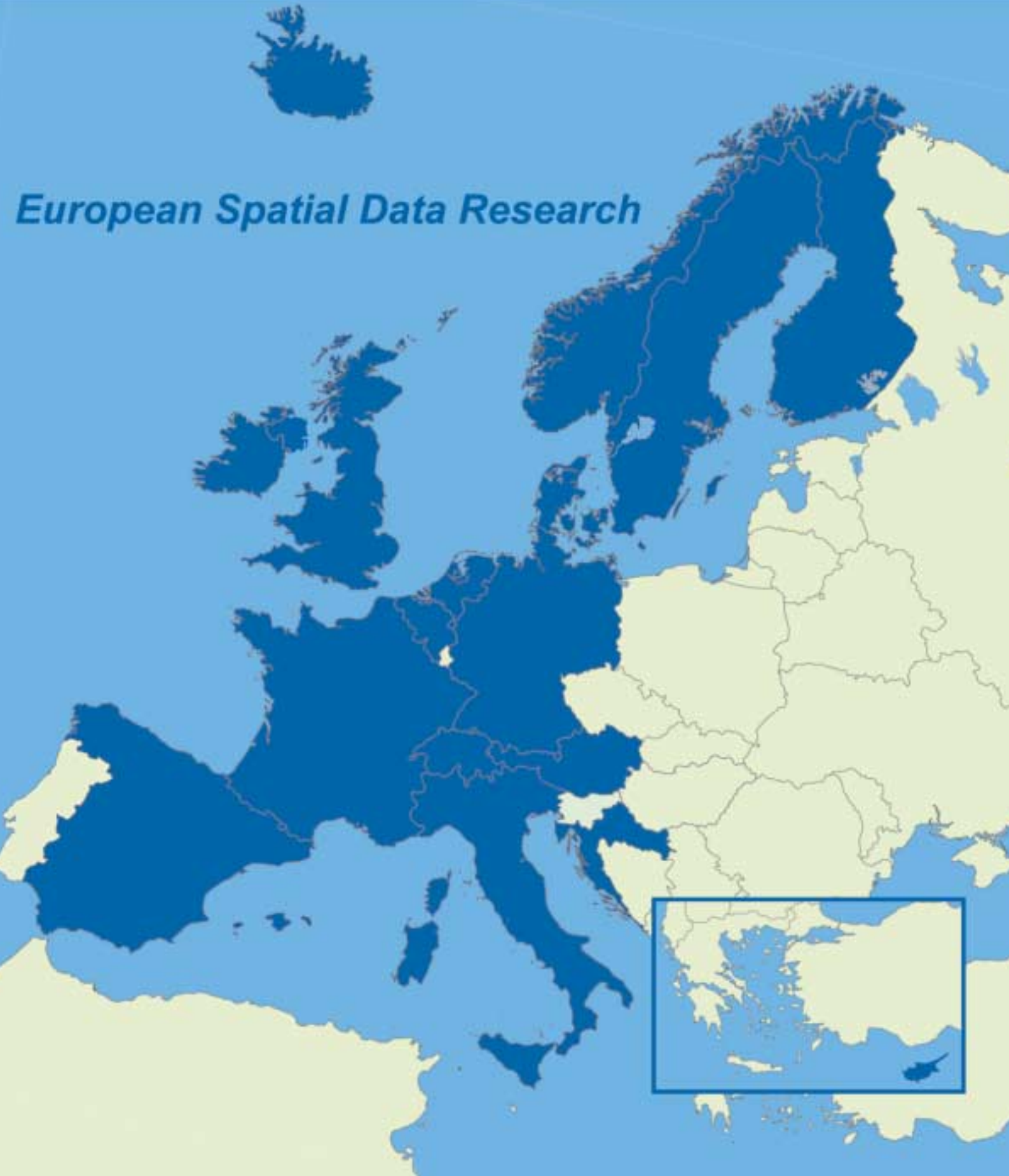




Annual Report 2009

www.euroedr.net

European Spatial Data Research



About EuroSDR

EuroSDR is a pan-European organisation established by International Treaty, as OEEPE, in 1953 in Paris in accordance with a recommendation passed by the Council of the Organisation for European Economic Co-operation. The spatial data research interests of European countries are represented through the membership in EuroSDR of national organisations from their production and research sectors.

The result is a network of delegates, from European Geographic Information organisations and research institutes, effectively and practically addressing Europe's spatial data research requirements.

Collaborative research projects address the acquisition, management and delivery of spatial data and services while international workshops and courses, in collaboration with related organisations, address key issues in a timely and focussed manner.

Our Member States and their Prime Delegates (2009)

Austria	Michael Franzen	Bundesamt für Eich- und Vermessungswesen (BEV)
Belgium	Ingrid Vanden Berghe	Nationaal Geografisch Instituut - Institut Géographique National
Croatia	Željko Hećimović	Hrvatski Geodetski Institut
Cyprus	Christos Zenonos	Department of Lands and Surveys
Denmark	Thorben Brigsted Hansen	Kort & Matrikelstryrelsen
Finland	Risto Kuittinen	Geodeettinen Laitos
France	Jean-Philippe Lagrange	Institut Géographique National
Germany	Dietmar Grünreich	Bundesamt für Kartographie und Geodäsie
Iceland	Magnús Guðmundsson	Landmælingar Íslands
Ireland	Colin Bray	Ordnance Survey Ireland
Italy	Carlo Cannafoglia	Ministero del l'Economia e Finanze
Norway	Jon Arne Trollvik	Statens Kartverk
Spain	Antonio Arozarena	Instituto Geografico Nacional
Sweden	Anders Olsson	Lantmäteriet
Switzerland	Francois Golay	Ecole polytechnique fédérale de Lausanne (EPFL)
The Netherlands	Jantien Stoter	Technical University of Delft and NL Kadaster
United Kingdom	Malcolm Havercroft	Ordnance Survey of Great Britain

Our Vision is to be **the European research platform** for National Mapping and Cadastral Agencies, Academic Institutes, the Private Sector, Industry and User Groups on issues related to the implementation of technology developments with respect to optimising the provision (collection, processing, storage, maintenance, visualisation, dissemination and use) of reference information (data serving as a spatial framework for organisations involved in monitoring, management and development) in a Geoinformation Infrastructure (GI) context.

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Message from the President

Antonio Arozarena Villar

2009 can be considered as the consolidation of the INSPIRE initiative (Infrastructure for Spatial Information in the European Community) in the scope of both the European Commission and the Member Countries. It is the year of implementation of the directive to the legislation of each country and therefore the increased cooperation between the different Public Administrations, primarily emphasizing the enforcement of existing short-term agendas in developing Data Specifications and Implementation Rules of Annexes I and II.

For this reason, EuroSDR increased its activities in research and development to facilitate compliance with the technical requirements, such as implementing in the same manner in each member country.

The close collaboration and participation in research and development with European mapping agencies is seen as an imperative to be increased in the near future in order to facilitate understanding and cooperation between National and European Administrations.

In this way the convergence in the short term needs for information and data for GMES (Global Monitoring for Environment and Security) and European Administrations (top-down approach) with the short, medium and long-term needs of the member states (bottom-up approach) will have relevance for EuroSDR contributions by way of technological solutions to both approaches.

In this sense we have been working within EuroSDR, with a view to improving both the internal organization (new body of economic management, creating the figure of Treasurer), supplemented by new forms of collaborative initiatives between the European Research and Mapping Organizations facilitating the emergence of new research projects and their implementation, contributing to increased efficiency in our Rolling Research Plans in the future.

For this reason the opening of these new lines of research, according to new needs highlighted from GMES and INSPIRE, as are the issues of "geometric, topological and semantics harmonization", "3D data and cartographic models", "Automatic change detection", "land cover and use",

"automatic validation", "multi representation" etc., will undoubtedly be issues that will occupy more time and activity in our organization over the coming years.

Also noteworthy is our closer

cooperation with other European and World Organizations. In this regard our increased presence and mutual collaboration with Eurogeographics should be noted, the fruit of the Memorandum of Understanding signed in 2008 between the two organizations. Our presence and future collaboration between World Organizations such as ISPRS (International Society for Photogrammetry and Remote Sensing), ICA (International Cartographic Association) with bilateral meetings at the Moscow Congress in 2008 and Santiago de Chile in 2009 respectively, will translate into trust in the coming months.

This horizontal collaboration will not only enrich our way of working, but also the complementarity of actions and ultimately better service to society.

Concerning current activities, our annual two Science Committee meetings took place this year, the 114th meeting in Paris (France) and 115th in Masala (Finland). With the assistance of all members, these were the fora for the exchange and generation of new ideas, contributing to knowledge and development of geospatial information.

