

Report on the ISPRS Commission VI Workshop "Development and Technology Transfer in Geomatics for Environmental and Resource Management", 25-28 March 2002, Dar es Salaam

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The internationally known virtuosos giving a concert.

other hand politics and sports is a fair game. There are few people who love talking politics and sports as much as the Turks do. If you mention that you are familiar with how good Turks at wrestling, weight lifting, Galatasaray

soccer teams UEFA championship and winning of Super Cup, Turkish basketball teams second place at European Championship and the recent third place at World Cup Soccer Championship, you surely will be the most loved one!

To sum up, a guest might commit social faux-pas, but what matters is the underlying intention. If there is a sense of equality and respect, which the Turkish people will be quick to detect, all will be well.

Enjoy your stay here in Turkey, the cradle of civilisations, while geo-imagery bridging continents!

Important Notice!

We kindly recommend you to read carefully this serial about Turkey, and to keep it for your further reference. By the end of 2003, there will be a quiz and winners will be awarded with promotional gifts of the ISPRS 2004 Istanbul Congress.

Report on the ISPRS Commission VI Workshop ‘Development and Technology Transfer in Geomatics for Environmental and Resource Management’, 25-28 March 2002, Dar es Salaam

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Organisation, Sponsors, Workshop Topics and Format

The workshop ‘Development and Technology Transfer in Geomatics for Environmental and Resource Management’ held at the Hotel White Sands, Dar es Salaam, Tanzania, 25-28 March 2002 was co-organised by the ISPRS WG VI/1 ‘Education and Training’ (<http://www.commission6.isprs.org/wg1/>), WG VI/3 ‘International Cooperation and Technology Transfer’ (<http://www.commission6.isprs.org/wg3/>) and the University College of Lands and Architectural Studies (UCLAS), University of Dar es Salaam, Tanzania. This is a continuation of a cooperation of these two WGs with activities last year in L. America, this year in Africa and next year in Asia.

The workshop was attended by 69 participants from 17 countries and three continents with 55 participants from African countries, 13 participants from Europe and one from Asia. Sponsors included the African Association of Remote Sensing of the Environment (AARSE), ISPRS Council, ITC, ESA and the UN Office of Outer Space Affairs (OOSA). Organisations that contributed financially, besides the last four, included among others UCLAS, a SADC Project on Capacity Building in Environmental Information Systems, ETH Zurich and the National

Research Foundation of South Africa. Of the participants who attended the workshop, about 70% were, to one or another extent, supported financially, even if at a late stage of the workshop organisation, indicating the need, particularly for Africa, for appropriate and timely financial support to enable participation of scientists in such events.

Both workshop topics and format were selected with valuable suggestions from many Programme Committee members. The workshop focussed on the use of Geomatics technologies (Remote Sensing, GIS, Environmental Information Systems, Photogrammetry and GPS) as tools to generate geo-spatial information for environmental and resources management. Sub-themes of the workshop included collaborative capacity building, education and training, international co-operation and technology transfer. The main topics, as reflected in the titles of the technical sessions, included: (a) Education and training, technology transfer and international co-operation; (b) EIS, crises and natural disasters, land degradation and desertification; (c) Mapping and spatial data infrastructure; (d) Ecosystems protection and resource management; (e) GIS, Remote Sensing and Internet applications. The programme format included: opening session and keynote address, an invited talk, two tutorials, presentations in five

technical sessions, two panel discussions on the sub-themes and four technical visits. In spite of the quite long daily duration of the workshop up to 7 p.m., the attendance was very high and constant to the workshop end, and discussions were lively. The technical programme was accompanied by social events (Welcome Party, Gala Dinner with traditional music and dances, ITC alumni party), which allowed a better social interaction and fruitful discussions, as well as an impressive glimpse of the African culture. The hotel facilities and services were very good, enabling work in a relaxed atmosphere.

