content

2006 number 3

introduction

One down, three letters: Group on Earth Observations. Answer: GEO. One across, five letters: Global Earth Observation System of Systems. Answer GEOSS. If these acronyms ring a bell but you feel you'd like to know a little more, then you need look no further than this issue of *ITC News.* On 28 September ITC was pleased to welcome Dr José Achache, the director of the GEO Secretariat, to Enschede, where he was one of the distinguished guests at the ceremony to mark the Opening of the Academic Year 2006-2007 (page 2). Not only did he attend the ceremony but he also delivered the Schermerhorn Lecture. Although our report can give you only the barest glimpse into the content, hopefully that, together with the interviews on pages 10 and 14, will arouse your interest in this ambitious undertaking and its future progress. And ambitious it certainly is. Just think of the frustration when even your e-mail provider decides to indulge in a little system maintenance. And I'm sure we can all readily identify with the allusion to the Tower of Babel. Fortunately the founding fathers of GEOSS were not, and are not, easily daunted, and the global community is clearly set to benefit if the objectives of the 10-year implementation plan are achieved.

The Schermerhorn Lecture highlighted the need for timely information and this theme is taken up again - if from a slightly different angle - in the article on the May earthquake in Java (page 18). But if you've a mind for something a little different, why not turn to page 25 and see how art meets science in the mosaic of Montevideo. No issue of *ITC News* would be complete without a selection of awards and personal achievements, and our congratulations in this instance go to Ms Lyande Eelderink (page 21), Dr John Carranza (page 23) and Professor John van Genderen (page 23).

The aim of GEOSS is to bring the right information to the right people at the right time. You could say that this is also the aim - albeit in a more modest way - of *ITC News*. We hope you, our readers, feel we are going some way to achieving our goal. And just one parting thrust: you have of course noted the GEO symposium in Spain (page 14) in your diary, haven't you?

Janneke Kalf
Managing Editor

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Opening Academic Year 2006-2007

ITC News itcnews@itc.nl

Returning to its former venue, the Grote Kerk in the old market square, the colourful ceremony that heralds the opening of the academic year at ITC was also back in favour as far as the weather was concerned.

The sun shone on Thursday, 28 September, showing the refurbished church to good advantage both inside and out. Indeed it would have been unfortunate had this not been the case, the ceremony coming as it did at the end of a summer that had broken a number of records in terms of length and temperature.

Passing through the heavy portals, those who had attended the opening ceremony on previous occasions were struck by the change of perspective. A more traditional seating arrangement had replaced the previous horseshoe configuration, but this gave the audience the opportunity to enjoy the beauties of the building from a different angle and possibly discover some missed on earlier visits. Maybe it was imagination, but it also seemed that the acoustics had benefited from the change.

In his opening speech Rector Martien Molenaar welcomed the ambassadors of Ghana, Kenya and Zambia; Dr Flierman and Professor Zijm, respectively President and Rector Magnificus of the University of Twente; Deputy Mayor of Enschede, Mr Helder; Director of the Royal Netherlands Meteorological Institute (KNMI), Dr Frits Brouwer; Mr Groothedde from the Board of the Netherlands Cadastre; and members of the ITC Board of Supervisors. And naturally an especially warm welcome was given to both special guest Dr José Achache, Director of the Secretariat of the Group on Earth Observations, who was to deliver the Schermerhorn Lecture, and the new students. “We are all here to welcome you, our 250 new course participants, who have left your homes and families to come to ITC, some for a few months but most of you for a year or 18 months. I apologise for the fact that you have had to deal with the unfriendly, almost hostile administrative procedures that our government has invented to discourage foreigners from coming to the Netherlands, but I hope that now you are here you will feel welcome in our country, and certainly here in Enschede.”

There was a full and varied programme on that September afternoon. After his opening address, Professor Molenaar was joined on the platform by Dr Anne Flierman for the purpose of signing the Letter of Intent, a document that expressed the intention of the two parties, ITC and the University of Twente, to develop a new relationship. Dr Flierman then spoke to the audience about the mutual advantages to the two institutions of increased cooperation, while at the same time introducing the students to the region of Twente and describing the role it would play in the future. It then fell to Mr Javier Carranza Torres, on behalf of the Student Association Board, to welcome the

Rector Professor Martien Molenaar

new students. He concluded his speech with a short video clip in which his young daughter greeted those present - and no doubt reminded them of their own families back home. The younger generation was again in evidence in the short musical interlude that followed. Mr Gijs van Schoonhoven, whose playing on the organ had greeted visitors to the Grote Kerk as they took their seats, now changed to the piano and was joined by his son Frans on the violin. The performance was captured on a large screen, enabling the audience to follow both visually and aurally the intricacies of *Scène de Ballet* by Charles Auguste de Bériot (1802-1870).

The second half of the programme began with the presentation of the Klaas Jan Beek Award for best MSc thesis. This agreeable duty performed, Professor Molenaar declared the ITC Academic Year 2006-2007 duly open. However, it was not time for the audience to vacate their seats because "according to our tradition, the first lecture will be the Schermerhorn Lecture, which will this year be presented by Dr José Achache. Since September 2005 he has been director of the GEO Secretariat, responsible for managing the programmatic and administrative support to GEO, for coordinating the development and implementation of the GEOSS work plan, and for maintaining effective working relationships with the broader GEO community."

In his lecture, Dr Achache explained the work and aims of GEO and the inspiration behind GEOSS, punctuating his address with practical cases that left his audience in no doubt as to either the desirability of a such a system of systems or the benefits it could bring to the global community.

Professor Molenaar brought the official programme to a close by thanking Dr Achache for a most interesting lecture - the warm applause was a clear indication that this was a view widely shared - and by inviting those present to the reception at the Twentse Schouwburg, where they would have the opportunity to meet new friends, colleagues and lecturers.