I would also like to remark that this year has seen the 80th birthday of Prof. Fritz Ackermann, noted researcher worldwide, without whom photogrammetry would not have advanced as much as we know it today. EuroSDR participated at a celebratory event on 6th November at the University of Stuttgart. Prof. Ackermann was the President of OEEPE (former name of EuroSDR) from 1982 to 1984 and again from 1992 to 1994.

I want to express my admiration for former Vice President Christian Heipke, with whom I shared not only all the vicissitudes of this presidency since my appointment, but enjoyed great support in the management and vision of this organization.

In 2010 we open a new era full of hope, with Prof. Dieter Fritsch as the new Vice President of EuroSDR, benefiting from this high profile professional and academic researcher, as well as his proven vision for the future.

In conclusion we can say that we increased our research capabilities, our collaboration with Mapping Agencies and, therefore, our image of service with the goal of being the reference for European-wide applied spatial data research.



Antonio Arozarena Villar
President
EuroSDR

Message from the Vice-President

Christian Heipke

During this year's October meeting in Helsinki, my final term in office as vice president of EuroSDR has come to an end, and Dieter Fritsch from Stuttgart University was inaugurated as new vice president. I take this opportunity to reflect somewhat on the past five, and indeed the past 13 years, in which I had the opportunity to work for OEEPE and EuroSDR, first as project leader in *Automatic aerial triangulation* and *Integrated sensor orientation*, then as president of Commission 2, and finally as vice president responsible for research. During those years, the organisation has successfully managed to reinvent itself: starting as an organisation dealing with photogrammetric data acquisition, EuroSDR is now an important player in the European GI research arena. This ambitious expansion has been accompanied by a name change, a change of the legal base, and an internal re-orientation with respect to goals and priorities.

Applied research in photogrammetry, while still being close to the heart of many of us (including myself) is embedded in the larger context of GI research of modelling, acquiring, managing, presenting and distributing geoinformation and derived products. Formal liaisons and informal contacts with sister organisations such as EuroGeographics, AGILE, ISO, OGC, JRC, ISPRS, ICA and others are witness to this development, as is the presentation of EuroSDR in this year's Map World Forum in Hyderabad (India) and the Photogrammetric Week in Stuttgart (Germany). EuroSDR has also started to submit projects for funding by the European Commission, one of them currently under evaluation and we all hope for its success.

EuroSDR activities are now focussed more and more on what the organisation has been created for over 50 years ago and is best at: applied research activities in the large field of GI. Ideas for new projects and workshops are constantly being born, discussed and realised within a relatively short time frame. Currently EuroSDR has more than ten running projects; all reported elsewhere is this publication. EuroSDR also organises or co-organises about five workshops per year. The 2009 programme included such diverse topics as the *INSPIRE Atlas of implementation*, *Crowd sourcing for updating national databases*, and *European mapping and satellite solutions*.

Some changes in the structure of our meetings held every six months have helped achieve these goals: we have introduced keynote presentations during the meetings and have thus opened a way for international experts to report about their activities as well as for EuroSDR to recruit new leaders for the organisation;

Commission 5 president Mike Jackson and Wolfgang Kresse, the leader of the task force on Standards are two such examples. We have also introduced country reports to highlight developments in specific geographical regions and round table discussions (break out and tour-de-table sessions) to provide the delegates with a better chance to actively take part in the deliberations of the organisation.

Of course, not all new and exciting possibilities could be turned in to projects, workshops and results, and a number of new and some not so new questions are (still) awaiting good answers. Examples include the future role of NMCAs in an era, in which crowd sourcing and open mapping have entered the scene, the role of academia in the European Research Arena in concert with the Bologna process (and thus also in EuroSDR), EuroSDR's role in further shaping the common European GI community and in particular having its voice heard in projects such as INSPIRE, GMES and Galileo, possibilities and needs to attract new members and the role of the commercial sector in our organisation.

After thirteen years of service for EuroSDR and five years as EuroSDR vice president I feel that it is now time for a change and others should have the possibility to shape the future of the organisation. I consider myself privileged to have had the chance to work together with all the colleagues from EuroSDR, to travel to and to get to know the people of all the corners of our diverse continent – from the Baltic to Portugal and from Iceland to Cyprus. The time at OEEPE and EuroSDR has been a time of learning about different cultures, different mentalities, and consequently different ways of mapping across Europe – a very interesting and rewarding time, which I would not want to have missed. Neither would I want to have missed the opportunity to make new friends wherever I went. If you allow me to, I will strive to keep these friendships for the future. It may be a mere coincidence that my first as well as my last EuroSDR meetings have both taken place in the same city: Helsinki. But this fact also points to the active role of our Finnish friends – Risto Kuttinen, for example, who provided excellent leadership not only during his presidency from 2002-2004 and who was instrumental in changing the legal basis of the organisation or Juha Hyyppä who took over Commission 2, when I left that job in 2004, and has since managed and led a number of very

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Christian Heipke
Vice-President
EuroSDR



Sensors, Primary Data Acquisition and Georeferencing Michael Cramer

Digital airborne photogrammetric imaging is already widely used for operational projects and sales numbers of digital airborne cameras are much higher than originally expected even from the manufacturers' point of view. Digital technology is rapidly substituting the classical analogue mapping cameras and, as expected from the past, systems are still evolving and new cameras are brought to market. It is interesting to note that the three most important suppliers of large format digital airborne mapping cameras, namely Leica Geosystems, Intergraph/ZI and Vexcel Imaging have presented new mid-format based camera systems RCD100, RMK-D and Ultracam-L/Lp, complementary to their large-format "premium" systems ADS80, DMC and Ultracam-X/Xp. These developments are intended obviously to supplement the in-house product sensor line adding smaller format but also lower cost digital sensors. This could make the changeover to digital technology something easier.

Further developments are also evident with "off-the-shelf" mid-format systems, quite often arranged in multi-head sensor configurations (i.e. 4 tilted camera heads, similar to DMC pan-chromatic sensor heads), which are very flexible and might be modified for specific applications, thus available in different layouts. With the use of the latest generation 40 – 60 Mpix frame sensors the coverage of such multi-head designs is, in some cases, superior to the format of those systems, which originally claimed to be large-format. Obviously the clear differentiation between large and medium format systems is disappearing, particularly since system providers like IGI mbH and Trimble (formerly Rolleimetric) also support the merging of the multiple single images to generate a larger format, but virtual image, from so-called image stitching. Different to the other former large format systems this is offered as an option, i.e. it is up to the individual user to decide to work with the acquired single-head images or to form the virtual image.

In addition, there are the almost unimaginable developments in military reconnaissance, typically not available to civilian users, and the broad field of un-

conventional platforms and applications like unmanned vehicle systems (UVS) / unmanned aerial vehicles (UAV), which also may influence the future field of traditional mapping. The impact of such UVS/UAV activities is continuously observed and reported through the ongoing EuroSDR

Michael Cramer
Chairman
Commission 1



NEWPLATFORMS activity to keep the EuroSDR community up to date with this evolving technology. The latest review of the state of UAS technology, legislation and applications has been reported by Jurgen Everaerts (VITO, Belgium): *NEWPLATFORMS Unconventional Platforms (Unmanned Aircraft Systems) for Remote Sensing* and is published in EuroSDR Official Publication No 56.

Returning to more traditional airborne mapping applications EuroSDR Commission 1 continues its work on the (empirical) analysis of digital airborne camera performance with the current focus on medium format based sensors and the analysis of radiometric sensor performance. The EuroSDR project on **Medium Format Digital Airborne Cameras** was closed after the first theoretical phase. A report is compiled by Görres Grenzdörffer (University of Rostock, Germany) and will be available as an official EuroSDR publication in 2010. As already pointed out, the latest developments in the medium format segment have shown that the two formerly separated fields of medium format and large format systems are merging. The term medium format clearly does not fully reflect the current potential of these systems. The potential of the medium-format systems using multi-head layout is already under investigation – in direct comparison to the established large-format systems. Such system configurations for example are already part of ongoing test campaigns, such as the German test on Digital Airborne Camera Evaluation, initiated by the German Society of Photogrammetry, Remote Sensing and Geoinformation (DGPF). A comprehensive presentation of results from this German test, including results on performance of medium format systems compared to the large format sensors, will be available in the PFG, issue 2/2010, the official journal of the DGPF. Results there also prove the convergence of the medium and large format sector and that the performance of both is almost similar. Thus additional and parallel empirical tests on only medium format sensors run through EuroSDR do not seem to be necessary and it also seems to be questionable whether a sufficient number of experts could be attracted for such parallel testings.