Opening Session

The workshop was officially opened by the Honourable Minister of Lands and Human Settlements Development, Mr. Gideon Cheyo, (M.P.). This indeed underscored the importance of the meeting and the significance being attached to Geomatics technologies by the African governments. The Minister stressed the importance of Geomatics technologies for providing basic infrastructure information for a variety of applications such as mapping, cadastre, land use planning and resource management in Tanzania and the region. He emphasised the fact that



The official opening of the workshop. From left to right: T. Woldai, Principal of UCLAS, E. Baltasvias, Minister of Lands and Human Settlements Development, M. Molenaar, G. Begni.

about 90% or more of all maps in Tanzania are out of date and have unnecessarily long updating cycles, e.g. 10 years for 1:50,000 and 5 years for 1:2,500 scale maps. The Minister concluded by pointing out that scientists and professionals working in the fields of Geomatics should develop methods and operational procedures for mapping, aiming at reducing the currently prohibitive mapping costs of US \$160/km² and US\$40 per km² for 1:5,000 and 1:10,000 scales respectively, but still delivering acceptable quality.

Gerard Begni, Second ISPRS Vice-President, explained the international role of ISPRS and pointed out that environment and resource management raised major concerns at global, regional, national and local levels and that physical and social-economic factors were highly embedded in their management. He therefore emphasised that a multi-disciplinary and interdisciplinary approach in the environmental and resource monitoring and management was mandatory and concluded that Geomatics could give invaluable information to scientists studying the evolution

of the environment and resources, as well as to policy makers who have to ensure sustainable utilisation and management of the environment and the natural resources.

Other short introductory remarks were made by Dr. G. Mtaló (Local Host), Prof. Idris Kikula (UCLAS Principal), Dr. E. Baltasvias (Organising Committee) and Dr. T. Woldai (AARSE).

Keynote Address

It was titled 'Capacity Building for Geo-Informatics in Africa: An ITC Perspective' and presented by Prof. Martien Molenaar, Rector of ITC.

Prof. Molenaar indicated that 30 years after the introduction of civilian remote sensing and 20 years after the breakthrough in GIS, the related techniques have matured and are fully accepted as tools for spatial management and form structural components of information infrastructure in both public and private sectors. He said that a Geo-information community has developed, consisting increasingly of highly educated professionals who can be categorised into three major groups: (a) Experts in the field of spatial information handling, (b) Users of Geo-information, and (c) Professionals and policy makers, who are aware of the importance of Geo-information for civil society. He emphasised that the education of the above professionals requires programmes that are carefully designed based on the mature paradigms of Geo-information Science and its related disciplines. The design of the educational programmes should be also based on a proper understanding of the contexts in which geo-information is produced and used and of the role that the three different types of professionals play in this field. Prof. Molenaar observed that a similar trend of processes is evident in Africa but that technological and institutional conditions in many regions of Africa are far from optimal for the creation of an information infrastructure. Therefore, great investments should be complemented by institutional and organisational development to ensure adequacy and effectiveness of the investments.

Regarding education and training, Prof. Molenaar underscored the importance of geo-information data infrastructure (GDI) for good governance, which has implications for national (public) organisations responsible for establishing and operating the GDIs. Therefore, the education of individuals should be accompanied by institutional capacity building. Due to changes in technological developments as well as developments in demand for information, Prof. Molenaar reported that ITC has had to change its modus operandi hence coming up with a new mission and the new name 'International Institute for Geo-information Science and Earth Observation' but retaining the ITC trademark. He further gave details on the new research and educational programme of ITC. Molenaar concluded by saying that most institutional

capacity building in Africa in the past was project-based and that upon completion of such projects the support stopped. In the new ITC approach, emphasis will be on international co-operation, whereby joint educational programmes, in a decentralisation venture, will be accredited by both ITC and the collaborating partner. The partners are expected to be committed to continuing the collaboration, using their own core funding sources, and scholarships/fellowships be funded from external sources. The arrangement will involve development of regional networks composed of limited number of pre-identified partners from among organisations with which experience has been gained during institutional development projects over the last 25 years.

