# Report on Joint CEOS-ISPRS Workshop

## Production and Validation of DEMs and Terrain Parameters from Spaceborne Sensors CEOS WGCV - ISPRS WGII/4 & III/6, University College London (26-27 May 1999)

***By L. Polidori (IRD, France), I. Dowman (UCL, UK), J. Morisette (University of Maryland, USA)***

This workshop was organised and hosted by Ian Dowman at University College London, in the frame of CEOS Working Group on Calibration and Validation (WGCV) and ISPRS working groups dedicated to radar techniques (WG II/4 and III/6). There were 24 participants, from UK, North America and Australia. The objective of the meeting was to bring together scientists working in the area of production and validation of land surface parameters from spaceborne sensors. There was a particular emphasis on the production and use of Digital Elevation Models (DEMs) in relation to validation of land parameters derived from the EOS mission.

### Production and Validation of DEMs

State of the art sensors and missions were first presented (Shuttle Radar Topographic Mission (SRTM), ENVISAT, IKONOS and the Vegetation Canopy Lidar). All these systems are expected to provide DEMs (digital elevation models) and other biophysical products in a near future, and their capability to satisfy standard scientific and operational requirements was discussed. The other sessions had a strong focus on the validation of DEMs and high level products such as geocoded forest cover, land use maps and vegetation indices. The IGOS Global Observation of Forest Cover (GOFC) project was taken as a typical example of what is required.

Existing or potentially available DEMs were described, both at a global scale (based on map compilation or radar altimetry) and at a regional scale (Great Britain, Amazonia). Several projects on DEM quality assessment were presented, not only in terms of error budget but also according to thematic application requirements (e.g. hydrological modelling and erosion prediction), and alternative approaches (hydrographic network, fractal dimension, link with land cover) were proposed to overcome the limitations of assessment only by root mean square error. Several presentations were given on radar techniques, either on interferometry, stereo matching or segmentation of multitemporal images.

In the course of the papers and discussion a number of issues were raised which suggest action at the level of the CEOS Plenary. One pressing problem resulting from the acquisition of global data sets, such as from SRTM, is how to obtain a well-distributed coherent set of ground control points. It was also noted that more international collaboration was required in the area of data fusion and synergistic use of sensors, the development of test sites and control data, and on an agreed statement of sources of error and quality requirements.

### Validation of Land Cover Parameters

The review and exchange of calibration and validation information for terrain parameters covered a broad spectrum of issues, ranging from reviewing established land cover accuracy assessment results (Alan Belward on IGBP Landcover validation and John Taylor's results from the MARS project) to current plans for validation of higher order biophysical products (EOS/MODIS validation plans by Chris Justice and Jeff Morisette and validation activities in Australia presented by Fred Prata). In addition to specific validation activities there was a presentation on sampling strategies with various global tessellations (Tim Richards). The Global Observations of Forest Cover (GOFC), presented by Frank Ahern in the context of the Integrated Global Observations Strategy (IGOS), emphasised the importance of the global perspective in thematic product validation. CEOS GOFC provides an operational pilot activity for the provision of space-borne data for various aspects of forest cover monitoring (http//www.gofc.org/gofc). One important focus for the GOFC project is to secure the provision of data sets needed to quantify forest cover extent and rates of change to address outstanding questions of the global carbon cycle.

### Future Action

Through the presentations and related discussions on terrain parameters, the meeting reached the conclusions that WGCV should initiate a Validation (Sub-Group) within CEOS WGCV, which would focus on validation of land products. The primary goals of the sub-group would include:

- Promoting the quantification and characterisation of satellite land product accuracy
- Sharing land product validation past experience and lessons learned
- Moving towards the generation of 'standardised products with known accuracy' from similar sensing systems in the context of data continuity

- Establishing relationships between like products - e.g. Vegetation Indices
- Developing traceable in situ validation measurement standards and protocols
- Co-ordinating international validation activities
- Improving access to validation data sets

There is an opportunity to use the CEOS GOFC project as a test-bed for developing improved land product validation co-ordination. This would not only contribute to the credence of the GOFC products but also allow the WGCV to assess gaps, overlap, and redundancy in observation requirements arising from the validation implications of the developing IGOS.

In order to continue this work a meeting will be held Spring 2000 with particular attention to validation of products associated with GOFC, with a focus on standardising products and product validation and to cover in situ measurement protocols, validation sites, and data access for various product suites.

## Conclusion

As the land remote sensing community starts to pay increased attention to data quality and accuracy through product validation, an international validation co-ordination mechanism has considerable appeal. The space agencies and land remote sensing community will benefit from sharing experience and resources associated with the collection and sharing of in situ validation data and from scientists concerned with DEMs and land cover working together. In the next few years there will be an increase in the availability of moderate resolution (c. 1km) sensing systems and a proliferation in data products. With the high cost of in situ data collection relative to the resources available for the non-space segment of most observation programs, the potential benefits from international co-ordination are considerable. The meeting was an important point of departure for such international co-ordination and an expanded role for the CEOS Calibration and Validation Working Group. It brought together scientists who describe both the terrain surface, through DEMs, and the land cover and enabled important recommendations to be made for future action.

