



## Contents

|   |           |
|---|-----------|
| <b>General Announcements.....</b>   | <b>3</b>  |
| Summary of the IAG General Assembly 2011 during the IUGG General Assembly 2011 .....  | 3         |
| Call for Participation for the "Global Geodetic Core Network: Foundation for Monitoring Earth System" .....                     | 4         |
| <b>Meeting Announcements .....</b>  | <b>5</b>  |
| Modern Height Reference Systems at AGU Fall Meeting 2011 .....  | 5         |
| <b>IAG Sponsored Meetings .....</b>   | <b>5</b>  |
| 3rd International Colloquium - Scientific and Fundamental Aspects of the Galileo Programme .....                                | 5         |
| Joint International Symposium on Deformation Monitoring .....   | 5         |
| <b>IAG Related Meetings .....</b>   | <b>5</b>  |
| ISDE7.....  | 5         |
| Unified Analysis Workshop .....   | 6         |
| Journées 'Systèmes de référence spatio-temporels' 2011 .....  | 6         |
| SMOS Science Workshop.....  | 6         |
| Intergeo 2011 .....   | 6         |
| ISPRS - PIA11 Photogrammetric Images Analysis.....  | 6         |
| IRI Workshop 2011 .....   | 6         |
| 5 <sup>th</sup> Coastal Altimetry Workshop.....   | 6         |
| SX5 - Scientific Service Support Based on Galileo E5 Receivers.....   | 6         |
| OSTST Meeting.....  | 6         |
| Modern Technologies, Education & Professional Practice in Geodesy and Related Fields.....                                       | 6         |
| 10th International E-VLBI Workshop .....  | 6         |
| UGI 2011 Regional Geographic Conference.....  | 6         |
| AGU Fall Meeting.....   | 6         |
| 2 <sup>nd</sup> International School on Least Squares Approach to Modeling the Geoid .....                                      | 6         |
| <b>Reports.....</b>   | <b>7</b>  |
| SIRGAS 2011 General Meeting and Third IAG-PAIGH-SIRGAS School on Reference Systems.....   | 7         |
| GNSS Radio Occultation and Reflectometry – International Workshop on GNSS Remote Sensing for Future Missions and Sciences ..... | 8         |
| <b>Book Review.....</b>   | <b>10</b> |
| Larrie D. Ferreiro: Measure of the Earth: The Enlightenment Expedition that Reshaped Our World .....                            | 10        |

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:

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## General Announcements

### Summary of the IAG General Assembly 2011 during the IUGG General Assembly 2011

The General Assembly of the International Association of Geodesy took place from 27 June to 8 July 2011 in the Melbourne Convention Centre, Australia. The IAG scientific symposia proceeded from 29 June to 6 July 2011; during the days before and after, there were meetings of the IAG Executive Committee and Council. More than 3500 participants registered for the IUGG General Assembly, approximately 400 participated in the IAG General Assembly.

IAG organized 14 symposia (1 Union Symposium, 6 Joint Symposia, and 7 IAG Symposia) and co-sponsored other 15 symposia (8 Union Symposia and 7 Joint Symposia). In addition, 19 business meetings of IAG components (Commissions, Services) and sub-components (Projects, Study and Working Groups) were held. The proceedings with the accepted papers will be published in the IAG Symposia Series, Springer-Verlag.

During the IAG Opening Session on 29 July, the three IAG Awards were presented:

- *Levallois Medal* for distinguished service to IAG and/or geodesy in general to *Ruth Neilan*, JPL Pasadena, USA, for her international service related to the geodetic and geophysical applications of the Global Positioning System (GPS).
- *Guy Bomford Prize* for outstanding contributions to geodetic studies to Johannes Boehm, Institut für Geodäsie und Geophysik, TU Wien, Austria, for his outstanding contributions to geodetic studies of atmospheric effects on microwave measurements (VLBI, GNSS, DORIS).
- *Young Authors Award* for important contributions in the Journal of Geodesy to Elizabeth Petrie, Civil Engineering and Geosciences, Newcastle University, UK, for her paper "A first look at the effects of ionospheric signal bending on a globally processed GPS network" published in Journal of Geodesy, Vol. 84, 491-499, 2010.



