

# THOUGHTS ON STANDARD-RELATED ACTIVITIES IN ISPRS COMMISSION I

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## ABSTRACT

Commission I of the International Society for Photogrammetry and Remote Sensing (ISPRS) has been involved since the end of World War II with the development of first a set of recommended procedures and later a specification. The development of the recommended procedures was precipitated by the desire to achieve an international agreement in regard to the testing of aerial cameras and the reporting of the test results, and it was for several inter-congress periods the central part of the commission's activities. This paper will review the present situation in regard to camera calibration, standards, standard-creating agencies and their activity of relevance to ISPRS and other activities related to primary data acquisition. Finally, recommendations will be made in regard to steps ISPRS may consider to undertake.

**KEY WORDS:** Recommended procedures, specifications, standards, standard organisations

## 1. ISPRS AND 'STANDARDS'

Commission I of the International Society for Photogrammetry and Remote Sensing (ISPRS) has been involved since the end of World War II with the development of first a set of *Recommended Procedures for Calibrating Photogrammetric Cameras and for Related Optical Tests* (ISP, 1960), and later a *Specification for Aerial Survey Photography* (ISPRS, 1984). The development of the *Recommended Procedures* benefited greatly from Canadian efforts to develop a specification for aerial survey photography at a time when the acquisition of aerial photographs was transferred from the Royal Canadian Air Force to civilian contractors. The document was then maintained - at no cost to ISPRS - by personnel of the National Research Council of Canada (NRC) which had been instrumental in writing it, until 1986 when Mr. P.D. Carman, a former Secretary of Commission I, retired, and the Photogrammetric Research section which had been in existence since 1951, was dissolved as part of an effort to increase the funds available for the Canadian contribution to the planned space station. The *Specification for Aerial Photography* was developed by a Commission I working group during the period 1980-1984 and is essentially the result of efforts of personnel at the International Institute for Aerial Surveys and Earth Sciences (ITC) in Enschede, The Netherlands, and the British Association of Aerial Surveyors; it was adopted for a trial period in 1984.

The state of both documents is reflected in resolution I-5 of the ISPRS Kyoto 1988 congress:

"The Congress

Noting that

- the 'Recommended Procedures for Calibrating Photogrammetric Cameras and for Related Optical Tests' were adopted in 1960, have not been modified since 1972 to adopt them to current needs
- these Rec.Proc. were maintained essentially on initiative and through the scientific support of one institution which no longer carries out related activities and

Recognising that

- ISO (the International Organisation for Standardisation, the author) recently adopted several photographic and optical standards of interest to the photogrammetric community and works on others
- the maintenance of ISPRS Procedures and Specifications appears meaningfully possible only if an institution takes a particular interest for a longer period

Recommends that

- ISPRS adopt a formalised approach to the maintenance of Rec.Proc. and Specs.
- ISPRS seeks the support of a research organisation concerned with photogrammetry and remote sensing in the continued maintenance of Rec.Proc. and Specs.
- ISPRS provides, if needed, financial support to this organisation to enable active participation in related ISO meetings
- ISPRS extends the period of use for the revised Specification for Aerial Photography for another four-year period
- ISPRS suspends the 'Recommended Procedures . . .' until a thorough revision has taken place.

The called for revision has not taken place, nor is the author aware that other recommendations were followed by action. As substitute chairman of Working Group I/1 he was probably expected to initiate action on some of the items, however, his employment situation made this largely impossible. The suspended ISPRS *Recommended Procedures* serve still as an international 'standard', as a recent decision of the German standards committee in photogrammetry and remote sensing shows (*Zeitschrift für Vermessungswesen* 1/1992, p. VII): the existence of the document led to the conclusion that there is no need for German standardisation, in particular also since the users of aerial cameras are larger companies which will consult the camera manufacturer directly in case of problems. The trust in the camera manufacturers has in Germany prevailed for a long period of time to the point that a national camera calibration facility was never established.

## 2. STANDARDS

### 2.1 General Comments

A standard is, according to *Webster's Ninth New Collegiate Dictionary*' (1986) ". . . something set up and established by authority as a rule for the measurement of quantity, weight, extent, value or quality". Standards act as equalisers and help insure compatibility, and by so doing, increase the options users have.

