ISPRS

2012

RESOLUTIONS

Approved Resolutions of the XXIInd ISPRS Congress - Melbourne 2012

APPROVED RESOLUTIONS OF THE XXIInd ISPRS CONGRESS MELBOURNE 2012

General Resolutions

Resolution 0.1 Appreciation to Australian SSSI and the organisers of the Congress

The Congress commends:

The Australian SSSI, its president Gary Maguire, the Congress Director Cliff Ogleby, the Technical Programme Director, Mark Shortis, the Local Organising Committee and the Congress PCO, ICMS Pty Ltd. for their excellent work which has resulted in a very successful Congress.

Resolution 0.2 ISPRS approach to capacity building

The Congress

Noting:
- the many international organisations in the geospatial community which are involved in capacity building (CB);
- the importance of GEO, CEOSS and GGIM in capacity building;
- the need to avoid duplication of effort in times of economic austerity.

Recognising:
- that technological and scientific progress in the domain of earth observation and geoinformation provision is very fast;
- that the application domains of this technology are continuously increasing and becoming more complex;
- the absolute necessity for collaboration and efficient use of resources;
- the need for coordinated action within ISPRS to make use of the expertise within Technical Commissions and to liaise with the international network of which ISPRS is part.

Recommends:
- that all capacity building (CB) activities be coordinated by Council;
- that a member of Council be appointed as CB coordinator to work with all Technical Commissions and with the Regional Representatives to ensure a coherent ISPRS programme of capacity building;
- that an item be included in the ISPRS budget to allow the CB coordinator to meet with other international bodies and to provide seed funding for capacity building projects;
- that ISPRS and her sister societies stimulate their professional and academic participants to make their expertise available for knowledge transfer and exchange in this context;
- that ISPRS stimulates her Technical Commissions to develop structured approaches for the dissemination of new knowledge in the context of lifelong learning and capacity development;2
- that Technical Commission VI should be responsible for dissemination of knowledge and should be an action-oriented agent of ISPRS and

that the President of TC VI should work closely with the CB coordinator to implement ISPRS capacity-building programmes.

Resolution 0.3 Importance of scientific publishing in high-ranked journals

The Congress

Noting:
- that the competition for research funding between disciplines is tougher than ever;
- that the qualifications of experts are found from databases such ISI Web of Knowledge and Scopus, and using indexes such as H-index;
- that the work done in the field of ISPRS is not properly indexed on lists such asISI.

Recognising:
- that the disciplines of ISPRS are competing with other disciplines for space in universities, and that the scientific merits and indicators found in databases such as those mentioned above play an important role in decisionmaking;
- the possibilities of open-access publishing.

Recommends:
- that ISPRS facilitates more possibilities for scientific publishing in high-ranked journals (listed in ISI Web and Scopus);
- that ISPRS activates open access publishing possibilities in cooperation with the professionals in the open-access publishing field;
- that conferences organised by ISPRS should cooperate in special issues of high-ranked journals.

Resolution 0.4 Cooperation with other organisations and groups in the spatial information science domain

The Congress

Noting:
- the variety of organisations and groups dealing with spatial information science (IGU, ICA, GIScience, AGILE, etc.);
- the increasing number of workshops, symposia and conferences in this discipline.

Recognising:
- the determination of ISPRS to further strengthen its position in the spatial information science domain;
- the importance for spatial information science of image data, as well as quick data capture and data update by a variety of distributed sensors;
- the need to transfer contributions and strengths of ISPRS research in this domain to other organisations.

Recommends:
- that cooperation with other organisations be further strengthened in order to identify key research issues;
- the organisation of joint workshops and symposia with other organisations (IGU, ICA and others);

- increasing the attractiveness of ISPRS events through reviewed publications and highly interactive workshops.

