# ISPRS Resolutions 2026

## General Resolutions

### Resolution 0.1: Appreciation of the Canadian Society

The Congress commends:

To congratulate The Canadian Society of Remote Sensing · Société Canadienne de Télédétection (CRSS · SCT), its president Shabnam Jabari, the Congress Director Derek Lichti, the Scientific Committee Chair Songnian Li, the Deputy Director Ahmed Shaker, the Local Organizing Committee, all supporters of CRSS · SCT, the International Programme committee, and the ISPRS Commission Officers, for their excellent work which has resulted in a very successful Congress.

### Resolution 0.2: GeoAI: A Strong Need for Coordination, Open Commons, and a Society-Wide Position

The Congress

Noting:

- Artificial Intelligence, through deep learning for the automatic information extraction from imagery, through multi-source vision foundation models to reduce significantly the volume of training data, through large language models for facilitating interactions with non-technical users, through the automatic design and orchestration of agents composing a processing workflow to respond to a query (multi-agent AI), through the increased employment of physics-based AI, through the automation of control-commands for autonomous navigation and decisions, is a transformative development to all ISPRS technical and societal activities as a whole and across commissions;

Recognizing:

- ISPRS addressing the whole workflow from multi-source image acquisition and processing to deliver high-end geospatial products, up to the elaboration of platforms offering capacities, services and other solutions based on these products and geoprocessing technologies;
- ISPRS fully mastering the geometry and physics of image generation and the extraction of information from image sources coming from various sensors and platforms;
- AI now being increasingly embedded advantageously in geo-processes with the aim to optimize them;
- A strong need for open-science AI foundation models to ensure transparency, model accuracy and their sovereign use;
- A strong need for AI training data, tools and models, for public good to be made publicly available free of charge, also when used in ISPRS publications;

Recommends:

- An Inter-Commission GeoAI working group (ICWG-AI) to be created to ensure a coordination of AI activities within ISPRS and to contribute to the development of multi-purpose, green, scalable, reproducible, and explainable AI in the fields of photogrammetry, remote sensing and spatial information sciences;
- ISPRS Council, together with the ICWG-AI to elaborate a society-wide position on GeoAI, addressing, besides technical issues, the governance, control, the role in autonomous systems,

and ethical issues of GeoAI;

- ISPRS to curate and maintain multi-modal, multi-sensor, and multi-temporal benchmark datasets and to encourage publications using these datasets, in particular in comparative studies;
- ISPRS to play a major role in structuring and coordinating the elaboration of GeoAI commons and multi-source vision foundational models together with its Ordinary Members;
- ISPRS to financially encourage the development of GeoAI Commons and tools that can be used by our community and that can contribute to solve global challenges under the umbrella of UNGGIM;
- ISPRS, in a common effort, to develop AI-integrated curricula in all geospatial subjects.

**Resolutions for Technical Commissions**

**Resolution I.1: Intelligent Sensor Systems for Real-Time Perception and Mapping in Dynamic Environments**

The Congress

Noting:

- Sensor systems are evolving from single, isolated perception units to multi-modal fusion-based intelligent perception systems;
- Artificial intelligence, particularly deep learning and reinforcement learning, has been deeply integrated into the sensor data acquisition and processing;

Recognizing:

- Real-time calibration, spatio-temporal synchronization and data fusion of multi-modal, heterogeneous sensors remain key challenges to achieving robust perception. A more universal and scalable fusion framework is particularly needed for asynchronous communication-constrained or dynamically changing scenarios;
- Real-time perception and mapping in dynamic environments (e.g., traffic flow, crowd movement, natural disaster evolution) require algorithms that extend beyond static geometric accuracy to capture the semantic and physical dynamics of the scene, placing higher demands on the adaptive and predictive capabilities of algorithms;
- The deployment of sensor systems in indoor-outdoor integrated settings and human-machine collaborative environments require addressing significant challenges, including complex occlusions and robust understanding of multi-target interactions;

Recommends:

- To promote research into integrated perception-computing architectures and specialized hardware aimed at achieving lower-power, and high-performance real-time sensor systems;
- Intensify research into fully automated, self-adaptive and online calibration technologies for multi-modal sensor platforms with a focus on developing robust calibration frameworks;
- To encourage the development of real-time data processing algorithms that embed physical modeling and semantic interpretation to improve perception, prediction and reconstruction performance in dynamic and complex environments.