Musical Interlude: Mr Gijs van Schoonhoven on piano and his son Frans on violin

Opening Speech Rector Martien Molenaar

Having welcomed the new students, Professor Molenaar went on to ask and answer the question: "Why did you go through all the trouble to get here? It's because most of you come from organisations and institutions involved in the management of our living environment and resources. They produce and use geo-information to monitor analyses, and understand and manage natural or man-induced processes. Both governments and civil society at large are involved in these processes and they realise that geo-information is indispensable for modern governance. When referring to governance - or good governance - we are generally thinking of the institutional as-

Opening Speech

Opening Academic Year 2006-2007

pects, the transparency of legislative processes, poverty reduction, access to resources, and the like. But we should also realise that good governance requires good information, and, because human activities generally leave a spatial footprint, this implies geo-information." Continuing on this subject, he went on to say that: "The monitoring and management of processes should be done at different aggregation levels, and requires the integration of in situ observations with airborne and satellite remote sensing data [… as well as] administrative and political interventions at levels ranging from local to global scale."

Further, Professor Molenaar said that the development of GEOSS should be seen in this context. He referred to the transverse or cross-cutting activities that make up the technical approach of GEOSS across the key societal benefit areas. These activities comprise user engagement, architecture, data management, outreach and capacity building - with ITC being heavily involved in the last. "Through GEOSS, Earth observation will become a mainstream activity."

Professor Molenaar went on to explain the role of ITC in partnerships with universities and other educational institutes around the world: "The academic sustainability of this network is assured through continuous impulses for academic and professional upgrading and innovation of the educational services [… Nevertheless] this network cannot serve all geographical regions and there will always be countries or organisations that prefer to send their staff to ITC."

Turning to the relationship that ITC enjoys with the University of Twente, Professor Molenaar said that the present *penhouder* construct would be replaced by an institutional arrangement to accommodate the new funding procedures to be implemented by the Ministry of Education, Culture and Science in January 2008. "We should realise that ITC and the University of Twente have different profiles but many similarities. ITC has a sectorial academic profile. Its main task is capacity building through training and education in a specialised academic/professional field. Additionally ITC transfers knowledge through advisory services to organisations in its target countries. Twente University has a university profile, providing educational programmes in a wide range of disciplines. Furthermore, its scope is primarily national or regional, whereas that of ITC is global, with the emphasis on lesser developed countries. "

"A new relationship between the University and ITC will have advantages for both and provides interesting opportunities for synergism. Full academic or university status is very important for ITC's international market position, whereas ITC can support the University in realising its international ambitions. Furthermore, the two institutions can jointly develop market strategies for the geographical regions outside Europe."

Addressing his audience more directly, Professor Molenaar said, "Today you will witness an important step in this process, and our newly arrived students will see that ITC is no exception in this world where only change is permanent."

Signing Ceremony Opening Academic Year 2006-2007

Signing Ceremony Letter of Intent ITC-UT

Before the actual signing of the document, Professor Molenaar explained both progress to date and the steps planned for the future with a view to intensifying the cooperation between ITC and the University of Twente. "This new relationship between the University of Twente and ITC has been under discussion since the beginning of this year. We have planned a four-stage process:

- In the first stage, a joint working group supported the Board of the University and the Board of ITC in mapping out the expectations and basic conditions pertaining to both parties with respect to the new relationship to be developed. This resulted in the letter that will be signed today. This letter expresses the intention of both parties to develop the new relationship in three more stages.
- In the second stage, which starts with the signing of the Letter of Intent, the new relationship between the University and ITC will be developed. This stage will end in June next year, when we plan to sign an agreement to implement the new relationship.
- The third stage will pave the way for the implementation of this new relationship, a relationship which should become a fact in September 2008.
- In the fourth stage, the necessary organisational adjustments required by the new situation will be made."

Dr Anne Flierman, Executive Board, University of Twente

With this, Professor Molenaar invited Dr Flierman of the University of Twente to join him at the table on the platform and add his signature to the Letter of Intent.

Dr Anne Flierman
Executive Board, University of Twente

Not only is the pen said to be mightier than the sword, it is also less of an encumbrance when moving from table to lectern. Opening his address, Dr Flierman pointed out that modern man or woman is never simply at one place at one time. "Take us today, for example. We've come together in a church, in a city, in a region, even in a Euregio, a country, a continent, and all these places have a different meaning and different importance to each of you." Today it was Dr Flierman's intention to illustrate the meaning and importance of the region of Twente. And this he did by tracing its culture, describing some quaint local customs, and outlining several economic and industrial activities. "In modern Europe the significance of national borders is diminishing, and this is to the great advantage of regions such as Twente. If you allow the focus on national borders to fade, no longer is Twente situated at the edge of the Netherlands but right in the centre of Europe. […] This special position was also clear early on to the architects of what is now called the European Union [… and] during the fifties, they founded the first Euregio - a kind of experimental area for cross-border cooperation. It was such a success that there are now dozens of them scattered across the European border regions."

Dr Flierman said it was no accident that both ITC and the University of Twente were located in Twente. The reason was to strengthen the knowledge infrastructure of the region. In the past the sights of the University had been set mainly on application in the region, whereas those of ITC had always been set on the world. Now, however, internationalisation is one of the University's new core ambitions. "Owing to their complementarity," said Dr Flierman, "ITC and the University of Twente are institutes that can interrelate wonderfully well, and, from the point of view of regional prox-

imity too, there is every reason to give shape to this interrelationship and to develop new joint initiatives from within this region." He said that through increased cooperation the University could benefit from the years of experience that ITC had had in teaching, supporting and supervising students from non-European cultures, while ITC would strengthen its academic profile and could benefit from the UT's academic and administrative network. Moreover, visibility within the region and beyond would be increased, and advantages of scale would be achieved by clustering efforts in the areas of education, research, infrastructure and services.

Dr Flierman is only too well aware that complications can arise when two organisations seek to intensify their cooperation - complications relating to mission, position and responsibilities. Maximum support of all concerned would be the key to ultimate success, and he felt it was very important to keep staff informed and involved in the next steps to be taken, thus creating a sense of a common future.