Handing-over of the Levallois Medal by Gerhard Beutler to Ruth Neilan



Guy Bomford Prize awardee Johannes Böhm



Young Authors awardee Liz Petrie

The new IAG Executive Committee had been elected partly by e-mail vote of the IAG Council before the General Assembly and was complete during the Melbourne meeting. The officers for the period 2011 – 2015 are:

|                      |                                      |
|----------------------|--------------------------------------|
| IAG President:       | <i>Chris Rizos (Australia)</i>       |
| IAG Vice President:  | <i>Harald Schuh (Austria)</i>        |
| Secretary General:   | <i>Hermann Drewes (Germany)</i>      |
| Past President:      | <i>Michael G. Sideris (Canada)</i>   |
| Commission 1 Pres.:  | <i>Tonie van Dam (Luxembourg)</i>    |
| Commission 2 Pres.:  | <i>Urs Marti (Switzerland)</i>       |
| Commission 3 Pres.:  | <i>Richard Gross (USA)</i>           |
| Commission 4 Pres.:  | <i>Dorota Brzezinska (USA)</i>       |
| Services Represent.: | <i>Riccardo Barzaghi (Italy)</i>     |
|                      | <i>Tom Herring (USA)</i>             |
|                      | <i>Ruth Neilan (USA)</i>             |
| GGOS Chair:          | <i>Hansjoerg Kutterer (Germany)</i>  |
| COB President:       | <i>József Ádám (Hungary)</i>         |
| Members at Large:    | <i>Claudio Brunini (Argentina)</i>   |
|                      | <i>Richard Wonnacott (S. Africa)</i> |

ICCT President: *Nico Sneeuw (Germany)*  
JoG Editor in Chief: *Roland Klees (The Netherlands)*

The Executive Committee 2007-2011 met four times in Melbourne. Major topics were the reports of the IAG components and the appointments of officers. The new Executive Committee 2011-2015 met for its constituting meeting on 7 July 2011. All the meeting summaries will be published in the IAG Homepage. The Council met twice with the major topics of reviewing the election process, auditing the IAG financial result 2007-2011, approving the budget 2011-2015, approving the IAG Resolutions, and selecting the venue of the IAG Scientific Assembly 2013.

Two IAG resolutions were approved:

1. Urging international and national institutions, agencies and governmental bodies in charge of supporting Earth science research to make all efforts in implementing new gravity field satellite missions.
2. Recommending that the new realization of the International Celestial Reference Frame (ICRF2) should be used as a standard for all future applications in geodesy and astrometry.

The next IAG Scientific Assembly was elected to be held in 2013 in the city of Potsdam (with activities in Berlin) on the occasion of the 150<sup>th</sup> anniversary of IAG, which was founded as the "Mitteleuropäische Gradmessung" in 1862 and held its first General Conference 1864 in Berlin. The Scientific Assembly will be held as the celebration of this anniversary, probably in September 2013.

A detailed report of the IAG General Assembly and the description of the new structure of IAG for the period 2011 – 2015 will be published in the Geodesist's Handbook 2012 as a special issue of the Journal of Geodesy. The reports of the IAG components (Travaux de l'AIG) and the national reports presented by several countries are available in the IAG Homepage.

HERMANN DREWES  
IAG Secretary General

### *Call for Participation for the "Global Geodetic Core Network: Foundation for Monitoring Earth System"*

Dear Colleagues:

The Call for Participation for the "Global Geodetic Core Network: Foundation for Monitoring Earth System" is available [here](#).

The Global Geodetic Observing System (GGOS) is soliciting proposals for the Core Network Sites to define and improve the Terrestrial Reference Frame and provide essential data for other space geodesy requirements.