Invited Talk

It was given by Prof. Tsehaie Woldai (ITC), representing AARSE, and focussed on the status of EIS and the key factors that have influenced EIS development in sub-Saharan Africa. Such key factors included: Cultural profile; Lack of development in space technology in Africa; Poor tradition in surveying and mapping; Few institutions providing geodetic education; Limited support for geodetic networking; Limited education and training in earth observation systems in Africa; The role of donors and NGOs in EIS development in Africa with varying interests and emphasis at different times.

Tutorials

A. 'New Developments in Information Extraction from Remote Sensing Data', Prof. Peter Zeil and Stefan Lang, Centre for Geographical Information Processing (ZGIS), University of Salzburg, Austria. After mentioning developments with new sensors and new possibilities opened, the lecturers stressed that classification of single pixels in a multi-dimensional feature space without using spatial concepts is still very common. But extraction of meaningful objects requires use of context-information from the images based e.g. on texture or fractal dimension, an object-oriented image analysis approach and subsequent application-specific analysis taking into account the object attributes. The lecturers then presented an object-based segmentation and classification approach, as implemented by the software package e-Cognition. Examples of landcover segmentation were given with emphasis on vegetation mapping and crop monitoring. A comparison between pixel- and object-based approaches was given, mentioning limitations of the former and explaining key procedures of the object-based ones, including shape and texture parameters.

B. 'Applications of Imaging Radar', Prof. M. R. Inggs, Radar Remote Sensing Group, Department of Electrical Engineering, University of Cape Town. The tutorial was at a very appropriate level for the workshop participants and

didactically excellent. It was presented in two sections. In the first section, Prof. Inggs discussed topics relating to applications of imaging radar, introduction to the theory of imaging radar, examples of geological applications and existing airborne and spaceborne data sources and pricing. The second section dwelt on map generation using SAR, a wide range of imaging radar applications, especially on environmental and resource monitoring, and African experiences. Regarding costs it was mentioned that airborne data is expensive due to mobilisation costs, reaching more than US\$50/km² and rising to US\$150/km² for a processed DEM. Satellite data is relatively inexpensive, if bought from existing databases, e.g. for ERS about US\$0.1/km². In spite of that, both airborne and spaceborne sensors have their unique applications. Inggs reported that SAR-processing can be performed using some general purpose Remote Sensing as well as dedicated commercial packages. However, the processing, especially interferometry and DEM generation, is highly technical and tedious and requires skill and experience.

Technical Presentations and Proceedings

36 papers from 59 authors in 16 countries were arranged in five technical sessions. All submitted abstracts were presented, with just one exception, where however the full paper was still submitted. Thus, no programme changes, as often happens in other events, were necessary. Presentation time was short, focussing on the main points of each paper, with common discussion of all papers of each session at the end of the session. The presentations gave valuable and detailed enough information and were mature in many aspects with very few exceptions. More details



Snapshot from the Gala Dinner with traditional African dances and music.

can be found in the full papers, which are available in the proceedings and on the WEB. The proceedings of the workshop include all papers, except the invited talk and 3 papers. They were published as International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences, Vol. 34, Part 6/W6 and consist of 225 pages including colour figures. They can be ordered from GITC bv, P.O. Box 112, 8530 AC Lemmer, The Netherlands, tel. +31-514-561854, fax +31-514-563898, e-mail: mailbox@gitc.nl, <http://www.gitc.nl>. The proceedings were also distributed on a CD, which included additional material like the tutorials, other information from ESA and OOSA and PR material. The papers were made available on the workshop WEB site two weeks in advance.