So, important institutional plans for the future. But there were many more personal aims and ambitions represented in the Grote Kerk that day, and, speaking directly to the new students among the audience, Dr Flierman had one final message, or rather wish: "When you return home having graduated from ITC - be it tomorrow, in a few days' time, or perhaps after a few months or even years - I hope that, along with all the other places you have been, you will feel that you have been in Twente, and that you will bear a dear memory of a region well fitted for education and research, but also a region where you had a good time, so that you will be an ambassador for ITC, for Twente University and for this region."

Student Association Board

Speaking on behalf of the Student Association Board, Mr Javier Carranza Torres welcomed the new students "to the place where you will struggle, discuss, adapt, negotiate, hate, love, and finally succeed in growing as people over the coming 12 or 18 months". It was also a place where they would encounter different cultures, differences in perception, institutions and society … and different food!

He thanked his fellow students for coming to ITC and for having the will to excel ("this is what the ITC spirit is made of"); he thanked all those who provided academic and administrative support through their skills and services; and he thanked the families at home for their unstinting encouragement. Mr Carranza said that he had learned many things during his time at ITC: that geo-information was much more than putting geodata together and playing with figures and computers; that Earth observation was far more than being an absent and voyeuristic lover of the shape of the Earth; that from observation comes understanding and from understanding comes knowledge; and that from knowledge comes the building and strengthening of societies.

Sharing with the audience his own wish "that from this building may come a new global society [where] peoples, countries, cities and families come to an awareness of a closer world with a more attainable and shared peace", Mr Carranza again thanked the new students for accepting the challenge to excel.

Mr Javier Carranza Torres,
President, ITC Student Association Board

Klaas Jan Beek Award 2006

Rectors have many responsibilities and duties but among the most pleasant must be announcing awards. Winner of the Klaas Jan Beek Award 2006 for best MSc thesis was Mr Muhammad Zulkarnain Bin Abdul Rahman from Malaysia for his thesis entitled *Digital surface model (DSM) construction and flood hazard simulation for development plans in Naga City, Philippines,* which was supervised by Dinand Alkema and Nanette Kingma of the ESA department.

The winner of the Klaas Jan Beek Award 2006 for best MSc thesis: Mr Muhammad Zulkarnain Bin Abdul Rahman from Malaysia and Professor Klaas Jan Beek

Mr Muhammad Zulkarnain Bin Abdul Rahman (Zul for short) joined ITC's Earth Resources and Environmental Geosciences (EREG) MSc programme in September 2004. In March 2006, he graduated and received an MSc degree in geo-information science and Earth observation with a specialisation in natural hazard studies. He was part of the last batch of EREG students, because the new curriculum in applied Earth sciences came into effect in 2005.

Zul works at the Remote Sensing Department of the Universiti Teknologi of Malaysia and came to ITC with a burning ambition to do an MSc and a PhD. He is supported in this by his employer, who envisions the Universiti Teknologi as a world-class university by 2010. Recently, Zul has been accepted as a PhD student at the Faculty of Aerospace Engineering at the Technical University of Delft.

Zul's research project fell within the scope of the ITC internal research project SLARIM (Strengthening Local Authorities in Risk Management). His fieldwork took him to Naga, the Philippines, and in his thesis he developed novel approaches for the validation and sensitivity analysis of flood models, which led to important conclusions for local authorities. He addressed two important components required for flood hazard assessment in a data-poor environment. First, he developed a procedure to integrate elevation data from different sources and of different quality into a digital surface model. This model forms the basis for 1D/2D flood propagation modelling, which he carried out using the software SOBEK. Second, he showed how the model results could be calibrated and used for assessing how flood characteristics are affected by major changes in surface topography.

During his MSc period, Zul mastered a wide range of advanced geospatial information tools. He carried out a levelling survey with a theodolite and a handheld GIS system with GPS; he applied geostatistics and worked with a complex hydraulic flood model; and he managed to integrate all the results in a geodatabase.

"Throughout his work, he showed himself to be aware of the possibilities and limitations these tools offered him. Zul has been a very hardworking and conscientious student who combines good-naturedness with intelligence, joy with endurance. The 2006 Klaas Jan Beek Award could not fall into more deserving hands." So saying Professor Molenaar congratulated Mr Muhammad Zulkarnain Bin Abdul Rahman on his achievement and asked him to come forward to accept the award from Professor Beek.

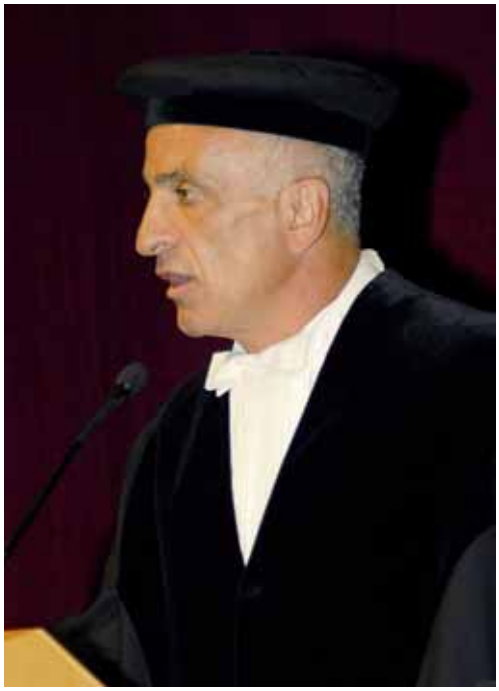
The full text of Mr Muhammad Zulkarnain Bin Abdul Rahman's thesis entitled *Digital surface model (DSM) construction and flood hazard simulation for development plans in Naga City, Philippines* can be found at www.itc.nl/library/papers-2006/msc/ereg/rahman.pdf

Schermerhorn Lecture
Opening Academic Year 2006-2007

Schermerhorn Lecture Dr José Achache

"GEOSS: A Global Earth Observation System of Systems for Science and Informed Decisions and Actions"

Opening his lecture, Dr Achache said that over the last 20 years it had become clear that mankind was a geological agent, indeed the first factor of erosion on this planet - much stronger than the wind and rain - and one affecting climate, biodiversity, and a number of other phenomena. Furthermore, the same decades had seen dramatic changes in the field of Earth observation. "Earth observation and Earth sciences are no longer a simple discipline, a simple engineering job. We have to understand the trends that our planet is going through. Even more, we have to forecast changes so that these forecasts can support informed decision. And the real difficulty comes from the fact that, if we observe, we can understand - but even if we understand, we're not even sure we know […] because these are non-linear phenomena, and the way they will evolve over the next weeks, months or years is very difficult to know."