The second technically driven project in EuroSDR Commission 1 is evaluating the **radiometric aspects of digital photogrammetric images**, co-chaired by the international experts Eija Honkavaara, Lauri Markelin (FGI Masala, Finland) and Roman Arbiol (ICC Barcelona, Spain). The first theoretical project phase was finished in 2009 and the major findings

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have been published in an extended paper “Airborne Photogrammetry—A New Tool for Quantitative Remote Sensing?—A State-of-the-Art Review on Radiometric Aspects of Digital Photogrammetric Images”. This scientific report can be accessed through the online journal at <http://www.mdpi.com/2072-4292/1/3/577/pdf>.



Figure 1: DMC image from the Sjöckulla test field in 1.9.2008 (photo by NLS).



Figure 2: ADS40 image from the Hyttiälä test site 23.8.2008 (photo by Estonian Land Board).



Figure 3: DMC image from Banyoles campaign (photo by ICC).

In addition, empirical data sets have been collected and prepared for individual radiometric analyses through voluntary experts. These data are now available for distribution. Interested participants are requested to contact the project leaders. The figures 1-3 show the three available test data sets from Sjöckulla and Hyttiälä (both in Finland) and Banyoles (Spain).

The main and maybe most topical current work in EuroSDR commission 1 is the development of **future certification strategies of digital airborne cameras** (EuroDAC² activity). The established core competence team is led by Michael Cramer (University of Stuttgart, Germany) and closely linked to the expertise from the above more technically oriented projects. This group met twice in 2009 to discuss recent findings and ongoing work. The last meeting was additionally supported by representatives from USGS, who have already developed and proposed a digital camera quality assurance concept for the US, Wolfgang Kresse as expert for ISO standards and representatives of the main digital camera system providers, were invited to give their feedback on the certification concepts and ideas. It is interesting to note that all manufacturers agreed with the EuroDAC² concepts, including the definition of test sites of common layout and the corresponding test guidelines to validate and certify the system quality. This is the only way to deal with the specific sensor designs. Open topics or problems were also mentioned and discussed. One such topic was the question as to who should perform certification of systems for the whole of Europe? This is a central aspect in the whole certification process and thus EuroDAC² intensifies contacts with the European metrology institutions to potentially embed the EuroDAC² certification process within this already established and accepted European metrology network.

Future activities regarding the definition of geometric test field layout and procedures will be closely aligned with the development of new ISO standards. Concerning radiometric issues the findings of the EuroSDR Radiometry project will be integrated into the EuroDAC² concept in 2010.

Any expert interested in any of the ongoing Commission 1 projects is cordially invited to participate!

Image Analysis and Information Extraction

Juha Hyyppä

This Commission deals with the automatic extraction and updating of geo-spatial information from aerial and space imagery. Currently three projects are under way.

The project **Radiometric Calibration of ALS Intensity**, chaired by Juha Hyyppä and Sanna Kaasalainen, FGI, and Wolfgang Wagner, TU Wien, was initiated in May 2007. The objective of the project is to develop a feasible, cost-effective technique for NMCAs and value-adding companies to carry intensity or backscatter cross-section calibration and to evaluate the proposed approach together with NMCAs and companies. The project is currently in the finishing stage and the final report will be completed in spring 2010. The final report will include written recommendations as to how the intensity information could be further calibrated and what further research is needed.

Calibration permits precise measurements and may allow accurate measurements. Precision relates to the relative calibration of the measurement while accuracy relates to the absolute calibration. If the calibration permits repeatable measurements, the system has good relative calibration. If the measurements not only are repeatable but also are absolute, they are said to be accurate. Relative calibration of ALS intensity means that measurements from different altitudes, incidence angles and dates are comparable for the same system. The methods for relative calibration reducing the effect of physical acquisition parameters on the intensity obtained have already been demonstrated.

Absolute calibration of ALS intensity means that the obtained corrected value of intensity describes the target properties and corresponding values obtained from various sensors are directly comparable. In publications of the project leaders, the absolute calibration of full-waveform ALS has been depicted and it has been shown that artificial tarps as well as gravel can be successfully applied in absolute calibration. The problems with absolute calibration are the extra costs. Experimental work has been carried out to find practical sources (e.g. natural targets, such as gravels) for absolute calibration. The effect of the moisture in gravels on recorded ALS intensity has been studied. A test for calibrating the intensity for the purpose of a national DEM acquisition was undertaken in 2009. It was also shown that the quality of the in-

tensity in ALS strips can change totally within one block – due to the use of a totally different ALS system, for correcting one strip with a hole in the data for example.

In order to calibrate the point cloud collected for the national DEM, FGI has begun a national project in order to discuss with data providers and users how the calibration can be done in a practical way with low costs. Currently more than 50,000km² of Finland has been covered with ALS and it seems that the whole of Finland will be scanned. From the point of view of the multiple usage of the data, the intensity data specifications should be completed as soon as possible.

Waveform data provides an improved way to calibrate the intensity and non-waveform data can be considered as an exception. However, non-waveform data remains the main data set used, at least in northern Europe.

Road Environment Mapping Using Vehicle-based Laser Scanning (VLS), chaired by Juha Hyyppä, FGI and Hannu Hyyppä, TKK aims at promoting and collecting algorithms and applications for using vehicle-based laser scanning and imaging. Data was distributed to open algorithm and application development for academic bodies, analyse the quality and accuracy of 3D models derived using vehicle-based laser scanning, compare the quality delivered by the partners, provide NMCAs with the basic knowledge of vehicle-based laser scanning and its possibilities and a book will be written on state-of-the-art on VLS. The project has ten possible contributing partners. The data was collected by the FGI ROAMER system and distributed



Figure 1. Sky view of a VLS data showing a street corner and office building façade. Courtesy to Antero Kukko, FGI. Acquired by ROAMER.

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in June 2009 to all participants. The inputs were requested by end of 2009. The analysis of results will be carried out in 2010.

VLS is a multi-sensor system that integrates navigation and data acquisition sensors (similar to ALS) on a rigid, moving platform for collecting point clouds of the surroundings of the mapping system. Examples of the moving platforms are a van, car, boat or UAV (Unmanned Aircraft Vehicle). The navigation sensors of VLS systems conventionally include GPS receivers and an IMU (Inertial Measurement Unit), while the data acquisition sensors include terrestrial laser scanners and various imaging systems. The point clouds provided by the VLS can be characterized with the following technical parameters: a) point density from several hundred to several thousand points per m^2 , b) point accuracy of a few centimetres when data is collected in good GPS and IMU conditions, and c) applicable range is typically a few tens of metres. It can be seen that vehicle-based laser scanning is in its early stages with regard to scientific work; thus, the status of VLS is similar to that of the ALS in the late 1990's. The scientific work is hampered by a lack of VLS systems and VLS data available, even though a number of research systems exist (e.g. Geomobil (ICC), GeoMaster (University of Tokyo), Lara-3D (Ecoles des Mines de Paris), ROAMER and SENSEI (FGI)) and commercial systems are provided, for example, by Optech (Lynx), 3D Laser Mapping (Streetmapper) and Riegl. Many recent studies on VLS systems, their accuracy and environmental modelling may be found in the literature.

Registration quality – towards integration of laser scanning and photogrammetry, chaired by Petri Rönholm, TKK, aims at evaluating the quality, accuracy, and feasibility of automatic, semi-automatic or manual registration methods for finding relative orientation between aerial images and laser scanning data. Sub-objectives include determining what kinds of registration methods are available or under development, by how much the registration methods differ in performance and accuracy, how image resolution and laser scanning data density affect registration accuracy and the possibility of robust relative orientation of laser data and images in urban areas without using ground information. The Registration Quality project is ongoing. Currently, the participants have developed and tested algorithms and methods to solve relative orientations between Z/I DMC aerial images (Panchromatic, RGB and near infrared channels) and airborne laser scanning data (Optech ALTM 3100 (2005) and Leica ALS50-II (2007)). During Optech data acquisition the flying height was approximately 1000 m resulting in a point density of 2-3 points/ m^2 . For the Leica laser scanning data the flying height was approximately 500 m resulting in a point density of 4-

5 points/ m^2 . Exterior orientation of Z/I DMC images was solved by aerial triangulation of both image blocks with Leica Photogrammetry Suite version 9.2 (Erdas LPS) and delivered to the participants of the project. The orientation of both laser scanning point clouds was changed in order to get initial mis-registrations, which need to be corrected. A set of ground control points, which were measured using real time kinematic (RTK) GPS, were also delivered.

Preliminary literature research has indicated three main strategies to extract tie features between laser scanning data and imagery:

- Corresponding 3D features are extracted from the laser scanning data and photogrammetric stereo measurements. This strategy requires stereo or multi image measurements.
- 3D features are extracted from the laser scanning data and corresponding 2D features are extracted from a single image.
- From a 3D laser point cloud, a virtual 2D image (either range or intensity representation) is created. Corresponding features are extracted from 2D laser scanning and optical images, for example using image processing algorithms.