**Resolution I.2: Embedded Perception, Collaborative Autonomous Systems and Swarm Intelligence**

The Congress

Noting:

- The effectiveness of autonomous navigation, obstacle avoidance and operation of mobile robot platforms, including UAVs and UGVs are highly dependent on the availability of lightweight, low-power embedded vision and computation systems;
- Collaboration and swarm intelligence have emerged as cutting-edge research frontiers, enabling multi-agent systems, such as UAV formations, to perform large-scale monitoring, search and mapping tasks;

Recognizing:

- Implementing high-precision, high-frame-rate real-time vision tasks (e.g., SLAM, 3D reconstruction, object detection) on embedded platforms remains highly challenging to strict resource limitations in computing power, memory, energy;
- Collaborative perception, planning and mapping of multi-agent systems must address fundamental challenges such as communication latency, data inconsistency and coordinated decision-making;
- More intelligent filtering, association and fusion methods are still needed to automatically extract reliable geospatial information from massive, multi-source crowdsourced data;

Recommends:

- Strengthen research on algorithm-hardware co-optimization for embedded platforms and encourage exploration of lightweight models, neural architecture search and customized hardware-acceleration solutions;
- Promote the development of decentralized and robust collaborative SLAM and mapping algorithms, and study technologies for maintaining swarm-level state consistency and map fusion under intermittent communication interruptions.

**Resolution I.3: Commercial Small Satellite Constellations and High-Frequency Information Acquisition**

The Congress

Noting:

- Small commercial satellite constellations have entered the stage of large-scale deployment and operational application;
- Data acquisition modes have become more diversified, including GNSS radio occultation sounding, Synthetic Aperture Radar (SAR), Laser Altimeter, hyperspectral remote sensing and nighttime light remote sensing, which provide abundant data sources for multi-dimensional monitoring of the Earth system.

Recognizing:

- Massive volumes of small satellite data are placing unprecedented demands on real-time/near-real-time processing, storage and distribution capabilities for providers as well as for users;
- The fusion and joint application of multi-source satellite data constitute a key pathway to improving the accuracy, reliability and application value of data products;

Recommends:

- Vigorously advance the application of artificial intelligence and cloud-native technologies in

the intelligent processing of small satellite constellation data;

- Develop deep learning-based models for automatic target detection, change discovery and parameter inversion to address the challenges posed by the data deluge;
- Encourage the establishment of closer collaborations of researchers with private aerospace enterprises and industrial end-users to jointly define data product standards, verify algorithm effectiveness and explore innovative business models;
- Support research on the systematic evaluation, calibration and validation of small satellite data quality, and establish a recognized data quality evaluation system.

**Resolution II.1: Foundation Models for Geospatial Applications**

The Congress,

Noting:

- The strong need for generally applicable deep representations that can be trained without need for reference data;
- recent developments in Foundation Models;

Recognizing:

- efforts across a wide range of applications like semantic segmentation, object detection and 3D object reconstruction in the ISPRS and their use in geospatial pipelines;

Recommends:

- extending the collaboration between all TCs for the development and use of foundation;
- building platforms for fostering research and knowledge sharing in foundation models for geospatial applications;
- taking the lead in developing foundation models tailored to the specificities of photogrammetry, remote sensing and spatial sciences, achieving strong generalization by integrating photogrammetric principles, and ensuring rigorous quality assessment through uncertainty estimation and error propagation.