With standards defining a certain product in place, a purchaser can be sure that the quality of an off-brand product will at least meet the industry standard, and that a higher price does not have to be paid for a brand-name product that

may unjustifiably be perceived to have a better quality. Likewise, standards protect small, start-up companies in the sense that even though they are unknown in the marketplace, if they meet the industry standards or can say in their literature that their product meets a certain standard, the customer can be assured of a minimum level of quality set by the standard. The same argument holds on an international scale in that, if a development country wants to market a certain product and it meets certain standards, this product should be as welcome as those from more developed countries. For a manufacturer, complying with a standard is one of the world's better marketing tools, and it was probably in recognition of this fact that the adoption of a *Specification for Aerial Photography* by ISPRS was so vigorously pursued by a national trade organisation.

Standardisation is a win-win situation. Users can be more certain they are getting what is advertised and that the product will be compatible with other equipment. The Manufacturer has both expanded and defined his market - expanded in the sense that the manufacturer can sell to anyone who wants (and insists) that the items be made to a standard, and defined in the sense that they are selling to a segment of the market that wants or insists on the standard.

## 2.2 International Standardisation

There are two international organisations, both chartered by the United Nations, involved in creating standards: the International Electrotechnical Commission (IEC), which creates standards for electrical devices, and the International Organisation for Standardisation (ISO), which creates other standards. Both bodies have overlapping charters, e.g. in regard to lasers, and a joint IEC/ISO Technical Programming Committee looks after the necessary co-ordination. A first inquiry seems to indicate that there is within IEC no standards work going on which is directly related to the Commission I activities.

The first continuing standards body was an international one: just after the turn of the century an international electrical congress held in St. Louis passed a resolution ". . . that steps be taken to secure the co-operation of the technical societies of the world by the appointment of a representative commission to consider the question of the standardisation of the Nomenclature and the Ratings of Electrical Apparatus and Machinery". The 'commission' was the IEC; it has been active since 1906 and is headquartered in Geneva, Switzerland. Not much happened in international standards until after World War II when, as a result of United Nations activity, ISO was formed in 1947 in response to a meeting with delegates from 25 countries. The ISO is concerned with the standardisation in all fields except those that are the purview of the IEC, is also located in Geneva, and the two organisations work closely together in areas of overlapping interests. The IEC is comprised of 'National Committees', the ISO of 'National Standard Bodies'; ISO considers as a national standard body a group "most representative of the standardisation in its country".

The IEC objective states the purpose of any standards organisation as: "The objective of the Commission is to promote international co-operation on all questions of standardisation and related matters in the fields of electrical and electronic engineering and thus promote international understanding. This objective inter alia is achieved by issuing publications, including recommendations in the form of international stan-

dards, which the National Committees are expected to use for their work on national standards, in so far as national conditions will permit." The following should be noted in regard to the cited objective:

- The IEC is a voluntary standards organisation; no National Committee has to use the IEC standards, and the extent of any use is optional depending on national conditions. Only if the government of some country legislates the use of one of the standards does the standard become mandatory for that country.
- Any country participating in the IEC forms its own National Committee.
- The scope of the IEC is confined to electrical and electronic engineering.

ISO describes its purpose as follows: "The object of ISO is to promote the development of standardisation and related activities in the world with a view to facilitating international exchange of goods and services, and to developing co-operation in the sphere of intellectual, scientific, technological and economical activity. The results of the ISO technical work are published as 'International Standards'. . . . ISO brings together the interests of producers, users (including consumers), governments and the scientific community, in the preparation of international standards."

The standards writing and administrative work within ISO is carried out by nearly 200 Technical Committees (TCs); each TC is administered by one of the member bodies of ISO, and that member body is called the Secretariat of the particular TC. A TC is established by ISO council, the scope of its activity approved on behalf of the Council by the ISO Technical Board (who also assigns TC secretariats), and the programme of work within the defined scope drawn up by the committee. Each TC may, in turn, establish Sub-committees (SCs) to cover different aspects of its work; the SCs have secretariats assigned by the parent TC. Within each of the SCs are Working Groups (WGs) where the actual work gets done; these have no special secretariats but Convenors and designated secretariats keep the work on moving.

