

THE INTERNATIONAL SOCIETY FOR PHOTOGRAMMETRY AND REMOTE SENSING



information from imagery

2018-19 Biennial Report



ABOUT ISPRS - WWW.ISPRS.ORG

ISPRS is an international non-governmental organization that promotes international cooperation between the worldwide organizations with interests in the photogrammetry, remote sensing and spatial information sciences. Established in 1910, ISPRS is the oldest international umbrella organization in its field, which may be summarized as addressing “information from imagery”. ISPRS achieves its aims by:

- advancing knowledge in the areas of interest of ISPRS by encouraging and facilitating research and development, scientific networking and inter-disciplinary activities,
- facilitating education and training with particular emphasis on less developed countries,
- promoting public recognition of the contributions from the photogrammetry, remote sensing and spatial information sciences for the benefit of humankind and the sustainability of the environment.

ISPRS MISSION

- To advance the photogrammetry, remote sensing and spatial information sciences through international cooperation in research, development and education for the benefit of society and for environmental sustainability.

ISPRS VISION

- To be the foremost scientific organization in its field,
- to speak for all people working in the field,
- to provide the necessary resources to develop the field.

XXIV ISPRS CONGRESS 2020

ISPRS2020-NICE.COM

LOCATION: Nice, France, 14 - 20 June 2020

HOST: French Society for Photogrammetry and Remote Sensing (SFPT)

CONGRESS DIRECTOR: Nicolas Paparoditis

GEOSPATIAL WEEK 2021

WWW.GSW2021.AE

LOCATION: Dubai, United Arab Emirates, 21 – 25 March 2021

HOST: Mohammed Bin Rashid Space Centre

GSW DIRECTOR: Saeed Hussain Al Mansoori

INTERNATIONAL SOCIETY FOR
PHOTOGRAMMETRY AND REMOTE SENSING

2018-19
BIENNIAL REPORT

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MESSAGE FROM THE PRESIDENT

As ISPRS enters the finishing straight of preparations for the 2020 Congress, to be held in Nice, France, in June under the tagline *Imaging today, foreseeing tomorrow*, I am delighted to address you in the Biennial Report 2018/19, which contains the ISPRS activities of the last two years.

During the last 24 months, ISPRS has been as active as ever in contributing to, and in some cases shaping, the major research and development trends and topics of our field. Examples include the increasing design and launch of satellite constellations to ensure long term data continuity for environmental monitoring as well as quick revisit times for every point on the globe (in some cases, achieving a visit per day for high resolution optical and radar systems), the use of remote sensing to achieve the Sustainable Development Goals (SDGs) set forth by the United Nations, the use and adaption of artificial intelligence, machine learning and deep neural networks to automatically analyse photogrammetric and remote sensing imagery, robotics and autonomous driving, smart cities, new concepts of online education, and many others.

2018 was of course the year of the Commission Symposia. As those familiar with ISPRS will know, 2018 was the first Symposia edition after changing the commission structure in 2016. The high number of attendees, the quality of the presentations and the feedback received from the attendees during and after the meetings seem to indicate that the changes were indeed successful. Nevertheless, ISPRS has asked its International Science Advisory Committee (ISAC) to systematically evaluate the new structure. We are curious to hear about the results in Nice.

2019, being an odd year, then saw the ISPRS Geospatial Week (GSW), perfectly organised by George Vosselman and his team in Enschede. The concept of the GSW is to bring together workshops on different ISPRS topics, so that participants can meet and discuss with parties of all areas of interest within ISPRS. Judging from the interest in GSW 2019, this concept seems to have become very popular.

During the last two years, the ISPRS Council has also revised the services it offers to its members and the ISPRS community at large, and has initiated a number of new opportunities to benefit from ISPRS membership. Examples include the *Keynote Speaker Programme*, which offers financial support to Ordinary, Associate and Regional Members to invite international experts to one of their meetings. Three presentations have already been given in 2019, when ISPRS sent speakers to Bogota, Suva and Kathmandu.

On the publication front, we obviously have our two journals, the *ISPRS Journal of Photogrammetry and Remote Sensing* and the open access *International Journal of Geo-Information*, both prominently listed in the Web of Science, and both attracting an ever-increasing number of submissions. In the open access world, authors have to pay so called APCs (author processing charges) to have their work published, which can sometimes be a challenge, indeed. ISPRS thus started to support authors, who have an accepted paper in the *International Journal of Geo-Information*, with a partial waiver of the APCs. We see this new possibility as an additional motivation to submit first class papers to this journal and to further increase its reputation.

Following requests from members, the *ISPRS Archives series* has been opened for proceedings of national meetings, the first of these new publications will come from ASPRS in spring 2020. In addition, in a cooperation with the Technical Information Library Hannover, earlier versions of the Archives are continually being added to the ISPRS web site with the aim of eventually having all Archive volumes available in digital form. Furthermore, for both, the Archives and the Annals an *automatic plagiarism check* will be introduced in 2020 to maintain the high quality of the two proceedings series.

Our youth organisation, the ISPRS Student Consortium (SC) has been extremely active throughout the last term, e.g. in organising a large number of summer schools across the globe. To recognize these activities, to increase the visibility of the SC and to motivate additional students to participate in the SC activities, ISPRS has recently introduced two new awards, the Student Consortium Best Paper Award and the Student Consortium Service Sward. Both awards will be presented in Nice for the first time.

As we all know, the real work of ISPRS is done in its working groups (hence the name ...). To acknowledge the activities of the working group officers and to improve our services for them, ISPRS now issues yearly calls for the *ISPRS Scientific Initiative* (in even years) and the *ISPRS Educational and Capacity Building Initiative* (in odd years). All *Working Group Officers* are eligible to submit proposals. These two initiatives provide seed money to successful applicants of projects which in one way or another raise the visibility of ISPRS. As of 2019, ISPRS workshops are also supported, ISPRS now covers the cost of the meeting management software ConfTool to handle paper submission and registration. In this way, we hope to harmonize the way in which ISPRS events are being organised and facilitate the administration of these meetings for all sides in the future.

We have also increased cooperation with sister societies, in particular in areas of the world, where only common efforts can bring progress. Based on a Memorandum of Understanding with the IEEE Geoscience and Remote Sensing Society (GRSS), the first joint conference LAGIRS 2020 (Latin American GRSS & ISPRS Remote Sensing Conference) will be held in Santiago de Chile in March 2020. This meeting follows a series of smaller workshops and tutorials in Latin America, organised together with GRSS over the last years. As another sign of cooperation, the GRSS chapter of Brazil has been admitted as Associate Member of ISPRS; efforts to increase cooperation continue also in Africa and Asia.

Now, we are all excited to attend the next ISPRS Congress in Nice. Besides overview papers and detailed presentations on scientific progress and technical development, innovations will include a much-enlarged track of Fora, first introduced in Prague in 2016, on topics such as Earth observations and SDGs, national mapping and smart cities, open geomatics and 3D cultural heritage to better connect to decision makers and to society at large. The commercial sector and the end users will benefit from the large exhibition, for which major companies such as Airbus, Thales-Alenia Space, ESRI, Hexagon and others have confirmed participation and will sponsor the event. And everybody will be able to enjoy the excellent food on the Mediterranean coast and the first-class social programme. Nicolas Papanicolaou and his team have prepared for us.

I hope that these activities will further increase the popularity of our society and will add to the experience of being a member of the ISPRS community, and I hope to see you in Nice in June 2020.



Christian Heipke
ISPRS President

MESSAGE FROM THE SECRETARY GENERAL

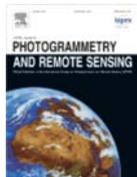
ISPRS: SCIENCE AND MEMBERS

ISPRS Technical Commissions and Working Groups are the scientific leaders of the Society. Conferences, symposia and workshops are one result of their activities. The Secretary General approves the events and publicises their reports in the ISPRS eBulletin. During the last two years, events have taken place around the globe, from New Zealand to the American continent. Some of them are organised by ISPRS Working Group Officers (ISPRS events) and some of them are organised by sister organisations with ISPRS support (ISPRS co-sponsored events).

2018 was the year of Technical Commission Symposia, starting in Beijing under the TC III leadership. Commission II then brought participants to Italy, Riva del Garda, in June. The last three were organised in autumn. In October, TC I Symposium took place in Karlsruhe, TC IV in Delft, and the Symposia “tour” was closed in November by TC V in Dehradun, India. The Symposium in Beijing attracted the highest number of participants of all Symposia ever. Considering the high participation numbers at all Symposia combined, with more than 1800 participants, it should be mentioned that a further 26 events were approved – 6 of them ISPRS events – in 2018. I would like to thank all TC Presidents for their huge effort which yielded such successful meetings.

In 2019, a total of 56 conferences and workshops were approved, 30 of them ISPRS events. It was also the year of the second largest ISPRS event – the Geospatial Week. The GSW 2019, hosted by the University of Twente, was a bundle of 13 workshops, with 713 participants. The Opening Ceremony hosted not only an interesting keynote speaker, but also awarded the 2018 Best Paper Authors of the Helava Award, and the very first Jack Dangermond Award Best Papers, for 2017 and 2018.

Together, all 2018 and 2019 events published 32 Volumes of [The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences](#) and 13 volumes of the [ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences](#).



isprs International Journal of
Geo-Information



ISPRS Journals and the latest GSW

ISPRS is a Society of members and exists for its members. There have been several changes in the Ordinary Membership. Via postal voting, the GA approved changes to the representation of four country's Ordinary Member, allowing these countries to continue their membership. The most significant change was in Sustaining Membership. ISPRS accepted 16 new Sustaining Members in 2018-19, 12 Sustaining Members resigned or their membership was discontinued because they no longer exist or due to changes in their professional interests.

ISPRS maintains its cooperation with non-governmental organisations – UN GGIM, UN OOSA, the International Science Council and its GeoUnions. With these co-operations, ISPRS is amongst the most important leading scientific organisations, not only in “geo” fields.

I would like to thank all my colleagues from Council and Annette Radtke, my secretary, for the hundreds of hours they have spent for the Society.

Lena Halounová
ISPRS Secretary General



MESSAGE FROM THE CONGRESS DIRECTOR

PREPARATION OF THE XXIVTH ISPRS CONGRESS

The XXIVth ISPRS Congress will be held in Nice, France, on the Mediterranean Sea, from 14-20 June 2020, in the Acropolis Convention Centre, that is in the heart of the city. The last ISPRS Congress organised in France was in 1934 in Paris. Although technologies have known a tremendous evolution since then, Photogrammetry, Remote Sensing and Spatial Information Sciences and techniques still remain very active and attractive research and development areas in a very dynamic geospatial market. In this market, ISPRS plays a key role in structuring the research and development activities through its Technical Commissions. At the quadrennial ISPRS Congress, the advances of research, technology and innovations are presented and discussed, and it is also the main arena where the scientific and technical orientations of our geospatial community are discussed.



The Nice sea front, the Masséna square and pedestrian promenade leading to Acropolis Convention Centre

The general program of the Nice Congress has been designed, on the one hand, to develop interaction between academia, industry, and public agencies, and on the other, to offer a very high-quality program and to facilitate the navigation of participants in the different events, sessions and contents proposed.

To develop interaction between academia, industry, and public agencies, and provide better feedback to each of these communities of interest, we are organising several thematic forums to discuss hot topics aimed at defining how our community, as a whole and its different components, can contribute to global and societal challenges (earth resource and climate change monitoring, SDG's, autonomous navigation, openscience, etc.).

We hope to ease the navigation of our participants by giving better visibility to ISPRS Technical Commissions, each with their own parallel track in the Congress program. Indeed, a remote sensing scientist will most probably mainly attend the Commission III 'Remote Sensing' track, but will also attend some other specific sessions of interest in the tracks of other commissions. The architecture of the ISPRS 2020 Congress website has also been improved and designed in accordance with that of the Geospatial Week 2019, in order to provide user friendly and look-alike websites of our events for our participants. This experience being successful, the standardisation of our ISPRS event websites will be highly encouraged for all future ISPRS events.

The elaboration of a very high-quality scientific speakers' program is being built by the International Program Committee, with the help of the Program Chairs. This is based, of course, on the quality of the reviews, but also by ensuring the representation of the different topics of interest in our geospatial community and also by promoting innovative subjects and papers.

Looking forward meeting you in Nice. Don't forget that Nice is nice!



