



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

FIG COMMISSION 4

Hydrography

ANNUAL REPORT – 2012

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Chair (2011-2014), Commission 4, International Federation of Surveyors (FIG)

February 2013

The end of the year 2012 marked the end of the 2nd year of Commission 4's 2011-2014 term. Some events have affected the Commission during 2012:

- The now former Chair of Working Group Working Group 4.3 *Multi-Sensor Systems for Hydrographic Applications* died tragically on Friday, 31st August, 2012;
- The current Chair of Work Group 4.1 *Ellipsoidally Referenced Hydrographic Surveys (ERS)* retired from his fulltime job and, though still committed to Commission 4, has understandably begun a new phase in his life.

Regardless, the Commission continues to pursue significant contributions to hydrography and hydrography-related activities. Specific contributions and achievements for 2011 are outlined in this report.

ACTIVITIES OF THE CHAIR

During 2012, the Chair of Commission 4 assisted in organizing sessions at FIG2012 (Rome, Italy) and the 8th FIG Regional Conference in Montevideo, Uruguay, and FIG2013 (Abuja, Nigeria), among the other duties of the position. In 2012, the Chair was specifically invited to speak at certain international events, and gave the following Commission 4 relevant presentations:

- Sutherland M. (2012). "Boundaries and Governance in Coastal and Marine Spaces". Special invited presentation, European Union Permanent Committee on Cadastre (PCC), Cyprus, November 29-30.
- Sutherland M. (2012). "Spatially Enabled Governance". Special invited presentation, UNRCC-PCGIAP International Symposium on Spatially Enabled Government and Society, Kuala Lumpur, Malaysia, February 15-16.

WORKING GROUPS

Work Group 4.1 Ellipsoidally Referenced Hydrographic Surveys (ERS)

The objectives of Commission 4.1 for 2011-14 included:

1. Study and report on the technical aspects of using GNSS to vertically reference hydrographic surveys to the ellipsoid;
2. Catalog the methods used to conduct a vertical datum transformation from the ellipsoid to vertical datums used for hydrographic and offshore surveying;
3. Develop uncertainty models for both of the above.

Work is progressing on writing and editing the proposed technical report on ERS surveys. The Chair of this working – Mr. Jerry Mills – now retired from his fulltime job, is in communication with his replacement on the technical report, Mr. Corey Allen. A first draft has been completed and is in further development. The intention is to complete the paper by early 2014.

Next Steps:

1. Continue to engage the international hydrographic community in identifying and refining "best practices" for (a) the use of GNSS in vertical positioning relative to the ellipsoid for hydrographic surveying, (b) the development of vertical separation models and (c) the determination of uncertainty models for both of the above.

2. Produce a publication on the above “best practices” and make a proposal to the International Hydrographic Organization (IHO) to include the information in this publication in the IHO Manual on Hydrography.

Work Group 4.2 Standards and Guidelines for Hydrography

This working group’s aim is to:

- Assist in the development and recognition of standards of competency;
- Assist in the development of technical standards and guidelines;
- Cooperation with sister organizations and other appropriate bodies.

The working group continues to seek to:

- Promote the use of standards and guidelines to the surveying community;
- Review Standards coming from ISO TC211 (and other reputable sources) for relevance to Hydrography;
- Assess the impact of international standards on current industry practice;
- Represent Commission 4 on the FIG Standards Network;
- Promote recognition of professional pathways;
- Review IHO and other Manuals of Hydrography in conjunction with WG 4.3.

WG activity in 2012 was still limited to tasks undertaken by the chair on a Canadian national level where priorities called for efforts related to Standards and Guidelines to be directed closer to home.

Working Group 4.3 Multi-Sensor Systems for Hydrographic Applications

The stated foci of this working group are to:

- Assist in the development of technical guidelines for sensor integration (best practises);
- Cooperate with sister organizations and other appropriate bodies (e.g., IHO, IMO);
- Cooperate with other FIG Commissions.

Stated specific objectives are to:

- Liaise with working group 4.2 to upholding the standards of hydrography;
- Report on the development, possibilities and limitations of new technologies;
- Organize a Symposium with the working title "Integrating Sensors in Hydrography";
- Assist in the development of technical guidelines for sensor integration.