We seek proposals from organizations that would participate in the development, implementation and maintenance of the GGOS Global Geodetic Core Network. We seek proposals from:

1. Organizations that currently operate a space geodetic site and would implement and operate one or more core sites including:
  - a. existing sites that already have the four techniques implemented and plan for upgrade to the next generation systems;
  - b. existing sites that have one or more techniques operational and are planning for upgrade to the next generation systems and for the implementation of additional techniques;
2. Organizations that would actively participate with the GGOS Bureau for Networks and Communications in the network design and planning activity with analysis, simulations, and site research (geology, weather, logistics, personnel, etc);
3. Organization that would help design and develop the inter-technique vector systems and operational procedures;
4. Organizations that have no operational space geodetic systems, but would implement and operate core sites;
5. Organizations that have space geodetic instruments or are developing space geodetic instruments which they are willing to relocate to a GGOS Global Geodetic Core Site in cooperation with a local organization.

Many of the sites will require cooperative arrangements to fulfill the core network site requirements (site, logistics, communications, full systems, hardware components, etc.). We encourage preformed teams to propose to implement/upgrade and operate these sites.

The implementation of this network will be very challenging. We encourage as many organizations as possible to participate.

Proposals are short and are due by **November 15, 2011**.

If you have any questions, please contact me at [mpearlman@cfa.harvard.edu](mailto:mpearlman@cfa.harvard.edu)

With best regards,

MIKE PEARLMAN  
Director, GGOS Bureau for Networks and Communications

## Meeting Announcements

### *Modern Height Reference Systems at AGU Fall Meeting 2011*

The upcoming AGU Fall meeting, 5-9 December 2011, includes the Session G12: Modern Height Reference Systems. Please consider contributing to this important topic. The deadline for abstract submission is **4 August 2011**. The Session Description follows. See also: <http://sites.agu.org/fallmeeting/scientific-program/session-search/313>.

Description: Hurricanes, earthquakes, and tsunamis wreak havoc with the geodetic control needed to re-build, assess damage, and mitigate the destruction from future events. Other natural and anthropogenic surface deformations demand frequent updates in control. Rapidly re-establishing vertical control relative to the geoid requires an accurate gravity model. Ongoing infrastructure modernization in the U.S. and worldwide is challenged by these problems at the cm level. The focus is on new methods to define, realize, and maintain precision in vertical datums, including new paradigms that eliminate tide gauge references, and that address the needs for civil and scientific applications. Datum unification and continuity with previous definitions are additional topics of interest.

CHRISTOPHER JEKELI

### *IAG Sponsored Meetings*

#### *3rd International Colloquium - Scientific and Fundamental Aspects of the Galileo Programme*

*August 31 - September 2, 2011 in Copenhagen, Denmark*

More information and online abstract submission is available on the Colloquium web site: <http://www.congrex.nl/11A12/>.

#### *Joint International Symposium on Deformation Monitoring*

*November 2-4, 2011, Hong Kong, China*

URL: <http://dma.lsgi.polyu.edu.hk/>

### *IAG Related Meetings*

#### *ISDE7*

*August 23-25, 2011, Perth, Australia*

The 7th International Symposium on Digital Earth (ISDE7) with the theme of the Knowledge Generation will be held in Perth, Australia from 23-25, August 2011 in conjunction with the Western Australian Land Information System (WALIS) Forum and the State Natural Resources Management (NRM) Conference.

URL: <http://www.isde7.net/>

### Unified Analysis Workshop

September 16-17, 2011, Zurich, Switzerland

URL: <http://iag.dgfi.badw.de/index.php?id=291>

### Journées 'Systèmes de référence spatio-temporels' 2011

September 19-21, 2011, Vienna, Austria

URL: <http://info.tuwien.ac.at/hg/meetings/journees11/index.html>

### SMOS Science Workshop

September 27-29, 2011, Arles, France

URL: <http://www.smos2011.org/>

### Intergeo 2011

September 27-29, 2011, Nürnberg, Germany

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

### ISPRS - PIA11 Photogrammetric Images Analysis

October 5-7, 2011, Munich, Germany

URL: <http://www.pia11.tum.de/>

### IRI Workshop 2011

October 10-14, 2011, Hermanus, South Africa

URL: <http://iri2011.hmo.ac.za/>

### 5<sup>th</sup> Coastal Altimetry Workshop

October 16-18, 2011, San Diego, USA

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

### SX5 - Scientific Service Support Based on Galileo E5 Receivers

October 18, 2011, Neubiberg/Munich, Germany

URL: <http://ifn.bauw.unibw.de/sx5/workshop.html>

### OSTST Meeting

October 19-21, 2011, San Diego, USA

URL: <http://www.aviso.oceanobs.com/en/courses/sci-teams/index.html>

### Modern Technologies, Education & Professional Practice in Geodesy and Related Fields

November 10-11, 2011, Sofia, Bulgaria

Contact: [milev@bas.bg](mailto:milev@bas.bg)