The implementations of these three basic strategies varied greatly, and the project centre has received several interesting approaches from the participants of the project. The project has nine participants so far (excluding organizing institutes, which will also participate). The reports of each participant were submitted by 30th November 2009. The results are currently being analysed and the final report is due in early 2010.

A new project "Benchmarking of Image Matching Approaches for DSM computation" is under preparation to be led by IGN France. Image matching techniques for DSM computation are well known and have been available in commercial software for a long time. However, over the last decade LiDAR data has been preferred owing to their better accuracy, but new digital airborne cameras can cover the target with high overlap capacity and excellent radiometric quality. These characteristics are expected to foster the usage of the image-derived DSMs even though important computational aspects still need to be considered in detail.

Production Systems and Processes

André Streilein

2009 activities of this Commission were focussed on raising awareness, networking and capacity building in new fields of research such as virtual globes, 3D landscape models, Crowd-Sourcing and Semantic City Models. A number of workshops document these activities.

The project on “**Semantic Enrichment of 3D City Models for Sustainable Urban Development**” (project leader is Claudine Métral, University of Geneva, Switzerland) aims at the support and enhancement of the decision-making processes of cities in a sustainable perspective. Integration of urban knowledge, 3D modelling, visualizations and simulations should happen in such a way that urban decision makers and stakeholders will get a better understanding of the context and the impact of their decisions.



A training school on “3D Geo-information for Disaster Management” within this COST action (TU0801) was initiated in the week of 5th to 9th October 2009, in Delft, Amsterdam and Arnhem (The Netherlands). This school, which dealt with the examination of the different phases and characteristics of risk and disaster management and the demands for 3D GIS technology, the roles and responsibilities of actors involved in risk and disaster management and the analysis of the potential of current 3D GIS technology to support decision making, was a success.

André Streilein
Chairman
Commission 3



A **Workshop on historisation and archiving of geodata** was organised by the Swiss Federal Office of Topography and the Swiss Federal Archives and held on 3rd July 2009 at the Swiss Federal Office of Topography.

The aim of this one-day-workshop was to discuss the different aspects of archiving and historisation of digital geodata, to identify research issues and to define the future steps with respect to the Swiss situation. This workshop was originally designed to serve the Swiss community, but was also of significant interest to EuroSDR members. In total thirty participants from four countries joined the workshop and represented the fields of archiving, information technology and geosciences. The presentations of this workshop can be found at: <http://www.swisstopo.admin.ch/internet/swisstopo/de/home/docu/Kolloquien/090703.html>.

The lively discussion at the workshop showed that there is a growing (economic) need to solve the problem of digital archiving. The following potential research topics were identified: Archiving of digital data (Principles for the selection; How to select; How to archive the selected data; Access to the archived data), Historisation (Multi-temporal GIS), Migration of data (Ideas and concepts for alternatives; What enabled mankind to preserve data for more than 1000 years; What are suitable media).

As a result of this workshop in Switzerland a small group with members drawn from universities, the Swiss Federal Archives and the Swiss Federal Institute of Technology was established. This group will investigate the potential research topics in more detail and their financing. Further activities are planned for 2010.

The **1st EuroSDR Workshop on Crowd Sourcing for Updating National Databases** was held on 20th and 21st August 2009 at the Swiss Federal Office of Topography (Swisstopo), Wabern, Switzerland. This workshop dealt with the use of Web 2.0 technologies and communities for the mutual use of user generated content in the framework of national databases. Current applications and data management processes were demonstrated. Experiences and expectations as well as current limitations and challenges were discussed. Thirty-nine delegates from eight countries attended the workshop.

On the first afternoon of the workshop participants from the private sector, universities and government gave presentations. On the second day of the workshop common topics and future research aspects were worked out in three break-out groups.

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Information and further details can be obtained from the workshop homepage at http://www.eurosd.net/workshops/crowdsourcing_2009/index.htm

The findings of the three break-out groups were discussed in plenary. Needs were expressed for strong collaboration of the mapping agencies and the research communities in the field of user generated content, which is identified as an important and valuable input in map or geodata updating procedures, content generation and interactions with the users. There is a lack of experience and knowledge on interaction schemes, on techniques, on legal aspects, on production process integration aspects etc. The dialogue between crowds and mapping agencies, in most cases, is not established or on a very basic level. How to establish, support and motivate a community to achieve tailored user generated contents is seen as one main field of investigation.

The audience agreed that research, exchange of facts and figures as well as further workshops on crowd sourcing for national mapping agencies are welcome and even necessary.

The Workshop on National 3D Geoportals - Research Issues, Applications, Quality and Legal Issues was held on 21st September 2009 at the University of Applied Sciences Northwestern Switzerland, Muttenz / Basel (Switzerland). This workshop, organised by EuroSDR and the University of Applied Sciences Northwestern Switzerland FHNW, dealt with Virtual 3D Globes, emerging 3D National Geospatial

Data Infrastructures (3D NGDIs) and existing and future National 3D Geoportals. The workshop attracted fifty-nine participants from organisations planning to establish 3D Geoportals, from industry and universities developing and researching today's and tomorrow's Virtual 3D Globe technologies and from existing and potential users of 3D Geoportals. The workshop home page with the presentations and findings can be found at <http://www.3dgi.ch/eurosdrrws>.

It was agreed, that phase 3 of the project on Virtual Globes should deal with the definition and establishment of an international testbed for 3D web services and 3D geodata standards based on the latest OGC specifications and recommendations (e.g. Web 3D Service, Web Perspective Service and SLD-3D) and with the active participation of NMCA's.

On 8th and 9th October 2009 EuroSDR co-organized a seminar **EuroMap3S - European Mapping and Satellite Solutions Seminar**, which was held at the Centre National d'Etudes Spatiales (CNES) in Paris. This workshop covered Pleiades, Cosmo Skymed and Orfeo Earth Observation systems and examined future steps and needs of European organisations. Sessions included: Current experiences of Mapping Organisations in using satellite imagery; Introducing the Pleiades Satellite and the Orfeo Programme; Future User Needs; Use and further development of National and European Earth Observation Programmes. The workshop was attended by more than eighty participants, which led to interesting and lively discussions.

The findings were, that EuroSDR and EuroGeographics were the partners to take the workshop to an international event; that there still is a certain border between space and aerial remote sensing communities; that the development of satellite sensors is an issue for NMCA/EuroSDR (i.e. spectral resolution); that the strong votes from NMCA's put the presentations from satellite image providers into the right perspective (e.g. repetition rate, real-time products).

The EuroMap3S presentations are available at the following address: http://www.spheris-fr.com/Info/index.php?RID=5&catdoc_idt=17

Data Specifications

Ulf Sandgren

Development of specifications for spatial data presents several challenges. For a long time we have been developing cartographic models, which have made it possible to describe the real and complex world in a good way for a specific purpose. However, this means that the structure of data, scale and lay-out of a map normally fits only a limited number of use cases.

Nowadays, the demands for interoperability between different data themes, different organisations and different levels of detail make it even more demanding to work out data specifications supporting the use of spatial data for many different purposes.

INSPIRE

An important driver for moving from production of data stovepipes to fulfilling harmonised data views is the INSPIRE Directive. Several EuroSDR members have been involved in the setting up of models for development of data specifications and in development of specifications for data themes covered by Annex I of the Directive. By the end of 2009 the INSPIRE Committee adopted the Implementing Rules for these data specifications. This will have a great impact on the development of the European spatial data infrastructure.

In cooperation with EuroSDR Commission 5, AGILE and OGC a workshop was arranged in June 2009 in Hannover on experiences from work within test-beds. One outcome from the workshop is a “test-suite” with guidelines on methods for testing data specifications and services. The work with these guidelines has been coordinated by JRC based on the outcome of the workshop.

Generalisation

Jantien Stoter of ITC led an investigation and comparison of applications and methods that support generalisation of geodata. The project was finalised during the autumn and gives a clear picture of the current status of possibilities for the use of automatic methods for filtration and generalisation of spatial data.

Multiple Representation

A new project proposal on Multiple Information Representation and Consistent Logical Environment (MIRACLE) was submitted for FP7. MIRACLE addresses the challenges of semantically integrating extremely large and growing volumes of heterogeneous multi/vario-scale GI by providing data models, architectures and soft-

Ulf Sandgren
Chairman
Commission 4



ware for both data providers and end-users. The goal of MIRACLE is to enable users to seamlessly integrate GI across scales and countries without being limited by technical constraints.