In 2011 it was reported by the now deceased Chair as follows:

A questionnaire was distributed in summer 2010. The main goals were to contact with interested persons and establish an efficient working group. Responses to the questionnaire didn't meet expectations but the working group is active and is communicating via email and ftp. An ftp website for the distribution of information was announced to collect the description of problems, international, national and institutional standards and presentations/papers regarding the use of multi-sensor systems. New approaches shall be taken into account.

A new German report was distributed which deals with uncertainties in Hydrography, implemented as part of a new quality management system of the German water- and shipping authorities. Presentations and papers can be expected in the near future. Several discussions clarified that one focus of the working group shall lie on the positioning, attitude determination and calibration of MBES and MLS onboard (patch test).

Next steps:

- *The ftp site has to be filled up with information, published to interested user and later be switched to a website.*
- *The IHO Manual will be investigated regarding possible additions.*

- *Beside the FIG Working Week in Rome some aspects of multi-sensor systems for hydrographic applications will probably be presented at the Hydro12 conference in Rotterdam (NL) in November 2012 (hydro12.com).*

The work was in continual development in 2012 but, sadly, Dr. Volker Böder died tragically on Friday, 31st August, 2012. The Passing of Professor Dr. Volker Böder was reported in *Hydro International* as follows:



It is with great sadness that we recognise the passing on Friday, 31st August, 2012 of Professor Dr. Volker Böder of HafenCity University Hamburg (HCU), Germany and, until his passing, Vice-Chair of Commission 4, and Chair of Working Group 4.3 Multi-Sensor Systems for Hydrographic Applications. Ironically, Volker's demise was due to a shipping accident that occurred on the River Rhine close to Basel (on the German-Swiss border). Volker was a very active member of Commission 4 who was working on a publication related to the development of technical guidelines for sensor integration (best practises). Although he had a busy life outside of FIG and Commission 4, he was very supportive of the Commission's work and objectives. I found him always pleasant, soft spoken, respectful and dependable. He shall be very much missed as a colleague and friend.

Commission 4 will meet in Abuja, Nigeria at FIG 2013 to discuss the future of this Working Group.

Work Group 4.4 Maritime and Marine Spatial Information Management

This working group's aim is to participate in co-operation with United Nations agencies on topics that are related to commission expertise (e.g. marine cadastre, data framework for e-Navigation etc.) and on guidance by FIG Council. Specifically the working group aims to:

- Cooperate with, and represent the interests of FIG Commission 4 to, IMO in the development of an e-Navigation data framework (e.g., harmonization of data models among stakeholders).
- Cooperate with IHO on the continuing development and expansion of S-100 to support hydrographic- and hydrographic-related spatial information management.
- Cooperate with appropriate stakeholders (e.g., IHO-MSDIWG) on the development of concepts and principles that impact and are impacted upon by hydrography (e.g., MSDI, marine spatial planning and management, marine data models and applications, marine cadastre etc.).
- Present and promote the above concepts, principles and outcomes to the international surveying community.

This working group (specifically the Chair) has directly been involved in the following activities:

- Conference Chair, 5th International Conference on Geoinformation Technologies for Natural Disaster Management, Mississauga, Ontario, 9-11 October 2013.
- International Scientific Committee , 26th ICC 2013, 25-30 August 2013, Dresden, Germany
- Chair, Scientific Committee, 4th International Conference on Earth Observation of Global Change (EOGC2013), 5-7 June 2013, Toronto, Ontario, Canada
- Co-Chair, 8th International Symposium on Mobile Mapping Technology (MMT2013), Tainan, Taiwan, 1-3 May 2013.

