extraction, computer vision, and sensor technology form the core of this well-written chapter. The fourth essential part deals with the fairly complex topic of routing and guidance. Though classically considered distinct from navigation, the authors define guidance as a subset of navigation because its applications have extended far beyond the military connotations of the past. In particular, routing is intimately connected with graph theory and the traveling salesman problem where trajectories are constrained by specific connected paths (roads, as opposed to open ocean or skies). Interspersed among these four areas of emphasis are chapters and sections on maps with an emphasis on digital mapping processes, Kalman filtering, augmented and integrated systems, and traffic and vehicle management. The last chapter of the book contains many additional examples, which might have found a better home in the preceding chapters, but nevertheless underscore the breadth of applications that navigation systems have expanded into and the complexity of the systems that provide the answer to the questions “where am I?” and “how do I get from here to there?” in an ever increasing spectrum of scales and environments.

On the whole the book is replete with facts, definitions, classifications, methodologies, system descriptions, and concepts all related to navigation, attesting to its encyclopedic characterization – one would be challenged to find a missing element. It suffers a bit from this factuality for the reader who is interested in a more analytical development from first principles or a deeper exposition beyond mere descriptive informational content. As presented, facts and descriptions sometimes presume some basic specialized knowledge (for example, the Doppler effect, often invoked, is never fundamentally explained using physical principles), and the text relies heavily on references to other literature where the mathematical or analytical details are more fully developed. The prose, by authors whose native tongue is not English, generally lapses into the passive voice, which makes the reading less engaging than it might otherwise be. But for the novice who would like to obtain a solid appreciation for the modern field of navigation and the expert who needs to be reminded of the vastness and the new opportunities in this rapidly evolving discipline, this book is definitely worth adding to their respective libraries.

CHRIS JEKELI

Wolfgang Kresse and Kian Fadaie: ISO Standards for Geographic Information



Title: ISO Standards for Geographic Information
Authors: Wolfgang Kresse and Kian Fadaie
Publisher: Springer - Berlin/Heidelberg/New York
ISBN: 3-540-20130-0
Year: 2004
Price: 129.00 USD (approx. 97 EUR)
Pages: xi + 322
Size: 16 cm x 24 cm
Details: hard cover

Everybody recognizes that standards have become more and more essential in our life and the way led from traditional fields over the information technologies to the world of geographic information.

The Technical Committee 211 *Geographic information / Geomatics* (TC211) of the International Standardization Organisation (ISO) is developing the ISO 19100 family of geographic information standards (more than 40 standards or technical reports).

This book serves as compact introduction to the geographic information standardization and mainly addresses

- technical Geographic Information Systems (GIS) experts
- implementers of standardized GIS solutions and
- a better understanding of GIS backgrounds.

The book gives an overview of this standard family.

The authors Dr. Wolfgang Kresse (Professor for GIS and photogrammetry at the University of Applied Sciences in Neubrandenburg, Germany) and Dr. Kian Fadaie (Natural Resources Canada, Ottawa, ON, Canada) are intensively involved in the ISO/TC211 standardization process.

The book is well structured both in chapters and in text completed by significant tables and figures.

After a short introduction the authors review in chapter 1 (24 pages) the basics of standards. An overview of standards with more relevance for geographic information and of the work of ISO/TC211 follows in chapter 2 (28 pages).

The main chapters 3 (70 pages) and 4 (60 pages) deal with the specific standards - the non-geometry and geometry standards.

Chapter 3 starts with explanations of information technology background and is followed by a description of the non-geometry standards (infrastructure standards, basic standards, imagery standards, catalogue standards, implementation standards). Chapter 4 explains details of the geometry-oriented ISO 19100 standards (relations between the geometry standards, positions, spatial schema, simple features, schema for coverage geometry and functions, Geography Markup Language - *GML*).

The remaining chapter 5 (28 pages) and chapter 6 (4 pages) are devoted to the so called liaison members (e.g. the Open Geospatial Consortium - OGC) and to a short description of two applications (Canadian GIS industry and the German cadastral and topographic information systems). Annexes (bibliography, terms and definitions of the ISO 19100 standards, ISO 19115 Metadata package data dictionaries, Extensible Markup Language (XML), abbreviations, class names, past and planned meetings) and an index complete the book.

Because GIS are related to the Earth an exact modelling of the referencing by (geodetic) coordinates and there transformations are very important.

From the geodetic point of view the standard ISO 19111 *Spatial referencing by coordinates* and the technical report ISO 19127 *Geodetic codes and parameters* are the most interesting ones.

The ISO 19111 *Spatial referencing by coordinates* models coordinate reference systems (CRS) and coordinate transformations for the ISO geographic information standards.

For a better understanding some CRS phrases from the ISO 19111 are cited:

A coordinate reference system is defined by one [geodetic, vertical or engineering] datum and by one [mathematical] coordinate system.

A geodetic datum gives the relationship of a coordinate system to the Earth and is used as the basis for two- or three-dimensional systems. In most cases it shall require an ellipsoid definition. A vertical datum gives the relationship of gravity-related heights to a surface known as the geoid. The geoid is a surface close to mean sea level.

A coordinate system defines the name, the units, the direction and sequence of the axes. Coordinates in a set are listed according to this sequence.

The horizontal and vertical components of a description of position in three dimensions may sometimes come from different coordinate reference systems rather than through a single 3D coordinate reference system. This is always the case for positions where vertical coordinates are related to sea level. This shall be handled through a compound coordinate reference system (CCRS) which identifies the two coordinate reference systems utilized, ...