Dr José Achache, director of the GEO Secretariat

To illustrate this difficulty, Dr Achache took the case of sea-level change over the last 10 years. It is well established that this has increased by roughly 3 cm during that time, but now it is necessary to understand this increase - to understand "whether it is a threat or just natural variation". Thermal expansion, melting ice caps and continental water have all been identified as contributing factors but more precise measurements are needed. "So in this particular case - and it's a fairly important issue - we still do not know, because we don't have the observations. And I guess this would be the same for any problem that you might have to deal with. The Earth is a complex system of systems and any part of it that you are studying at any given time will require an understanding of the other system parts. Here, in order to understand the ocean, we have to understand the polar caps and the water in the continents."

Recognising the value of the visual message, Dr Achache used many slides to underline the complexity of system Earth as well as the vital role that Earth observation could play to the benefit of society. A wide range of examples - the El Niño phenomenon, the Gulf Stream, Hurricane Katrina and the Indian Ocean tsunami served to illustrate the point "that a single observation will serve many many disciplines and that's why there is now recognition that we have to share data. This was recognised through a series of international summits that took place in Washington, Tokyo and Brussels, which led to the formation GEO, the Group on Earth Observations, which was intended to create a system where information could be shared." Different formats, different languages: the story of the Tower of Babel is just as relevant today. So GEO was created to produce a coordinated, comprehensive and sustained system of observing systems: GEOSS. "The idea is to bring them together and make sure they can exchange the data properly."

Dr Achache went on to emphasise that: "... whenever you are producing information, what is really important - and difficult to cover - is the last mile. How do you actually bring the information to the users at the

The full text of the Schermerhorn lecture by Dr José Achache can be obtained from ITC's Communication department (pr@itc.nl)

right moment? And the tsunami in Asia is certainly one of the best examples of this problem. It was observed, but no one was prepared to receive the information so no information was broadcast." In his view, the mechanism to bring information to end users so that they could use it efficiently and effectively would probably be the most challenging aspect of future work in this field.

GEO is working on a 10-year implementation plan for GEOSS, but a lot can change in 10 years. People's conception of a home computer back in 1964 is a far cry from today's Blackberry. And there will be a whole range of new actors in Earth observation. Private operators, investment bankers, insurance companies are just some of the likely players. "And of course," said Dr Achache, directing his parting shot at the new students, "the citizen, whose role is growing every day. Hopefully GEO will also play a role and change the picture in the future. Today GEO is a group of ministers: hopefully tomorrow GEO will be you!"

Conclusion

The academic year 2006-2007 had now begun, and the students had had their first lecture. It was a lot to take in, but Professor Molenaar had words of balm to offer: "Although we have failed to take out insurance against droughts, the thirsty among you need not fear. We do have drinks available at the reception across the way." The hint was taken and, after the cortege had filed out, the audience too headed towards the sunlight.

The Academic Cortege

Interview with Dr José Achache, Director GEO Secretariat

ITC News itcnews@itc.nl

It seems that the acronyms GEO (Group on Earth Observations) and GEOSS (Global Earth Observation System of Systems) have been cropping up in discussions and on the printed page with increasing frequency over recent months.

But, although the names may sound familiar, many of us may well be at a loss if required to explain the precise remit of the new organisation and its far-reaching objectives.

GEO formally came into being at the Third Earth Observation Summit in February 2005 and was charged with carrying out the GEOSS 10-Year Implementation Plan. This plan had been developed by a planning body known as the Ad Hoc GEO, which was established by the First Earth Observation Summit in July 2003. The primary decision-making body of the GEO is the GEO Plenary, which is composed of designated representatives of members and participating organisations and meets at least once a year. It establishes committees and working groups whose task is to provide high-level review advice, recommendations, and support in the ongoing development and implementation of GEOSS activities as described in annual or pluriannual work plans. And the overall purpose of GEOSS? To achieve comprehensive, coordinated and sustained observations of the Earth system in order to improve monitoring of the state of the Earth, increase understanding of Earth processes, and enhance prediction of the behaviour of the Earth system. So whatever way you look at it, this is quite an undertaking!

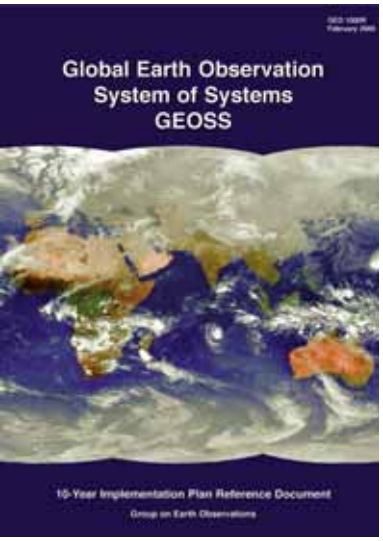
The GEO Secretariat was established to serve as the centre of international coordination for GEOSS in Geneva, Switzerland, in May 2005 - so new it certainly is in the scheme of things. Fortunately Dr José Achache, the first director of the Secretariat, was in Enschede to deliver the Schermerhorn Lecture at the ceremony to mark the opening of the ITC academic year 2006-2007 and was willing to talk to *ITC News* and expand on the thinking behind this initiative and the progress made so far.