- Scientific Committee, International Workshop on the Role of Geomatics in Hydrogeological Risk, 27-28 February 2013, Padua, Italy
- Conference Chair, International Conference on Computer Vision in Remote Sensing, 16-18 December 2012, Xiamen, China
- Scientific Committee, 8th International Conference on Geo-information for Disaster Management (Gi4DM 2012), 13-14 December 2012, Enschede, The Netherlands
- Chair, Scientific Committee, International Symposium on Geomatics for Integrated Water Resources Management (GIWRM2012), 19-21 October 2012, Lanzhou, Gansu, China
- International Advisory Board, International Workshop on Laser Scanning Technologies and Applications (LSTA2012), 28 March 2012, Kuala Lumpur, Malaysia

Related literature in 2012:

- [1] Kwon, T.-J., Li, J., and Wong, A., 2013. ETVOS: an enhanced total variation optimization segmentation approach for SAR sea-ice image segmentation, *IEEE Transactions on Geoscience and Remote Sensing*, doi:10.1109/TGRS.2012.2205259 (IEEE SCI/EI).
- [2] Chen, J., Mao, Z., Philpot, B., Li, J., and Pan, D., 2013. Detecting changes in high-resolution satellite coastal imagery using an image object detection approach, *International Journal of Remote Sensing*, 34(7): 2454-2469 (Taylor & Francis: SCI).
- [3] Sun, Z., Wang, C., Li, P., Wang, H., and Li, J., 2012. Hyperspectral image classification with SVM-based domain adaption classifiers, *Proceedings of CVRS2012*, Xiamen, China, 16-18 December, 4pp (IEEE: EI).
- [4] Li, J. and Kwon, T.-J. 2012. Improved capability for marine oil spill detection using new generation of SAR imaging satellites, *ISPRS 2012 Congress*, Melbourne, Australia, 25 August- 1 September, Oral Presentation.
- [5] Chen, H.Y., Xu, S.Q., Sun, Q., Chen, L.Q. and Li, J., 2012. Retrieval atmospheric W2 profile from underway data and AIRS in the southern ocean, *Journal of Remote Sensing*, in press.
- [6] Shu, Y., Li, J. and Xie, S., 2012. SAR image segmentation using a novel Markov random field model with label cost prior, *ASPRS Annual Conference*, Sacramento, California, March 19-23.
- [7] Yang, X. and Li, J. (eds.), 2012. *Advances in Mapping from Remote Sensor Imagery: Techniques and Applications*, Taylor & Francis, CRC Press, ISBN 978-1-43-987458-5, 444pp.
- [8] Kwon, T.-J. and Li, J., 2012. Mapping marine oil spills from space, In Yang, X. and Li, J. (eds.) *Advances in Mapping from Remote Sensor Imagery: Techniques and Applications*, Taylor & Francis.
- [9] Chen, J., Li, J., Zhu, Q. and Mao, Z., 2012. Edge-guided multiscale segmentation of satellite multispectral imagery, *IEEE Transactions on Geoscience and Remote Sensing*, 50(11): 4513 - 4520 (IEEE: SCI/EI).

Work Group 4.5 Hydrography in Africa

The stated foci of this working group are to:

- Raise the awareness of hydrography in all African countries.
- Make available its potentials to various countries (Africa).
- Enunciate its potentials as a vital component and catalyst to nation building.
- Promote free exchange of information among all those engaged in Hydrography.

Stated specific objectives are to:

- Organize seminars and workshops on the potentials of hydrography in several countries.
- Promote recognition of hydrography by organizing charity walks.
- Communicate the activities of Commission 4 and other FIG events to African member countries.
- Liaise with working group 4.2 to uphold the standards of hydrography.

In 2012 this working group continued engaging stakeholders with the aim of increasing recognition in Africa of the important contributions of hydrography to society's objectives, and to ensure that this discipline receives the public funding and support that it deserves.

In October 2012, the Chair of this working group – Commission Chair-Elect Mrs. Angela Etuonovbe – visited as an attendee at the FIG Africa Task Force meeting. After the workshop a visit was made to the Lands Ministry where meetings were held with the Director and other top government officials. At another meeting a presentation was made on the economic benefit of hydrography to a nation. This activity has stimulated interest among the government officials.

Future Plans

There are plans for further visits to Ghana, and for a visit to Kenya.