A project proposal with the same aim was proposed two years ago. Unfortunately, that proposal was ranked too low on the priority list to allow it to be funded within the limits of the budgetary resources available. The new attempt is much better motivated and defined and, hopefully, will be accepted.

Production Partnership Management

A previous EuroSDR workshop on production partnership management has formed the working programme for a new ISO standardisation initiative. Antti Jakobsson of EuroGeographics head office and Ray Patrucco of Ordnance Survey GB are the editors.

Performance testing of GI services

A joint Commission 4 and 5 project on performance testing of GI services led by Anders Östman has begun during 2009.

Communication

Members of the Commission have been involved in a great number of conferences, seminars and workshops where issues within the work programme of the Commission have been presented and discussed.

Message from the Vice-President

Christian Heipke

(Continued from page 5)

successful research projects.

I would like to wholeheartedly thank everybody involved in EuroSDR for having given me the chance for such a unique European experience. It is the active participants, the project leaders, the organisers of workshops and my colleagues in the Executive Team who have all contributed to the common success including the enthusiastic support from our Dublin headquarters with Secretary-General Kevin Mooney and his right hand Oonagh Birchall. Last but not least I wish Dieter Fritsch all the best in continuing to steer the EuroSDR research activities in the direction of the future. I am absolutely sure he and all the EuroSDR members will have a successful, interesting and enjoyable year 2010 and beyond. I wish EuroSDR and the readers of the annual report all the best for the future!

Network Services

Mike Jackson

A Persistent Test-Bed (PTB) initiative has been the principal on-going activity of Commission 5 for the last thirty months. The project has the goal of developing a research platform and a persistent test environment for geospatial interoperability research, education and demonstration. The initiative was launched jointly with AGILE and OGC in June 2007 and has continued to gain momentum and community interest. The PTB is managed by a representative of each of the three “sponsor” organisations. During 2009 the representatives were (i) Prof. Mike Jackson, Centre for Geospatial Science (CGS), University of Nottingham, UK, for EuroSDR, (ii) Professor Lars Bernard, Technical University Dresden (TUD), Germany, for AGILE and (iii) Chris Higgins, EDINA, University of Edinburgh, UK, for OGC. 2008 saw the handover of the role of the PTB Project Manager from Dr Gobe Hobona (CGS, University of Nottingham) to Johannes Brauner (TUD). We thank Gobe for his excellent support from launch through the Phase 1 Use Cases and welcome Johannes, who has already contributed greatly, onto the Project. For a more detailed background to the initiative see the PTB web-site <http://plone.itc.nl/gitestbed/> and a background and future directions discussions document at <http://plone.itc.nl/gitestbed/phase-1-documents/PTB-background-and-future-directions-proposal.pdf>.

The focus on a standards-based persistent test-bed and software platform for research, teaching and demonstration is relevant to the European SDI as defined by INSPIRE as well as other European and international programmes such as GMES and GEOSS. As a standards-based platform adopting a service-oriented and web-services based architecture it offers a potentially powerful basis for research group collaboration and by encouraging harmonisation and sharing of data and services it can aid both innovation and productivity in research and efficiency in the knowledge transfer process.

In the 2008 Annual Report the definition and development process of four Use Cases was described. These were:

UC08-001: "Unified portrayal of geospatial cross-border information" by Universität der Bundeswehr München and EDINA, University of Edinburgh

UC08-002: "Discovery and Invocation of Schematization Services" by the Centre for Geospatial Science (CGS), University of Nottingham and the International Institute for Geo-Information Science and Earth Observation (ITC)

UC08-003: "Fog Monitoring and Information Service" by Newcastle University and Universität Rostock

UC08-004: "Semantic Web Service Discovery and Execution" by the University of Münster

The use cases were presented and discussed in the context of other geospatial interoperability test-bed activity and next steps were debated at a joint EuroSDR Commissions 4 and 5 and AGILE Workshop held 2nd June 2009 preceding the 12th AGILE International Conference on Geographic Information Science in Hannover, Germany (3rd to 5th June). The presentations and Workshop summary can be downloaded from the PTB web site at: <http://plone.itc.nl/gitestbed/ptb-preconference-workshop-at-agile-2009-hannover>

In addition a joint paper entitled, “Establishing a Persistent Interoperability Test-bed for European Geospatial Research” was presented within the AGILE Conference by Dr Gobe Hobona (see <http://www.ikg.uni-hannover.de/agile/fileadmin/agile/paper/31.pdf>).

Following the Hannover Workshop there have been two major developments. The first was within the context of the EU FP7 *GEOSS*, *INSPIRE* and *GMES an Action in Support Project* or *GIGAS*. The *GIGAS* objectives are to promote the coherent and interoperable development of the European *GMES* and *INSPIRE* projects and the international *GEOSS* initiative through the concerted adoption of standards, protocols, and open architectures. In co-operation with the *AGILE/EuroSDR/OGC PTB* project, a business model for a European persistent research test-bed was developed by a team led by the Technical University of Dresden and will be reported to the 2nd *GIGAS* Stakeholders Workshop in Ispra, Italy, January 2010. <http://www.thegigasforum.eu/cgi-bin/download.pl?f=366.pdf>. The *GEOSS*, *INSPIRE* and *GMES* testing approaches were analysed and a strategy developed to implement and maintain such a test-bed. The final findings of this report will be disseminated in 2010.

The second major development was a “Phase 2” call for PTB proposals. Full details of the call which has a closing date of 27th January 2010 can be found at: <http://plone.itc.nl/gitestbed/phase-1-documents/PTB-Call-for-Proposals-Phase-2.pdf>.

Phase 2 aims to build on the successful Use Cases of Phase 1 and

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Mike Jackson
Chairman
Commission 5



(Continued from page 13)

seeks the following:

- A willingness and ability to participate in the **Network for Testing GI Services Initiative**. The objective is to coordinate across various initiatives concerned with testing INSPIRE related services and components as they are developed. More information about this initiative can be found at <http://inspireforum.jrc.ec.europa.eu/pg/groups/8141/network-for-testing-giservices/>.
- A willingness to participate in an “access management federation of European universities” project as part of an OGC Authentication Interoperability Experiment. The objective here is to demonstrate securely sharing licensed data across the European academic sector using OGC Web Services. A briefing summary of this Interoperability Experiment can be found at: <http://plone.itc.nl/gitestbed/phase-1-documents/PTB-AuthN-IE-briefing-v1.pdf/view>
- Data and service offerings for publication in the PTB catalogue. Contributors should be prepared to provide metadata describing their resources.
- Additional Use Cases, the implementation of which will further the PTB. A template and examples from Phase 1 can be found at <http://plone.itc.nl/gitestbed/>

[phase-1-documents/phase-1-use-cases](#)

The above list was non-exclusive and it was stated that any proposals which further the PTB would receive consideration.

The response to the Phase 2 call has been strong and at the time of this report over a dozen proposals have been received, many of which represent collaborations of organisations. The number of countries and organisations within Europe covering Government, academia and for the first time commercial interest is very encouraging. The process of reviewing these proposals was active at the time of this report but it indicates a strong and continuing interest in the PTB and its potential relevance not only to academic research and education, which were the original objectives, but increasingly to the European SDI, INSPIRE and the national SDI programmes in EU member states.

For those interested in participating in the Commission 5 programme please contact the Commission Chair, Mike Jackson at mike.jackson@nottingham.ac.uk or, specifically to participate in the PTB test-bed activities, johannes.brauner@tu-dresden.de.

References:

Hobona, G; et al. “Establishing a Persistent Interoperability Test-bed for European Geospatial Research.” In Proceedings of 12th AGILE International Conference on Geographic Information Science, edited by Jan-Henrik Haunert, Birgit Kieler, and Judith Milde. AG-

Dieter Fritsch begins term as new EuroSDR Vice-President

On the occasion of the 114th EuroSDR meetings in Paris in May, Prof. Dieter Fritsch was appointed to succeed Prof. Christian Heipke, as the new vice-President of EuroSDR for an initial term of four years beginning in October.

Prof. Fritsch is Head of the Institute for Photogrammetry at the University of Stuttgart, Germany and has served six years as Rector of the University. He has been the research delegate to EuroSDR from Germany for many years.

Prof. Fritsch brings considerable experience to the post of Vice-President, as he has served on several steering committees in both academia and industry throughout his career. He is well known as the host of the biennial Photogrammetric Week series of conferences held at his university in Stuttgart.

As Vice-President, Prof. Fritsch will chair the scientific part of EuroSDR meetings and co-ordinate the

activities of the five scientific commissions. He will be responsible for the preparation of EuroSDR's Research



Plan for approval of the delegates and the evaluation of the results of the work of the commissions against the approved Research Plan.