"We're seeking to build a large global system that will coordinate all the observing systems that the members and participating organisations operate. While it may take a while to agree on standards to ensure that future systems are interoperable and can play together easily, we are faced with existing systems that have different designs and different modes of operation. We have therefore decided to define some interoperability requirements - requirements that these systems have to meet so that they can be used jointly by member countries. The systems will not be dramatically changed, just adapted to facilitate interoperability. We're currently defining these requirements and a list should be drafted before the end of the year. Then each member country can

Dr José Achache
presenting the Schermerhorn Lecture

make sure that their systems satisfy these requirements and can contribute, and we can build the GEOSS. All organisations can contribute while still remaining in control of their own systems; the role of GEO will be to act as a facilitation agency. There's no question of the organisations concerned giving away their systems - that would be much too expensive. "

"Naturally, data access is a very important issue within GEO. So far members who have endorsed the 10-year plan have come to a soft definition of data access. They will ensure the provision of easy and open access to data, while recognising national and commercial regulations. Essentially there are three areas of concern. First, there is the commercial dimension. Some satellites are operated by private companies so, although high-resolution Earth observation data are available, fees are attached. Second, there is the issue of national security. Water data, for example, may be considered strategic information and some countries may be reluctant to share such data openly. Third, there is the time delay in the availability of geological data. National meteorological offices are given priority in accessing data on the atmosphere and relevant observations for forecast purposes, but forecast insecurity has meant a number of constraints on accessibility. GEO has already begun to address this issue of access by approaching key people for their views on how best to improve the situation. The open flow of data will facilitate the best possible use of such data."
To summarise so far, topping the list of priorities comes defining the rules and requirements to ensure interoperability. And coming hard on its heels is the point of entry: the GeoWeb portal with attached clearinghouse. "All data produced by GEOSS will be available through this portal. You can imagine it as the entrance to a huge shopping mall. We'll also have to create a clearinghouse - a register of shops, services and tools, if you will - which will include the certification of data and the necessary tools to calibrate and inter-reference the data, reconciling the different formats. In this way, any potential user will be able to shop efficiently via this portal."



Cover of the GEOSS 10-Year Implementation Plan Reference Document: World cloud map for 15:00 hours UCT on 1 February 2005. The mosaic is a composite of Meteosat-5, Meteosat-7, GEOS-9, GOES-10 and GOES-12 imagery

The aim of GEOSS is to meet the need for timely, quality, long-term global information as a basis for sound decision making, and consequently enhance the delivery of benefits to society in nine key areas:

- Reducing loss of life and property from natural and human-induced disasters
- Understanding environmental factors affecting human health and well-being
- Improving management of energy resources
- Understanding, assessing, predicting, mitigating, and adapting to climate variability and change
- Improving water resource management through better understanding of the water cycle
- Improving weather information, forecasting and warning
- Improving the management and protection of terrestrial, coastal and marine ecosystems
- Supporting sustainable agriculture and combating desertification
- Understanding, monitoring and conserving biodiversity.

"Some countries," explains Dr Achache, "have much more advanced observing capabilities than others, and are prepared to share data. There is a reason for this. Many issues are global issues and therefore have to be addressed jointly. Thanks to the existence of satellites, this is doable. Satellite data are global. One operating satellite looks at the entire Earth, not just the country of origin, which means it is easy and natural to share such data. This makes GEO very attractive to developing countries as it enables them to obtain information on their own territories."

However, this is not the whole story. Many issues generally considered to be of local importance also have global consequences, and that is why GEOSS will include regional and local in situ data alongside satellite data. As an example, Dr Achache mentioned the plight of the European crayfish. "Increasing severity of the crayfish plague has ravaged native crayfish stocks. Such plagues are often triggered by the incorporation of new species, possibly by the release of ballast waters. Monitoring at local scale can have con-

Improving weather information, forecasting and warning

Reducing loss of life and property from natural and human-induced disasters

Supporting sustainable agriculture and combating desertification

siderable global value in instances like this. Water too, is a cross-border issue. Data should be grouped at the basin level and not remain within country boundaries."

It is fair to say that the nine societal benefit areas are pretty much all-embracing. "At first, biodiversity may have seemed something of a fad or a luxury," observes Dr Achache, "but it is now recognised that biodiversity can have important economic value. New molecules that industry cannot produce can potentially be derived from forest species. Furthermore, loss of biodiversity and the removal of some ecosystems are triggering diseases - and once they appear, it's not long before their presence is felt globally, thanks to modern life and modern travelling habits." Deforestation has a lot to answer for, in Dr Achache's view. "Lyme disease borne by ticks is a case in point. In a well-preserved system, development of ticks is limited; however, changes in the ecosystem associated with urban expansion tend to destroy the balance and increase the abundance of species that carry the tick, leading to an explosion of disease. This disease has been found in the northern United States for over 25 years, and this is clearly linked to deforestation. Lyme disease is now breaking out in northern Europe as well, in connection with the end of the Soviet Union. Here the link with deforestation is not obvious, and probably socio-economic data too will have to be brought into the equation in order to actually formulate an understanding."

So it is clear that sharing data and Earth observations makes sense; it will benefit both developed and developing countries. Most countries feel comfortable with GEO located in Geneva and increasingly the Group is gaining support worldwide. It has been established on a voluntary and legally non-binding basis, with voluntary contributions to support activities. It is not a UN organisation and this brings the advantages of reduced bureaucracy and increased flexibility.

But it is still very new, little more than a year old. Dr Achache has been in office since September 2005. What has been achieved over the past year? "The first year of activities has been dedicated to setting up the Secretariat: hiring and training the people we need. We now have 16 people - nine of whom are scientists and technologists - who work with the user communities on a daily basis. Implementation will be driven by a series of annual work plans. Currently, we're also working on the next pluriannual work plan, which contains a series of very precise, well-defined actions that we have designed in collaboration with participating scientific agencies. But the ultimate goal, of course, is to deliver! A new ministerial GEO summit is planned for the end of 2007 - a year from now - so we will make sure we have achieved a number of milestones, giving early demonstration of success."

GROUP ON EARTH OBSERVATIONS

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As director of the GEO Secretariat, José Achache is responsible for managing the programmatic and administrative support to GEO, coordinating the development and implementation of GEOSS activities, and maintaining effective working relationships with the broader GEO community.