Nicolas Paparoditis, Congress Director

COMMISSION I - SENSOR SYSTEMS

With view on the new ISPRS commission structure, Commission I “Sensor Systems” is concerned with the design, construction, characterization, calibration and use of imaging and non-imaging sensors, sensor systems and sensor networks for photogrammetry, remote sensing and spatial information science. This includes, on one hand, the development of new and innovative technological concepts, yet likewise models and methods for optimally exploiting, calibrating and thoroughly evaluating new sensors, networks or single components of them. As it is also reflected by the new commission title “Sensor Systems”, an imaging or non-imaging sensor can never be seen as isolated unit, it is rather one of the core components of a comprehensive (geo-)data acquisition and exploration process. The commission’s internal structure goes along this systemic approach. Sensor concepts are focal points of the commission. Yet methodological challenges arising from these concepts are on a par with them – especially regarding the exploitation, calibration and characterization the recorded data with view on practical applications.

In the report period, Commission I was involved in the (co-)organization of numerous events – mainly with focus on science but occasionally also with focus on education.

Highlights of these actions of Commission I were definitely the following four activities:

- TC I Symposium “Innovative Sensing – From Sensors to Methods and Applications” was organized under the lead of the TC I board at KIT in Karlsruhe from 10 – 12 October 2018. Attached to the Symposium, a series of one-day tutorials was held on 9 October. (For more information see tc1-symposium2018.ipf.kit.edu). In total, 36 full paper submissions and 85 abstract submissions were received. The full paper submissions entered a strict double-blind peer-review process. Each paper was checked by at least three reviewers and, in case of strongly varying opinions, an additional external reviewer was involved for the acceptance decision. Finally, 22 full paper submissions were accepted for publication in the ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences (Volume IV-I). Among the remaining full paper submissions and the abstract submissions, a total number of 70 submissions were accepted for publication in the International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences (Volume XLII-I).
- Related to this topic, a Special Issue of the ISPRS International Journal of Geoinformation has been initiated, edited by the TC I officers and released last year: https://www.mdpi.com/journal/ijgi/special_issues/Innovative_Sensing
- Geospatial Week 2019, with the lead of TC I WGs for three workshops, in particular:
 - I. Organization of the well-known and very visible UAV-g workshop by ICWG I/II and supported by, as well as participation from many other TC I WGs (see also www.uav-g.com).
 - II. Organization of the workshop HyperMLPA at GSW 2019, putting special emphasis on very recent topics within the scope of “Hyperspectral Imaging meets Machine Learning and Pattern Analysis” (see also gsw2019.org/hypermlpa). During GSW the idea was born that this topic should continue as a workshop series, possibly as an ISPRS-IEEE cooperation, in relation with the well-known WHISPERS event. The future will show in which direction this idea can develop.
 - III. Organization of the SARCon workshop of TC WG I/3 putting special focus on current and future SAR satellite missions and data.
- Co-organization and preparation of LAGIRS 2020 (2020.lagirs.org), a joint large-scale ISPRS-IEEE event with high impact, in particular in South America (yet not limited there), to be held in Santiago de Chile, 22 – 26 March 2020.

Further events and activities with strong involvement of TC I WGs or officers refer to various other events cooperatively organized by our commission and other organizations, such as:

- Laser Scanning 2019 Workshop at ISPRS GSW: Scientific Committee members and support by various TC I WGs in reviewing and presentations

- PIA19 (Photogrammetric Image Analysis): Program Committee members and support by various TC I WGs in reviewing and presentations
- Self-Calibration for LiDAR-based Mobile Mapping Systems. 2nd International EuroSDR Workshop on Point Cloud Processing: Scientific Committee members and support by various TC I WGs in reviewing and presentations.

In an effort to seek new members and reach out to the geoscience community in general, Commission I has supported several meetings by providing keynotes, workshops, tutorials, and promoting Commission I activities. Several WGs provided major contributions to various meetings and events. Here, we want to cite, in particular, the following events:

- 3D Sensing, Scene Reconstruction and Semantic Interpretation, EuroSDR series of e-learning
- From Active Optical 3D Sensing to Descriptive Features. Tutorial on “Acquisition and Automatic Characterization of Scenes – A holistic approach for scene analysis in terms of semantic labeling and object extraction” at the ISPRS Commission II Symposium held at Riva del Garda, Italy
- Summer school on Clean Energy and Sustainability (KATHES) in Thessaloniki (www.kathes-research.eu) with special tracks on remote sensing for environmental and energy-related applications.

Looking at the future, the focus of TC I is now on supporting the organization of the ISPRS 2020 Congress in Nice. From TC I perspective, this will provide a unique inter- and multi-disciplinary forum for all the professionals involved in geospatial sensing and data acquisition from a variety of platforms.



Stefan Hinz
President, ISPRS Commission I



Raul Queiroz Feitosa
Vice President, ISPRS Commission I

COMMISSION II – PHOTOGRAMMETRY

TURNING IMAGES INTO METRIC INFORMATION

ISPRS Technical Commission II focuses, at various scales, on geometric, radiometric and multi-temporal aspects of image- and range-based 3D surveying and modelling. Specifically, Commission II deals with image orientation, point cloud generation and processing, 3D feature extraction, scene understanding, sensor and data fusion, sensor characterization, machine learning for geospatial data analysis and techniques for massive geospatial data processing. The uniqueness of TCII mainly comes from its multi-scale perspective - encompassing theory and methods to derive accurate and reliable information from images or point clouds, and its various application fields - industrial metrology, heritage, geosciences, etc. These aspects make TCII a perfect reference for all researchers involved in the fields of mapping, industrial measurements, heritage documentation, environmental monitoring, etc.



The various companies supporting ISPRS Commission II in this period.

In 2018, ISPRS Commission II held its Symposium in Riva del Garda, Italy, on 3-7 June. The symposium hosted some 420 registered participants (with some 90 PhDs, 18 B.Sc. and M.Sc. students) from 37 countries. The event transformed the town on Lake Garda into a unique meeting point for researchers, practitioners and companies working in the field of photogrammetry, computer vision, geospatial data analysis and point cloud processing. A very rich scientific program was assembled with 213 scientific articles finally published in the ISPRS Archives (172) and Annals (41). This enabled all participants to be informed about the latest advances in both research and industry domains. Plenary and parallel sessions, oral (115) and poster (98) presentations as well as 4 keynote speakers presented the latest achievements, developments and future vision in the fields of image processing, point cloud classification, 3D scene reconstruction, robotics, nationwide mapping, BIM, environment and infrastructure monitoring, heritage documentation, etc. Oral sessions specifically dedicated to students and young researchers were also organized, to discuss their on-going activities and receive critical feedbacks from both young and more experienced colleagues. A quite large industrial exhibition hosted some 12 of the most important business players in the photogrammetric and geospatial domains. Besides visiting the dedicated booths, participants also discovered the latest innovations and products of companies by attending their short business presentations, scheduled within each plenary session. A total of 6 best paper awards were assigned, for young authors (2), articles presented with an oral presentation (2) and articles presented with a poster presentation (2). The symposium also featured four tutorials to provide participants with an exceptional insight into the fields of camera calibration, deep learning, scene analysis and advanced network orientation.

Last but not least, particular attention was given to social events, to support networking and exchanges between research and industry on one hand, and students and experienced researchers on the other.

After the Symposium, we selected the most promising contributions published in the conference proceedings, that convey deep insight into the latest advances of photogrammetry, from image orientation and point cloud generation, to 3D scene reconstruction, large-scale machine learning methods for geospatial analysis, underwater data acquisition and processing and environmental applications. A double special issue with 10 papers was published in the Photogrammetric Engineering and Remote Sensing journal with the most salient outcomes of the studies presented at the Symposium.

Beside the successful Symposium, which took all attention and activities in 2018, accomplishments and results for Commission II in the past two years are numerous. WG officers have been involved in the organization and running of many workshops (15+), special sessions (7+), special issues in journal (10+), summer schools (3+), books (2) and scientific initiatives (3), covering all aspects and topics of Commission II.



Snapshots of the 2018 Technical Commission II Symposium held in Italy.

We deeply acknowledge the voluntary efforts, commitments and dedication of all WG officers that supported ISPRS Commission II so far and we are looking forward meeting them again at the forthcoming ISPRS Congress in Nice in June 2020.



Fabio Remondino
President, ISPRS Commission II



Takashi Fuse
Vice President, ISPRS Commission II

COMMISSION III – REMOTE SENSING

ISPRS Technical Commission III on Remote Sensing (2016-2020) has been working actively to promote and support developments in the remote sensing field. With 10 working groups and six inter-commission working groups, 12 workshops have been organized in 7 countries during 2018-2019, with Annals and Archives published reflecting the latest research results in the fields of each working group. Following is the list of workshops organized by the working groups

- GeoInformation for Disaster Management (Gi4DM 2018), March, 2018, Turkey (by ICWG III/IVa)
- GeoInformation for Disaster Management (Gi4DM 2019), September, 2019, Czech Republic (by ICWG III/IVa)
- 2nd ISPRS Workshop on Remote Sensing and Synergic Analysis on Atmospheric Environment, November, 2018, China (by WG III/8)
- 3rd ISPRS Workshop on Remote Sensing and Synergic Analysis on Atmospheric Environment, October, 2019, China (by WG III/8)
- International Geoinformatics Conference 2019, February 2019, Saudi Arabia (by ICWG III/IVb)
- International Workshop on Earth Observations for Agricultural Monitoring, followed by Tutorial on “Advances in Remote Sensing for Agriculture”, February, 2019, India (by WG III/10)
- ISPRS Workshop on Multidisciplinary Remote Sensing for Environmental Monitoring, March 2019, Japan (by WG III/2 and WG III/10)
- The 2019 ISPRS International Workshop on Advances in SAR: Constellations, Signal processing and Applications, in GSW2019, June, 2019, the Netherland (by WG III/2 and WG III/3)
- Hyperspectral Sensing meets Machine Learning and Pattern Analysis (HyperMLPA), in GSW2019, June, 2019, the Netherland (by WG III/4)
- International Workshop on Image and Data Fusion, in GSW2019 (by WG III/6)
- The 2019 ISPRS Workshop on Cryosphere and Hydrosphere for Global Change Studies, in GSW2019, June, 2019, the Netherland (by WG III/9)
- 2019 International Workshop on Planetary Remote Sensing and Mapping, in GSW2019, June, 2019, the Netherland (by ICWG III/II)

With the support from ISPRS Scientific Initiatives, WG III/1 conducted international benchmarking of terrestrial laser scanning approaches for forest inventories, while WG III/4 established a website to provide reliable and high-quality hyperspectral datasets and initiated a benchmark framework for validating novel processing and data analytics methodologies.



Fig. Mosaic generated from the left-eye images of the Chang'e-4 rover's panoramic camera. The lander and the shadow of the rover are visible

With support of ISPRS Education & Capacity Building Initiative, WG III/5 delivered two data sets to the scientific society to test new LiDAR mobile mapping and multi-spectral LiDAR technology. The two data sets paved the way for the scientific community to explore new LiDAR technologies. The members of ICWG III/II have developed new techniques of planetary mapping and applied them in scientific analyses of planetary data to support Chinese Chang'e-4 lunar landing mission for topographic mapping and analysis of the landing site, and the localization of the lander and rover. A book entitled 'Planetary Remote Sensing

and Mapping' was published as ISPRS Book Series. An online spectral library for pigments of paintings is also under development by TC III members.

Four journal special issues were published based on the working groups' achievements. These special issues are: 1) 'Frontiers in Spectral Imaging and 3D Technologies for Geospatial Solutions' in Remote Sensing; 2) 'Laser Scanning' in Applied Sciences; 3) 'Frontiers in Spectral imaging and 3D Technologies for Geospatial Solutions' in MDPI Remote Sensing; and 4) 'Geospatial Technology in Environmental Health Applications' in Journal of Environmental Monitoring and Assessment. Four volumes of ISPRS Archive and one volume of ISPRS Annals were also published.