114th Meetings in Paris, France

The 114th EuroSDR meetings were hosted in Charendon, Paris by IGN France from 13th to 15th May 2009.

The very productive meetings began with a seminar on 13th May showcasing some of the key developments in GI production and research in France. The lively discussions among delegates following each presentation reflected the considerable interest among our European members in the enormous contribution to research and development continuing to be made by



Delegates enjoy a refreshment break during the 114th EuroSDR meetings in Paris.

France. Topics presented were:

Earth (optical) Observation at CNES Philippe Lier, CNES, France

From SIGMA to MAGIS: a Step Further Michel Mainguenaud, MAGIS, the French GI research network

Current Activities and Initiatives at IGN-France François Brun, Deputy Director General of IGN-France

INSPIRE developments in France François Chirié, European and International Affairs, IGN-France

MATIS & LOEMI laboratories Didier Boldo, MATIS Research laboratory, IGN-France

Research at COGIT laboratory Bénédicte Bucher, COGIT Research laboratory, IGN-France

The EuroSDR Board of Delegates continued with its Spring meeting from 14th to 15th May. In addition to the regular commission, project and taskforce reports, a very interesting keynote presentation, 'Semantic enrichment of 3D city models for sustainable urban development', was delivered by Dr. Claudine Métral, University of Geneva.

The meetings also saw the inclusion of what will become a regular agenda item, namely an invited presen-



Dr Claudine Métral, University of Geneva, delivering the keynote presentation to the EuroSDR delegates.

tation about spatial data production and research in a particular European country that may or may not be a member of the organisation. In this case the topic 'R&D Projects at IGN Spain - opportunity for collaboration' was presented by Guillermo Villa, Head of the Remote Sensing unit at IGN Spain.

A further highlight of the meetings in Paris was the election of the new EuroSDR Vice-President, Professor Dieter Fritsch of the University of Stuttgart, for a term commencing in Autumn 2009. Prof. Fritsch thanked the delegates for their confidence in him and looked forward to pursuing a modern and relevant research agenda in the years ahead.

Our hosts, IGN France, provided superb hospitality and very efficient management of the event over the three days.



François Brun, Deputy Director General of IGN-France, addresses the delegates, their guests and guests of IGN-France during a very enjoyable boat trip on the river Seine.

Standards

Wolfgang Kresse

The 2009 programme of work of ISO/TC 211 includes imagery, geospatial services, and information management.

Imagery: The ISO 19130 "Imagery sensor model for geopositioning" is completed and will be published soon. The work on the new ISO 19130-2 has started and will add further sensors such as SAR/InSAR, LIDAR, and Sonar, as well as aerial triangulation. The ISO 19159 "Calibration and validation of remote sensing imagery sensors and data" is another new standardization project. Regarding aerial cameras major contributions are expected from EuroDAC², while other project partners come from Australia, Japan, the USA and many others.

Geospatial services: Some of the standards are new such as ISO 19142 "Web Feature Service" and ISO 19149 "Rights expression language for GI" (both originally developed by the OGC). Other standards are being revised because they have reached their 5-year-limit. In particular the ISO 19117 "Portrayal" will gain substance compared to the first version.

Information management: The new standard ISO

19158 "Quality assurance of data supply" has almost reached maturity. The new ISO 19157 "Data quality" will incorporate three individual former standards. The ISO 19115-2 "Metadata – Part 2: Extensions for imagery and gridded data" has been completed.

New contacts were established with ISO/TC 172 "Optics and photonics". Many of their topics are of interest to EuroSDR such as the test methods for optical components and lasers as well as safety aspects.

EuroSDR is regularly involved in the meetings of the Standards and Interoperability Forum (SIF) of GEOSS. This work has led to a publicly accessible standards registry. Through SIF EuroSDR participates in the GIGAS-project.

The status of the Open Geospatial Consortium's work is well summarized in the "OGC Reference Model", a document that was published a year ago. It covers the enterprise view, geospatial information, geospatial services, reusable pattern for deployment, and implementations of OGC standards.

EduServ

Anders Östman

The objective of the EuroSDR inter-commission working group on education services' EduServ programme is to provide training services to EuroSDR members. These actions are closely related to other dissemination actions such as publications of reports, workshops and presentation at conferences. This means that EduServ has to serve two different aims, namely to provide training that is of interest to the EuroSDR members and through training actions disseminate the results of other EuroSDR projects.

The seventh EuroSDR Educational Services (EduServ7) was delivered from May to September 2009. The introductory seminar was given in Aas, Norway on 18th and 19th May. In total twenty-three students attended the courses. Of these, four students came from national mapping agencies, ten from universities, two from private companies and seven from other organisations. The participants came from all over Europe, from Sweden in the north to Turkey in

the southeast and to Spain in the southwest.

In EduServ7, the following courses were given:

- Geometric performance of digital airborne cameras (Instructors: Michael Cramer and Dirk Stallmann)
- CityGML (Instructors: Thomas Kölbe and Anders Östman)
- Laserscanning for tree extraction (Instructors: Juha Hyypä and Harri Kaartinen)
- Schema matching, mapping and transformation for INSPIRE (Instructors: Anders Östman and Imad Abugessaisa)

The eighth EduServ series will be hosted by the KU Leuven, Belgium, beginning in late April 2010.

115th Meetings in Masala, Finland

The 115th EuroSDR meetings began in Masala, Finland with a seminar hosted by the Finnish Geodetic Institute and the National Land Survey of Finland on research and production activities in Geographical Information in Finland on Wednesday 21st October 2009. Presentations included:

National Land Survey of Finland - Down to Earth Jarmo Ratia, Director General National Land Survey of Finland

Laser Scanning Research Activities in Finland Juha Hyyppä, Anttoni Jaakkola and Sanna Kaasalainen, Finnish Geodetic Institute Building

Vectorization Arttu Soininen, Software Developer, Terrasolid Oy

Production of (new) National DEM (KM2) - 2 meter GRID based on laser scanning Olli Sirkiä, Process Manager, National Land Survey of Finland

Experiences about the use of new DEM Jouko Vanne, Geologist, Geological Survey of Finland



EuroSDR President Antonio Arozarena, Vice-President Christian Heipke, and guest, Fabio Crosilla following Professor Crosilla's presentation.

The EuroSDR Board of Delegates continued its meeting over the following two days where reports of ongoing activities and plans for new projects and workshops were discussed in detail. A keynote presentation, 'Navigating Uncharted Waters: The Use of Strategic Foresight and Scenarios in Creating a Better Built Environment', was delivered by Professor John Ratcliffe, Director Faculty of Built Environment, Dublin Institute of Technology.

'Surveying and Mapping activities at the Italian Universities and Institutional Cartography Production' was the title of the invited presentation by Professor Fabio Crosilla of the University of Udine in Italy who im-



Delegates engaged in one of the focussed discussion sessions at the 115th EuroSDR meetings.

pressed the delegates with his account of the extensive activities in his country in our field.

The 115th meetings marked the completion of the final term as EuroSDR Vice-President of Professor Christian Heipke of the Leibniz University of Hannover in Germany. Prof. Heipke served as Vice-President for five years and, during that time, oversaw many significant innovations in the EuroSDR research agenda. His will be a difficult act to follow but Professor Dieter Fritsch commenced his term in strong style with a very thought provoking presentation charting possible future research directions for the organisation.



EuroSDR President, Antonio Arozarena, makes a presentation to Christian Heipke to mark his retirement as EuroSDR Vice-President .

The meetings in Masala were very productive and highly enjoyable and sincere thanks are due to Prof. Kuittinen and his colleagues at the Finnish Geodetic Institute together with Dr. Jarmo Ratia and his colleagues at the National Land Survey of Finland.

Organisational Matters

During 2009, a number of colleagues completed their involvement with EuroSDR and were replaced by new delegates and colleagues. Juha Vilhomaa stepped down as delegate of Finland and was replaced by his colleague at the National Land Survey, Jurkka Tuokko. Juha has been a long-standing and active delegate at EuroSDR and was responsible for arranging the membership of the National Land Survey of Finland as EuroSDR's first Associate Member.

Following the retirement in 2008 of Danish delegates Joachim Höhle (Aalborg University) and Nikolaj Veje (KMS), the new Danish delegates Lars Bodum (Aalborg University) and Thorben Brigsted Hansen (KMS) took up their appointments at the 114th EuroSDR science committee meetings in May 2009.

We were delighted to welcome representatives, Andy McGill of Ireland and Dimitrios Skarlatos of Cyprus as observers to both meetings in 2009 and look forward to their further involvement in 2010.

Professor Christian Heipke, Leibniz University of Hannover, completed his term as EuroSDR Vice-President at the 115th meetings in Masala.