### 10th International E-VLBI Workshop

November 13-16, 2011, Broederstroom, South Africa

URL: <http://www.hartrao.ac.za/e-vlbi2011/e-vlbi2011.html>

### UGI 2011 Regional Geographic Conference

November 14-18, 2011, Santiago, Chile

URL: <http://www.ugi2011.cl/>

### AGU Fall Meeting

December 5-9, 2011, San Francisco, USA

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

### 2<sup>nd</sup> International School on Least Squares Approach to Modeling the Geoid

February 27- March 2, 2012, Johor Bahru, Malaysia

Theoretical lectures in the mornings are followed by practical computer exercises in the afternoons.

URL: <http://www.infra.kth.se/geo/events/IGS-2012.pdf>

## Reports

### *SIRGAS 2011 General Meeting and Third IAG-PAIGH-SIRGAS School on Reference Systems Heredia, Costa Rica, August 3 – 10, 2011*

SIRGAS (Sistema de Referencia Geocéntrico para las Américas) is the Sub-commission 1.3b (Regional Reference Frame for South and Central America) of the International Association of Geodesy (IAG) and a Working Group of the Cartographic Commission of the Pan American Institute for Geography and History (PAIGH). The integration in IAG provides scientific and technical guidance; the interaction with PAIGH guarantees access to the particular necessities of non-geodetic specialists requiring coordinates of high-precision in the Americas.

The main objectives of SIRGAS are the definition, realization and maintenance of the geocentric reference system for Latin America and the Caribbean, including a gravity field-related vertical reference system. The SIRGAS activities are coordinated by three Working Groups: WG1 (Reference System) is concentrating on the maintenance of the SIRGAS reference frame, which at present is composed by about 250 continuously operating GNSS stations. WG2 (SIRGAS at national level) is in charge of supporting the activities oriented to extending, adopting and using the SIRGAS reference frame in the different SIRGAS member countries, which at present are 18. WG3 (Vertical Datum) deals with the definition and realization of a unified vertical reference system that supports the determination and combination of geometrical and physical heights with high precision.

Activities, advances, and new challenges of SIRGAS are reported, discussed, and re-oriented (if necessary) in the SIRGAS yearly meetings, which have been realized since 1993. The SIRGAS 2011 General Meeting was held in Heredia, Costa Rica, between August 8 and 10, 2011. In the week before, from August 3 to 5, the Third IAG-PAIGH-SIRGAS School on Reference Systems took place. The SIRGAS meeting and the School were hosted by the Escuela de Topografía, Catastro y Geodesia of the Universidad Nacional (ETCG-UNA).



Participants of the SIRGAS 2011 General Meeting and Third IAG-PAIGH-SIRGAS School on Reference Frames (Heredia, Costa Rica. August 3 – 10, 2011)

The School was attended by 116 participants from 17 countries. It covered the themes:

- Types of coordinates, their definitions, relations and transformations;
- Geodetic reference systems and frames (ICRS/ICRF, ITRS/ITRF, EOP, regional and national densifications of ITRF);
- Determination of precise coordinates (station positions and velocities) using GNSS techniques, including network adjustment and alignment to ITRF;

- Vertical reference systems (geometrical and physical heights, reference surfaces, unification of heights systems);
- Definition, realization, and use of SIRGAS in practice and science.

The SIRGAS Meeting was attended by 144 participants and comprised 55 oral presentations distributed in the following sessions:

- Towards a unified vertical datum for the SIRGAS region;
- National advances within SIRGAS;
- Analysis of the SIRGAS reference frame;
- Impact of seismic events on the SIRGAS reference frame;
- SIRGAS in real time;
- Atmospheric analysis based on the SIRGAS infrastructure.