Technical Resolutions

Resolution I.1 New paradigm for quality assurance and quality control of modern mapping systems The Congress

Noting:
- that there is significant improvement in direct georeferencing technology, which is allowing for substantial reduction of the control requirements for photogrammetric and lidarmapping;
- that miniaturisation of modern mapping systems such as cameras and laser scanners is becoming the norm for cost-effective mapping;
- that the employment of multi-unit mapping systems (multi-camera or multi-scanner systems) allows for larger coverage of mapped areas using fewer paths;
- that the end user is interested in the original data acquired by the system as well as derived products from such data.

Recognising:
- that achieving the potential accuracy from these multi-unit mapping systems is contingent on accurate sensor modelling and calibration and estimation of the system parameters while considering various deviations from the assumed acquisition geometry;
- that maintaining the economic gains from newly available mapping systems requires the development of cost-effective in-situ calibration procedures;
- that the increasing volume and varying format of collected data pose additional challenges in verifying the quality of data products delivered to the end user and even more challenges in the quality control of the delivered data products.

Recommends:
- investigation of established sensor modelling procedures to see if they are the best approach to handle multi-unit mapping systems (for example the concept of the exterior orientation parameters of the individual images might not be appropriate for dealing with imagery captured by multi-camera systems);
- development of better procedures for in-situ calibration of multi-unit mapping systems while increasing the flexibility of the data collection and control configuration;
- development of standardised procedures for investigating the stability of the estimated parameters while considering the needs of the end user (for example statistical testing of temporal calibration parameters might not be the best approach for system stability analysis);
- linking the quality control and quality assurance activities by considering hybrid approaches that can be used for verifying the quality of the delivered data while offering the possibility of improving the system calibration in case of identified problems;

- extending the quality control process to include the outcome of the data processing activities.

Resolution I.2 Digital surface and terrain models from spaceborne data

The Congress
Noting:
- the continuing increase in high resolution stereoscopic data acquisition capabilities from space;
- the increasing use of SAR and interferometric SAR for DEM generation;
- the need for accurate and detailed DEMs, also covering many areas with no availability of high resolution DEM and for applications where a higher DEM repetition rate is necessary;
- the simultaneous availability of multispectral information for improved stereo data evaluation.

Recognising:
- the need for the development of robust techniques for DSM and DTM generation using spaceborne data with different viewing angles and resolutions;
- the potential of satellite-borne high-resolution optical stereo and multispectral data to derive city models.

Recommends:
- the investigation and comparison of DEM generation methodologies (both DSM and DTM) based on high-resolution stereo sensors and SAR interferometry;
- the development of validation and quality measures for DEM data from space;
- the continuation and intensification of work to combine and correct datasets such as ASTER and SRTM using the Geoscience Laser Altimeter System (GLAS) or other high-order elevation data in order to produce global, high-quality DSMs;
- the collaboration with other Technical Commissions on the applicability to city modelling and more frequent coverage for 3D change detection and other applications.

Resolution I.3 Integrated systems for sensor georeferencing (orientation) and navigation

The Congress
Noting:
- the rapid expansion of new multi-sensor platforms devoted to mobile mapping and operating from the ground, water or air (operation from the latter may be achieved in autonomous mode),
- while the procedures for fusing sensor observations inherited from the past engage models and/or
- estimation methods that are less appropriate to the new hardware and do not fully exploit the observation redundancy in terms of detection and elimination of systematic errors (in navigation as well as in optical sensor data);
- the foreseen extension of GNSS with the GLONASS update and the upcoming deployment of Galileo, but the relative "fragility" of all GNSS signals to electromagnetic interference and the

dependency of direct georeferencing and navigation performance on its availability;
- the evolution of inertial technology that will gradually lead to the replacement of the larger, costly, yet more precise and reliable tactical-grade instruments with smaller, less expensive Micro Electro Mechanical Systems (MEMS) inertial measurement units (IMUs) of lower quality but with the possibility of redundant configurations;
- the absence of standards and regulation in the rapidly expanding market for mobile mapping from autonomous platforms that would reflect the real robustness and reliability of unmanned aerial vehicle (UAV)systems;
- the limitations of currently available models for inertial sensors and IMUs in the context of the high precision, accuracy and reliability requirements of photogrammetry, vision-based and vision-aided navigation.