Christian Heipke served EuroSDR for more than ten years in a number of capacities. As project leader he was responsible for the publication of the report on Integrated Sensor Orientation (Publication no. 43: Heipke, C., Jacobsen, K. and Wegmann, H.: Integrated Sensor Orientation - Test Report and Workshop Proceedings - Frankfurt a.M. 2002). This report became a much-cited reference in spatial data research. He

served as Chairman of Commission 2, Image Analysis and Information Extraction, until 2004 when he took on the position of Chairman of the Science Committee and Vice-President of EuroSDR until 2009.

His contributions and value to the organisation were immense during his involvement and it is hoped that he will play further roles with EuroSDR in the future.

Financial Overview 2009	
Income	
Membership EuroSDR	89,000
Membership OEEPE	11,500
Total	€100,500
Expenditure	
Research Seed	24,895
Executive Team	8,595
Secretariat	59,697
Info. & Marketing	254
Fees & Charges	7,705
Total	€101,146
Income Surplus	€647

Birthday Colloquium for former OEEPE President, Fritz Ackermann

Our picture shows EuroSDR President Antonio Aroarena, former OEEPE President Fritz Ackermann and EuroSDR Vice-President Dieter Fritsch at the 80th birthday colloquium of Prof. Ackermann hosted by the University of Stuttgart, Germany on 6th November 2009.

Professor Ackermann was President of OEEPE from 1982 to 1984 and again from 1992 to 1994 and author/editor of Official Publication No. 8, "Proceedings of the OEEPE Symposium on Experimental Research on Accuracy of Aerial Triangulation (Results of Oberschwaben Tests)".



45 Years of EuroSDR Publications

1. *Trombetti, C.*: "Activité de la Commission A de l'OEEPE de 1960 à 1964" - *Cuniatti, M.*: "Activité de la Commission B de l'OEEPE pendant la période septembre 1960 - janvier 1964" - *Förstner, R.*: "Rapport sur les travaux et les résultats de la Commission C de l'OEEPE (1960-1964)" - *Neumaier, K.*: "Rapport de la Commission E pour Lisbonne" - *Weele, A.J. v.d.*: "Report of Commission F." - Frankfurt a.M. 1964.
2. *Neumaier, K.*: "Essais d'interprétation de >>Bedford<< et de >>Waterbury<<. Rapport communétabli par les Centres de la Commission E de l'OEEPE ayant participé aux tests" - "The Interpretation Tests of >>Bedford<< and >>Waterbury<<. Common Report Established by all Participating Centres of Commission E of OEEPE" - "Essais de restitution >>Bloc Suisse<<. Rapport commun établi par les Centres de la Commission E de l'OEEPE ayant participé aux tests" - "Test >>Schweizer Block<<. Joint Report of all Centres of Commission E of OEEPE" - Frankfurt a.M. 1966.
3. *Cuniatti, M.*: "Emploi des blocs de bandes pour la cartographie à grande échelle - Résultats des recherches expérimentales organisées par la Commission B de l'OEEPE au cours de la période 1959-1966" - "Use of Strips Connected to Blocks for Large Scale Mapping - Results of Experimental Research Organized by Commission B of the OEEPE from 1959 through 1966" - Frankfurt a.M. 1968.
4. *Förstner, R.*: "Sur la précision de mesures photogrammétriques de coordonnées en terrain montagneux. Rapport sur les résultats de l'essai de Reichenbach de la Commission C de l'OEEPE" - "The Accuracy of Photogrammetric Co-ordinate Measurements in Mountainous Terrain. Report on the Results of the Reichenbach Test Commission C of the OEEPE" - Frankfurt a.M. 1968.
5. *Trombetti, C.*: "Les recherches expérimentales exécutées sur de longues bandes par la Commission A de l'OEEPE". - Frankfurt a.M. 1972.
6. *Neumaier, K.*: "Essai d'interprétation. Rapports des Centres de la Commission E de l'OEEPE". - Frankfurt a.M. 1972.
7. *Wiser, P.*: "Etude expérimentale de l'aérotiangulation semi-analytique. Rapport sur l'essai >>Gramastetten<<". - Frankfurt a.M. 1972.
8. "Proceedings of the OEEPE Symposium on Experimental Research on Accuracy of Aerial Triangulation (Results of Oberschwaben Tests)" *Ackermann, F.*: "On Statistical investigation into the Accuracy of Aerial Triangulation. The Test Project Oberschwaben" - "Recherches statistiques sur la précision de l'aérotiangulation. Le champ d'essai Oberschwaben" - *Belzner, H.*: "The Planning, Establishing and Flying of the Test Field Oberschwaben" - *Stark, E.*: "Testblock Oberschwaben, Programme I. Results of Block Adjustment by Independent Models" - *Ebner, H.*: "Comparison of Different Methods of Block Adjustment" - *Wiser, P.*: "Propositions pour le traitement des erreurs non-accidentelles" - *Camps, F.*: "Résultats obtenus dans le cadre du projet Oberschwaben 2A" - *Cuniatti, M.*; *Vanossi, A.*: "Etude statistique expérimentale des erreurs d'enchaînement des photogrammes" - *Kupfer, G.*: "Image Geometry as Obtained from Rheidt Test Area Photography" - *Förstner, R.*: "The Signal-Field of Baustetten. A Short Report" - *Visser, J.*; *Leberl, F.*; *Kure, J.*: "OEEPE Oberschwaben Réseau Investigations" - *Bauer, H.*: "Compensation of Systematic Errors by Analytical Block Adjustment with Common Image Deformation Parameters". - Frankfurt a.M. 1973.
9. *Beck, W.*: "The Production of Topographic Maps at 1:10,000 by Photogrammetric Methods. - With statistical evaluations, reproductions, style sheet and sample fragments by Landesvermessungsamt Baden-Württemberg Stuttgart". - Frankfurt a.M. 1976.
10. "Résultats complémentaires de l'essai d'<<Oberriet>> of the Commission C de l'OEEPE - Further Results of the Photogrammetric Tests of <<Oberriet>> of the Commission C of the OEEPE".
Hárry, H.: "Mesure de points de terrain non signalisés dans le champ d'essai d'<<Oberriet>> - Measurements of Non-Signalized Points in the Test Field <<Oberriet>> (Abstract)" - *Stickler, A.*; *Waldhäusl, P.*: "Restitution graphique des points et des lignes non signalisés et leur comparaison avec des résultats de mesures sur le terrain dans le champ d'essai d'<<Oberriet>> - Graphical Plotting of Non-Signalized Points and Lines, and Comparison with Terrestrial Surveys in the Test Field <<Oberriet>>" - *Förstner, R.*: "Résultats complémentaires des transformations de coordonnées de l'essai d'<<Oberriet>> de la Commission C de l'OEEPE - Further Results from Co-ordinate Transformations of the Test <<Oberriet>> of Commission C of the OEEPE" - *Schürer, K.*: "Comparaison des distances d'<<Oberriet>> - Comparison of Distances of <<Oberriet>> (Abstract)". - Frankfurt a.M. 1975.
11. "25 années de l'OEEPE".
Verlaine, R.: "25 années d'activité de l'OEEPE" - "25 Years of OEEPE (Summary)" - *Baarda, W.*: "Mathematical Models". - Frankfurt a.M. 1979.
12. *Spiess, E.*: "Revision of 1:25,000 Topographic Maps by Photogrammetric Methods." - Frankfurt a.M. 1985.
13. *Timmerman, J.*; *Roos, P.A.*; *Schürer, K.*; *Förstner, R.*: "On the Accuracy of Photogrammetric Measurements of Buildings - Report on the Results of the Test "Dordrecht", Carried out by Commission C of the OEEPE. - Frankfurt a.M. 1982.
14. *Thompson, C.N.*: "Test of Digitising Methods." - Frankfurt a.M. 1984.
15. *Jaakkola, M.*; *Brindöpke, W.*; *Kölbl, O.*; *Noukka, P.*: "Optimal Emulsions for Large-Scale Mapping - Test of "Steinwedel" - Commission C of the OEEPE 1981-84. - Frankfurt a.M. 1985.
16. *Waldhäusl, P.*: "Results of the Vienna Test of OEEPE Commission C." - *Kölbl, O.*: "Photogrammetric Versus Terrestrial Town Survey." - Frankfurt a.M. 1986.
17. *Commission E of the OEEPE*: "Influences of Reproduction Techniques on the Identification of Topographic Details on Orthophotomaps." - Frankfurt a.M. 1986.
18. *Förstner, W.*: "Final Report on the Joint Test on Gross Error Detection of OEEPE and ISP WGIII/1." - Frankfurt a.M. 1986.
19. *Dowman, I.J.*: "Spacelab Metric Camera Experiment - Test of Image Accuracy" - Frankfurt a.M. 1987.
20. *Eichhorn, G.*: "Summary of Replies to Questionnaire on Land Information Systems - Commission V - Land Information Systems" - Frankfurt a.M. 1988.
21. *Kölbl, O.*: "Proceedings of the Workshop on Cadastral Renovation" - Frankfurt a.M. 1988.
22. *Rollin, J.*; *Dowman, I.J.*: "Map Compilation and Revision in Developing Areas - Test of Large Format Camera Imagery" - Frankfurt a.M. 1988.
23. *Drummond, J. (ed.)*: "Automatic Digitizing" - Frankfurt a.M. 1990.
24. *Ahokas, E.*; *Jaakkola, J.*; *Sotkas, P.*: "Interpretability of SPOT Data for General Mapping" - Frankfurt a.M. 1990.
25. *Ducher, G.*: "Test on Orthophoto and Stereo-Orthophoto Accuracy" - Frankfurt a.M. 1991.
26. *Dowman, I.J. (ed.)*: "Test of Triangulation of SPOT Data" - Frankfurt a.M. 1991.
27. *Newby, P.R.T.*; *Thompson, C.N. (ed.)*: "Proceedings of the ISPRS and OEEPE Joint Workshop on Updating Digital Data by Photogrammetric Methods" - Frankfurt a.M. 1992.
28. *Koen, L.A.*; *Kölbl, O. (ed.)*: "Proceedings of the OEEPE Workshop on Data Quality in Land Information Systems" - Frankfurt a.M. 1992.
29. *Burman, H.*; *Torlegård, K.*: "Empirical results of GPS-Supported Block Triangulation" - Frankfurt a.M. 1994.
30. *Gray, S. (ed.)*: "Updating of Complex Digital Databases" - Frankfurt a.M. 1995.
31. *Jaakkola, J.*; *Sarjakoski, T.*: "Experimental Test on Digital Aerial Triangulation" - Frankfurt a.M. 1996.