CONFERENCES, MEETINGS, WORKSHOPS AND SYMPOSIA

FIG Working Week 2012, Rome, Italy

Commission 4 fully participated in the International Federation of Surveyor's Working Week 2012 held in Rome, Italy between May 6th and 11th. Commission 4 technical sessions included themes such as Hydrographic Surveying, Hydrographic Technologies, Hydrography Development and Vertical Reference Systems (held jointly with Commission 5). The sessions were well attended with some sessions full to capacity.



The Commission remains active by all accounts. The full report to the FIG 2012 General Assembly is to be found on the Commission's appropriate website. Discussions during a Commission meeting held at FIG 2012 focussed on a number of activities underway by working groups and members, including but not limited to:

- The use of GNSS to vertically reference hydrographic surveys to the ellipsoid;
- The development of multi-sensor systems for hydrographic applications;
- The development of awareness of the importance of hydrography, among key decision makers in Africa;
- Continued involvement in FIG Task Forces (related to Africa, and climate change);
- Continued development and strengthening of FIG/Commission 4 relationship with the IHO (attendance at meeting and conferences);

- Continued involvement in the joint FIG/IHO/ICA International Board for the Standards of Competence of Hydrographic Surveyors and Nautical Cartographers (IBSC).



It is expected that publications will eventually ensue from some of these activities. Ms. Angela Etuonovbe (Nigeria) was confirmed as Chair-Elect, Commission 4 for 2012-2014.



Mrs. Angela Etuonovbe (Nigeria)
Chair-Elect, Commission 4

**UNRCC – PCGIAP INTERNATIONAL SYMPOSIUM ON SPATIALLY ENABLED GOVERNMENT AND SOCIETY
14th - 16th February 2012, Kuala Lumpur, Malaysia**

The International Symposium on Spatially Enabled Government and Society, hosted by the Department of Survey and Mapping, Ministry of Natural Resources and Environment Malaysia was held at the Kuala Lumpur Convention Centre, Kuala Lumpur, Malaysia over the period February 14 – 16, 2012. The Symposium was sponsored by the Permanent Committee on GIS Infrastructure for Asia and the Pacific (PCGIAP) with support from the International Federation of Surveyors (FIG), the Global Spatial Data Infrastructure Association (GSDI), The International Cartographic Association (ICA) and the International Society for Photogrammetry & Remote Sensing (ISPRS). The main symposium (15th and 16th February) was preceded by an Expert Group Meeting on Spatially Enabled Government & Society held on 14th February and in which FIG representatives played active roles. FIG was represented at the expert meeting and main symposium by CheeHai TEO (President), Professor Ing. Rudolf Staiger (Vice President), Dr Michael Sutherland (Chair, Commission 4), Dr Daniel Steudler (Chair, FIG Task Force on Spatially Enabled Society), Peter Laarakker (Dutch Kadaster), Enrico Rispoli (CNGGeL Italy) and Brent Jones (ESRI).

The symposium sought to emphasise the importance of spatial information to governance decision making processes that support the pursuit of economic, social, political and environmental objectives. Many countries including Malaysia, Japan, Korea, The Netherlands, Singapore, Brunei, Trinidad and Tobago, Iran, Australia, Switzerland, and Hong Kong made presentations. Representatives from institutions and organizations such as FIG, ICA, Trimble, ESRI and the World Bank also made presentations. Commission 4 Chair, Dr. Michael Sutherland presented on Spatially Enabled Governance and underscored a number of important points:

- The historic divisionist view of the world is the root cause for the development of silo institutions that struggle to share information needed to make better governance decisions;
- Governance is best approached from a holistic point of view;
- A change of mentality from tessellations of reality to systems thinking is vital in designing information systems to support holistic governance;
- Spatial information is a key contributor to the governance decision making process;
- The need for spatial enablement of government and society has been recognised for decades, especially among geomatics professionals;
- Spatial enablement also relates to the marine environment.



Many other symposium speakers presented various local institutional, technological and social barriers to spatial enablement that had to be overcome, but the foci of their presentations were mostly land-related. Hydrographic and other marine and maritime spatial information are very important components of the spatial enablement of government and society, and Commission 4 must rise to the challenge.