Panel Discussions

The topics of the two panel discussions, co-ordinated by Prof. H. Ruther and Dr. G. Begni respectively, were: Education and Training, and International Co-operation and Technology Transfer. Among the key issues raised and agreed upon were:

- Education and training requires co-ordination and networking. There is need for creation of networks (South-South and North-South) to facilitate sharing of human and training material resources
- It is important to train and, due to new technological developments, also retrain personnel at various levels: technician, professional, management and career officer. This can be facilitated through modularised training
- There is need for vigorous awareness campaigns, at all possible levels, in the area of Geo-information to increase involvement
- Training in Geo-information should be both application-oriented as well as being linked to core profession courses supported by Geo-information
- It is important that facilities are developed so that those trained can apply the technologies
- The policy makers at various levels (governmental, NGOs, intergovernmental, international) should facilitate job creation so as to create opportunities for those trained in Geo-information
- There is need for regional/international co-operation to avoid duplication of efforts
- There are limited institutional and financial resources in Africa to facilitate creation of critical technical masses and, therefore, there is need to create critical masses while building teams of core professionals
- Multi-media education has been hampered in Africa by poor communication network, hindering information exchange and international co-operation
- The role played by EIS-Africa in bringing together players and stakeholders in Geo-information was recognised and other institutions (particularly technical ones) were asked to play leading roles in the use of Geo-information
- Funding fellowships for further training should be made available not only to persons in governmental institutions, as up to now, but also to professionals in private institutions
- There is need for African countries to identify their priority needs in the area of Geo-information

Technical visits

The workshop was concluded with visits to the following institutions in Dar es Salaam, involved in Geomatics technologies: GeoInformation Centre (GIC) of UCLAS and the Institute of Resource Assessment - TANRIC both of the University of Dar es Salaam, Infobridge Ltd. (a major private geoinformation company in Dar es Salaam) and the GEODESA laboratory of the EU-supported GIS Centre of the Southern and Eastern Africa Mineral Research Centre (SEAMIC). The visits included short presentation of activities, visit of the facilities and demonstrations on selected topics, projects and products. Particularly impressive were the activities of GIC with very good facilities in GIS, Photogrammetry and Remote Sensing, and increasing personnel and research and development output.

Varia

- The workshop found considerable attention in the local press (e.g. English newspaper Guardian, Dar es Salaam) with multiple articles, even on the first page
- ISPRS Council provided institutions the opportunity to order gratis existing copies of the ISPRS Archives. In addition, free copies of the ISPRS Journal were delivered to selected important educational institutions
- The WEB page of the workshop was set-up early enough and provided complete and well-structured information that was helpful in the successful holding of the workshop. The workshop programme, together with full information (incl. free proceedings, tutorial notes, keynote speech and panel discussion conclusions), can be found at the WEB site of the workshop (<http://www.commission6.isprs.org/daressalaam/>)

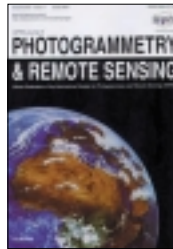
General Observations and Specific Recommendations

- The workshop was generally very well organised, before and during the workshop with the support of the Local Organising Committee
- From presentations and discussions made, it appears that the usage of Geomatics data has not yet very much come of age in Africa. This could be attributed to a number of factors:
 - Lack of awareness at the policy level of the large amount of geo-information data and their relatively low cost
 - Inadequately trained personnel in the use of Geomatics technologies and data, stressing the serious need for high-level training at graduate or postgraduate level. In the past, the focus has been on short training courses that has created awareness but not in-depth understanding of these technologies
 - The developments in Geomatics technologies have been too rapid to cope with - particularly in Africa where in-depth understanding of Geomatics technologies has not been up-to-date
 - Most data (particularly geo-spatial data such as topographic and thematic maps) in Africa are out-of-date. The geo-spatial data generators and geo-spatial application institutions such as Government Departments, Regional Centres, the -United Nations Environment Programme (UNEP), etc. should come together to discuss areas of collaboration to assist in information updating in Africa
 - There is an urgent need to build and enhance capacity, particularly human resources, as a means of improving the use of geo-information in Africa. Fellowships/scholarships should be provided for graduate and postgraduate training. Organisations, especially regional and international, may assist either directly or through donors to provide funds for training in order to enhance geo-information data understanding and usage globally, and particularly in Africa where the resources base is quite limited