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# International Organization for Standards (ISO)

***By Norman C. Andersen***

The International organization for standardization (ISO), is a federation of national standards bodies, comprising of 118 members (85 member bodies, 24 Correspondent members, and 9 Subscribing members), one from each country. ISO international standards are developed in agreement between Member bodies. A committee draft is given to an ISO Technical Committee (TC) for discussion. After consensus in the TC, the central secretariat of ISO emits a Draft International Standard (DIS). The drafts include the voting results from all respective countries. Final voting by all ISO Member bodies and the final version has to be agreed to by at least 75% of the voters.

**Purpose of ISO/TC 211**

The purpose of the ISO/TC 211 standards work is to provide standardization in the field of digital geographic information that is to establish a structured set of standards for information concerning objects or phenomena that are directly or indirectly associated with a location relative to the Earth. These standards specify methods, tools and services for data management (including definition and description), processing, analyzing, accessing, presenting and transferring such data in digital/electronic form between users, systems and locations. The set of standards links to complementary standards for information technology and data where possible and provides a framework for the development of sector-specific applications using geographic data.

**Use of ISO/TC 211 Standards**

The ISO/TC 211 standards work is directed to different classes of users, including the following:

- Developers of commercial or proprietary GIS products
- Developers of GIS application systems (possibly using GIS products) including system integrators, purchasers, data integrators, and data administrators
- Producers or suppliers of geographic or geospatial data
- Users of geographic data (and GIS)
- Developers of specific geographic information application and Information Technology (IT) Standards

**Renumbering of the ISO/TC 211 Projects (Resolution 109)**

ISO/TC 211 endorses the proposal to renumber the projects within the committee in the new number series allocated by the ISO Central Secretariat, that is, all projects being numbered in the range 19100 and 19199. The existing project numbers will be changed according to the table below.

| New number | Old number | Title |
|---|---|---|
| 19101 | 15046-1 | Geographic information - Reference model |
| 19102 | 15046-2 | Geographic information - Overview |
| 19103 | 15046-3 | Geographic information - Conceptual schema language |
| 19104 | 15046-4 | Geographic information - Terminology |
| 19105 | 15046-5 | Geographic information - Conformance and testing |
| 19106 | 15046-6 | Geographic information - Profiles |
| 19107 | 15046-7 | Geographic information - Spatial schema |
| 19108 | 15046-8 | Geographic information - Temporal schema |
| 19109 | 15046-9 | Geographic information - Rules for application schema |
| 19110 | 15046-10 | Geographic information - Feature cataloguing methodology |
| 19111 | 15046-11 | Geographic information - Spatial referencing by coordinates |
| 19112 | 15046-12 | Geographic information - Spatial referencing by geographic identifiers |
| 19113 | 15046-13 | Geographic information - Quality principles |
| 19114 | 15046-14 | Geographic information - Quality evaluation procedures |
| 19115 | 15046-15 | Geographic information - Metadata |
| 19116 | 15046-16 | Geographic information - Positioning services |
| 19117 | 15046-17 | Geographic information - Portrayal |
| 19118 | 15046-18 | Geographic information - Encoding |
| 19119 | 15046-19 | Geographic information - Services |
| 19120 | 15854 | Geographic information - Functional standards |
| 19121 | 16569 | Geographic information - Imagery and gridded data |
| 19122 | 16822 | Geographic information - Qualifications and certification of personnel |
| 19123 | 17753 | Geographic information - Schema for coverage geometry and functions |
| 19124 | 17754 | Geographic information - Imagery and gridded data components |

ISO/TC 211 instructs the secretariat, in cooperation with the Convenor and project leaders, to update the drafts according to the new numbers.

**New Work Items**

Three work items have been added to the ISO/TC 211 series since the last report.

**19122 Geographic information/Geomatics - Qualifications and Certification of Personnel**

Scope: To develop a Type 3 report, which describes a system for the qualification and certification, by a central independent body, of personnel in the field of Geographic Information Science / Geomatics. To define the boundaries between Geographic Information Science/ Geomatics and other related disciplines and professions. To specify the technologies and tasks pertaining to Geographic Information Science / Geomatics. To establish skill sets and competency levels for technologists, professional staff and management in the field. To research the relationship between this initiative and other similar certification processes performed by existing professional associations. To develop a plan for the accreditation of candidate institutions and programs, for the certification of individuals in the workforce, and for collaboration with other professional bodies.

**19123 Geographic information - Schema for coverage geometry and functions**

Scope: Definition of a standard conceptual schema for describing the spatial characteristics of coverage's.

**19124 Geographic information - Imagery and gridded data components**

Scope: To standardize concepts for the description and representation of imagery and gridded data in the context of the ISO/TC 211 series of standards. This includes new work on the following aspects of such data: Rules for application schemas, Quality principles and Quality evaluation procedures, Spatial reference systems, Visualisation, and Exploitation services. The work will also identify aspects of existing parts of the family of standards that need to be expanded to address imagery and gridded data. New metadata elements will be defined using the extension mechanism of ISO 19115 Geographic information - Metadata. Methods of encoding imagery and gridded data will be identified for inclusion in ISO 19118 Geographic information - Encoding

**Calendar of Upcoming Plenaries:**

| Meeting | Time | Place |
|---|---|---|
| ISO/TC211, 10th | 2000-03-09/10 | South Africa |
| ISO/TC211, 11th | 2000-09-28/29 | USA |
| ISO/TC211, 12th | 2001- 03/04 | Portugal (To be confirmed) |

**Web Site:** For more information pertaining to ISO/TC 211 please visit our World Wide Web-server at the following URL address: **http:/www.statkart.no/isotc211/**

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