Recognising:
- the need for development of new sensor fusion procedures that reach beyond the separate or
- cascaded adjustment of navigation and sensor data;
- the necessity of developing new algorithms for navigation, guidance and control of UAVs with mapping payload for increased performance, robustness and autonomy in the absence of GNSS signals;
- the need to develop new models for sensor and systems of lower quality employed in mobile mapping and direct georeferencing (e.g. low-cost cameras, MEMS IMUs, etc.);
- the need to establish new approaches when determining or certifying new platforms for unmanned mapping operations;
- the need to develop integrity concepts and measures for vision-based and vision-aided indoor and outdoor navigation systems.

Recommends:
- initiation of, and support for, the development of new models and estimation procedures that integrate optical sensors and navigation data at measurement level and their optimisation for both real-time and post-processing;
- the integration of the concept of geodetic-like robustness and reliability in the design of new unmanned mapping platforms while increasing their autonomy and integrity in the absence or perturbation of GNSS positioning;
- investigation and establishment of links between vision-based and vision-aided navigation and navigation integrity;
- the enhancement of the modelling and estimation procedures for redundant MEMS IMU configurationsin the service of direct georeferencing and sensor orientation;
- the investigation of the potential of using swarms of UAVs for better estimation of the navigation parameters through collaborative navigation solutions;
- collaboration with other international organisations on unifying standardisation of measures related to

mapping quality from mobile platforms and proposing new concepts for estimating the reliability of new unmanned mapping systems.

Resolution II.1 Multi-dimensional, multi-thematic and multi-resolution spatial information for spatial decision-support systems
The Congress
Noting:
- the increasing availability of spatial data at different temporal, thematic and geometric
- resolutions;
- that many urgent issues facing mankind require detailed spatial data;
- the development of geosensor network technology allowing distributed sensors to measure and locally communicate geospatial information;
- the availability of moving-point datasets representing spatial phenomena or spatio-temporal behaviour.

Recognising:
- the critical role of explicit semantics and ontologies of geospatial data;
- the potential of such data for decision support;
- the need for data integration in order to exploit the richness of the individual datasets;
- the need to identify appropriate spatial information for dedicated applications via the Internet.

Recommends:
- the development of methods and tools for the mining of multi-resolution spatio-temporal data, and its semantic, geometric and topological integration and analysis;
- the development of methods and algorithms for moving-point data representation, storage, analysis and visualisation;
- the establishment and development of techniques for integration of intelligent sensor data;
- the development of efficient representation and storage methods for multi-dimensional and multi-temporal data;
- the establishment of benchmarks and sample datasets for testing proposed solutions in spatial data handling and for quality control.

Resolution II.2 Pervasive geocomputing and services
The Congress
Noting:
- the newly emerging cloud computing technology;
- the general trends towards miniaturisation, and towards ubiquitous and wearable computing; - new applications of spatial data and geocomputing, e.g. in traffic and personal navigation;
- the fast emergence of Web 2.0;
- the paramount role of the Internet and location-based services, and of 'virtual globes' in society.

Recognising:
- the increasing potential of the World Wide Web for dissemination of spatial information;

- that 'virtual globes' offer a more intuitive view of spatial phenomena for a wider audience than conventional maps;
- the challenges of efficient storage and processing of vast amounts of spatial data.

Recommends:
- the development of cloud computing for geospatial modelling and simulation;
- the encouragement of research in pervasive geocomputing;
- the development of geospatial data processing techniques using distributed services and other advanced developments in general purpose computing;
- the development of Web and mobile search engines for spatio-temporal data.

Resolution II.3 Uncertainty modelling and quality control for spatial data and analyses

The Congress
Noting:
- the trend of demand for ever higher quality of spatial data from GIS users;
- the existence of errors in spatial data and uncertainties in spatial analyses and modelling;
- the potential of new solutions for error modelling and uncertainty analyses for spatial data.