José Achache, of French nationality, graduated from the Ecole Normale Superieure in Paris. He obtained his doctorate in geophysics at the Université Pierre et Marie Curie in 1979 and his doctorate in physical sciences at the Université René Descartes. He was a visiting scholar at Stanford University from 1979 to 1980.

He began his career at the Institut de Physique du Globe de Paris as a research assistant, then became chargé de recherche, and in 1989 was appointed professor, director of the Department of Space Studies and director of the Graduate School of Earth Sciences.

In 1996, he joined the French Geological Survey as deputy director of the Research Division, and the following year became its director. In 1999, he was named advisor to the president of the French Space Agency (CNES), and in 2000 was appointed to the post of Deputy Director General for Science.

In 2002, he was appointed director of Earth observation for the European Space Agency (ESA). While at ESA, he initiated the GMES programme in partnership with the European Commission.

Interview with Rector Martien Molenaar and Dr Chris Mannaerts

ITC News itcnews@itc.nl

With GEO and GEOSS featuring so prominently in this issue of ITC News, it was felt that our readers might well be curious to know in greater detail how ITC itself was involved in this exciting new undertaking. Where did the Institute fit into this intricate jigsaw?

Rector Martien Molenaar and Dr Chris Mannaerts of the Department of Water Resources agreed to shed some light on this subject.

"Over the last four or five years, there's been an ambition to embed ITC in a number of networks," begins Professor Molenaar. "As an institute, it's relatively small, and can only realise its full potential by operating with other parties. It needs to participate in stable networks - for example, university networks. When we heard about GEO and the development of GEOSS, we thought that this sounded like a relevant environment for ITC. No less than 68 countries have combined to form GEO and develop GEOSS, with commitment stemming from ministerial level. In fact, this environment - and in particular the transverse area of capacity building - goes to the very core of ITC activities. So, from the ITC perspective, this ambitious undertaking is an interesting environment that offers the opportunity to actively participate in building a joint network and in conducting joint research. More than that, we can make a significant contribution to the whole endeavour by bringing in our own network, particularly the nodes in developing countries."

The first visit to the GEO Secretariat in Geneva took place in January this year. Discussions centred on a possible role for ITC and the outcome was highly positive. Participation was arranged through the Royal Netherlands Meteorological Institute (KNMI), the national representative in this connection. No great coincidence, then, that Dr Frits Brouwer, the director of KNMI, was among the distinguished guests attending the recent ceremony to mark the opening of the academic year, when Dr Achache, director of the GEO Secretariat, was a guest speaker.

The GEO Plenary establishes committees and working groups to address different aspects of GEOSS implementation, and to date has set up five:
(i) the Architecture and Data Committee,
(ii) the Capacity Building Committee,
(iii) the Science and Technology Committee,
(iv) the User Interface Committee, and
(v) the Working Group on Tsunami Activities.
Professor Molenaar is a member of the Capacity Building Committee, whose remit is to support *GEO "in strengthening the capability of all countries, in particular developing countries, to use Earth observation data and products in a sustainable manner and to contribute observations and systems to GEOSS"*. The strategy followed in pursuit of this objective is in line with the World Summit on Sustainable Development concept of a global partnership between those whose capacity needs development and those who are able to assist in the process, recognising that activities have intertwined social, environmental and economic objects.

"The first meeting of the Capacity Building Committee was held in March this year in Paris," says Professor Molenaar, taking up the story, "and was followed by a May workshop at the premises of the Brazilian space agency INPE in São José dos Campos. The main objectives of this workshop were to raise awareness among GEO members and participating organisations of existing Earth observation capacity building initia-

tives, identify best practices worthy of replication, and embark on an analysis of opportunities for project integration and new joint initiatives to close gaps. A second meeting of the committee, with ITC inputs, has already been held - in Brussels in September. As various areas in which ITC is active are involved in the development of GEOSS, a large and diverse group of staff members is being drawn into the undertaking. So it falls to me to facilitate the establishment of a secretariat to coordinate ITC contributions to GEOSS. And that's where Chris comes in - he's the overall ITC coordinator, in addition to being the principal contact with regard to two of the tasks in progress."

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"It's a wide-ranging programme," says Dr Mannaerts, "with a 10-year implementation plan. And ITC has a major role to play, particularly in capacity building. The GEO community has recognised no less than 97 tasks in its 2006 Work Plan and ITC is involved in eight of those relating to capacity building."

Perhaps this may be a suitable point to scrutinise these specific tasks a little closer in order to gain an idea of what is actually involved - particularly as our readers are likely to come across progress reports in future issues of this newsletter. ITC is the lead organisation and point of contact in:

1 Capacity building task CB-06-01: Perform a review of capacity building initiatives in GEO members and participating organisations, taking into account results of existing surveys, to identify existing and planned capacity building activities and gaps (contact: Dr C. Mannaerts)
2 Capacity building task CB-06-03: Perform a review of existing education and training initiatives for Earth observation utilisation in developing countries, and promulgate the use of best practices in cooperation with specialised UN agencies and other organisations (contact: Dr C. Mannaerts)
3 Disasters task DI-06-12: Initiate a knowledge transfer programme to developing countries, to ensure basic capacity to utilise Earth observations for disaster management (contact: Professor F. van der Meer)
4 Agriculture task AG-06-07: Initiate the design of training modules to demonstrate the usage of Earth observation data and products for the agricultural sectors in Africa, Asia, Latin America, Central and Eastern Europe, and in small island states (contact: Dr K. de Bie).

In addition, ITC is a contributing agency in the following:

5 Disasters task DI-06-14: Support the design of multimedia training modules to communicate the levels of risk from hydro-meteorological hazards to the public to enable them to make informed decisions (contact: Professor Z. Su)
6 Water task WA-06-06: Promote best practices in Earth observation application for integrated water resource management in developing countries by supporting a series of workshops in South America, Asia, Africa and a small island nation (contact: Professor Z. Su)
7 Water task WA-06-07: Initiate a capacity building programme in Latin America to develop tools for using remote sensing data in support of water management, and to show the value of Earth observations generally in water resource management (contact: Professor Z. Su)
8 Ecosystems task EC-06-7: Build upon existing initiatives (e.g. ANTARES in South America for oceans and GOFC-GOLD regional networks for terrestrial domains) to develop a global network of organisation networks for ecosystems, and coordinate workshops to strengthen observing capacity in developing countries (contact: Professor A. Skidmore).