One of the main events was the successful Mid-term Symposium of TC III on "Developments, Technologies and Applications in Remote Sensing" held in Beijing, China, during May 7-10, 2018. There was a total of 763 participants from 52 countries and regions who took part in the symposium, with 48 ISPRS officers among them. A total of 727 abstracts/papers were received, and 510 full papers were accepted and published, including 467 papers in the ISPRS Archives and 43 in the ISPRS Annals. One keynote session, 39 oral sessions, 18 poster sessions and 1 technical exhibition were arranged, with 190 oral presentations, 320 poster presentations and 12 exhibitors. Eight participants were awarded Travel Grants by the ISPRS Foundation, one author was awarded the Young Author Award and two papers were awarded the Best Poster. ISPRS TC III business meeting was held during the symposium. As the preparatory activities, the International Seminar on Spatial Data Infrastructure and Applications SDI and ISPRS Summer School were held before the symposium. 25 participants from 12 developing countries attended the seminar. It was composed of 10 lectures, 4 technical visits, two day tours, and all the delegates attended the ISPRS TC III Symposium. The ISPRS Summer school was held on 3-6 May, just before the symposium. There were 31 participants from China, France, Finland and Korea. Experts from 8 different countries gave 17 lectures.



Jie Jiang
President, ISPRS Commission III



Ahmed Shaker
Vice President, ISPRS Commission III

COMMISSION IV - SPATIAL INFORMATION SCIENCE

The world's human population has reached 7.8 billion in 2019 and by 2050 it is estimated to be 9.7 billion. This rapidly increasing human population continues to challenge researchers to examine new approaches and technologies to support decision-making. The pressures placed on the usage of spaces above, below and underground necessitates decisions based on high-resolution, multi-dimensional and cross-discipline spatial data. The large volumes of data to be processed and analysed requires a high level of automation and intelligence. The increased social engagement requires user-centred approaches for visualisation and communication. This situation presents unprecedented demands for Spatial Information Science.



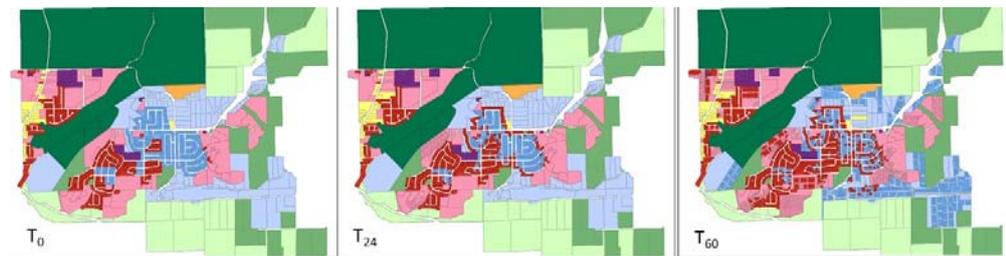
3D Multi-representation: BIM, voxel, 3D GIS

In the period 2016-2020, the Commission concentrated on many fundamental as well as application-oriented issues in modelling, structuring, management, analysis visualization and simulation of geospatial data. The Commission focusses on 10 scientific areas of research that are coordinated by 10 working groups (WG) as follows - WG1: Multidimensional Modelling; WG2: Ontologies, Semantics, and Knowledge Representation for Geospatial Information; WG3: Spatial Data Analysis, Statistics and Uncertainty Modelling; WG4: Collaborative Crowdsourced Cloud Mapping; WG5: Indoor/outdoor Seamless Modelling, LBS and Mobility; WG6: SDI: Internet of Things and Spatial Decision Support; WG7: Geo-Data Management; WG8: Geo-Computation and Geo-Simulation; WG9: Geovisualization, Augmented and Virtual Reality; WG10: Advanced Geospatial Applications for Smart Cities and Regions, and ICWG IV/III: Global Mapping: Updating, Verification and Interoperability. The WG collaborated extensively in organising joint events, special journal issues and scientific initiatives.

In the four-year period, the Commission actively coordinated many research activities and forums. The Commission organised five to six conferences per year in many parts of the world, on topics related to the WGs. Many of the annual conferences such as 3D GeoInfo, Indoor3D, Gi4DM, SDSC (UDMS), GeoAdvances, GRAFFS were organised under the umbrella of ISPRS. Several workshops were organised in collaboration with GISRUIK, FOSS4GIS and GIScience. WG chairs were approached to assist in the organisation of local conferences in Nepal, Malaysia and Iran. The commission organised workshops during the ISPRS GSW in 2017 and 2019. The papers from these conferences were published under the ISPRS publications. The Commission contributed to improving the quality of the scientific publications by strengthening the requirements for authors and the entire review process. The WG officers have acted as Editors of a large number of ISPRS IJGI journal special issues. The topics of the special issues covered the terms of reference of the working groups. Several of the special issues are still open for submission, for example: Geodata Science and Spatial Analysis in Urban Studies; Big Geo-Spatial Data and Advanced 3D Modelling in GIS; Uncertainty Modelling in Spatial Data Analysis; Integrating GIS and Internet of Things (IoT) in Sustainable Cities; 3D Indoor Mapping and Modelling; Applications of GIScience for Land Administration; and Deep Learning and Computer Vision for Geoinformation Sciences.

The Commission provided forums for students through organisation of mapathons and the ISPRS Student Consortium Summer School: Geospatial Technologies for Natural

Environment Management and Monitoring, organised by WG IV/1 and WG V/5 in Wroclaw (Poland) in 2019.



Geocomputation and geosimulation models for informed decision making

The Commission was awarded one Education and Capacity Building Initiative: Capacity Building for High-Resolution Land Cover Inter-comparison and Validation (2018); and three Scientific Initiatives: ISPRS Benchmark on Indoor Modelling (2017 and 2019); GeoBIM benchmark: reference study on software support for open standards of city and building models (2019).

The ISPRS Technical Commission IV Symposium was held In Delft and provided an excellent forum for researchers and practitioners to share their research work and ideas. The Symposium was organised as a joint event with 3DGeoinfo, SDSC (UDMS) and FID 3D cadastres. A dedicated session on Standards was organised in cooperation with OGC. The results of the ISPRS Scientific Initiatives and Education and Capacity Building Initiatives were presented and discussed.

Looking ahead to the ISPRS congress, the Commission is preparing scientific and thematic sessions on latest research, developments and technologies.

In this four-year period, the Commission led the research and developments in 3D data modelling and data structuring. Commission members contributed to the developments of OGC standards such as CityGML, IndoorGML and LADM. Active collaboration was established with international societies such as ICA, FIG and UN GGIM and SDI. The Commission promoted many young and middle carrier researchers, who contributed enthusiastically with new ideas and a plethora of activities.



Sisi Zlatanova
President, ISPRS Commission IV



Suzana Dragicevic
Vice President, ISPRS Commission IV

COMMISSION V – EDUCATION AND OUTREACH

The mission of Technical Commission V is to support, promote and motivate capacity building at different levels of professionals, educators and students and develop cost effective teaching methods which include distance learning programmes, international collaborative effort for sharing web-based resources – both material and trainers as well as best practices for effective transfer of knowledge and curricula development that meet regional needs, encourage open source software tools and innovative methodologies for urban infrastructure, citizen science and geospatial technology in various applications, and support youth forum and students consortium activities.

Since the 2016 Congress, TC V has finalized the Terms of References of the Commission based on the resolutions of ISPRS and set up eight working groups and their TOR. The WG officers come from 20 countries across 5 continents, namely Azerbaijan, Brazil, Canada, China, Czech Republic, Germany, India, Indonesia, Italy, Kenya, Kuwait, Nepal, Poland, Russia, South Africa, Taiwan, Turkey, UAE, Ukraine and USA. These eight Working Groups are:

- WG V/1: Framework for Multi-level Education & Training – Curriculum Development and Methodology.
- WG V/2: Promotion of International Collaborative Education Programs.
- WG V/3: Promotion of Regional Collaboration in Citizen Science and Geospatial Technology.
- WG V/4: Web-based Resource Sharing for Education and Research.
- WG V/5: Promotion of the Profession to Young People.
- WG V/6: Distance Learning – Education and Training Services.
- WG V/7: Innovative Technologies in Training Civil Engineers and Architects.
- WG V/8: Promotion of Open Source on Geospatial Technology.

The period of 2018-19 has been an eventful year of TCV and its working groups as there were many important activities conducted. These activities are centred on ISPRS sponsored or co-sponsored workshops and conferences, Students Consortia's Summer Schools and Special Sessions in other national symposia and conferences to promote the ISPRS prime activities at large and on mission objectives of TCV in particular. Some of these are as listed here:

ISPRS TC V Mid-term Symposium on Education and Outreach with theme “**Geospatial Technology – Pixel to People**” was organized at IIRS during November, 20-23, 2018. The total participation was 445 and 213 papers were selected for publication in ISPRS Archives and Annals. Of these, there were about 57% of students who participated. ISPRS Foundation has also supported 9 participants across the globe whose papers were accepted for presentation. ISPRS paper review process web application system was developed following ISPRS guidelines for submission and review.

- An important highlight of this Symposium was the first day with two sessions on International Cooperation on Earth Observation – as part of International Policy Advisory Committee. In this, there were about 10 leading scientists representing ISRO, NASA, ESA, CNES space agencies, CEOS, UN-ESCAP organizations and Government-Private agencies joining deliberations on this topic. This was followed by a panel discussion.
- Pre-symposium Tutorial was organized during November 17-19, 2018 at IIRS. A total of 68 students participated, with the following four themes:
 - 1) Satellite Remote sensing of Air Quality
 - 2) Satellite Remote sensing of Flood Monitoring and Management
 - 3) Ground based 3D Modelling (Close range Photogrammetry & TLS)
 - 4) Big Geospatial Data Analytics.

- There were 4 Plenary, 26 technical and 3 Special Sessions making this Symposium beneficial to most participants. Three best papers and best posters to young teachers (below 35 years of age) were awarded during the ISPRS TC V Symposium.

Working Groups of TCV are actively involved in organizing and participating as chairs and advisory members in internationally reputed conferences, and also in proposing new Scientific Initiatives. They also initiate many special sessions to highlight their WG activities, thereby propagating the ISPRS primary objective of TCV for preparing future leaders in photogrammetry, remote sensing and geo-information sciences. Some of the highlights of their activities are listed below:

- WGV/1 actively supported the ISPRS sponsored International Conference on “Geomatics and Restoration: Conservation of Cultural Heritage in the Digital Era” in Milan, Italy, May 2019. This group has also initiated and conducted Special Sessions in the Asian Conference of Remote Sensing (ACRS) as an ISPRS session to promote education and outreach methods in Malaysia, South Korea and Dehradun during 2018 and 2019. A special session was organized during a National Symposium on ‘Innovations in Geospatial Technology for Sustainable Development with special emphasis on North-eastern Region, India’ during 20-22 November 2019 at Shillong. Other events were organized by the Centre for Environmental Planning and Technology University, Ahmedabad, India, such as: 1) Summer School on “Capacity building in Open Source Geospatial Tools and Technology” organized during May-June, 2019. 2) An expert lecture was organized on “Good City Life: The role of Urban Data Science in enhancing Urban Planning and Policy-making” by Mr. Felix E. Anyiam, Centre for Health and Development, University of Port Harcourt, Nigeria on 24 May 2019. 3) An International Conference on ‘Smart Data, Smart Cities, Smart Governance’ was organized during 3-5 October 2019. A National Symposium on ‘Industry Academia Collaboration for Geospatial Technology – 2019’ was organized during December 2019, wherein participants from Industry, Government and Academia attended. This working group has won an ISPRS Scientific Initiative for 2019 on ‘Development of educational content for the “D3MOBILE Metrology World League’.
- WGV/2 was involved in Scientific Committees of the Society of Italian Photogrammetry and Topology and in IEEE International Conference on Metrology for Archaeology and Cultural Heritage in June and October 2018 respectively. “Geomatics for digitization of built heritage: the GAMHer “Geomatics Data Acquisition and Management for Landscape and Built Heritage in a European Perspective” project on 22 November 2019 in Italy. WV/2 was involved in organizing 5th International Conference MetroArcheo 2019: Metrology for Archaeology and Cultural Heritage during December 2019, organized at Florence, Italy.
- WGV/3 besides conducting a pre-symposium tutorial on “Big Geospatial Data Analytics” in Mid-term Symposium, its officials were engaged in EUASIAN GIS Congress in Baku, Azerbaijan, September 2018, and also have been actively involved in preparing a Special Issue on “Citizen Science and Geospatial Capacity Building” for the ISPRS International Journal of Geo-information. The first International Conference in India on “Unmanned Aerial System in Geomatics” – 2019 was organized as an ISPRS co-sponsored event during 6-7 April 2019, at Greater Noida Extension Centre, the Indian Institute of Technology, Roorkee, India.
- Student Consortium under WV/5 has conducted Summer Schools (SS) in many international meetings across the globe. In Malaysia, a SS was conducted on “Big Geo-Sensing Data Ecosystem” at ACRS 2018 and in 2018, it conducted a SS and hackathon as part of its Scientific Initiative on “MOTIVATE Learning: Making Opportunities to Initiate Valuable Alliance through Experiential Learning,” a SS was also conducted in Wroclaw, Poland on “Geospatial technologies for natural environment management and monitoring”, in August 2019. In October 2019, the Student Consortium conducted another SS in ACRS 2019 under the theme “Progress of remote sensing technology for smart future” at Daejeon, South Korea. In SERFA 2019, the SC, with IEEE GRSS Young Professionals, jointly conducted a summer school on Remote Sensing Applications for Defence, in Sao Paulo, Brazil in November 2019.
- WV/6 was responsible for initiating many online webinar courses to outreach users across the globe. They have conducted hands-on training as a part of pre-symposium on “satellite remote sensing for air quality” during TCV Mid-term Symposium. They have

also conducted NASA/ARSET– ISRO combined online webinar on “high temporal resolution for air quality” observations from space in September 2018. Its Chair served as editor to initiate a special ISPRS Journal issue on “Education and Training in Applied Remote Sensing” in 2019.