The 8th Regional Conference, Montevideo, Uruguay, November 2012.

This was the first event in South America and Commission 4 had one key technical session, TS07D – Hydrography, chaired by Gordon Johnston. One paper was not presented due to the absence of the speaker; otherwise it was a full session and the audience of some 30 persons sat quietly and asked many questions causing the session to overrun its allotted time. The room had simultaneous translation between Spanish and English which was very necessary and a complete success. The contacts made at the event will be added to the Commission 4 contact list for distribution of notices and promotions etc.

IHO - IMO - IOC – WMO – IALA - IAEA 5th Capacity Building Coordination Meeting, December 2012

The IHO - IMO - IOC – WMO – IALA - IAEA held their 6th Capacity Building Coordination Meeting at IOC Project Office for IODE, Oostende, Belgium, 10 December 2012. Commission 4 was in attendance and was represented by Vice-Chair Administration and Communication, Mr. Gordon Johnston, Commission 4's de facto liaison to IHO.

Commission 4's participation represents evidence of its commitment to cooperate with sister organizations, outlined in section 6 of its work plan. The organizations meet with the freedom of not having established any formal terms of reference for this event. This enables the participants to express their views and indicate potential (as well as real activities) that illustrate how they each work and where some lessons may be gained for other organizations. The role of FIG and Commission 4 was outlined citing various publications, in particular S-57, The Economic Benefits of Hydrography and the various meetings we organise. These are the practical and demonstrated deliverables relating to Capacity Building. Again the concept of a coordinated meeting was raised and the up and coming event in April 2013 was promoted. IMO, IHO are participating. If successful this could pave the way for more coordinated meetings, possibly as joint events, to better reach our audiences.

Other Conferences, Meetings and Symposia

During 2012 Commission 4 officers and members attended other meetings or presented papers at a number of conferences of importance to hydrography:

- IEEE Transactions on Geoscience and Remote Sensing;
- CVRS2012, Xiamen, China, 16-18 December;
- ISPRS 2012 Congress, Melbourne, Australia, 25 August;
- Ocean Business 2012, Southampton, UK;
- ASPRS Annual Conference, Sacramento, California, March 19-23;
- Canadian Hydrographic Conference (15th - 17th May, 2012) in Niagara Falls, Canada;
- Hydro12 "Taking Care of the Sea" conference, Rotterdam, Netherlands, November 13th – 15th 2012;
- FIG 8th Regional Conference, Montevideo, Uruguay, 26th to 29th November, 2012.

BOARDS, COMMITTEES AND LIAISONS

FIG/IHO/ICA International Board on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers (IBSC)

Commission 4 continues to represent FIG on the FIG/IHO/ICA International Board on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers (IBSC) jointly with IHO and ICA. Commission 4 has four representatives on the Board, these being: Gordon Johnston (UK), Dr. Razali Mahmud (Malaysia), Adam Greenland (New Zealand) and Dr. Keith Miller.

At the IBSC meeting, held in May 2012, Buenos Aires, Argentina, kindly hosted by the Argentine Naval Academy and Hydrographic Office at the Sea Sciences School, the IBSC reviewed 14 submissions, granting immediate recognition to 9 and several conditional recognitions (subject to clarifications and further material). A full list of the current Recognised Courses is available on the IHO website at:

http://www.iho.int/srv1/index.php?option=com_content&view=article&id=440:ibsc&catid=64:4ircc&Itemid=398

Included in the successful submissions for the very first time was the Australasian Hydrographic Certification Panel that sought recognition for its continuing competency and assessment certification scheme. The aim for the 2013 meeting will be to update the Standards themselves for their technical content in relation to a syllabus. Some internal discussions have been made regarding the IBSC and how it relates to the main body of work of the Commission and FIG as a whole. This will be a subject proposed for the working week in Abuja.

IHO Liaison

IN 2011 a dialogue started between FIG Commission 4 and the IHB of the IHO with an aim to creating a possible dual hosted event. This work has been fruitful in that a joint FIG-IHO one day conference is now planned for the 9th April 2013 in Southampton, UK alongside the large commercial exhibition Ocean Business that attracts several thousand visitors.