The ISO *Memento* issued annually and is a 170-page, soft-cover book that tells about the work and organisation of ISO. The main body of the book lists the over 200 TCs and their WGs in English and French. The secretariats of each TC are given along with the chairman's name, a short description of the scope of each TC, a list of liaisons with other TCs of ISO and IEC, and a list of all SCs with their supporting secretariats, titles and WGs (also with their supporting secretariats and titles). The book also gives the names and addresses of all national member bodies of ISO. As a preface, there are several pages of explanations dealing with the origins of ISO, who the members are, how the technical work is organised into the various technical committees and how an international standard is developed.

An international standard is the result of an agreement between the member bodies of the ISO, and the procedures of formulating international standards are given in the ISO *Directive* which is a joint publication with the IEC, in three parts and deals with the organisational and procedural structure of standards writing, the methodology of writing standards and the formal drafting (writing the final version) of standards. Part I deals with the procedures followed by the two organisations in developing and maintaining international standards with the help of technical committees and subsidiary bodies. Copies of the forms to be used in the

standards activities are given as appendices; the use of these forms forces a consistent and logical, if somewhat bureaucratic standards development.

The procedural section of the *Directive* lays down the five stages of development each standard must pass, and the procedures for a formal review of standards every five years. A first important step towards an international standard is a committee draft (CD) - a document circulated for study within the TC or SC and registered with the ISO Central Secretariat. When consensus has been reached, the document becomes a draft International Standard (DIS) and is submitted to ISO member bodies for voting by a given date; if 75% of the votes are cast in favour of the DIS, it is accepted for publication as an International Standard and listed in the ISO *Catalogue*.

Each national standards body belonging to ISO can decide whether it wants to Participate (be a P-member) or be an Observer (be an O-member) in each of the SCs. Being a P-member implies active participation with an obligation to vote on DISs and, whenever possible, to participate in meetings. O-members are kept informed of the work of the SC and may make comments on the work and attend the meetings if they desire. International organisations may be granted 'liaison status' with TCs and SCs; this status comprises two categories: 'A' (effective contribution to the work) and 'B' (wish to be kept informed only). Liaison A gives the right to submit papers, attend meetings and participate in discussions. ISPRS has a liaison B status with TC 42 (Photography). All liaisons (with over 450 organisations) are listed in the 144-page document ISO *Liaisons*.

### 2.3 Regional Standardisation

The pledge of the European Economic Community (EEC) to introduce open markets in 1992 has given a boost to the introduction of European standards. On the EEC level, there are two standards-setting groups, CEN (the European Committee for Standardisation) and CENELEC, which correspond closely to ISO and IEC.

In June 1991, the ISO Executive Board and the CEN Administrative Board signed a new co-operative agreement, the 'Vienna Agreement', which, with a view to avoiding duplication of work and permitting ISO and CEN to benefit mutually from international and regional standardisation activities, includes improved and simplified methods for the exchange of information and defines the methods for technical co-operation on standards preparation between ISO and CEN. The new procedures provide for direct contacts between, and the mutual attendance of meetings of, ISO and CEN technical committees. They equally cover parallel voting for documents developed either within ISO or within CEN, as draft International or draft European Standards

### 2.4 National Standardisation

Domestic voluntary standards are typically written by trade and professional organisations that recognise it is in their industry's best interest to have standards. The resulting standard is completely voluntary in the sense that none of the participating organisations have to use the standard. For it to become a national standard, it would have to be approved by the national ISO Member Body as standard. This approval is gained easily if the organisation that wrote the standard fol-

lowed certain guide lines. For example, it must be demonstrated that manufacturers, users and consumers were well represented during the formulation of the standard, and that all their inputs were considered.

As an example for ongoing national standards activity, the work on optical standards in the USA will be reviewed later in this paper.

### 2.5 A Note on Standards

International and national standard bodies do not write standards but supervise the writing of standards. Most voluntary standards are copyrighted material and the various national standards-writing bodies support themselves, at least partially, by selling the standards they write.