- WV/7 have conducted several events to promote training of civil engineers with modern tools and technologies. The International forum on “Geospatial Solutions for Structural Design, Construction and Maintenance”, during 21-23 March 2018 and 27-29 March 2019, as well as XIV International Exhibition and Scientific Congress “Inter-expo GEO-Siberia” during 25-27 April 2018 in Novosibirsk. They have spearheaded ISPRS sponsored International Workshop “Measurement, Visualization and Processing in BIM for Design and Construction Management”, 24-25 September 2019, Prague, Czech Republic. Another such sponsored workshop was conducted on “Capacity building and education outreach in advanced geospatial technologies and land management” in Kathmandu, Nepal, 10-11 December 2019. They have also initiated joint pilot education project on “Civil Engineers Training by Modern Technologies for Inventory of Heritage Monuments and Historical Value Objects” between Michigan Technological University, USA and Kyiv National University, Ukraine during 2018-2020 under which many innovative research has been carried out and degrees (M.S. and Ph.D.) were submitted.

- WV/8 on promoting Open source has conducted tutorials in 37th Conference on Surveying and Geoinformatics at National Central University, Taiwan in September 2018 wherein the they have covered Remote Sensing open data and software and Open Internet of Things Architecture. WV/1 and WV/8 been jointly involved in conducting a 2-day workshop on “Open Source and Multi-level Education for Geospatial Technology”, Taiwan, April 2019.

- Inter-working groups of TCV conducted a joint session on “Capacity Building and Education in Geospatial Technology” in an ISRS Annual Convention in ‘Innovations in Geospatial Technology for Sustainable Development with special emphasis in N-E Region, India’ organized during 20-22 November 2019 at Shillong, India.

In all, the ISPRS Technical Commission V, through their Working Groups’ dynamic activities, has achieved targeted objectives for 2018-2019.

A. Senthil Kumar
President, ISPRS Commission V



P. L. N. Raju
Vice President, ISPRS Commission V



INTERNATIONAL POLICY ADVISORY COMMITTEE (IPAC)

According to its Terms of Reference, the International Policy Advisory Committee (IPAC) of ISPRS shall advise Council on issues relevant to Society interaction with intergovernmental organizations and shall – specifically - identify, coordinate and prioritize issues on which ISPRS should have a public policy. These issues include legal and policy challenges, data and information policy and industrial developments.

Chaired by Gunter Schreier (German Aerospace Center, DLR), IPAC addressed these topics in supporting the Council in topics raised by UNOOSA and other international bodies. Furthermore, IPAC supported the organization of three related workshops in 2018-19.

50 YEARS OF EARTH OBSERVATION – WHAT’S NEXT?

Conducted as an ISPRS hosted plenary aside UNISPACE 50+ (June 19th 2018) at the VIC, Vienna, Austria, this event assembled speakers from academia, international organizations, space agencies and NEW SPACE businesses: (Christian Heipke, President ISPRS; Barbara Ryan, Director GEO; Jim Green, Chief Scientist, NASA; Josef Aschbacher, Director Earth Observation, ESA; Mr. Kazuo Tachi, Associate Director General, JAXA; Robbie Schingler, CSO, Planet; Wolfgang Wagner, TU Vienna; Jean-Jacques Tortora, Director ESPI, Vienna).

Since the early days of space borne Earth observation, we now face large scale programs (e.g. Copernicus), innovative technologies (e.g. Cube Sats, AI) and new companies (e.g. Planet). This all together is changing the way we do Earth Observation, in science, government and companies. Moderated by Lena Halounova and Gunter Schreier, the panel ended with a round table discussion, wherein the speakers shared their visions on where Earth observation is developing and what actions need to be taken to meet the societal demands on fast, reliable and global geo- information.



Panellists at the UNISPACE 50+ ISPRS Space Agency Forum

FROM SPACE TO PLACE

This International Symposium on the use of Space Technologies for Natural and Cultural sites (Sept. 18-20, 2018 Campeche – Mexico) was – amongst others – also organized under auspices of ISPRS (Conference Organizer: Mario Hernandez). Gunter Schreier, IPAC Chair, was invited to give a keynote on “Earth Observation and the Copernicus Programme in support to Archaeology and World Heritage Preservation”. He also introduced the participants to ISPRS topics.

INTERNATIONAL COOPERATION IN EARTH OBSERVATION

IPAC organized this event on 20 November 2018, aside ISPRS TC V Mid-term Symposium at the Indian Institute of Remote Sensing, Dehradun.

The presentations and panel discussions with invited speakers reviewed international cooperation in Earth observation missions and Earth observation application projects. Conducted in India, the focus was on cooperative missions between ISRO and international partners.



Final Round Table discussion at the IPAC Session “International Cooperation in Earth Observation”

High level speakers from ISRO, ANTRIX, CNES, NASA and ESA introduced collaborative Earth Observation Missions and application schemes which aim to contribute to the understanding of global change and support the United Nations Sustainable Development Goals (SDG). Next to the wide range of missions conducted and planned by ISRO, joint missions with CNES (Megha-Tropiques, SARAL, Trishna) and NASA (NISAR) were presented. International programs and organisations such as CEOS, the Space Climate Observatory (SCO), the Asia-Pacific cooperation scheme and Copernicus concluded the presentations. A round table discussion closed the one-day event.

IPAC ORGANISATIONAL ISSUES

IPAC reviewed its 2016 – 2020 Workplan in close contact with the ISPRS Council. In September 2019, IPAC proposed to revise the terms of reference harmonized with the other ISPRS Committees (ISAC, I²AC). By end 2019, IPAC also renewed its membership. IPAC has now 14 members presenting academia, organisations and companies coming from nearly all continents. The updated list of members is here: <https://www.isprs.org/structure/ipac.aspx>

For the forthcoming ISPRS congress in Nice, IPAC was asked to organize a session titled “EuroSDR National Mapping and Cadastral Agency (NMCA) and ISPRS Space Agency (SA) Forum”. The forum is planned for Tuesday, 16 June 2020 and will be organized by Jon Mills, Andre Streilein (NMCA part) and Gunter Schreier (SA part). Senior members of national and international organisations will be invited as speakers for this forum.



Gunter Schreier, IPAC Chair

INTERNATIONAL SCIENCE ADVISORY COMMITTEE (ISAC)

TERMS OF REFERENCE AND MEMBERSHIP

The terms of reference and membership remain the same and ISAC has been responding to requests for advice from Council and considering science issues of importance to ISPRS. The terms of reference and membership of ISAC can be found at <http://www.isprs.org/structure/isac.aspx>

RESTRUCTURING COUNCIL

ISAC reviewed proposals to restructure Council and made a number of constructive comments which were taken into account by Council in the revision of the first draft. A number of additional issues were identified which Council might wish to consider in the future.

One issue which has not been addressed is encouraging and enabling individuals from developing countries to serve on Council. Although Council travel is funded, it is common and useful for people to serve as Commission Presidents prior to seeking Council positions and that is where there is a problem with financial support. There can also be a disconnect between qualified individuals and national representation in ISPRS.

RESTRUCTURING COMMISSIONS

ISAC was asked to review the success of the restructuring of the Technical Commissions which was approved before the 2016 Congress. A report was compiled from the responses received and the general conclusion is that the restructuring has been successful and the current structure of ISPRS meetings with major events every year ensuring good interaction between members and scientists. However, the new structure has not significantly helped communication or involvement with less well financed countries.

KEYNOTE SPEAKER PROGRAMME

ISAC is generally in favour of the proposals for a Keynote Speaker programme with some reservations, such as possible problems in evaluating speakers and keeping the list up to date. ISAC made some suggestions to Council. First, that Ordinary Members should be able to nominate speakers themselves, and second, that Council ensures that Ordinary Members from developing countries apply. It was also suggested that ISPRS make the list available to non ISPRS members.

PLAGIARISM

In November 2019 Council asked ISAC to advise on how to implement tests for plagiarism in the Annals and Archives, this is ongoing.

OTHER ISSUES

In 2019 the chair of ISAC was appointed chair of the International Science Committee of GSW in Enschede and the 2020 Congress. The role of the chair in these positions has varied significantly in all of these and other events and is considered to be important that the role of ISAC in GSW and Congresses should be made quite clear.

In the last report of ISAC a number of suggestions were made for Council consideration. These included that ISPRS should work with other organisations to develop recognition in their areas of interest; AARSE, ICA and GEO were all mentioned. Areas for collaboration include capacity building, GEO BON (Biodiversity Observation Network) and SDGs.

Ian Dowman, ISAC Chair



SENSING OF ENVIRONMENT (ICORSE)

ICORSE INTRODUCTION

The International Committee on Remote Sensing of Environment (ICORSE) is a standing ISPRS subcommittee. ICORSE membership is composed of representatives from Earth science, geospatial, and environmental agencies of countries represented in ISPRS. The ICORSE goal is to advance the use of remote sensing to address priority issues of the environment including scientific, policy, management, and other pursuits. The primary function of ICORSE is to provide guidance to the biennial International Symposium on Remote Sensing of Environment, (ISRSE).

ICORSE RESULTS

The 38th International Symposium on Remote Sensing of Environment (ISRSE-38) was co-convened with the 21st Pecora Conference from 6-11 October 2019 in Baltimore, Maryland, USA. The American Society of Photogrammetry and Remote Sensing (ASPRS) with support from NASA, NOAA, and the USGS, hosted this highly successful and productive symposium. The event website is as follows: <https://pecora.asprs.org>

ISRSE-38 Highlights

Attendees	519
Countries	25
Sessions	69
Oral Presentations	350
Posters	37

ICORSE, chaired by Dr. Guo Huadong (RADI), met on October 7, 2019 in association with ISRSE-38. Dr. Huadong thanked the participants, as there was very good representation from the sponsoring agencies. Chuck Hutchinson (ICORSE) provided background and history of ISRSE, dating back to its conception in 1962, redistributed the report for ISRSE-37, held in Tshwane, South Africa, and announced that John Latham and Barbara Ryan would be the incoming Board Chair and Secretary, respectively for the ICORSE Board of Directors. Considerable discussion was held on the unique role that ISRSE plays globally as an ‘applications’, not just technology conference that is open, and is in fact, held, in both developing and developed countries. It is an independent voice for the continued support of the world’s space agencies, and its close and complementary relationship with GEO brings added value and visibility to GEO’s Society Benefit Areas (SBAs), and in particular the Sustainable Development Goals (SDGs), increasing the sustained involvement of international actors from scientific, policy and management sectors. There was a call for continued and sustained financial support, and in that regard, the Board briefed the Committee on a potential sponsoring partnership with IEEE-GRSS.

Looking to the future, the host and venue for ISRSE-39 was announced – The Vietnam Academy of Science and Technology/Vietnam National Space Center (VAST/VNSC) to be held in Hanoi. ICORSE agreed that it was appropriate to convene the next symposium in Asia, and also supported Europe for ISRSE-40.