**Resolution II.2: Multi-Modal Data Integration for Joint Reasoning**

The Congress,

Noting:

- The need to reason across multiple data modalities simultaneously for joint predictions:
- The need to develop data-driven approaches to integrate multiple different data modalities like images, point clouds, and text for more trustworthy, precise measurements:

Recognizing:

- The large availability of data from a wide range of modalities across space and time that provide complementary evidence but differ in spatial and temporal resolution, sensing principles, coverage, robustness, accuracy, acquisition costs and accessibility:
- Potential of deep learning models to digest multi-modal inputs for estimating joint outputs along with quality assessments like well-calibrated uncertainties in a fully data-driven way

Recommends:

- Providing multi-modal benchmark datasets and tasks in photogrammetry and more broadly geospatial applications;

- Making multi-modal datasets along with source code, their meta-data and tutorials publicly available to increase accessibility and to foster silo-breaking research;
- Initiating and supporting methodological developments across scientific disciplines including photogrammetry, computer science, statistics, and applied mathematics.

**Resolution II.3: Time Series Analysis for Monitoring Processes**

The Congress,

Noting:

- The need to monitor processes on Earth for applications such as mapping, change detection, forecasting, and monitoring;
- The requirement for data-driven approaches for a semantic analysis of time series of remote sensing data in order to obtain more accurate information about such processes

Recognizing:

- The large availability of remote sensing data from a wide range of platforms that offer data acquisition with short revisit times;
- Recent developments in deep learning, in particular for the processing of sequential data that allow for global information exchange between sites and timesteps

Recommends:

- Put more emphasize on research for the development of new, better and more accurate methods for processing of time series, allowing to monitor processes;
- Join efforts to provide multi-temporal benchmark datasets for tasks in photogrammetry and remote sensing with more broadly geospatial applications.

**Resolution III.1: New Methods and Techniques for Processing Multi-Dimensional Remote Sensing Imagery**

The Congress

Noting:

- the increasing availability of multi-dimensional (spatial, spectral and temporal) remote sensing data and the need for efficient data processing;
- the significant advancement of deep learning technologies for image interpretation;
- the general lack of large remote sensing sample datasets;

Recognizing:

- the challenges of constructing large scale sample datasets and deep learning networks for effective interpretation of remote sensing images;
- the challenges on quality control, evaluation and validation of information extracted from remote sensing images at global/ regional level;

Recommends:

- developing and improving remote sensing data processing algorithms;
- promoting open access of remote sensing image resources, algorithms, deep learning networks, and publications;
- developing benchmark datasets and task-oriented networks for mission CALVAL and intelligent remote sensing image interpretation method and product validation.

**Resolution III.2: Remote Sensing Applications**

The Congress

Noting:

- the need for bridging the gap between the capabilities of earth observation systems and analytical techniques used to process their data;
- the increasing requirement for accurate and timely monitoring of climate and environmental change as well as epidemics, disasters and emergency events;

Recognizing:

- the need for supporting research, operational management and decision making;

Recommends:

- developing and improving remote sensing methods and models to improve parameter retrieval and its use in predictive modelling;
- developing and promoting user-friendly products for visual communication, negotiation, environmental awareness and fight against fake information;
- strengthening existing partnerships and building new ones with a broad spectrum of remote sensing users, including in the field of health, security and social sciences.

**Resolution III.3: Geospatially-Enabled SDGs Monitoring**

The Congress

Noting:

- that the implementation of the 2030 Agenda for Sustainable Development requires the use of a wide range of data, including earth observation and the extracted geospatial information;
- that geospatial information is expected to play a pivotal role in assessing and monitoring the progress of Sustainable Development Goals (SDGs);
- that a number of the inter-governmental organizations, in particular UN-GGIM and GEO, have already supported studies and developments;
- that ISPRS has already launched a scientific program in support of geospatially-enabled SDG monitoring;

Recognizing:

- the need for new methodologies to extract relevant geospatial information to support SDG indicator estimation;
- the role of IPAC in fostering closer ties between ISPRS and international organizations;

Recommends:

- mobilizing and integrating all resources that ISPRS and its members have to promote the use of remote sensing for geospatially-enabled SDG monitoring.