In the frame of the SIRGAS meeting, a General Assembly of the SIRGAS Directing Council was carried out. This is the main body of SIRGAS and defines the official policies and recommendations of SIRGAS. It is composed by one representative of each member country, one of IAG and one of PAIGH. According to the bylaws, it meets every four years (in the same year as the General Assembly of the IUGG) to elect the SIRGAS authorities, which correspond to the SIRGAS President and Vice-president. In this opportunity, Claudio Brunini (Universidad Nacional de la Plata, Argentina) and Laura Sánchez (Deutsches Geodätisches Forschungsinstitut, Germany) were re-elected for a second term, from 2011 to 2015.

The report of the SIRGAS-President and Vice-president for the previous term (2007-2011), the planned activities for the new period (2011-2015), and the presentations, extended abstracts, and main conclusions of the SIRGAS 2011 General Meeting are described in the SIRGAS Newsletter No. 16, which is available at the SIRGAS web site ([www.sirgas.org](http://www.sirgas.org)).

Thanks to the unconditional and generous backing of IAG and PAIGH, it was possible to provide 20 participants from 11 countries with partial travel grants. SIRGAS deeply acknowledges this support.

CLAUDIO BRUNINI  
SIRGAS President

LAURA SÁNCHEZ  
SIRGAS Vice-president

*GNSS Radio Occultation and Reflectometry – International Workshop on GNSS Remote Sensing for Future Missions and Sciences  
Shanghai, China, 7-9 August 2011*





The Global Navigation Satellite System (GNSS) has been widely used in navigation, positioning and geoscience applications. Recently, the versatility of GNSS as a new remote sensing tool has been demonstrated with the use of refracted, reflected and scattered GNSS signals to sound the atmosphere and ionosphere, ocean, land surfaces (including soil moisture) and the cryosphere. The GPS Radio Occultation (RO) missions, e.g., the US/Argentina SAC-C, German CHAMP (CHALLENGING Minisatellite Payload), US/Germany GRACE (Gravity Recovery and Climate Experiment), Taiwan/US FORMOSAT-3/COSMIC (FORMOSA SATellite mission - 3/Constellation Observing System for Meteorology, Ionosphere and Climate) satellites, the German TerraSAR-X satellites and the European MetOp, together with ground-based GNSS observations have provided high resolution and precise information on tropospheric water vapor, pressure, temperature, tropopause parameters, ionospheric TEC and electron density profiles. The GNSS reflected signals from the ocean and land surface can determine the ocean height, wind speed and wind direction of ocean surface, soil moisture, ice and snow thickness. With the improvement expected due to the next generation multi-frequency GNSS systems and receivers, and new space-based instruments tracking GNSS reflected and refracted signals, new scientific applications of GNSS are expected in the near future across a number of environmental remote sensing fields.

The current status and future developments of GNSS Radio Occultation and Reflectometry were recently discussed at the International Workshop on “GNSS Remote Sensing for Future Missions and Sciences”, that attracted about 100 international scientists from 20 countries to Shanghai, China, during August 7-9, 2011. The objectives of the workshop held at the Shanghai Astronomical Observatory were to: (1) assess our current capabilities in GNSS Radio Occultation and Reflectometry, (2) present recent results in GNSS atmospheric sounding and reflectometry, (3) discuss future developments and challenges in GNSS Radio Occultation and Reflectometry, and (4) explore new collaboration opportunities through, for example, joint nanosatellite experiments and GNSS refractometry, reflectometry and scatterometry mission concepts, such as the proposed CICERO (Community Initiative for Continuing Earth Radio Occultation) satellite mission ([http://geooptics.com/?page\\_id=58](http://geooptics.com/?page_id=58)).

In the near future, with increasing numbers of global permanent GNSS stations and denser GNSS constellations (such as GPS, GLONASS, Galileo, Beidou/COMPASS, QZSS and IRNSS), as well as more space-borne GPS reflectometry and refractometry missions (e.g., follow-on FORMOSAT-7/COSMIC-2 mission, CICERO and TechDemoSat-1), it will be possible to measure environmental parameters using GNSS Radio Occultation and Reflectometry techniques with unprecedented time and spatial resolution and accuracy. Such a tool will revolutionize atmospheric sounding and weather studies, ocean remote sensing and land/hydrology mapping. This workshop was a successful beginning and has taken us one step closer to the goal of establishing an operational service for the benefit of the international community.