Recognising:
- the importance of high quality spatial data for spatial decision making;
- the challenges of effective modelling uncertainties in complex spatial data;
- the importance of recognition of quality problems in spatial data by general GIS users, especially those using Internet GIS whose data quality is not ensured.

Recommends:
- investigation of new mathematical theories for uncertainty modelling of spatial data and analyses;
- the development of effective methods of uncertainty modelling for multi-resolution and multi-temporal spatial data;
- the encouragement of research on spatial data quality control including the implications of crowd sourcing;
- the implementation of advanced methods of spatial data quality checking and control on commercial GIS software, towards possible inclusion in national and international data quality standards.

Resolution II.4 Geovisualisation of multi-dimensional data

The Congress
Noting:
- an increasing demand by the general public for visualisation of spatial data;
- the wide availability of mobile and Web-based visualisation products;
- the availability of huge, complex, multi-dimensional geospatial datasets, and the development of new visualisation devices such as globe displays, smart paper and touch tables.

Recognising:
- that the integrated visualisation of multi-dimensional data offers major challenges;
- that visualisation plays an important role in all ISPRS disciplines;
- the need for collaborative visualisation using a variety of devices.

Recommends:
- research into novel visualisation technologies for spatial data;
- the development of strategies and methods for collaborative geovisualisation of dynamic phenomena in cooperation with TC IV;
- the development of advanced methods for visualisation of, visual analytics for, and interaction with, multi-dimensional heterogeneous data, complementing the work of TC IV.

Resolution III.1 Building enhanced links between the communities of photogrammetry, remote sensing, computer science and robotics

The Congress
Noting:
- that photogrammetric concepts and tools are being developed and redeveloped in the robotics field especially for the localisation of robots;
- that maps are used more and more for the analysis of the surroundings of robots and the planning of trajectories;
- that remote sensing imagery and data, and their processing, are taking a larger place in the computer graphics community.

Recognising:
- that past resolutions on the convergence between photogrammetry and computer vision techniques have had positive effects on our disciplines;
- that tools to visualise, edit, interact and manage updates with huge 3D models and/or point clouds are being successfully developed in the computer graphics community;
- that interesting work is being carried out in the field known as photometric computer vision or photometric computer graphics, for radiometric and shadow correction to increase readability and seamlessness of images.

Recommends
- that the positive work in bringing the photogrammetric and computer vision communities together should be continued;
- bringing together our community with the robotics and computer graphics community
- the co-organisation of workshops with these different communities;
- research on the generation of maps for autonomous navigation;
- the development of hybrid models for image correction, unlighting and relighting.

Resolution III.2 Developing models and scaling processing methods to manage "big data" collections

The Congress

Noting:
- that some datasets (known as "big data") are becoming so large and complex that they become awkward to work with using on-hand database management tools;
- that the volumes of data acquired by mobile mapping systems is increasing significantly;
- that image-based sensor networks (e.g. CCTV camera networks) needing real-time processing are also developing fast.

Recognising:
- that many applications in our field require quick-response mapping or would require real-time or near real-time processing;
- that having large collections of data allows the use of better statistical models for applications such as object detection, object reconstruction or data mining.

Recommends:
- the development of models and methods for scaling the analysis and object extraction with GPU, multi-CPU or hybrid architectures;
- the development of new models and processing techniques for applications such as data mining or image retrieval that may benefit from the availability of large datasets.

Resolution III.3 Data fusion for object extraction and scene analysis

The Congress

Noting:
- that many mapping systems are equipped with ranging, imaging and positioning sensors;
- that polarimetric and multi-frequency SAR is becoming increasingly used.

Recognising:
- that processing in a sufficiently short time to avoid congesting production lines is a major constraint;
- that the processing of each source of imagery on its own is not optimal;
- that positioning information is important for aligning the data acquired by ranging and imaging sensors.

Recommends:
- the development of methods and algorithms mixing data from imaging, ranging and positioning systems for object extraction and scene analysis.