**Resolution IV.1: Multi-Dimensional and Semantically Rich, Intelligent Data Models**

The Congress

Noting:

- the increasing availability of huge, complex, multi-dimensional (including time), multi-resolution and unstructured location-based and spatial data representing social, economic, man-made and natural phenomena above, beneath and on the surface, enclosed and open,

designed and as built, local and global;

- the growing importance of such data as a foundation for data-driven methods, including Artificial Intelligence and machine learning, requiring huge, reliable, documented and interoperable datasets, while respecting data sovereignty, ownership and jurisdictional constraints;

Recognizing:

- the contributions of ISPRS Commissions to representations, processing algorithms of multi-scale n-dimensional data, models and data structures, uncertainty and quality modelling for static, mobile and dynamic data for a range of applications from microscale indoor applications to macro-scale climate change monitoring;
- the increasing interest of ISPRS commissions in, research on and contributions to methods and approaches to improve semantics representations and interconnections between data sets by enabling reliable and explainable AI-based methods and knowledge graphs;

Recommends:

- further development of semantically rich, standard compliant spatial data structures, knowledge graphs, spatial indexing schemes and generic analytical tools for model validation, supporting both traditional analysis and AI-driven approaches and scalable hybrid computing environments where suitable;
- further investigation of federated spatial data models and linked data considering different representations, data uncertainty, data resolution and data quality, and their importance for AI training and inference, while preserving data sovereignty and controlled data access;
- further exploration of strategies for fusion of multi-dimensional spatial models, databases and data lakes, linked data, socio-economic models and IoT data to enable advanced analytics and Artificial Intelligence applications.

**Resolution IV.2: Spatial Analytics, Simulation and Advanced Visualization**

The Congress

Noting:

- the increasing availability of unprecedented amounts of big spatial data from traditional remote sensors (satellites, aircrafts, UAVs, in-situ sensors, etc.) to Internet of Things (IoT) and user-generated content (volunteered geographic information and social networks) widely used for increased number of applications across different domains;
- The rapid shift to developing fully automated processing and analytics by employing advanced data-processing methods, Artificial Intelligence (AI), and generative AI to support complex challenges in sustainable development, overarching Smart Cities, Digital Twins and time-critical applications (such as disaster management);

Recognizing:

- the contributions of ISPRS Commission IV to processing, analyzing, mining, simulation, visualization, quality assessment and semantic understanding of static and dynamic (including trajectory) data, user-generated content, image and video data;
- the active research of ISPRS commissions in investigating and applying recent developments in AI;

Recommends:

- further strengthening the research on real-time analytics, exploratory and confirmatory analysis, data interpretation, uncertainty modeling and explainability for local and global applications, including AI-based and generative approaches and exploring hybrid (including quantum) computational methods for complex spatial optimization problems;
- further intensifying the development and application of Artificial Intelligence and machine learning, including Geospatial Foundation Models, generative AI and Geospatial Knowledge, for scalable data analysis, data fusion and knowledge discovery, while improving the interpretability and accuracy of information extraction and analytical outcomes;
- further development of natural language-based interfaces, VR/AR/MR environments, multi-dimensional and multi-user visualizations, considering privacy, usability and ethics, transparency and responsible AI principles.

**Resolution IV.3: Information Processing, Services and Applications**

The Congress

Noting:

- the rapid advancement of cloud native computing, clusters and grids, high-performance and edge computing, the leverage of hybrid computing infrastructures, including quantum-classical integration, within advanced geospatial service ecosystems, open-source ecosystems, geo-sensor networks, mobile and wearable technologies, web and platform-based service technologies, and new AR and VR devices and equipment;
- the increasing integration of Artificial Intelligence, machine learning, Geospatial Foundation Models and generative AI into geospatial information services, together with a rising interest in human-centered design of technology, as well as open geospatial standards;

Recognizing:

- the contributions of ISPRS Commissions to semantics and ontologies, sensor web, visual analytics, service and cloud-native architectures, AI-enabled applications, online and immersive interfaces, e.g., for Smart Cities and Digital Twins;
- the need for validated and transparent use of generative AI and LLM in geospatial information services, addressing risks such as hallucination and bias, the active participation of ISPRS Commissions in advancing open international geospatial standards addressing usability, accessibility, privacy and ethics, including data sovereignty considerations;