More information about the workshop is available at <http://www.shao.ac.cn/GNSS/>.

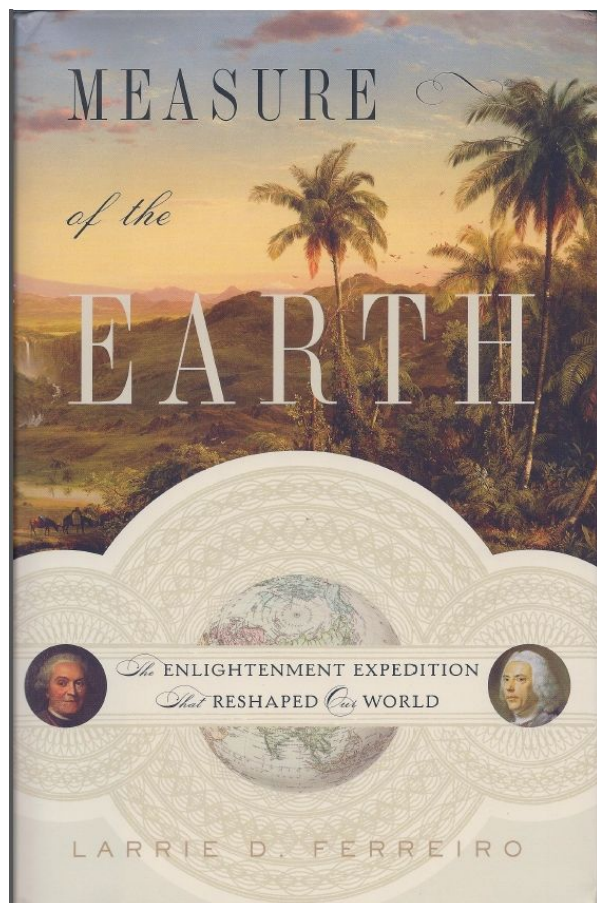
SHUANGGEN JIN  
Shanghai Astronomical Observatory

CHRIS RIZOS  
University of New South Wales

ANTONIO RIUS  
Institut d'Estudis Espacials de Catalunya (IEEC)

## Book Review

Larrie D. Ferreiro: *Measure of the Earth: The Enlightenment Expedition that Reshaped Our World*



Title: Measure of the Earth: The Enlightenment Expedition that Reshaped Our World  
Author: Larrie D. Ferreiro  
Publisher: Basic Books, New York  
ISBN: 978-0-465-01723-2  
Year: 2011  
Price: \$28.00  
Pages: xix, 353 p., 24 x 16 cm, Illus., Includes bibliographical references and index  
Details: Hardback. Available as e-book

So much has been written about the mid 18th century measurement of the meridian arc in the Spanish unexplored lands of colonial Peru (present-day Ecuador) that I was a little apprehensive before I started reading Ferreiro's latest book of this historical revival. Furthermore, about a decade ago the mathematical discussion of the problem of the Earth's shape during this time period was meticulously covered by the exhaustive treatise written by Greenberg (Soler 1998). Nevertheless, I was pleasantly surprised to discover that *Measure of the Earth*, although addressed to a broad and not necessarily scientific audience, contains enough original substantive information from which even a trained historian in geodesy could profit. The storyline is fluent and engaging and the multitude of vicissitudes that plagued this singular scientific expedition during the apogee of the Enlightenment are richly described and well researched. The preparation of this work was a time consuming journey that bustled the author through libraries and archives of several countries. He explicitly confides to his readers that from conception to completion there was a span of about twenty years dedicated to search and compile the sources before finishing his project. Ferreiro personally consulted libraries in France, Spain, Britain, the United States, Peru, Ecuador and even Chile, the current repository of some of the manuscripts and papers (taken from Peru as

spoils of war during their bellicose conflict in 1879-1884), scrupulously uncovering vital material directly related to this fascinating, albeit melodramatic, geodetic enterprise.