Dr. Guo Huadong thanked the Committee for the support he has received as Chair, and agreed to remain as Chair for another six months until the next Chair is selected.



Guo Huadong, ICORSE Chair

REGIONAL REPRESENTATIVE - AFRICA

ISPRS CAPACITY BUILDING FOR HIGH-RESOLUTION LAND COVER INTER-COMPARISON AND VALIDATION WORKSHOPS

The project "Capacity Building for High-Resolution Land Cover Inter-comparison and Validation", involving ISPRS WG IV/4, is one of the ISPRS Education and Capacity Building Initiatives 2018. The project aims at developing computer aided educational material on the inter-comparison and validation of global Land Cover (LC) maps to address a variety of societal needs including the United Nation's Sustainable Development Goals (SDGs). Two hands-on workshops were given: the first on September 1, 2018 at the World Bank in Dar es Salaam, Tanzania (in conjunction with the FOSS4G 2018 conference); the second on September 3, 2018 at the Regional Centre for Mapping of Resources for Development (RCMRD) in Nairobi, Kenya. The two workshops, run by representatives of the project's Principal Investigators - Politecnico di Milano (Italy) and the National Geomatics Center of China (China) - were attended by a total of 60 people from 8 African countries.

FREE OPEN SOURCE FOR GEOSPATIAL (FOSS4G) 2018 CONFERENCE

The conference was held in Dar es Salaam, Tanzania, in August 2018. The theme was 'Leave No-One Behind'. The conference show-cased geo and open data projects across Africa and the world which included: growth of OpenStreetMap communities and innovative ways of data collection using mobile phones to drones, Open Cities Africa – making cities resilient through open data and participatory mapping, Ramani Huria - community-based mapping project in Dar es Salaam creating highly accurate open data on flood prone areas using OpenStreetMap. The conference was attended by 1,135 delegates 71% being from Africa.



Group Photo FOSS4G Conference 2018

SUMMER SCHOOL IN BOTSWANA

ISPRS, in collaboration with the Regional Centre for Mapping of Resources for Development (RCMRD) and other partners in Botswana, organized a four-day training event in Gaborone, Botswana from 24 -28 September 2018. The other partners were University of Botswana and Surveys and Mapping Department. The training targeted University Students and young researchers to further develop and enhance EO data processing skills they learnt at tertiary institutions. Fifty-four (54) participants took part in the training. The following outcomes were achieved: Increased capability to pre-process and analyse remote sensed earth observation data; Use open source tools in analysis of spatial data and remote sensing data and building of institutional linkages of participating institutions and inter-personal networks amongst participants and peers.

JOINT 4TH AFRIGE OSS SYMPOSIUM AND 3RD RCMRD INTERNATIONAL CONFERENCE

The fourth AfriGEOSS Symposium and the third Regional Centre for Mapping of Resources for Development (RCMRD) International Conference was held jointly from 13-16 August

2019 in Nairobi, Kenya. The objective of the Symposium and Conference was to spur exchange of ideas on fast-tracking application of earth observation and geospatial technologies in development decision making. The theme was *Earth Observation for Evidence Based Decision Making*. More than 200 scientist, researchers and government officials attended the conference. The ISPRS Africa Regional Representative attended and gave a good will message from ISPRS.



Group Photo of Training Participants

AFRICA ASSOCIATION OF REMOTE SENSING CONFERENCE - 2018

The conference was held in Alexandria, Egypt, from 25-29 October 2018. It was organized by the African Association of Remote Sensing of the Environment (AARSE) and the Arab Academy of Science and Technology, in partnership with the National Authority for Remote Sensing & Space Sciences (NARSS). The theme was Earth Observations and Geospatial Science in service of Sustainable Development Goals. The Conference was attended by the ISPRS President where he was honoured for his outstanding contribution to Earth Observation in Africa.

SUMMER SCHOOL IN UGANDA – JULY 2019

The summer school took place on 22-24 July 2019 at the GIS Center of the College of Engineering, Design, Art and Technology, Makerere University, Kampala, Uganda. The summer school was attended by 25 participants from different institutions in Uganda. It was facilitated by Prof Mahdi Motagh from Leibniz University Hannover, Germany, who gave a series of lectures on the use and acquisition of SAR data.

AFRICA GIS 2019

AfricaGIS 2019 conference was held from 18-22 November 2019 in Kigali, Rwanda. Hosted and organized by EIS-Africa and the University of Rwanda through its Centre for GIS and Remote Sensing, the conference explored the role of innovations in geospatial information and its implication in addressing the 17 SDGs targets for an inclusive, prosperous and sustainable African continent. The biennial conference, which attracted about 500 participants, contributes to the development of skills and institutional capacity across the continent. The conference was officiated by Hon. Paula Ingabire, the Rwanda Minister of ICT and Innovation.



Hussein Farah
African Regional Representative

REGIONAL REPRESENTATIVE - ASIA

The Asian Association of Remote Sensing (AARS) is actively involved in promoting remote sensing, photogrammetry and spatial sciences in Asia. AARS members consist of 18 ordinary members (within Asia), 10 associate members (not only from Asia but also from outside Asia) and 12 sustaining members (space Organisations, international societies and companies). AARS regularly conducts its annual conference, the Asian Conference on Remote Sensing (ACRS). ISPRS has been actively participating and supporting AARS/ACRS for years as a sister society.

The ISPRS Student Consortium has conducted Summer Schools along with ACRS 2018 and 2019 on "Big Geo-sensing Data Ecosystem" and "Progress of Remote Sensing Technology for Smart Future", respectively. From 2019, ISPRS officially joined AARS as a sustaining member. The 39th ACRS was organised in Kuala Lumpur, Malaysia, during October 15-19, 2018, jointly by AARS, Ministry of Energy, Technology, Science, Climate Change and Environment and Malaysian Remote Sensing Agency (MRSA). 865 delegates presented 418 papers related to remote sensing, spatial sciences and environment. The 40th ACRS was organised in Daejeon, Korea by AARS and Korean Society of Remote Sensing (KSRS) during 13-18 October 2019. 805 participants from 32 countries presented 403 papers. The 41th ACRS is planned to be organised in Deqing, China during 2-6 November 2020.

The Centre for Space Science and Technology Education in Asia and the Pacific (CSSTEAP), Dehradun, regularly conducts Post-Graduate (PG) Courses (nine months) and Short Courses (2-4 weeks) related to space science and technology. During 2018 and 2019, CSSTEAP conducted PG Courses on Remote Sensing and GIS (68 participants), Satellite Meteorology (13 participants), Satellite Communications (37 participants), Global Navigation (26 participants) and Space Sciences (13 participants). The short courses included Geospatial Modelling in Forestry and Ecology for Climate Change Response Studies, Disaster Risk Reduction with special emphasis on Floods and Earthquakes and Forest Fires, Small Satellite Missions, Weather Forecasting, Space Weather, etc. A Webinar on Application of Remote Sensing in Hydro-meteorological and Geological Disasters (148 participants from 12 countries) was organised during 17-20 Sep 2019.

ISPRS TC V Mid-term Symposium on Education and Outreach on "Geospatial Technology - Pixel to People" was organised during 20-23 November 2018, along with the Indian Society of Remote Sensing. The total participants were 445 and 213 papers were published in ISPRS publications. Pre-symposium tutorials on Satellite Remote Sensing of Air Quality, Satellite Remote Sensing of Flood Monitoring and Management, Ground-based 3D modelling and Big Geospatial data Analytics were also organised.

Other ISPRS co-sponsored activities include

1. The First International Conference on "Unmanned Aerial Systems" during Geomatics-2019, Indian Institute of Technology-Roorkee, April 2019.
2. International Workshop on "Capacity Building and Education Outreach in Advanced Geospatial Technologies and Land Management", Land Management Training Centre, Ministry of Land Management, Cooperatives and Poverty Alleviation, Government of Nepal, December 2019.
3. A session on "Capacity Building and Education in Geospatial Technology for Sustainable Development" was organised during ISRS Annual Convention, in November 2019.



Shailesh Nayak
Asian Regional Representative



Group Photo at the Opening Ceremony of the 40th ACRS



Memorial speech of Prof. Shunji Murai, the founder of ACRS

REGIONAL REPRESENTATIVE - LATIN AMERICA

For the last six years, ISPRS has been working in Latin America towards the establishment of a series of academic international events under the thematic of Remote Sensing and Photogrammetry, with the attendance of scientists, researchers and Latin-American space agencies and/or cadastral institutions. We are proud to report herein that ISPRS will organize a biannual international symposium jointly with GRSS.

ISPRS PRESENCE AT LARS

From 3-6 April 2018, ISPRS was represented at LARS (Latin American Remote Sensing Week), by Christian Heipke and Lena Halounová. They had meetings with the University of Chile and with the IEEE-Geoscience and Remote Sensing Society (IEEE-GRSS). It was then decided to jointly launch a new ISPRS and GRSS biennial event under the title "*Latin American Remote Sensing and Geoscience Conferences (LAGIRS)*". The first event is planned for 22-27 March 2020, in Santiago de Chile. In order to formalize this initiative, an overall Agreement of cooperation between ISPRS and GRSS (wider than only focusing on LAGIRS), was signed in October 2018.

https://www.isprs.org/society/mou/MoU_ISPRS-IEEE_GRSS.pdf

ISPRS PRESENCE AT THE MEETING OF SELPER

In November 2018, the 18th meeting of Sociedad Latinoamericana en Percepción Remota y Sistemas de Información Espacial took place in "La Habana Cuba" (in English "Havana"). ISPRS was represented by Mario Hernandez. In addition, Laurent Polidori (CNES) and Jaime H. Hernandez (University of Chile) also spoke, under the umbrella of ISPRS. At SELPER, Mario Hernandez introduced LAGIRS, indicating the need to work closely between ISPRS and SELPER in order to strengthen SELPER. The agreement ISPRS – SELPER has now expired. Mario Hernandez is working jointly with Maurizio Fea (SELPER international representative) in order to have a new draft agreement to be proposed to the SELPER General Assembly.

While attending the SELPER-Habana Conference it became clear that the US embargo is severely affecting Remote Sensing and Photogrammetry in Cuba. However, under very difficult conditions, experts try to continue with their tasks. As much as possible, ISPRS should see how Cuba can receive some support.

PROMOTING ISPRS IN LATIN AMERICA

In order to promote ISPRS in all the meetings in the region that Mario Hernandez organizes, he asked to have a half day meeting with university students. In this way, during a two hours presentation and discussion, the students became aware of ISPRS and the advantages to join such a Society. Meetings have been held in the following cities in Mexico: Mexico City, Morelia, Campeche, Merida, as well as in Bogota, Colombia; Lima, Peru; and Buenos Aires, Argentina.

AN INTERNATIONAL SYMPOSIUM ISPRS AND PARTNERS.

In September 2018, in the City of Campeche, Mexico, a four-day International Symposium on the use of space technologies to support Natural and Cultural heritage took place. During the International Symposium there was half a day dedicated to Mexican students and ISPRS. The idea was to promote ISPRS and its activities showing the advantages of becoming a member of ISPRS.

For this session, we had the honour of having a very good ISPRS presence: Prof. Li Deren, Dr. Gunter Schreier and Mario Hernandez.



Mario Hernandez
Latin American Regional Representative

ISPRS STUDENT CONSORTIUM (ISPRS SC)

INCREASING YOUTH ENGAGEMENT IN ISPRS

The ISPRS Student Consortium (ISPRS SC) has been actively engaging the youth in a number of different activities, organized and designed to advance their knowledge in the fields of remote sensing, photogrammetry and spatial information science, and to effectively build their professional networks within ISPRS.



Photos from the summer schools (China, South Korea, Brazil, Poland and Uganda), the Spatial Exchange Program under MOTIVATE Learning in Thailand, the technical session in the TC V Mid-term Symposium in India and the presentation of ISPRS and ISPRS SC in the Remote Sensing Applications for Defense Symposium in Brazil.

From 2018 to 2019, the ISPRS SC organized seven summer schools and led one of the projects under the ISPRS Education and Capacity Building Initiatives. In addition to these activities, the organization was continuing the publication of the SpeCtrum – the official Newsletter of the ISPRS SC and introduced the new Webinar Series.