Recommends:

- further involvement of parallel and cloud-edge, distributed processing paradigms, including AI, for management and analysis of spatial data and services and hybrid computing approaches in case performance advantages are met,
- further intensifying the development of Application Programing Interfaces (API), Software as a Service (SaaS), accounting for privacy, security, transparency and responsible use of AI, while ensuring compliance with data sovereignty principles,
- further strengthening theory and practice in developing Agentic-based frameworks to establish connections between Smart Cities and Spatial Digital Twins and other applications, leveraging AI-driven analytics, real-time data streams and intelligent geospatial information services.

**Resolution V.1: Education and Outreach Research**

The Congress

Noting:

- education and outreach as a cross-cutting theme that are often perceived as supportive rather than core scientific contributions;
- the number of technically strong, research-oriented, and high-impact papers under the Commission is comparatively low;
- the submissions are often descriptive or experience-based rather than methodological, analytical, or innovation-driven;

Recognizing:

- the education and outreach commission lacks a strongly differentiated scientific identity compared to technology-focused commissions dealing with areas like AI, photogrammetry, remote sensing, spatial analytics, and geospatial modelling,
- researchers prefer technically intensive Commissions for greater academic visibility, citation impact, and professional recognition,
- there is inadequate global standardization in geospatial education frameworks, competencies, curriculum structures, and accreditation systems. Core research on this is very limited;

Recommends:

- promoting evidence-based and innovation-driven research in geospatial education, pedagogy, and training methodologies,
- developing and advancing international frameworks for geospatial competencies, curriculum development, accreditation systems, and standardized syllabi and learning pedagogies,
- pursuing clearer thematic positioning and stronger coordination among Commissions to ensure complementarity while reinforcing the distinct goal of advancing education and outreach.

**Resolution V.2: AI for and in Education**

The Congress

Noting:

- the increasing role of AI in education and industry;

Recognizing:

- emerging themes such as AI-enabled learning, digital education platforms, cloud-based geospatial training, and immersive technologies are still insufficiently addressed in the 'education assessment';

Recommends:

- expanding research and collaboration on digital learning ecosystems, AI-enabled education, cloud-based training platforms, and immersive technologies;
- research into how to convey the geospatial knowledge in the era of AI.

**Resolution V.3: Community of Stakeholders**

The Congress

Noting:

- strong collaboration among academia, industry, government institutions, and international

organizations is necessary to ensure that geospatial education and outreach remain responsive to societal needs, technological advances, and workforce demands;

Recognizing:

- industry participation in educational research and workforce development initiatives remains limited,
- interdisciplinary educational research linking geospatial sciences with various sectors is still fragmented;

Recommends:

- encouraging interdisciplinary and industry-linked educational initiatives,
- strengthening collaboration with academia, industry, government, and international organizations;
- improving the documentation, dissemination, and international exchange of best practices, outreach models, educational resources, and capacity-building initiatives;
- enhancing the scope of geospatial education and outreach beyond technical disciplines toward a broader vision of "Global Vision with Local Action," ensuring that geospatial knowledge contributes meaningfully to local communities and societal development;
- improving education in transdisciplinary research with a focus on creating impact and teaching a startup-mentality.

**TC Resolution Committees**

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|---|---|
| **TC I** | Tang Xinming, Antonio Tommaselli, Zhang Tao, Jiang Jie |
| **TC II** | Ewelina Rupnik, Charlotte Pelletier, Franz Rottensteiner, Jan-Dirk Wegner |
| **TC III** | Xinlian Liang, Saeid Pirasteh, Francesco Pirotti, Laurent Polidori |
| **TC IV** | Maria Brovelli, Hao Wu, Sisi Zlatanova |
| **TC V** | Gay Jane Perez, Ayin Tamondong, Anjana Vyas, Dmitrios Bolkas |
| **ISPRS** | ISAC, Nicolas Paparoditis, Christian Heipke |

Compilation: Christian Heipke (ISPRS Past President 2022-2026)