Examples for CRS (like World Geodetic System 84), projected CRS (NAD83/Alabama East) or compound CRS (European Vertical Reference Network *EUVN*: European Terrestrial Reference System *ETRS89* + European Vertical Reference System *EVR*S) are listed.

The two different kinds of changing the coordinates from a source CRS into a target CRS (with the same or with different datums) are presented.

The ISO 19127 *Geodetic codes and parameters* bridges the gap between the abstract frame of ISO 19111 (it doesn't standardize a specific CRS) and a practical GIS usage. This practical description will be managed by a so-called register (in correspondence to ISO 19135 *Procedures for registration of geographical information items* - section 3.4.1).

This book fills a existing gap in the GIS standardization literature and leads to a better understanding of these *boring seeming* topics and it's a good introduction into this closed standardization world.

ERHARD PROSS
BUNDESAMT FÜR KARTOGRAPHIE UND GEODÄSIE
LEIPZIG, GERMANY

Art Stolz: An Introduction to Geodesy, 2nd Edition

Title: An Introduction to Geodesy, 2nd Edition
Author: Art Stolz
Publisher: School of Surveying and Spatial Information Systems, The University of New South Wales,
UNSW SYDNEY NSW 2052, Australia
ISBN: 0-7334-1736-1
Year: 2001

Price: Australia AUS\$ 24.50 (incl. GST), overseas AUS\$ 22.00 plus AUS\$ 11.00 for handling and postage (per order)
Pages: 142
Size : 18 x 26 cm
Details: soft cover

As indicated in the title, the booklet gives an introduction to Geodesy. This requires a careful selection of topics and a restriction to the basic principles of Geodesy. As mentioned in the preface, the book is designed for First Year students who know nothing about the subject and should get a first impression of the task of Geodesy and its various applications. The book is divided in seven main sections. Each section is concluded by a list of references to the specific topic and some exercises.

The first section gives a short introduction to the definition of geodesy and its historical development, its relation to other sciences and to its various applications. The situation of geodesy in Australia is sketched in a separate paragraph. The second section gives an introduction to the Earth's gravity field and its fundamental concepts as Newton's law of attraction and the representation of the gravity field by level surfaces and plumb-lines. The normal gravity is introduced as an approximation of the gravity field. Then the concepts of geoid undulations and its computation by the Stokes' formula are explained as well as the deflections of the vertical and its determination based on the disturbing potential. A section follows with the variation of the gravity field with height and position on the Earth. The mathematical approximation by spherical harmonics is shortly illustrated. The third section is dedicated to the topic of time. Time keeping and time scales are treated in rather detail on more than ten pages. The motion of artificial satellites is explained in detail in the fourth section. The section starts with Kepler's famous three laws followed by a short discussion of the two-body problem. The motion along an ellipsoidal orbit is derived in detail as well as the motion of the satellite in space. The section concludes with an introduction of the perturbation theory with a detailed explanation of the secular perturbations caused by the second zonal harmonic. In the fifth section coordinates and coordinate systems are discussed. The section starts with an overview of the relevant curvilinear coordinate types such as cylindrical and spherical coordinates. The ellipsoidal or geodetic coordinates are dealt with in some details. The natural coordinates, here identified also as geographical coordinates, are mentioned in this context as well. After explaining the basic constituents of reference systems such as origin, fundamental plane and principal direction, the two fundamental reference coordinate systems, the space-fixed and Earth-fixed reference systems and their relations to a geodetic datum are treated. A sub-section contains the transformations between space- and Earth-fixed reference systems as well as the transformation between different Earth-fixed reference systems. The sixth chapter covers the terrestrial geodetic methods, subdivided in horizontal and vertical control surveys, as well as a short introduction into the measurement of gravity. In the first sub-section on horizontal networks the concepts of triangulation, trilateration and traverse surveys are introduced with the important local and global astronomical coordinates and in a second sub-section the concepts of geopotential heights, height systems and vertical datum systems. This chapter is concluded by some remarks on terrestrial geodetic computations. The seventh and last chapter is dedicated to the space geodetic methods, with an overview on satellite laser ranging, very long baseline interferometry, satellite radar altimetry and a short introduction into the global positioning system with some remarks on three-dimensional geodesy and the modern techniques of GPS-levelling.

The booklet is a nice introduction into the subject of geodesy; it is well organized with a list of references after every main chapter and a selection of questions and exercises where the students can control themselves. It is a very helpful introduction for those who just want to get a quick impression on the main aspects of geodesy. It is a natural fact that these introductory texts are very subjective with respect to the selection of topics and details but also with respect to the choice of references for further studies. Some topics of the booklet seem to be unbalanced: while the chapter on time is treated in rather details, some important facts of physical geodesy are missing at all or treated very shortly. The lists of references are not up to date, some of them refer to older editions and do not seem to be properly selected because of restricted accessibility. The references in the introductory section 1.6 include important text books as those by Torge (but again as an old edition) and Vanicek/Krakiwsky but those by Kaula, a classical booklet on satellite geodesy, or the standard text book by Moritz/Heiskanen on Physical Geodesy is missing in this first list of references. Furthermore, it would be helpful, especially for the beginner, if the references were classified as introductory texts and more advanced ones. The lack of timeliness is the main point of criticism: modern concepts such as the new gravity satellite missions CHAMP and GRACE and their amazing results achieved so far, including the possibility to derive the temporal variations of the gravity field are not mentioned at all. Nevertheless, the booklet on "An Introduction to Geodesy" by A. Stolz can be recommended for those who want to get a very first impression on the various aspects of geodesy. It remains to be hoped that this nice booklet will be updated to the modern state-of-the-art in the next edition.

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