The summer schools remain as one of the major activities of the ISPRS SC. As of 2019, the current ISPRS SC board has coordinated and organized a total of twelve summer schools in different countries in Asia, Europe, Latin America and Africa. These summer schools also strengthen the international linkages of the ISPRS SC to the Asian Association on Remote Sensing (AARS) with the continued organization of this event following the annual Asian Conference on Remote Sensing (ACRS), and to the local chapter of the IEEE Geosciences and Remote Sensing (IEEE GRSS) in Brazil, through the summer school jointly organized with the IEEE GRSS Young Professionals. In 2019, the summer school in Brazil have been organized under the Remote Sensing in Defense Applications Symposium hosted by the Institute of Advanced Studies.

The ISPRS SC further explored the potential of the summer schools by leading one of the projects under the ISPRS Education and Capacity Building Initiatives – Making Opportunities to Initiate Valuable Alliance through Experiential Learning (MOTIVATE Learning) in cooperation with the Geo-Informatics and Space Technology Development Agency (GISTDA) of Thailand and ASEAN Research and Training Center for Space Technology and Applications (ARTSA). The project featured a Summer School + Hackathon, which challenged the resourcefulness of the participants by thinking of innovative geospatial solutions for sustainable development and the Spatial Exchange Program, which provided the young researchers a great opportunity to work with international experts and professors as well as the researchers from GISTDA on research problems about disaster risk reduction, environmental monitoring, emergency decision support system and carbon stock assessment.



The special issues of SpeCtrum - Women in Remote Sensing and Geospatial Information and Into the Details of the Society for the Mid-term Symposia, and the new activities of the ISPRS SC – the Webinar Series and the ISPRS SC Awards.

The Webinar Series was also launched in 2018, beginning with “An Introduction to Google Earth Engine” featuring Dr. Nicholas Clinton, Developer Advocate of Google Earth Engine. The webinar received great response from the ISPRS SC members and would continue to tackle relevant topics in the profession. The Webinar Series would also introduce experts with ISPRS to the members of the ISPRS SC.

A special issue of the SpeCtrum entitled, “Into the Details of the Society,” was released for the Mid-term Symposia. The Newsletter also received outstanding attention in 2019 with the special issue on “Women in Remote Sensing and Geospatial Information” – one of the most read issues of the official Newsletter and most shared post on social media for the ISPRS SC. This issue featured a number of brilliant women – from young leaders of different student and youth organizations, the Ladies of Landsat, the initiative called Soapbox Science and most especially, the women in ISPRS. It was also a great privilege to feature the interview with Dr. Barbara Ryan, former Director of the Group on Earth Observation (GEO) and dubbed as the “Salt-of-the-Earth” woman. This issue provided a great insight for the ISPRS SC, signifying that these Newsletters can both be scientific and socially relevant. These special issues can further encourage and inspire the members of the organization.

The ISPRS SC also carried on its efforts to connect with the Technical Commissions and experts within ISPRS by organizing student activities for ISPRS events. One of the summer schools was organized under the Technical Commission III Mid-term Symposium in China, one technical session was hosted in the Technical Commission V Mid-term Symposium and a special Student and Young Professionals Night was held in the Geospatial Week in The Netherlands.

The ISPRS SC also continues to strengthen its foundations through the recruitment of new board members and the revision of the Statutes. Two new awards – the Excellence and Service awards – have been recently announced and will be given for the first time in the upcoming ISPRS Congress in 2020. Within the ISPRS SC board, documentation and guidelines have been an integral part of the preparation and organization of activities. The ISPRS SC also envisions an increased engagement from the members at the local level, through the introduction of the Student Chapters, which will begin by 2020. The ISPRS SC will continue to pursue activities and endeavours that will integrate the youth more effectively into ISPRS.



Sheryl Rose Reyes
ISPRS SC President

GEOSPATIAL WEEK 2019

ENSCHDEDE, THE NETHERLANDS, 10-14 JUNE 2019

From 10 till 14 June the fourth ISPRS Geospatial Week took place at the campus of the University of Twente, the Netherlands. With the scientific support of 30 ISPRS Working Groups, the 13 workshops listed below provided excellent opportunities to discuss the latest developments in the fields of sensors, photogrammetry, remote sensing, and spatial information sciences.



- C3M&GBD – Collaborative Crowdsourced Cloud Mapping and Geospatial Big Data
- CHGCS – Cryosphere and Hydrosphere for Global Change Studies
- EuroCow-M3DMan – Joint European Calibration and Orientation Workshop and Workshop on Multi-sensor systems for 3D Mapping and Navigation
- HyperMLPA – Hyperspectral Sensing meets Machine Learning and Pattern Analysis
- Indoor3D
- ISSDQ – International Symposium on Spatial Data Quality
- IWIDF – International Workshop on Image and Data Fusion
- Laser Scanning
- PRSM – Planetary Remote Sensing and Mapping
- SarCon – Advances in SAR: Constellations, Signal processing, and Applications
- Semantics3D – Semantic Scene Analysis and 3D Reconstruction from Images and Image Sequences
- SmartGeoApps – Advanced Geospatial Applications for Smart Cities and Regions
- UAV-g – Unmanned Aerial Vehicles in Geomatics

Many of these workshops were part of well-established series of workshops convened in the past. They covered topics like UAV photogrammetry, laser scanning, spatial data quality, scene understanding, hyperspectral imaging, and crowd sourcing and collaborative mapping with applications ranging from indoor mapping and smart cities to global cryosphere and hydrosphere studies and planetary mapping.

In his inspiring opening keynote, Dr. Edward Anderson, of the World Bank, emphasized the importance of geospatial technologies for urban resilience in Africa. Facing floods, cyclones, and earthquakes, Africa's fast-growing cities need timely collection of actionable risk data. On behalf of the World Bank, he reached out to the research community through sharing data and organizing AI challenges. Throughout the week, further eleven keynotes were presented by internationally leading experts in the sessions related to the offered workshops.

In total, 398 presentations on research advancements have been given, distributed over oral sessions (287 presentations) and poster sessions (111 presentations). These presentations were selected out of 500 submissions. 143 submission were subjected to the full paper review process and 357 contributions were reviewed on the basis of extended abstracts. The reviewing and decision process was in the hands of the working groups. In total, 1250 reviews have been provided by 295 reviewers. The workshop chairs decided to accept 81 papers for publication in the International Annals of Photogrammetry, Remote Sensing and Spatial Information Sciences (volume IV-2/W5). Another 289 papers have been published in the International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences (volume XLII-2/W13).

From Tuesday till Thursday, thirteen companies displayed their latest products and developments in the exhibition area. Eight further companies sponsored the event without exhibiting. The seven Gold sponsors took the opportunity to present their work in the industry sessions during the lunch breaks.

The ISPRS Geospatial Week 2019 was attended by 711 participants from 56 countries from all continents with large delegations from Germany, China, and host country, the Netherlands (each slightly over 100 participants). Students and seniors (28% of the participants) enjoyed a strongly reduced participation fee. 73% of the participants registered early to take advantage of the early bird registration fees. Participants could register for any number of days and select the first day of their registration. On the days registered they could attend any of the sessions offered in up to six workshops running in parallel. This flexible registration resulted in varying numbers of participants over the week with the highest number on Wednesday (567) and the lowest on Friday (378).

On the Sunday before the Geospatial Week four tutorials were offered:

- Deep learning for geospatial data analysis (morning)
- Deep learning methods for 3D point cloud semantic segmentation (afternoon)
- Geospatial Web Service Technologies: Online Sharing of Geospatial Data, Algorithms and Models (whole day)
- Programming photogrammetry with Pix4Dengine (afternoon)

These tutorials attracted 76 participants, some of them attending two half-day tutorials. In particular, the two deep learning tutorials were popular. Both were booked out with 40 participants.

ConfTool was used to handle the paper submission and reviewing, participant registration, as well as the publication of the Geospatial Week programme at a glance and session details. At the moment of writing this report, the programme is still [online](#). Participants could also access the programme using the Conference4me app on their smartphone which was synchronised with ConfTool to include last minute programme updates. Much more information was and still is available through the website www.gsw2019.org. This website remains in use to share photographs of the event as well as the video recordings of all keynote presentations.

Social dinners were held on the Tuesday as well as Thursday to allow participants of all workshops to attend a dinner. The Tuesday dinner was held at the historic water mill of the Singraven estate, beautifully situated at the Dinkel river. On Thursday, the big band Exposure entertained the participants at the dinner in the old restaurant in the scenic Volkspark in Enschede. On the Wednesday the local Twente beer brewery visited the venue with their beer truck for the exhibitor reception.

The organisation of an event like the ISPRS Geospatial Week requires the involvement of a large number of people. I would like to thank the workshop chairs

and other Working Group officers for the scientific lead in the handling of all submissions and the composition of their interesting workshop programmes. Many thanks as well to the tutorial convenors for sharing their expertise. Finally, I would also like to thank my colleagues in the Local Organising Committee and all volunteers. It has been a great experience to jointly organise the ISPRS Geospatial Week 2019.



Participants enjoying a walk over the Singraven estate grounds.



George Vosselman
GSW 2019 Director

ISPRS EDUCATION AND CAPACITY BUILDING INITIATIVE 2018

In accordance with the statutory mission and activities of ISPRS, the Society shall provide funds to support scientific and other initiatives, which will further improve its international status in the field of the photogrammetry, remote sensing and spatial information sciences, and will therefore benefit all ISPRS members. To this end, a new Education and Capacity Building Initiative was established to enhance ISPRS international status in the educational area. The very first call for the Education and Capacity Building Initiative was issued in October 2017 and fifteen teams of researchers from working groups across all of the five ISPRS Technical Commissions submitted applications. Comments were sought from the relevant Technical Commission Presidents, and a committee of three Council members was convened to independently review the proposals, based on overall benefits to ISPRS and community, merit of the proposal, competence of the team, contribution to education and capacity building, and budget and feasibility. The committee's recommendation to fund seven projects to a total of 44,000 Swiss Francs was accepted by ISPRS Council in 2017. The following briefly describes the outcomes of each project, with full reports available on the ISPRS website.

GEOINFORMATION SCIENCE PEDAGOGICAL OUTREACH PILOT PROGRAM: 3S-4-SCHOOLS

(PI: Timo Balz, Wuhan University, China)

ISPRS 3S-4-schools project aimed at improving understanding of advanced concepts in remote sensing and global satellite navigation, by developing several teaching modules to help youngsters understand basic ideas behind the geosciences. The project has developed some modules, but is still ongoing due to some unexpected problems.

CAMERA CALIBRATION AND PERFORMANCE DATABASE

(PI: Mark R. Shortis, RMIT University, Australia)

The project developed an online database of camera calibration and performance information, which will enable registered practitioners to both contribute and extract information on cameras. The online database contains information on the specifications of camera and lens combinations; the results of camera calibrations in terms of quantification of calibration parameters; levels of precision and accuracy resulting from the calibration or project; and a link to further information on the calibration or project such as reports and papers. The database will be made available through the website <http://www.cameracalibration.org/>, where camera calibration experts can be invited to test the online access to the database.

SPREADING OUT THE KNOWLEDGE FROM ISPRS EDUCATIONAL EVENTS USING A DISSEMINATION INTERNET PLATFORM

(PI: Marco Scaioni, Politecnico di Milano, Italy)

The project (SKIEE-DIP) developed an online course dealing with close-range sensing data acquired during the ISPRS summer school on close-range sensing techniques, in Alpine terrain in Obergurgl, Austria, in 2015 and 2017. The online course is embedded within an e-learning platform provided by the University of Innsbruck. Four assignments dealing with close-range sensing data derived from cameras and laser-scanning devices to monitor environmental process in Alpine environments were made freely available to everyone interested in these topics. The platform can be accessed online at (login with the guest access): <https://lms.uibk.ac.at/url/RepositoryEntry/4345856002>.

CAPACITY BUILDING FOR HIGH-RESOLUTION LAND COVER INTERCOMPARISON AND VALIDATION

(PIs: Maria Brovelli, Politecnico di Milano, Italy; Hao Wu, National Geomatics Center of China, China)

The project focused on the current needs in the field of intercomparison and validation of high-resolution Land Cover (LC) maps, and developed the computer-aided teaching and learning material that facilitates and enhances implementation of validation and intercomparison. Dissemination of the developed material started with FOSS4G 2018 Conference in Dar es Salam, Tanzania in 2018, followed by two hands-on workshops on 1 September 2018 at the World Bank in Dar es Salaam, Tanzania and 3 September 2018 at the Regional Centre for Mapping of Resources for Development in Nairobi, Kenya.