Resolution IV.1 Data acquisition, update and automation for creating and maintaining interoperable geospatial databases

The Congress

Noting:
- the increasing role of interoperable distributed geospatial databases created and maintained by different nations, regions, cities, agencies and the private sector;

- the increased awareness of standards in data models and database technology to support weband loud-based parallel processing and query;
- the acquisition of an increasing amount of high-resolution digital images and high-accuracy point clouds from many diverse platforms, but in particular from unmanned aerial vehicles (UAVs), and in geosensor networks collecting and analysing spatial data in a collaborative way;
- the increased availability of data gathered through crowd sourcing, social media and other means of participative data acquisition;
- the increased availability of high-performance software and hardware for data acquisition and processing, including image and vector data and ancillary information.

Recognising:
- the lack, in many cases, of the necessary up-to-date and properly integrated data for time-critical applications;
- the relatively slow progress in developing interoperable, multi-scale, multi-dimensional data models and databases serving the needs of the geospatial community;
- the need to further understand geosensors and geosensor networks to fully exploit their potential in developing proactive geospatial systems and applications;
- the difficulties in assessing the impact of current research tools for many users responsible for geospatial data acquisition and update and database maintenance;
- the lack of established procedures for integration and common use of authoritative and participative data.

Recommends:
- the promotion of the use of new sensors, platforms and geosensor networks for the fast acquisition and update of geospatial data;
- the intensification of development and experimental usage of multi-scale, interoperable geospatial and spatio-temporal 2D and 3D databases in activities such as pilot studies and benchmarking atthe local, regional, national and global level;
- - the organisation of comparative tests of the results available in the scientific literature in order to assess and improve existing tools for semi-automatic and automatic data acquisition and update from images and ancillary data with a special emphasis on open-source solutions;
- the intensification of development of methods and good practice examples for database maintenance and quality control including fast access, indexing, query and search mechanisms.

Resolution IV.2 Geospatial infrastructures and web/cloud-based services for managing, displaying, disseminating and exploring multi-sensor data

The Congress

Noting:
- the increased access to terabytes of geospatial information over cyber infrastructure has

continuously changed the way people work, live and play, but a lack of sufficient processing power remains;
- mapping services having emerged as the new way to allow a multitude of users to post, consume, compare and analyse data collaboratively;
- the trend of providing automatic, analytical, shared and open source web/cloud services, using the web/cloud as the managing, processing and computing platforms for geospatial information;
- the trend towards miniaturisation, and ubiquitous and wearable computing;
- the increasing demand-driven availability of web-based visualisation tools and of new visualisation devices;
- the increased interest in real-time monitoring of dynamic phenomena and moving objects;
- advances in cyber-infrastructure network and communicating technologies, especially the more recent cloud computing technologies.
- Recognising:
- the potential for accessing massively scaled computing infrastructure and new web/cloud services for online processing of static and dynamic geospatial and spatio-temporal information and data-intensive problems;
- the value of "virtual globes" for processing and dissemination of geospatial data, processes and phenomena;
- the integrated multi-user collaborative visualisation of multi-dimensional data offering major challenges in research and development;
- international activities for standardisation of service, system architectures and geospatial information, processes and workflows such as those from ISO and from OGC.

Recommends:
- research into novel online multi-dimensional visualisation technologies for spatial data, geospatial analytics and methods for collaborative geovisualisation of dynamic phenomena in cooperation
- with ISPRS Technical Commission II, International Cartographic Association (ICA) and Open Geospatial Consortium (OGC);
- further development of cloud-based, server-based, location-based, network-centred, distributed and federated architectures for geospatial services and analysis including grid computing;
- the development of applications for dynamic management, analysis, service and archiving of multi-sensor data over the web;
- investigation of social and organisational issues related to web/cloud-based services for managing, displaying, disseminating and exploring multi-sensor data.