Meanwhile FIG has been included in the invitations to a couple of Regional Hydrographic Commission events. There are a number these events each year and this is a topic that will be raised in Abuja for discussion.

PUBLICATIONS

FIG Publications

No Commission 4 supported FIG publications were made during 2012.

Newsletters

Commission 4 continued to publish newsletters in *Hydro International* on a regular basis. Newsletters are also published in *Geomatica* (the official publication of the Canadian Institute of Geomatics) and *Lighthouse* (the official publication of the Canadian Hydrographic Association) upon request. A newsletter was also published on Commission 4 website (<http://www.fig.net/commission4/newsletters/newsletters.htm>).

Other Publications

In 2012 Commission 4 members made contributions to hydrography and hydrography-related issues *via* publications in journals and other related media. The importance of these publications, when not directly about hydrography, is that they demonstrate the importance of hydrography as applied to the social, economic, political and environmental objectives of society at large. Some of these publications include:

- Kwon, T.-J., Li, J., and Wong, A., 2013. ETVOS: an enhanced total variation optimization segmentation approach for SAR sea-ice image segmentation, *IEEE Transactions on Geoscience and Remote Sensing*, doi:10.1109/TGRS.2012.2205259 (IEEE SCI/EI).
- Chen, J., Mao, Z., Philpot, B., Li, J., and Pan, D., 2013. Detecting changes in high-resolution satellite coastal imagery using an image object detection approach, *International Journal of Remote Sensing*, 34(7): 2454-2469 (Taylor & Francis: SCI).
- Sun, Z., Wang, C., Li, P., Wang, H., and Li, J., 2012. Hyperspectral image classification with SVM-based domain adaptation classifiers, *Proceedings of CVRS2012, Xiamen, China, 16-18 December*, 4pp (IEEE: EI).
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- Chen, H.Y., Xu, S.Q., Sun, Q., Chen, L.Q. and Li, J., 2012. Retrieval atmospheric W2 profile from underway data and AIRS in the southern ocean, *Journal of Remote Sensing*, in press.
- Shu, Y., Li, J. and Xie, S., 2012. SAR image segmentation using a novel Markov random field model with label cost prior, *ASPRS Annual Conference, Sacramento, California, March 19-23*.
- Yang, X. and Li, J. (eds.), 2012. *Advances in Mapping from Remote Sensor Imagery: Techniques and Applications*, Taylor & Francis, CRC Press, ISBN 978-1-43-987458-5, 444pp.
- Kwon, T.-J. and Li, J., 2012. Mapping marine oil spills from space, In Yang, X. and Li, J. (eds.) *Advances in Mapping from Remote Sensor Imagery: Techniques and Applications*, Taylor & Francis.
- Chen, J., Li, J., Zhu, Q. and Mao, Z., 2012. Edge-guided multiscale segmentation of satellite multispectral imagery, *IEEE Transactions on Geoscience and Remote Sensing*, 50(11): 4513 - 4520 (IEEE: SCI/EI).
- Sutherland, M. (2012). "Report from FIG Working Week 2012, Rome Italy". In *Hydro International*, 2012, Volume 16, Number 4, July/August.
- Nanlal, C., D. Davis and M. Sutherland (2012). "An Evaluation of Tides in the Caribbean". Published in the proceedings of the International Federation of Surveyors Working Week 2012, Rome, Italy, May 6-11, 15 pages.

- Davis, D., M. Sutherland, S. Jaggan and D. Singh (2012). "Determining and Monitoring Sea Level in the Caribbean using Satellite Altimetry". Published in the proceedings of the International Federation of Surveyors Working Week 2012, Rome, Italy, May 6-11, 13 pages.
- Sookram, S. and M. Sutherland (2012). "Grande Riviere, Trinidad and Tobago: The Vulnerability of a Coastal Community to Sea-Level Rise". Presented at the UCCI/UWI/ICCI Caribbean Conference: 50-50 – Surveying the Past, Mapping the Future, Grand Cayman, Cayman Islands, March 21-23, 25 pages.

Commission 4 Officers (2011-2014)

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