If there is a need to write an ISO, a regional or a national standard on some aspects of a specific field, and such a standard already exists in another ISO member country, it would not make sense to write a new (and possibly conflicting) standard. The original standard should be used as a foundation, incorporating new technology as appropriate. If possible, the original organisation would be called in to help with the writing of the upgraded version. The *Recommended Procedures* were prepared at a time when no international standardisation in optics and related matters existed. Now, such standards either exist or are in preparation; these should be considered as representing the best effort in the field and made the base for any revision of the ISPRS document.

Draft international standards (DISs) are copyrighted material by ISO and are not to be circulated except for review (to P-, O- and liaison-A TC or SC members), are not to be used as standards, and are normally not available to persons not involved with the TC or SC work, for example to the professional and scientific community represented by ISPRS. When they are finally revised and published as International Standards, they are available from ISO or the national standard bodies. All persons and agencies, including government agencies, who will be materially affected by these standards are effected to purchase copies; it is the sale of the documents that provides substantial support for the international standards work.

## 3. ISO STANDARDS ACTIVITIES OF INTEREST TO ISPRS COMMISSION I

The following ISO/TCs (given with their title, year of formation and secretariat) seem of interest in connection with photogrammetry and remote sensing:

ISO/TC 12	Quantities, units, symbols, etc	1947	SIS
ISO/TC 42	Photography	1947	ANSI
ISO/TC 172	Optics and optical instruments	1978	DIN
ISO/TC 187	Colour notations	1984	SIS

The abbreviations ANSI, DIN and SIS identify the ISO member bodies from the USA, Germany and Sweden, respectively. In addition, there is an ISO/IEC Joint Technical Committee dealing with standardisation in the field of information technology; it was created in 1987, and its secretariat is with ANSI.

In this section, the activities of ISO/TC 172 and of ISO/TC 42 will be reviewed because of their relevance in regard to a revision of the *Recommended Procedures* and the *Specification*.

### 3.1 TC 172

TC 172 was formed in 1978 to avoid fragmentation in the optical field, and it took until 1990 that it published a substantial body of standards. A TC 172 Plenary was held in April 1991 in Las Vegas. Because of the increased activity in the TC, the next Plenary was scheduled for 1994 and not, as would have been customary, after six years in 1997.

Within TC 172 there are nine Subcommittees (SCs) on various fields of optics; of interest in regard to photogrammetry and remote sensing are activities within

SC 1	Fundamental standards	DIN
SC 6	Geodetic Instruments	SNV (Switzerland)
SC 9	Electro-optical systems	DIN

Within the context of the *Recommended Procedures* the activities in SC 1 deserve special attention; there are three WGs and two task groups.

- WG 1 deals with optical testing; its activities have centred around standards for OTF testing and its application to 35mm camera lenses, telescopes, office copier lenses and x-ray image intensifiers as well as veiling glare and lens distortion.
- WG 3 is developing standards for environmental testing of optics and optical systems; these activities will not be reviewed here.

According to the documentation available, the work of SC 1 has not yet resulted in ISO standards but there several DISs of interest; the given date indicates a deadline for voting by the ISO member bodies:

- DIS 9039: Quality evaluation of optical systems - Determination of distortion (92-01-25)
- DIS 9334.2: Optical transfer function - Definition and mathematical relationship (91-08-06)
- DIS 9335.2: Optical transfer function - Principles and procedures of measurement (91-08-06)
- DIS 9336-1: Optical transfer function - Application - Part 1: Still camera lenses - Interchangeable lenses for 35mm cameras (92-01-25)
- DIS 9336-2: Optical transfer function - Application - Part 2: Lenses for office copiers (92-01-25)
- DIS 9336-3: Optical transfer function - Application - Part 3: Telescopes (92-01-25)
- DIS 9358: Veiling glare of image forming systems - Definitions and methods of measurement (92-01-25)

### 3.2 TC 42

TC 42 was one of 67 TCs formed in 1947. Its scope includes standardisation of definitions, dimensions and recommended practice in the field of photography; methods for testing, rating and classifying the performance characteristics of materials and devices used in photography; and methods, materials and processes used for photographic document reproduction. Specifically excluded are cinematography and office document copying machines. The TC holds Planeries biannually, with the last having taken place in August 1991.