Resolution IV.3 Multi-dimensional spatial databases for safety and security, relief management and monitoring.
The Congress
Noting:
- the role of geospatial data in sustainable development and time-critical applications;
- the advances in designing and developing multi-dimensional geospatial databases, standards and tools;
- the increased cooperation between international standardisation bodies involved in developing specifications, standards and regulations for collecting and preserving geospatial data in different domains;
- the maturity of geospatial and multi-media database management systems.
Recognising:
- the increased demand for geospatial information in supporting safety and security, relief monitoring and managing activities;
- the increasing importance of harmonised geospatial data as a common base for many aspects of safety and security, environmental monitoring and sustainable development;
- the significantly increased role of geospatial data in understanding time-dependent processes and phenomena related to global change;
- the increased need for integration of multi-scale, indoor/outdoor, above/under and land/water/air geospatial data for time-critical decision making;
- the increased need for user-centred, context-aware, knowledge-based software to be used by a larger group of professionals dealing with security and environmental issues.
Recommends:
- the intensification of development of integrated indoor/outdoor, above/under surface geospatial databases in support of safety and security, relief and environmental monitoring applications;
- dedicated research efforts on semantics in geospatial data and semantic mapping of geospatial databases;
- the organisation of comparative tests and best-practice applications and pilot projects, the better to demonstrate the value of accurate and reliable geospatial information to other players in the fields of security and relief operations and in global change;
- strengthening research on bridging 3D geospatial and spatio-temporal data structures and models considering different needs and representations of the above-mentioned disciplines.

Resolution IV.4 Geodatabases for extraterrestrial research
The Congress
Noting:
- the advances in sensors, platforms and programmes for remote sensing of the planets, satellites and small bodies of the solar system;

- the interest of the general public in planetary and other extraterrestrial datasets and results of planetary exploration.

Recognising:
- the increased demand for, and availability of, spatial information in supporting solar system exploration;
- the need to process the available and increasingly voluminous extraterrestrial datasets,
- particularly for the Moon, the planet Mars and Sun-Earth interactions, in an integrated and harmonised way in order to provide a solid base for their scientific exploitation;
- the need to study the history of the planets and other extraterrestrial bodies in order to learn more about future scenarios of the Earth and to provide valuable contributions to sustainable planning.

Recommends:
- that the development of integrated spatial databases for extraterrestrial applications should be intensified;
- the strengthening of research and development of observing and analysis technologies for extraterrestrial remote sensing and mapping;
- the forging of collaborations with the other Commissions and Working Groups of ISPRS to apply the widest range of state-of-the-art analysis and mapping techniques to problems involving planetary data.

Resolution V.1 Low cost 3D sensors
The Congress
Noting:
- the widespread availability and ubiquity of relatively low cost 3D sensors;
- the increasing development and maturity of smartphone technology;
- the increased interest in the application of such sensors to measurement.

Recognising:
- the need for rigorous yet tractable calibration, orientation and recognition algorithms.

Recommends
- that ISPRS research activity on 3D sensors be strengthened in the application and development of low-cost sensors for measurement purposes.

Resolution V.2 Mobile mapping
The Congress
Noting:
- the increase in the number of commercially operational mobile mapping systems comprising integrated navigation sensors and multiple passive and active imaging sensors;
- the consequential growth of the mobile data collection industry.

Recognising:
- the need for fast and accurate algorithms to recognise patterns in huge volumes of collected point clouds.

Recommends
- increased research activity into automated object recognition from point clouds collected by mobile platforms;
- closer cooperation between ISPRS Commissions I, III and V, as well as external organisations (e.g. FIG and EuroSDR) concerning such systems.

Resolution V.3 Object reconstruction using consumer-grade imagery and open-source, web-based software
The Congress
Noting:
- the increasing demand for non-specialist applications of image-based spatial data;
- the wide availability of accessible web-based solutions capable of generating 3D data from consumer image sources (e.g. Microsoft Photosynth/Autodesk 123-D Catch).

Recognising:
- the desire to maintain precision and accuracy as important aspects of photogrammetric solutions.

Recommends:
- investigation of the potential for precise three-dimensional spatial reconstruction of objects online from crowd-sourced image and associated data;
- identification of ways to engage non-photogrammetrists with the ISPRS community.