ESTABLISHING AN OPEN REPOSITORY AND CATALOGUE FOR GEOSPATIAL EDUCATIONAL RESOURCES

(PIs: Victoria Rautenbach and Serena Coetzee, University of Pretoria, South Africa)

The project developed an open, searchable catalogue for geospatial educational resources, which can be used by communities, such as ISPRS or GeoForAll, universities and other educational institutions. The development was based on the evaluation of existing catalogues and the profile of IEEE LOM that was developed for catalogue metadata. The pilot catalogue is available at <https://isprs.education/> and the code can be accessed at https://github.com/vrautenbach/isprs_catalogue.

EDUCATION AND TRAINING RESOURCES ON DIGITAL PHOTOGRAMMETRY

(PI: Grazia Tucci, University of Florence, Italy)

The project aimed at producing and sharing updated educational and training resources for supporting tutorials, workshops, seminars about the latest advances in digital photogrammetry. The materials developed were first used in the Ground-based 3D Modeling (Close-Range Photogrammetry & TLS) tutorial, held during the ISPRS TCV Midterm Symposium in 2018 in Dehradun, India, followed by a workshop held from 23 to 26 March 2019, acquiring part of the so-called New Jerusalem of San Vivaldo, Montaione, Italy.

MOTIVATE LEARNING: MAKING OPPORTUNITIES TO INITIATE VALUABLE ALLIANCE THROUGH EXPERIENTIAL LEARNING

(PIs: Sheryl Rose Reyes, Angelica Kristina Monzon, Charles Jjuuko, ISPRS Student Consortium; Tanita Suepa, Jakrapong Tawala, GISTDA Thailand)

The project was designed to build the capabilities of students and young professionals in the fields of remote sensing, photogrammetry and spatial information sciences, which was comprised of two programs: ISPRS SC Summer School + Hackathon and The Spatial Exchange Program, both were successfully organized. The project materials, including presentations from lecturers, manuscripts and lecture videos, and photos can be accessed at: <http://bit.ly/2FJb9RK>.

In 2019, a new call for ISPRS Educational and Capacity Building Initiatives projects was issued, and four projects were selected to be completed by the end of 2020. In total, the funding for ISPRS Educational and Capacity Building Initiatives reaches 80,000 Swiss Francs.

ISPRS SCIENTIFIC INITIATIVES 2019

In accordance with the statutory mission and activities of ISPRS, the Society shall provide funds to support scientific and other initiatives, which will further improve its international status in the field of the photogrammetry, remote sensing and spatial information sciences, and will therefore benefit all ISPRS members. After 3 rounds of calls for Scientific Initiative projects in 2014, 2015 and 2017 physical years, the Council issued a new call in June 2018 for 2019 projects, with an original total budget of 60,000 Swiss Francs. By the submission deadline, fifteen proposals were received from the five Technical Commissions. Comments were sought from the relevant Technical Commission Presidents, and a committee of three Council members was convened to perform independent reviewing of the proposals based on their scientific merits, as well as value to, and promotion of, ISPRS. The committee's recommendation of the six top-ranked applications, with a total budget of 55,000 Swiss Francs, was approved by the ISPRS Council. The following briefly describes the outcome of each project, with full reports available on the ISPRS website.

ISPRS BENCHMARK ON MULTI-SENSORIAL INDOOR MAPPING AND POSITIONING

(PI: Cheng Wang, Xiamen University, China)

This project provided a framework for the evaluation and comparison of LiDAR-based SLAM, BIM feature extraction, and smartphone-based indoor positioning methods, with the datasets available the [ISPRS website](#) for researchers to download for further evaluation of the BIM feature extraction on indoor 3D point clouds. The project results have been published in a number of journal and conference papers. A further plan is to organize a benchmark test by issuing a call for interested researchers to participate in the benchmark test by applying their methods to the benchmark datasets and submitting the results for evaluation.

DEVELOPMENT OF AN OPEN SOURCE MULTI-VIEW AND MULTIMODAL FEATURE MARCHING TOOL FOR PHOTOGRAMMETRIC APPLICATIONS

(PI: Diego González-Aguilera, University of Salamanca, Ávila, Spain)

The project developed an open source feature extraction and matching platform, called PhotoMatch. PhotoMatch encloses and combines different state-of-the-art detectors and descriptors, together with different matching strategies, providing a tool that guarantees the best combination of the triplet: detector/descriptor/matcher and offering an educational tool that allows the user to test and combine different detectors and descriptors, as well as to assess the precision and reliability of the results obtained. The project plans to promote its results in ISPRS/CIPA/EuroSDR events as well as in the CATCON contest in 2020.

INTERNATIONAL BENCHMARKING OF TERRESTRIAL IMAGE-BASED POINT CLOUDS FOR FORESTRY

(PIs: Markus Hollaus, TU Wien, Austria; Martin Mokroš, Czech University of Life Sciences, Czech Republic; Yunsheng Wang, Finnish Geospatial Research Institute, Finland)

The project proposed to evaluate the performance of terrestrial image-based point clouds in plot-level forest inventory through an international benchmarking and investigated whether the image-based point clouds can be an alternative solution to the more expensive terrestrial laser scanning (TLS) derived point clouds. The image-based point clouds of ten typical forest plots situated in five different countries (two in each country), namely Austria, China, Czech Republic, Finland and Slovakia, were acquired and processed with their own algorithms for tree mapping and modeling. The results were received from all from 14 different research groups, pending for evaluation and analysis with respect to field collected reference as well as TLS data and the images. The project is still ongoing.

GEOBIM BENCHMARK: REFERENCE STUDY ON SOFTWARE SUPPORT FOR OPEN STANDARDS OF CITY AND BUILDING MODELS

(PI: Francesca Noardo, TU Delft, Netherlands)

The project aimed at identifying tools that are needed to better support the integration of the two kinds of models, 3D City Models (from GIS) and Building Information Models (BIM), working towards GeoBIM, which is an integrated, single view of the built environment (see [GeoBIM benchmark 2019](#)). It tested a significant number of software tools, including the most frequently used ones, to validate support for open standards (CityGML and IFC), effective management of geo-referencing by BIM software (for IFC data), and available conversion procedures between CityGML and IFC. A reference framework for researchers and practitioners working on geo-BIM integration, along with a wish list for further developments, was developed. The outcomes of the project also include a number of scientific papers, meetings and a workshop.

THE ISPRS BENCHMARK TEST ON INDOOR MODELLING

(PI: Kourosh Khoshelham, University of Melbourne, Australia)

The main objective of this project was to evaluate the performance of indoor modelling methods with respect to level of automation, computational complexity, and the quality of the generated model. For this purpose, the project developed an evaluation framework and extended the benchmark dataset developed in a previous SI project. An open call for participating in the benchmark test was issued, and eight submissions have been received for evaluation. The evaluation results are published on the [ISPRS website](#). The evaluation framework was presented through conference and journal papers, and the project plans to present the full evaluation results in Nice congress and in a journal article.

CAPACITY BUILDING FOR OBJECT DETECTION AND TRACKING IN UAV VIDEOS USING DEEP LEARNING

(PI: K. Vani, Anna University, India)

The project aimed at developing learning materials and tools for object detection and tracking in UAV videos using deep learning with the aid of open source software, based on the study and development of novel methodologies for object detection and tracking, using deep learning with UAV videos. While still pending for completion, the project has so far completed the development of the deep learning tool using open source software for object detection and tracking using UAV videos and has published a number of journal articles and conference papers.

The total ISPRS funding of Scientific Initiatives for 2014, 2015, 2017 and 2019, exceeded 180,000 Swiss Francs. Reports on projects funded by the 2014, 2015 and 2017 Scientific Initiatives calls can also be found on the ISPRS website. The next call for Scientific Initiatives projects will be announced in June 2020.

Songnian Li
ISPRS Treasurer



ISPRS PUBLICATIONS AND EVENTS SINCE THE XXIII ISPRS CONGRESS 2016 IN PRAGUE

THE INTERNATIONAL ARCHIVES OF THE PHOTOGRAMMETRY, REMOTE SENSING AND SPATIAL INFORMATION SCIENCES

Year	Title	Date/Place	Volume
2019	ISPRS WG V/7 & WG IV/6 <u>International Workshop on “Capacity Building and Education Outreach in Advance Geospatial Technologies and Land Management”</u>	10-11 Dec Dhulikhel, Nepal	XLII-5/W3
2019	ISPRS TC II <u>Optical 3D Metrology</u>	2-3 Dec Strasbourg, France	XLII-2/W18
2019	ISPRS TC II <u>6th International Workshop LowCost 3D – Sensors, Algorithms, Applications</u>	2-3 Dec Strasbourg, France	XLII-2/W17
2019	ISPRS WG IV/4 & IC WG IV/III <u>ISPRS and GEO Workshop on Geospatially-enabled SDGs Monitoring for the 2030 Agenda</u>	19-20 Nov Changsha, China	XLII-4/W20
2019	ISPRS TC V <u>PhilGEOS x GeoAdvances 2019 “Geomatics and Data Science: Towards Adaptive Management in a Changing World”</u>	14-15 Nov Manila, Philippines	XLII-4/W19
2019	<u>2019 ISPRS Workshop on Remote Sensing and Synergic Analysis on Atmospheric Environment (RSAE)</u>	25-27 Oct Nanjing, China	XLII-3/W9
2019	ISPRS WG IV/3, WG I/8 & WG II/4 <u>ISPRS International GeoSpatial Conference 2019, Joint Conferences of 5th Sensors and Models in Photogrammetry and Remote Sensing (SMPR) and 3rd Geospatial Information Research (GI Research)</u>	12-14 Oct Karaj, Iran	XLII-4/W18
2019	<u>4th International Conference on Smart Data and Smart Cities</u>	1-3 Oct Kuala Lumpur Malaysia	XLII-4/W17
2019	ISPRS WG IV/I <u>6th International Conference on Geomatics and Geospatial Technology (GGT 2019)</u>	1-3 Oct Kuala Lumpur Malaysia	XLII-4/W16
2019	ISPRS WG IV/10 <u>14th 3D GeoInfo Conference 2019</u>	24-27 Sep Singapore	XLII-4/W15
2019	ISPRS WG V/7 <u>Measurement, Visualisation and Processing in BIM for Design and Construction Management</u>	24-25 Sep Prague Czech Republic	XLII-5/W2
2019	ISPRS ICWG II/III <u>PIA19+MRSS19 Photogrammetric Image Analysis & Munich Remote Sensing Symposium: Joint ISPRS conference</u>	18-20 Sep Munich, Germany	XLII-2/W16

2019	ISPRS TC I & WG I/10 <u>Workshop on the Evaluation and Benchmarking Sensors, Systems and Geospatial Data in Photogrammetry and Remote Sensing</u>	16-17 Sep Warsaw, Poland	XLII-1/W2
2019	ICOMOS/ISPRS International Scientific Committee <u>CIPA – Heritage Documentation: 50 Years: Looking Backwards</u>	-	XLII-2/W14
2019	ISPRS ICWG III/IVa <u>Gi4DM 2019</u> <u>GeoInformation for Disaster Management</u>	3-6 Sep Prague, Czech Republic	XLII-3/W8
2019	ICOMOS/ISPRS International Scientific Committee on Heritage Documentation (CIPA) <u>27th CIPA International Symposium</u> <i>Documenting the past for a better future</i>	1-5 Sep Ávila, Spain	XLII-2/W15
2019	ISPRS WG IV/4 <u>FOSS4G 2019 – Academic Track</u>	26-30 Aug Bucharest, Romania	XLII-4/W14
2019	<u>ISPRS Geospatial Week 2019</u>	10-14 June Enschede, The Netherlands	XLII-2/W13
2019	ISPRS WG II/10 & WG II/5 <u>International Workshop on Photogrammetric and Computer Vision Techniques for Video Surveillance, Biometrics and Biomedicine</u>	13-15 May Moscow, Russia	XLII-2/W12
2019	ISPRS WG II/8, WG III/5, WG V/1 <u>GEORES 2019</u> <i>2nd International Conference of Geomatics and Restoration</i>	8-10 May Milan, Italy	XLII-2/W11
2019	ISPRS TC II, WG II/9 <u>Underwater 3D Recording and Modelling</u> <i>A Tool for Modern Applications and CH Recording</i>	2-3 May Limassol, Cyprus	XLII-2/W10
2019	ISPRS Technical Commission III WG III/2, 10 Joint <u>Workshop</u> <i>Multidisciplinary Remote Sensing for Environmental Monitoring</i>	12-14 Mar Kyoto, Japan	XLII-3/W7
2019	ISPRS WG III/10 - GEOGLAM - ISRS <u>Joint International Workshop on Earth Observations for Agricultural Monitoring</u>	18-20 Feb New Delhi, India	XLII-3/W6
2019	<u>8th International Workshop 3D-ARCH</u> <i>3D Virtual Reconstruction and Visualization of Complex Architectures</i>	6-8 Feb Bergamo, Italy	XLII-2/W9
2018	ISPRS TC V <u>ISPRS TC V Mid-term Symposium</u> <i>Geospatial Technology – Pixel to People</i>	20-23 Nov Dehradun, India	XLII-5
2018	<u>2018 ISPRS Workshop on Remote Sensing and Synergic Analysis on Atmospheric Environment</u>	7-8 Nov Guangzhou, China	XLII-3/W5
2018	ISPRS TC I <u>ISPRS TC I Mid-term Symposium</u> <i>Innovative Sensing – From Sensors to Methods and Applications</i>	10-12 Oct Karlsruhe, Germany	XLII-1