Other than TC 172, TC 42 does not break up into SCs but directly into WGs. Of the 11 presently existing WGs, the following appear to pursue activities of interest to the photogrammetric community:

- WG 3 Sensitometry, image measurement and viewing
- WG 5 Physical properties and image permanence of photographic material

- WG 6 Photographic chemicals and processing
- WG 8 Photographic film and paper products - Dimensions
- WG 12 Lens quality characteristics
- WG 18 Electronic still picture imaging (established 1991)

Of the numerous standards, the following may indicate the extent of relevance in regard to the ISPRS Commission I concerns just by their titles:

- ISO 5 Photography - Density measurements  
Part 1: Terms, symbols and notations (1984)  
Part 2: Geometric conditions for transmission density (1991)  
Part 3: Spectral conditions (1984)  
Part 4: Geometric conditions for reflection density (1983)
- ISO 2240 Photography - Colour reversal camera films - Determination of ISO speed (1982)
- ISO 5800 Photography - Colour negative films for still photography - Black-and-white continuous-tone papers - Determination of ISO speed and range for printing (1983)
- ISO 7829 Photography - Black-and-white aerial camera films - Determination of ISO speed and average gradient (1986)

## 4. STANDARDS AS AN ACTIVITY WITHIN A PROFESSIONAL SOCIETY

### 4.1 Statutes, Bylaws and Standards

Interestingly enough, neither the *Statutes* nor the *Bylaws* of ISPRS refer to standardisation as one of the activities the society engages in nor does either call for co-operation with organisations involved in standardisation. However, this activity should be recognised by those documents guiding the ISPRS activities if they are deemed important.

As an example for the inclusion of standard-related activities into Statutes and Bylaws, the objectives of the International Commission on Illumination (CIE, from Commission Internationale de l'Eclairage) will be given here.

The CIE is a ". . . technical, scientific and cultural organisation devoted to international co-operation and exchange of information among its member countries on matters relating to the science and art of lighting"; it is recognised and accepted as representing the best authority on the subject of illumination since its inception. The CIE objectives are:

- (1) To provide an international forum for the discussion of all matter related to the science, technology and art in the fields of light and lighting and for the interchange of information in these fields between countries.
- (2) To develop basic standards and procedures of metrology in the fields of light and lighting.
- (3) To provide guidance in the application of principles and procedures in the development of international and national standards in the fields of light and lighting.
- (4) To prepare and publish standards, reports and other applications concerned with matters related to the science, technology and art in the fields of light and lighting.
- (5) To maintain liaison and technical interaction with other international organisations concerned with matters related to the science, technology, standardisation and art in the fields of light and lighting.

The CIE maintains a permanent Bureau (at present in Vienna) and is recognised by ISO as the authoritative group in regard to standards in their field with the result that CIE develops ISO standards.

The author is convinced that an extension of the ISPRS activities in the direction of standardisation and the mounting of serious efforts in this direction through active collaboration in standard-creating activities of organisations like the ISO and SPIE would be an enhancement to ISPRS.

#### 4.2 Example for a Standards Committee

One society which has recently formed a Standards Committee is **SPIE**, The International Society for Optical Engineering, which has grown from an American society named The Society for Photo-Optical Instrumentation Engineers. SPIE is a "non-profit society dedicated to advancing engineering and scientific applications of optical, electro-optical and optoelectronic instrumentation, systems and technology, and communicating them through its publications and symposia". Its members are scientists, engineers and users interested in the reduction to practice of these technologies. SPIE has for nearly 30 years held symposia and published the SPIE *Proceedings* which number well over 1600. In the recent past, SPIE started several other publication series such as the *Milestone Series*, *Critical Reviews*, *Tutorial Texts* and the *SPIE Press Monographs and Handbooks*. SPIE also publishes a scientific journal called *Optical Engineering* monthly and a monthly tabloid in newspaper format called *OE Reports*.

SPIE has a number of international chapters and 18 working groups which members can join for an additional fee. At least the following working groups are likely active in areas falling into the sphere of interest of ISPRS: Electronic Imaging, High Speed (Photography, Videography and Photonics), Robotics, and Thermosense (Thermal Infrared Sensing for Diagnostics and Control).