Resolution VI.1 Cooperation with sister societies on education for lifelong learning and capacity development
The Congress
Noting:
- that the technology and societal conditions of earth observation and geoinformation provision are developing very fast;
- that the application domains of this technology are also continuously expanding and becoming more complex;
- that these developments lead to continuous development of processes and working conditions for the provision and use of spatial information;
- that GI organisations and professionals should continuously update and upgrade their knowledge;
- that in many countries and/or regions ofthe world the development of the geo-information sector is lagging behind and requires support to catch up with global standards.

Recognising:
- the fact that in many regions educational and training capacity in the geo-information field is insufficient;
- the insufficiency of provisions for lifelong learning;
- the complexity and wide coverage of the domain of the provision and use of spatial information;
- the still growing needs for professionals and organisations working in this domain.

Recommends:
- that ISPRS and her sister societies ICA, FIG, EuroSDR and others should develop joint action

programmes for the provision of educational and training facilities;
- that these facilities focus especially on the needs for lifelong learning and capacity development;
- that these societies stimulate and develop joint activities with leading educational institutions in this domain;
- that these societies stimulate their professional and academic participants to make their expertise available for knowledge transfer and exchange in this context.

Resolution VI.2 Promotion of the profession to students and young scientists
The Congress
Noting:
- that the number of students continues to be too low for the viability of the profession and the availability of graduates who form the future core of ISPRS;
- the increasing possibilities for student mobility between institutions during their education and training.
Recognising:
- the need to promote the profession and recruit young professionals for the photogrammetry, remote sensing and spatial information sciences.
Recommends:
- the continuation and active promotion of the ISPRS Youth Forum and Student Consortium;
- that the cooperation of the ISPRS Youth Forum with related groups in sister societies of ISPRS
- should be stimulated and supported;
- the encouragement of relevant organisations to facilitate international student exchange and
- technical training programmes at all levels;
- that the Student Consortium should be supported with funding for its activities.

Resolution VII.1 Importance of in-situ measurements in remote sensing processes
The Congress
Noting:
- that sensor technology is developing very rapidly;
- the possibility of using high-quality measurements from novel sensors as in-situ data together with airborne and spaceborne remote sensing data, for example terrestrial laser scanning and hyperspectral imagery as a source of data for in-situ measurements in large-area remote sensing processes;
- that these developments lead to continuous development of processes and working conditions for the provision and use of spatial information.
Recognising:
- the need to foster development in the area of in-situ measurements and their automation.
Recommends:
- the development of in-situ measurements and earth observation production processes including advanced in-situ solutions, within ISPRS TC VII and in cooperation with ISPRS TCsI, III and V.17

Resolution VII.2 Releasing and indexing of remote sensing datasets
The Congress
Noting:
- the increasing demand for, and availability of,remote sensing datasets;
- the increasing need for standardisation related to remote sensing data as called for by GEO, GCOS, IPCC and other organisations.
Recognising:
- the emergence of data citation indices offered by publishing houses;
- a culture of free sharing of datasets;
- the increasing use of Digital Object Identifiers (DOI) for datasets.
Recommends:
- that the ISPRS community should develop quality control and standardisation procedures for certifying relevant remote sensing datasets;
- that ISPRS should consider the introduction of ISPRS-owned DOIs and the development of procedures for the assignment of these DOIs to datasets which have passed the procedures for quality control and have been found to comply with the required standards.

Resolution VIII.1 Global change studies
The Congress
Noting:
- that remote sensing data and models are monitoring changes in relationships between the earth's oceans, land, and atmosphere;
- that these changes impact the wellbeing of the earth's environment and populations;
- that global climate change is happening and islikely to impact ecosystems, livelihoods, and human health;
- that many measurements pertaining to atmospheric constituents and profiles are available from a network of space and in-situ systems;
- that major initiatives now under way will lead to significant new insights into global processes and decades of valuable polar research..
Recognising:
- the need to address underlying issues such as climate change, water, and health, that impact the wellbeing of the earth and its environment and inhabitants;
- the continuous need for monitoring of essential climate variables, and understanding of the bio-geo-chemical cycle and of atmospheric processes;
- the need for short-, medium- and long-term weather forecasting;
- the capability of remote sensing technologies to provide valuable inputs to polar research;
- the obligation to allow free access to relevant data under the UN Remote Sensing Principles.
Recommends
- that ISPRS prioritises activities which address global climate change;
- integration of ground observation and satellite data for developing long-term calibrated records of