*Measure of the Earth* rekindles the riveting story of the famous scientific undertaking co-sponsored by the government of Spain and the Paris Academy of Sciences that sent to Quito a team of French and Spanish scholars to solve, once and for all, the quest of deciphering if the Earth ellipsoid was prolate or flattened along its polar axis. Ironically, what was planned as the first cooperative international scientific endeavor soon deteriorated into constant intellectual quarrels that exalted the temper of the primary participants to the point of writing independent (but very valuable) scientific and expeditionary reports that reached the bestseller status in their own right. The main objective of this joint effort was to contrast the results gathered in South America with a previously completed measurement of one degree arc length made by Jacques Cassini in France. The equatorial region was selected for obvious reasons to magnify, as much as possible, the differences between the two geodetic calculations that could finally confirm the shape of the Earth and put to rest the acidic dispute colliding the Cartesian and Newtonian philosophies. To their despair, the expeditionary team learned in the field that one of their colleagues (Pierre-Louis Moreau de Maupertuis), by measuring the length of a one degree arc in the cold regions of Lapland north of the Gulf of Bothnia, had already solved the scientific puzzle. This occurred long before they were able to wrap up their own conclusions, thus stealing from them overnight a resound scientific victory and a dreamed accomplishment of universal glory.

The principal characters of this saga were notorious scientists with familiar names such as the French academicians Louis Godin, Pierre Bouguer, Charles-Marie de La Condamine, and the Spanish naval officers Jorge Juan y Santacilia and Antonio de Ulloa y de la Torre-Guiral. Their entourage was completed by another group of supportive participants: one doctor and botanist, one surgeon, one instrument maker, one engineer and cartographer, one draftsman, and two assistants. The book narrates masterfully the interaction between all of these protagonists and provides a colorful detailed description of the tense, sometimes hysterical, clash of personalities between these supposedly well-educated scientists, all intertwined with the extreme hardships that they endured while trying to achieve their intended geodetic ambition. The story is exhilarating at times and plainly demonstrates that scientific paradigms have not changed much in about three hundred years: worthy research requires original ideas, concentration, perseverance and a good amount of luck and money.

There is a wealth of carefully assembled references compacted into 37 pages at the end of the book. To facilitate understanding for non-polyglot readers, the author painstakingly translated every single title, mainly from French and Spanish, into English. In the opinion of the reviewer this is one of the most complete sets of annotated references ever published in the English literature connected to this mission and the pulsating lives of its players. However, perhaps it was unnecessarily redundant information to repeat the full title and its translation in the list of notes in every chapter. The same abbreviations used within chapters would have sufficed.

Some vocabulary shortcomings appear in the text. One concerns the mistaken nomenclature employed by the author that systematically uses the adjective “geodesic” (e.g. Geodesic Mission, geodesic measurements, geodesic survey, etc.) instead of its correct acceptance “geodetic”. Ferreiro explicitly recognizes this peculiar mix-up although, he makes things worse by stressing in a short “Note on Language” (probably added shortly before releasing the volume) that he has “consciously” selected this inaccurate terminology. This explanation is bizarre to say the least and utterly inconsistent with every single English reference cited by the author at the end of his book. To avoid any needless confusion it is imperative that the author pertinently corrects this misnomer in any prospective future editions. Similarly, the proper spelling of the derogatory word used by the native population of colonial Spain to designate Spanish peninsular immigrants settling in the viceroyalty is *chapelón*, with plural *chapelones*; both words are wrongly misspelled every time that this idiosyncratic social rank is alluded to.

In spite of those quibbles the narration and handling of this thrilling scientific adventure is enlivening and historically informative. Its chronicler deserves recognition for a work well done. I emphatically recommend this excellent book to any reader mesmerized by travel and adventure amid the intrigue of the most celebrated geodetic (not geodesic) expedition of all times.

TOMÁS SOLER  
National Geodetic Survey

Reference:

Soler T (1998) Book Review: Greenberg, John Leonard. *The Problem of the Earth's Shape from Newton to Clairaut*. Cambridge University Press, 1995. xviii+781 p. J Geod 72(3), 183-184.  
<http://www.springerlink.com/content/rmve143214qe5vc2/fulltext.pdf> (August 2011)