SPIE has created a Standards Committee to initially help the optical industry in the USA recognise the beneficial nature of standards and to encourage industry to support existing trade groups in regard to standards and in particular, in joining the national standards writing bodies such as ANSI. This committee does not draw up or recommend standards. Each committee member represents himself, his organisation or is a liaison to another standards organisation such as AFNOR (France), DIN, BSI (Great Britain), JCOIITI (Japan), IEC, EEC, CEN or CENELEC; there is also liaison with professional societies such as SMPTE (the Society of Motion Picture and Television Engineers), IEEE (the Institute of Electrical and Electronic Engineers) and OSA (the Optical Society of America). Since SPIE is an international organisation with chapters in many countries, there is a serious effort to ensure that all interested nations have an opportunity to participate in the discussions and review of standards of interest to the optical community.

In the USA, an optics standards subcommittee was created in 1990 under the umbrella of the standards writing body concerned with photographic apparatus which has been in operation for many years; the administrative organisation is the National Association for Photographic Manufacturers (NAPM), and optical industry trade groups and professional societies (such as SPIE and OSA) will act as advisors. It is expected that the new subcommittee be deeply involved with

the changeover from military standards to voluntary standards mandated by a directive issued several years ago by the US Office of Management and Budget requiring federal agencies to use voluntary standards as opposed to military or other government standards, wherever such voluntary standards exist and are applicable. At the moment (March 1992) more than 20 military (MIL) standards are invoked for the various optical products used by the US military services. It will only be possible to convert these to voluntary standards when there is an existing voluntary standard that is better or more encompassing than the military one. The committee will need to write new national standards to cover those cases where there is no appropriate existing standard.

SPIE has set up for its members an electronic network service called OPTOLINK which includes an optical standards database, and will set up programs to educate and train members on how standards are used and applied. OPTOLINK in September 1991 provided information on all 12 published ISO/TC 172 standards as well as on over 110 DISs and CDs from the same TC. SPIE is now collecting information on optical standards in the USA, where no clearing house for such standards exists, and will then attempt to also include other national standards. This effort will also cover military standards; those in the US were introduced when it was realised that military purchases of optical equipment could in the absence of national optical standards be made more efficient with the introduction of standards.

OPTOLINK can be accessed by telephone from anywhere in the world and offers various other services to the membership of SPIE such as electronic bulletin boards, SPIE working group communication centres, calendar of future events, member/publications database searches, on-line conference/course registration, on-line purchase of publications and electronic employment service.

## 5. BEYOND OPTICAL SYSTEMS

The *Recommended Procedures* and the *Specification* address problems related to the calibration and use of optical cameras recording on film. The 1988 Kyoto congress passed the following resolution (# I-2) in regard to newer sensor technology:

"The Congress

Noting that

- the use of digital image data from solid state cameras by the photogrammetric/remote sensing community is increasing

Recognising that

- there is a need to more fully understand the geometric and spatial resolution characteristics of digital imaging solid state sensors
- calibration methods and procedures for digital space-borne sensors are being actively discussed in the WG Calibration within the 'Committee on Earth Satellites (CEOS)'

Recommends that

- ISPRS takes action to be kept informed and to become involved in the work of the CEOS-Committee
- investigations should continue to be conducted on
  - geometric calibration of digital imaging systems
  - image quality standards for digital sensor systems
  - spatial, spectral, radiometric and temporal resolution of digital space sensors as related to specific remote sensing and mapping tasks"

The establishment of the Commission I Working Group on Microwave Remote Sensing Systems after the 1984 congress indicated that ISPRS was also prepared to look beyond optical systems; the WG was reinforced by a separate resolution passed at the 1988 congress.

SPIE has been active in holding symposia in aerospace sensing for years; for example, in 1991 Infrared Technology XVII and Airborne Reconnaissance XV were held besides a larger number of other symposia. The SPIE *Proceedings* contain a significant number of volumes dedicated to areas of interest to ISPRS Commission I.