weather and climate variables to improve analysis of the impact of climate variability and change;
- the development of models that assimilate remote sensing and in-situ data to describe bio-geo-chemical cycle;
- the development of strategies, methods, and algorithms for integrating remotely sensed data in researching and monitoring cryospheric regions;
- continuing monitoring of land use and land cover change, with special emphasis on global land cover.

Resolution VIII.2 Applications for the benefit of society
The Congress
Noting:
- that significant contributions are being made by remote sensing technologies to facilitate natural resource mapping, monitoring and inventories, including agriculture, land, water, forests, ecosystems andminerals;
- the contributions made by geoinformatics and space technology in disaster management;
- that rapid, unplanned urbanisation and industrialisation worldwide is causing environmental degradation, including air pollution which may impact human health and the environment;
- the importance of exploration and sustainable utilisation of energy resources and the environmental impacts of energy production and consumption.
Recognising:
- that remote sensing applications for food security, water, and ecosystems generally have been restricted to mapping at different resolutions and in isolation;
- the benefits and impacts of remotely sensed data in monitoring urbanisation;
- the improved spatial, spectral and temporal capabilities of new sensor technologies;
- that information resulting from earth observation can improve health studies and disease prevention;
- the urgent need for protection of mineral resources and energy supplies;
- the scattered nature of research studies into the understanding of disaster precursors and the development of early warning models;
- the obligation to allow free access to relevant data under the UN Remote Sensing Principles.
Recommends:
- that greater use should be made of remote sensing and GIS for food, water, and environmental security and in understanding the processes and fluxes in the bio-geosphere;
- that greater emphasis should be placed on developing better early warning models and mitigation techniques for disasters;
- the integration of the Earth observing systems with modelling capabilities for early warning and

surveillance of environmental impacts on human health;
- investigation of the use of remote sensing technologies in managing energy and mineral resources, and exploring the potential of renewable energy sources.

Resolution VIII.3 Collaboration with global and applied sciences programmes and user communities
The Congress
Noting:
- that the mission, vision and strategy of the ISPRS Strategic Plan of July 2010 promotes interdisciplinary collaboration aimed atintegrating ISPRS with global activities;
- that global organisations and programmes are promoting and using applications of earth observing data and models for climate change and variability, and for societal and economic benefits;
- that local, national, and international policies are driven by environmental and economic changes;
- the importance of engaging with both space and end-user agencies in support of policy decisions.
Recognising:
- the need for ISPRS to contribute to, and participate in, ongoing global organisations and programs, such as GEO, UNOOSA, ICSU, GGIM, IUGS, CEOS and IEEE GRSS;
- the need to bridge the gap between geospatial technologies and the user communities they serve;
- that long-term quality-controlled spaceborne derived data records are of critical importance for both climate-related research and operational remote sensing applications;
- the need to engage deciders and policy makers in processes for developing useful products.
Recommends:
- the designation of working group representatives to actively serve and interact with kindred organisations and programmes, such as GEO, IMO, ICSU and IPY;
- interaction with the science and modelling communities which integrate their results to produce remote sensing products;
- the assimilation ofremote sensing products with geospatial systems for end-user applications;
- the education of end-user communities in the use ofremote sensing products;
- the organisation of workshops and symposia to focus on emerging topics such as global change and related policy and environmental issues;
- that ISPRS should engage with both space agencies and end-user agencies to provide the case for
- supporting current and future missions;
- the expansion of ISPRS efforts to quantify the socioe-conomic benefits of remote sensing applications;
- that ISPRS should offer to contribute technical sessions to professional organisations that are relevant to the aims and goals of ISPRS.