2018	<u>5th International Conference on Geoinformation Science – GeoAdvances 2018: ISPRS Conference on Multi-dimensional & Multi-scale Spatial Data Modeling</u>	10-11 Oct Casablanca, Morocco	XLII-4/W12
2018	<u>3rd International Conference on Smart Data and Smart Cities</u>	4-5 Oct Delft, The Netherlands	XLII-4/W11
2018	ISPRS TC IV <u>ISPRS TC IV Mid-term Symposium 3D Spatial Information Science – The Engine of Change</u>	1-5 Oct Delft, The Netherlands	XLII-4
2018	<u>13th 3D Geoinfo Conference 2018</u>	1-2 Oct Delft, The Netherlands	XLII-4/W10
2018	<u>International Conference on Geomatic & Geospatial Technology (GGT 2018) Geospatial and Disaster Risk Management</u>	3-5 Sep Kuala Lumpur, Malaysia	XLII-4/W9
2018	<u>FOSS4G 2018</u>	29-31 Aug Dar es Salaam, Tanzania	XLII-4/W8
2018	ISPRS TC II <u>ISPRS TC II Mid-term Symposium Towards Photogrammetry 2020</u>	4-7 Jun Riva del Garda, Italy	XLII-2
2018	ISPRS TC III <u>ISPRS TC III Mid-term Symposium Developments, Technologies and Applications in Remote Sensing</u>	7-10 May Beijing, China	XLII-3
2018	ISPRS ICWG III/IVa <u>Geoinformation For Disaster Management</u>	18-21 Mar Istanbul, Turkey	XLII-3/W4
2017	ISPRS TC II <u>5th International Workshop LowCost 3D Sensors, Algorithms, Applications</u>	28-29 Nov Hamburg, Germany	XLII-2/W8
2017	ISPRS WG IV/1, WG IV/5 & WG IV/10 <u>12th 3D Geoinfo Conference 2017</u>	26-27 Oct Melbourne, Australia	XLII-4/W7
2017	ISPRS WG III/4, WG III/1 & WG I/5 <u>Frontiers in Spectral imaging and 3D Technologies for Geospatial Solutions</u>	25-27 Oct Jyväskylä, Finland	XLII-3/W3
2017	ISPRS WG IV/1 <u>4th International GeoAdvances Workshop – GeoAdvances 2017: ISPRS Workshop on Multi-dimensional & Multi-scale Spatial Data Modeling</u>	14-15 Oct Safranbolu, Karabuk, Turkey	XLII-4/W6
2017	ISPRS TC IV, WG IV/3 <u>ISPRS International Joint Conferences of The 2nd Geospatial Information Research GI Research 2017 The 4th Sensors and Models in Photogrammetry and Remote Sensing SMPR 2017 The 6th Earth Observation of Environmental Changes EOEC 2017</u>	7-10 Oct Tehran, Iran	XLII-4/W4
2017	ISPRS WG IV/10, WG IV/4, WG IV/6, WG IV/7 <u>2nd International Conference on Smart Data and Smart Cities</u>	4-6 Oct Puebla, Mexico	XLII-4/W3

2017	ISPRS WG IV/1 <u>International Conference on Geomatic and Geospatial Technology 2017 "Geospatial and Disaster Management"</u>	4 Oct Kuala Lumpur, Malaysia	XLII-4/W5
2017	<u>ISPRS Geospatial Week 2017</u>	18-22 Sep Wuhan, China	XLII-2/W7
2017	<u>International Conference on Unmanned Aerial Vehicles in Geomatics</u>	4-7 Sep Bonn, Germany	XLII-2/W6
2017	ICOMOS/ISPRS International Scientific Committee on Heritage Documentation (CIPA) <u>26th International CIPA Symposium – Digital Workflows for Heritage Conservation</u>	28 Aug - 1 Sep Ottawa, Canada	XLII-2/W5
2017	ISPRS ICWG III/II <u>2017 International Symposium on Planetary Remote Sensing and Mapping</u>	13-16 Aug Hong Kong	XLII-3/W1
2017	ISPRS WG IV/4 <u>FOSS4G-Europe 2017 – Academic Track</u>	18-22 Jun Marne La Vallée France	XLII-4/W2
2017	<u>ISPRS Hannover Workshop: HRIGI 17 – CMRT 17 – ISA 17 – EuroCOW 17</u>	6-9 Jun Hannover, Germany	XLII-1/W1
2017	ISPRS WG V/1, WG V/2, WG II/8 & CIPA <u>GEOMATICS & RESTORATION – Conservation of Cultural Heritage in the Digital Era</u>	22-24 May Florence, Italy	XLII-5/W1
2017	ISPRS WG II/10, II/5 <u>International Workshop on "Photogrammetric and computer vision techniques for video surveillance, biometrics and biomedicine"</u>	15-17 May Moscow, Russia	XLII-2/W4
2017	<u>37th International Symposium on Remote Sensing of Environment</u>	8-12 May Tshwane South Africa	XLII-3/W2
2017	TC II & CIPA <u>3D Virtual Reconstruction and Visualization of Complex Architectures</u>	1-3 Mar Nafplio, Greece	XLII-2/W3
2016	TC IV <u>11th 3D Geoinfo Conference</u>	20-21 Oct Athens, Greece	XLII-2/W2
2016	<u>3rd International GeoAdvances Workshop</u>	16-17 Oct Istanbul, Turkey	XLII-1/W1
2016	TC IV <u>International Conference on Geomatic and Geospatial Technology (GGT) 2016</u>	3-5 Oct Kuala Lumpur Malaysia	XLII-4/W1

ISPRS ANNALS OF THE PHOTOGRAMMETRY, REMOTE SENSING AND SPATIAL INFORMATION SCIENCES

Year	Event/Title	Date / Place	Volume
2019	ISPRS WG V/7 & WG IV/6 <u>International Workshop on “Capacity Building and Education Outreach in Advance Geospatial Technologies and Land Management”</u>	10-11 Dec Dhulikhel, Nepal	IV-5/W2
2019	<u>4th International Conference on Smart Data and Smart Cities</u>	1-3 Oct Kuala Lumpur Malaysia	IV-4/W9
2019	ISPRS WG IV/10 <u>14th 3D GeoInfo Conference 2019</u>	24-27 Sep Singapore	IV-4/W8
2019	ISPRS ICWG II/III <u>PIA19+MRSS19 - Photogrammetric Image Analysis & Munich Remote Sensing Symposium: Joint ISPRS conference</u>	18-20 Sep Munich, Germany	IV-2/W7
2019	ICOMOS/ISPRS International Scientific Committee on Heritage Documentation (CIPA) <u>27th CIPA International Symposium</u> <i>Documenting the past for a better future</i>	1-5 Sep Ávila, Spain	IV-2/W6
2019	<u>ISPRS Geospatial Week 2019</u>	10-14 June Enschede The Netherlands	IV-2/W5
2019	ISPRS Technical Commission III WG III/2, 10 Joint <u>Workshop</u> <i>Multidisciplinary Remote Sensing for Environmental Monitoring</i>	12-14 Mar Kyoto, Japan	IV-3/W1
2018	ISPRS TC V <u>ISPRS TC V Mid-term Symposium</u> <i>Geospatial Technology – Pixel to People</i>	20-23 Nov Dehradun, India	IV-5
2018	ISPRS TC I <u>ISPRS TC I Mid-term Symposium</u>	10-12 Oct Karlsruhe, Germany	IV-1
2018	<u>3rd International Conference on Smart Data and Smart Cities</u>	4-5 Oct Delft The Netherlands	IV-4/W7
2018	ISPRS TC IV <u>ISPRS TC IV Mid-term Symposium</u> <i>3D Spatial Information Science – The Engine of Change</i>	1-5 Oct Delft The Netherlands	IV-4
2018	<u>13th 3D GeoInfo Conference 2018</u>	1-2 Oct Delft The Netherlands	IV-4/W6
2018	ISPRS TC II <u>ISPRS TC II Mid-term Symposium</u> <i>Towards Photogrammetry 2020</i>	4-7 Jun Riva del Garda, Italy	IV-2

2018	ISPRS TC III <u>ISPRS TC III Mid-term Symposium</u> <u>Developments, Technologies and Applications in</u> <u>Remote Sensing</u>	7-10 May Beijing, China	IV-3
2017	ISPRS WG V/7 <u>ISPRS Workshop "Geospatial Solutions for Struc-</u> <u>tural Design, Construction and Maintenance in</u> <u>Training Civil Engineers and Architects"</u>	4-6 Dec Kyiv, Ukraine	IV-5/W1
2017	ISPRS WG IV/1, WG IV/5 & WG IV/10 <u>12th 3D Geoinfo Conference 2017</u>	26-27 Oct Melbourne, Australia	IV-4/W5
2017	ISPRS WG IV/1 <u>4th International GeoAdvances Workshop – Geo-</u> <u>Advances 2017:</u> <u>ISPRS Workshop on Multi-dimensional & Multi-</u> <u>scale Spatial Data Modeling</u>	14-15 Oct Safranbolu, Karabuk Turkey	IV-4/W4
2017	ISPRS WG IV/10, WG IV/4, WG IV/6, WG IV/7 <u>2nd International Conference on Smart Data and</u> <u>Smart Cities</u>	4-6 Oct Puebla, Mexico	IV-4/W3
2017	<u>ISPRS Geospatial Week 2017</u>	18-22 Sep Wuhan, China	IV-2/W4
2017	<u>International Conference on Unmanned Aerial Ve-</u> <u>hicles in Geomatics</u>	4-7 Sep Bonn, Germany	IV-2/W3
2017	CIPA <u>26th International CIPA Symposium – Digital</u> <u>Workflows for Heritage Conservation</u>	28 Aug - 1 Sep Ottawa, Canada	IV-2/W2
2017	ISSC 2017 <u>2nd International Symposium on Spatiotemporal</u> <u>Computing 2017</u>	7-9 Aug Cambridge, USA	IV-4/W2
2017	<u>ISPRS Hannover Workshop:</u> <u>HRIGI 17 – CMRT 17 – ISA 17 – EuroCOW 17</u>	6-9 Jun Hannover, Germany	IV-1/W1
2016	ISPRS TC IV <u>11th 3D Geoinfo Conference</u>	20-21 Oct Athens, Greece	IV-2/W1
2016	ISPRS TC IV <u>1st International Conference on Smart Data and</u> <u>Smart Cities, 30th UDMS</u>	7-9 Sep Split, Croatia	IV-4/W1

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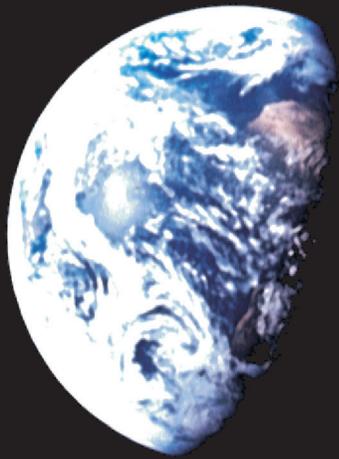
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