Dr José Achache (l) and Professor Martien Molenaar (r)

So there you have it: the ITC tasks in a nutshell according to the 2006 Work Plan. "But of course," explains Dr Mannaerts, "that is just the beginning. We meet together every two to three months to discuss developments and, where necessary, redefine, reshape or merge certain aspects to make the best use of available tools and expertise. And new components too may enter the picture. It's a dynamic undertaking, as you can see." And this also applies to the wider environment, the GEO community at large. As Professor Molenaar remarks: "Everyone wants to be involved, but not everyone can handle the work or is able to contribute. We have to build on those that are performing well and make optimal use of synergy at both national and local levels - directed natural development, so to speak. The first two years will reveal what will work and what will not. New priorities have already been set in the GEO 2007-2009 Work Plan, and work is also in progress on a five-year plan. We have to harness the expertise around the world, develop the supply chain. Different institutes offer different services - for example, ITC has courses on remote sensing, Brazil a specialised course on biodiversity, others on tectonics, and so on. The challenge is to link up with these different institutes and take advantage of their different services."

And the tools to tackle this issue? Surveys are one example. "A preliminary questionnaire was developed to prepare an inventory of existing capacity building programmes and initiatives. Now, a more comprehensive survey is in progress, and one of the main components is to develop a provider and a user perspective of capacity building activities," explains Dr Mannaerts. "Our alumni network is a strong factor in this context - a database of experts throughout the world. And our partners in GI-NET, who are active in research and development, education, training and advisory services, are also a significant source of information. Not only can these networks provide initial data, they can also be used in the future to track development and indicate performance in various countries. And there's another element that must not be forgotten: quality assurance. This should be embedded in GEOSS, as customers need to have confidence in the validity of the capacity building activities. The information gained from the surveys will be used in developing the GEO capacity building strategy, which will be presented at a symposium scheduled for April 2007 in Spain. This will also provide an opportunity to explain the work plan to funding agencies such as the World Bank."

Formulating GEO strategy papers would seem to be an art in itself, requiring the combined efforts of scientists, technicians and diplomats, and a great deal of care and sensitivity. This is understandable as the commitment is made at ministerial level - a great asset later on when it comes to implementation. "Naturally, different countries have different interests, and it's interesting to see how far it's necessary to go for these to be merged into a coherent and acceptable work plan," comments Dr Mannaerts. "And whereas official government and state organisations have to get the consent of the hierarchy as to what they say," adds Professor Molenaar, "ITC is free to work and state its position."

A great strength of the GEO community lies in its flexibility. This coalition of partners is able to interact and communicate in a less formal way than UN organisations. The other side of the coin, however, is that there is little funding available. "At present GMES (Global Monitoring for Environment and Security) and ESA (European Space Agency) are especially important when it comes to funding in the European field. Generally speaking, members and participating organisations try to channel parts of existing budg-

ets to this project. Goodwill, as you can see, is extremely important," explains Professor Molenaar. "At ITC we're currently working on our research programme and it's quite clear that the international agenda in relation to GEOSS will be an important item. It's possible that our MSc programme will be adjusted to reflect certain of the societal benefit areas in which ITC is active. After December we'll have a better idea of the direction we'll be taking in this respect."

With so much effort and commitment behind the scenes, the future for Earth observation looks interesting, to say the least. But we don't always have to gaze into a crystal ball; inspiring achievements can also be found in the here and now - GEONETCast, for example, which is based on EUMETSAT's EUMETCast data dissemination system. This is a concept by which environmental satellite and in situ data from participating data providers within GEO would be transmitted to all users through a global network of communication satellites, using a multicast access-controlled broadband capability. As Professor Molenaar says: "It's incredible to see how data can already be brought to the remote areas of Africa." And rapid access to data to enable informed decisions for the benefit of society is what GEOSS is all about.

Former ITC student appointed Commissioner for Minerals in Tanzania

Martin Hale hale@itc.nl

Dalaly Peter Kafumu came to ITC in 1990 as a young mid-career geologist. Behind him lay three years of gold and base-metals exploration in and around the Lake Victoria goldfields and four years as vice-principal of the Mineral Resources Institute, Dodoma, where he was responsible for training of mining and geological technicians. Peter studied Mineral Exploration at the branch of ITC then in Delft and graduated with a Postgraduate Diploma in 1991.

After a further few years with the Geological Survey - now as a senior geologist - Peter returned to Europe where he obtained his MSc (1995) and then DSc (2000) at the Free University of Brussels. Peter's career then took some significant turns. In the Ministry of Energy and Minerals of Tanzania he was first Head of Promotion and Statistics, promoting Tanzania's mineral sector to attract local and foreign investment, and subsequently Acting Director of Communications, supervising and coordinating communications with stakeholders in energy, minerals and the media. One consequence of this last function is that Peter has not only a selection of peer-reviewed scientific papers, conference presentations and geological reports to his credit, but also a number of newspaper articles, some on topics as exotic as geotourism, science and religion, and corruption. Peter's scientific interests have never waned: he is a member of several professional societies, editor of the Tanzania Journal of Earth Sciences, editor of the Tanzania Geological Society and part-time lecturer in environmental geomorphology at Sokoine University of Agriculture, Morogoro, Tanzania.

Following his recent appointment as Commissioner for Minerals in the Ministry of Energy and Minerals, Peter is now overall manager of the mineral sector in Tanzania. His responsibilities span policy, legislation, regulation, investment, safety and environmental protection. I think we can heartily congratulate him on building so successfully on his Postgraduate Diploma in Mineral Exploration - and wish him a bright future in his new position.