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32. *Dowman, I.J.*: The OEEPE GEOSAR Test of Geocoding ERS-1 SAR data - Frankfurt a.M. 1996.
33. *Kölbl, O.*: Proceedings of the OEEPE Workshop on Application of Digital Photogrammetric Workstations - Frankfurt a.M. 1996.
34. *Blau, E.; Boochs, F.; Schulz, B.-S.*: Digital Landscape Model for Europe (DLME) - Frankfurt a.M. 1997.
35. *Fuchs, C.; Gülch, E.; Förstner, W.*: OEEPE Survey on 3D-city models
Heipke, C.; Eder, K.: Performance of Tie-Point Extraction in Automatic Aerial Triangulation, Frankfurt a.M. 1998.
36. *Kirby, R.P.*: Revision Measurement of Large Scale Topographic Data, *Höhle, J.*: Automatic Orientation of Aerial Images on Database Information; *Dequal, S.; Koen, L.A.; Rinaudo, F.*: Comparison of National Guidelines for Technical and Cadastral Mapping in Europe ("Ferrara Test") Frankfurt a.M. 1999.
37. *Kölbl, O. (ed.)*: Proceedings of the OEEPE Workshop on Automation in Digital Photogrammetric Production - Frankfurt a.M. 1999.
38. *Gower, R.*: Proceedings of the OEEPE Workshop on National Mapping Agencies and the Internet *Flotron, A.; Kölbl, O.*: Precision Terrain Models for Civil Engineering, Frankfurt a.M. 2000.
39. *Ruas, A.*: Automatic Generalisation Project: Learning Process from Interactive Generalisation - Frankfurt a.M. 2001.
40. *Torlegård, K.; Nelson, J.*: OEEPE Workshop on Airborne Laserscanning and Interferometric SAR for Detailed Digital Elevation Models - Frankfurt a.M. 2001.
41. *Radwan, M., Onchaga, R. and Morales, J.*: A Structural Approach to the Management and Optimization of Geoinformation Processes - Frankfurt a.M. 2001.
42. *Heipke, C., Sester, M. and Willrich, F.*: Joint OEEPE/ISPRS Workshop - from 2D to 3D - Establishment and Maintenance of National Core Geospatial Databases, *Woodsford, P. (ed.)*: OEEPE Workshop – Use of XML/GML, Frankfurt a.M. 2002.
43. *Heipke, C., Jacobsen, K. and Wegmann, H.*: Integrated Sensor Orientation - Test Report and Workshop Proceedings - Frankfurt a.M. 2002.
44. *Holland, D., Guilford, B. and Murray, K.*: Topographic Mapping from High Resolution Space Sensors - Frankfurt a.M. 2002.
45. *Murray, K.*, 2003. OEEPE Workshop on Next Generation Spatial Database - 2005.
Altan, O. & Tastan, H., Eds., OEEPE/ISPRS Joint Workshop on Spatial Data Quality Management. Frankfurt a.M. 2003.
46. *Heipke, C., Kuitinen, R. and Nagel, G.*, 2003. From OEEPE to EuroSDR: 50 years of European Spatial Data Research and beyond. Seminar of Honour. Frankfurt a.M. 2003.
47. *Koua, E. & Woodsford, P.*, 2004. Proceedings of EuroSDR Workshop 'Visualisation and Rendering'. Frankfurt a.M. 2004.
48. *Bray, C. & Woodsford, P. (eds.)* 2005. Proceedings of EuroSDR Workshops: "NMCA's and the Internet II" - Electronic Delivery and Feature Serving (23rd -25th February 2005, Frankfurt, Germany).
Ontologies & Schema Translation Services (15th-16th April 2004, Marne-La-Vallee, Paris).
Positional Accuracy Improvement: Impacts of improving the positional accuracy of GI databases (5th-7th May 2004, Dublin). Frankfurt a.M. 2005.
49. *Roensdorf, C.*, 2006. Proceedings of EuroSDR Workshop: "PAI2: Achieving Geometric Interoperability of Spatial Data", Munich, Germany (June 2005),
Kolbe, T. & Gröger, G., 2006. "Next Generation 3D City Models", Bonn, Germany (June 2005)
Woodsford, P., 2006. "Feature/Object Data Models", Munich, Germany (April 2006). Frankfurt a.M. 2006.
50. *Kaartinen, H. & Hyypää, J.*, 2006. Evaluation of Building Extraction Report.
Steinnocher, K. & Kressler, F. 2006. Change Detection Report.
Bellmann, A. & Hellwich, O., 2006. Sensor and Data Fusion Contest: Information for Mapping from Airborne SAR and Optical Imagery (Phase I Report).
Mayer, H., Baltasvias, E. and Bacher, U., 2006. Automated Extraction, Refinement, and Update of Road Databases from Imagery and Other Data Report. Frankfurt a.M. 2006.
51. *Höhle, J. & Potuckova, M.*, 2006. The EuroSDR Test "Checking and Improving of Digital Terrain Models"
Skaloud, J., 2006. Reliability of Direct Georeferencing, Phase 1: An Overview of the Current Approaches and Possibilities
Legat, K., Skaloud, J. and Schmidt, R., 2006. Reliability of Direct Georeferencing, Phase 2: A Case Study on Practical Problems and Solutions. Frankfurt a.M. 2006.
52. *Murray, K. ed.*, 2007. Proceedings of International Workshop: "Land and Marine Information Integration", Dublin, Ireland. March 2007. Frankfurt a.M. 2007.
53. *Kaartinen, H. & Hyypää, J.*, 2008. Tree Extraction - report of EuroSDR project. Frankfurt a.M. 2008.
54. *Kolbe, T.H. (ed.)*, 2008. Final report on the EuroSDR CityGML Project.
Patrucco, R. & Murray, K. (eds.), 2008. Proceedings of the EuroSDR/EuroGeographics workshop 'Production Partnership Management' Southampton, UK. (November 2007)
Colomina, I. & Hernández, E. (eds.), 2008. Proceedings of the Institut de Geomàtica / EuroSDR 'International Calibration and Orientation Workshop EuroCOW 2008' Castelldefels, Spain (February 2008).
Heipke, C. & Sester, M. (eds.), 2008. Proceedings of the ISPRS / EuroSDR Workshop 'Geosensor Networks' Hannover, Germany (February 2008) Frankfurt a.M. 2008.
55. *Cramer, M.*, 2009. Digital Camera Calibration. Frankfurt a.M. 2009.
56. *Champion, N.*, 2009. Detection of Unregistered Buildings for Updating 2D Databases
Everaerts, J., 2009. NEWPLATFORMS - Unconventional Platforms (Unmanned Aircraft Systems) for Remote Sensing. Frankfurt a.M. 2009.

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