Probably the best access to information on new space systems can be obtained from the Committee on Earth Observation Satellites (CEOS), an organisation of satellite-operating agencies which was referred to in the resolution cited near the beginning of this section. CEOS has three primary objectives:

- to optimise the benefits of space-borne Earth observation systems through co-operation in mission planning and the development of compatible data products, formats, services, applications and policies,
- to aid its members and the international user community by serving as a focal point for international space-related Earth observation activities,
- to exchange policy and technical information to encourage complementarity and compatibility among space-borne Earth observation systems and the data received from them.

The primary focus of CEOS's work at present (although not its exclusive remit) is on satellite activity related to global environmental change. In order to strengthen its interaction with major international users of satellite data, CEOS created an affiliate status for intergovernmental bodies (ISO, UNEP, WMO) and international scientific programs (ISCU/IGBP, WCRP) and invited those organisations to participate in plenary deliberations and working group meetings.

It should be noted here, however, the CEOS Fifth Plenary Meeting in December 1991 decided in response to an application from ISPRS for affiliate status that professional societies would **not** be granted that status.

CEOS has at present two active working groups, the WG on Calibration and Validation and the WG on Data. The latter is concerned with enhancing co-ordination, complementarity and standardisation of space-borne Earth observation data management through, at present, work in the areas of user product formats, catalogue systems, common lexicon and data directory, networks, storage and distribution media, and data management strategies.

Of greater interest within the context of Commission I is the WG on Calibration and Validation (WGCV). The WG has formulated its objectives as follows:

"The objectives of the WGCV are to enhance co-ordination and complementarity, to promote international co-operation and to focus activities in the calibration and validation of Earth observations (including Earth and the neutral atmosphere) for the benefit of CEOS members and the international user community.

Work to meet these objectives will include the promotion of:

- exchange of technical information and documentation,
- investigation of possibilities for technical co-ordination

- and co-operation for space and ground segments,
- co-ordination of calibration and validation campaigns and programs,
- optimising and sharing of available facilities, expertise and resources as appropriate.

Specific objectives are

1. Sensor-specific calibration and validation: To document and establish forums for the assessment and recommendation of current techniques and standards for pre- and post-launch characterisation and calibration.
2. Geophysical validation: To document, and establish forums for the assessment and recommendation of, techniques for validation of geophysical parameters derived from Earth observation satellite systems."

The WGCV has at present one active subgroup (on SAR calibration), agreed to establish two new subgroups (on infrared/visible optical sensors and on passive microwave calibration) and is debating the establishment of a subgroup on terrain mapping from remote sensing satellites using optical and microwave systems. The latter group would be of great interest to the photogrammetric/remote sensing community but thus far does not find the support of the big players who are more oriented towards addressing systems providing data on a global scale.

## 6. RECOMMENDATIONS

The review of a number of standards-related activities presented here requires refinement by incorporation of further information requested but unavailable at this time. Nonetheless, the following preliminary recommendations can be made in addition to those made in resolution I-5 of the 1988 Kyoto congress which is cited in its entirety in the first page of this report:

- survey ISPRS member societies in regard to activities in standards, calibration and test procedures, and specifications,
- upgrade the liaison to ISO/TC 42 from B to A,
- enter into a liaison A with ISO/TC 172,
- inquire with ISO and IEC about standardisation efforts of interest to ISPRS in other TCs,
- become active in the SPIE Standards Committee and establish a connection to SPIE's OPTOLINK,
- attempt through suitable contacts to be informed about the various CEOS activities,
- determine the extent of activities in primary data acquisition of other international agencies such as the International Aeronautical Federation (IAF) which also has an Earth observation section or the IEEE Remote Sensing Society (IGARSS).

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## 8. REFERENCES

### ISPRS publications:

- International Archives of Photogrammetry (and Remote Sensing), volumes 13 (1960), 25B (1984) and 27A (1988)

### ISO publications:

- Memento 1992
- Liaisons 1992
- Catalogue 1992

### SPIE publications:

- OE Reports, since May 1990
- Catalogue of Publications in Optics & Optoelectronics, Winter/Spring 1992

CEOS material from meetings of the WG on Calibration and Validation, August 1991 and May 1992.