- Extensive use of Remote Sensing data, especially in emergency situations, is hampered by, among other factors, the fact that only one receiving station in Africa is active (SAC, S. Africa) with limited coverage of the continent
- There is need to (a) standardise and harmonise available geo-information to facilitate and ease data exchange and transfer and (b) generate metadata for all existing data in order to evaluate its quality, quantity and availability, and enhance its use
- Currently in Africa, there is a limited data-exchange network, something that should be improved urgently – by the Africans themselves
- There is a lack of information exchange and co-operation within African countries, between countries and even more regions, with obvious negative effects
- Scientific events, like this workshop, organised by ISPRS or other organisations, need to be better coordinated and have more continuity, with additional measures taken (see above), in order to be able to have a lasting impact and improve the current situation in Africa

ISPRS Journal of Photogrammetry and Remote Sensing - Call for Papers Theme Issue: ‘Integration of Geodata and Imagery for Automated Refinement and Update of Spatial Databases’

Guest editors: C. Heipke, K. Pakzad, F. Willrich (University of Hannover, Germany), A. Peled (University of Haifa, Israel), Planned publication date: Winter 2003/04



This theme issue focuses on the integration of geodata in vector format with non-interpreted raster data, e.g. optical aerial or high-resolution satellite imagery, airborne radar or laser imagery and digital terrain or surface models, for automated refinement and update of the input vector geodata. Vector data may come from maps, cadastral plans, geospatial databases etc. and should describe important objects like buildings, roads, water surfaces, vegetation and forests, parcels etc. Regarding input imagery, the focus will be on airborne photogrammetric imagery from digital cameras or scanned film. Used DTMs/DSMs can come from any source. Refinement refers to improvement, upgrade and extension of the input data, e.g. by improving their planimetric accuracy, adding height information and new attributes etc. Regarding methods focus will be on automatic/semi-automatic methods and extraction of 3D information. A major issue is the full exploitation of the geometric, topological and semantic description of existing geodata to facilitate object extraction and quality control by various means (restrict search space, bridge result gaps and difficult cases, derive reliability/accuracy measures etc.). Techniques for combining various raster data sets only, as well as methods for generation of the input data, are not subject of this theme issue. Topics addressed in this issue include:

- General methods/algorithms and strategies/architectures for combining vector and raster data
- Use of various object cues, incl. cost/benefit analysis,

and integration of partial results from different cues and/or algorithms

- Use and comparison of various processing options: orthoimages vs. stereo vs. multi-image, black/white vs. RGB vs. additional use of NIR or other spectral channels, various image scales, DTM vs. DSM or both with varying point spacing and accuracy etc.
- Use and improvement of a priori information on the input vector data regarding geometry, topology and attributes; data mining to extract new explicit information
- Studies concerning cost/benefit analysis of manual intervention
- Self-tuning / automated adaptation of software input parameters
- Methods and measures for qualitative and especially quantitative control of completeness, reliability and accuracy/consistency of geometry, topology and attributes, incl. error detection, and handling and propagation of uncertainty
- Reports on extensive tests using accurate reference data
- Experimental and operational systems, possibly integrated with digital photogrammetric, remote sensing and GI systems

The papers must be original contributions, not previously published in or submitted to other journals. Papers published or submitted for publication in conference proceedings can be considered to the extent that they are considerably extended and improved. Very good research and relevant-for-practice papers will be preferred. Papers must follow the instructions for authors described at <http://www.photogrammetry.ethz.ch/journal>. Please submit the full manuscript in Word or PDF format by e-mail to pakzad@ipi.uni-hannover.de by 15 January 2003.