Dalaly Peter Kafumu

research news

ITC Assistance Following Java (Indonesia) Earthquake

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At 05:54 am local time on 27 May 2006, a magnitude 6.3 earthquake struck eastern Java in Indonesia. Close to 6000 people died and an estimated 154,000 houses were destroyed in this earthquake, whose epicentre was approximately 20 km SSE of Yogyakarta, near the densely populated Bantul district.
Despite frequent geophysical disasters in Indonesia, the affected area had not experienced an earthquake of comparable magnitude in over 100 years, and was consequently ill prepared. It was also vulnerable because the simple brick buildings - the principal housing type in the affected area - could not withstand the ground motion and quickly collapsed. Despite the time of the earthquake (very early on a Saturday morning), many people were already busy outside their homes, thus limiting the loss of life in one of Indonesia's most densely populated areas (>1600 people per km^2). Figure 1 gives an overview of the disaster area, including the seismic intensity distribution and the fault (hatched line) that ruptured.

Within two days of the event, ITC was contacted by staff from Gadjah Mada University (UGM) in Yogyakarta, one of our sister institutes, and was asked to assist in image-based damage assessment. Four UGM students were currently at ITC, involved in the joint MSc course Geo-information for Spatial Planning and Risk Management, and two staff members from UGM's geography department were actually in transit from Indonesia to ITC at the time the earthquake occurred. So discussions quickly started on how UGM and ITC could combine forces to respond most effectively to the event. As part of the activities of the School for Disaster Geo-information Management (DGIM), it was decided to provide assistance, while also possibly adapting the MSc topics of the Indonesian students.

Fortunately, only some southern parts of Yogyakarta were heavily affected by the earthquake, so UGM, located to the north, was able to continue functioning and assume a principal role in the post-disaster response. While plans were drawn up to obtain small-format aerial photographs (SFAP) from an aeroplane, an initial damage survey of some 300 public buildings was carried out by UGM's geodesy department within days. This was followed by a far more extensive campaign, involving some 100 staff and students from UGM's geography department, which ultimately, over a course of several weeks, mapped the damage to more than 40,000 houses in the districts south of Yogyakarta.

The original plan was for ITC to assist in interpreting the SFAP acquired by one of the UGM-ITC students, and to create damage maps based on these images. Poor weather, however, and flight opportunities restricted to weekends delayed image acquisition until 2 July, five weeks after the event. By that time, Norman Kerle from the EOS department had travelled to Yogyakarta to help with the response activities.

The Indonesian earthquake was the largest disaster to affect Indonesia since the 2004 tsunami, and occurred just weeks after strong sustained eruptions of the Merapi volcano, some 45 km to the north of the epicentre and also very close to Yogya, prompting speculations of a connection. However, the earthquake movement followed a previously identified NS-trending fault and, although Merapi's activity may have played a role, it resulted primarily from the Australian Plate subducting beneath the Sunda Plate at a rate of 6 cm a year (see Figure 1). Because of the severity of the disaster, international assistance was swift and extensive, with several dozen organisations deploying teams to the disaster area. The International Charter "Space and Major Disasters" was also activated, and satellite high- and medium-resolution imagery was acquired within a

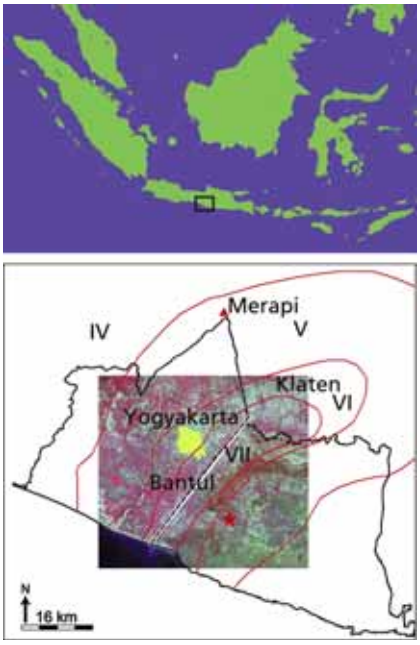

Figure 1 Overview of the area affected by the earthquake on 27 May 2006, showing the location of Yogyakarta, the epicentre (red star), and the seismic intensity distribution. A post-disaster ASTER image provides a visual reference, and shows that the Bantul area largely suffered intensity VII motion, and is also heavily vegetated (red colours in this false-colour composite).

few days of the event. Based on these data, maps providing an overview of the area were produced to help response forces to navigate, and to show structural damage.

By the time SFAP acquisition was finally possible, it was too late to use these photographs for actual damage mapping as much of the rubble had already been cleared, building remains had been torn down, and some reconstruction work had even begun. So we decided the project should focus on comparing the potential of these vertical and oblique photos with that of high-resolution satellite data for future rapid response, with or without the integration of pre-disaster images or GIS and auxiliary data. The work will lead to a quantitative assessment of the utility of such data, and the derivation of best practices and optimal approaches for their deployment.

The difficulty of image-based damage mapping was apparent from the damage maps produced using the Charter data. These maps, produced primarily by DLR-ZKI and UNOSAT, used different mapping approaches to process IKONOS and Quickbird data. Figure 2 shows such damage maps for parts of the Bantul area, both based on Quickbird data (2.4 m multispectral). However, the main damage area is characterised by small clusters of houses embedded in, or surrounded by, relatively dense vegetation (Figures 1 and 3). Hence, work is now underway to assess the quality of these maps, using ground data collected in Indonesia and gathered for the UGM housing damage survey.

Initial results demonstrate the difficulty of such image processing. Whereas destruction in open areas is well visible in such high-resolution satellite data, it becomes far more difficult to map individual damaged houses. Figure 3B shows that damage in larger and open settlements is reasonably visible. In more densely vegetated areas, although damage to clusters of houses (yellow areas in C and D) can still be mapped successfully, this is not always the case. The red and blue dots indicate buildings with total and moderate damage, respectively, as mapped on the ground by the UGM survey. Post-processing of the data is still in progress at UGM, but once the data become available the analysis will be continued in order to understand how the accuracy of such initial damage maps can be increased.

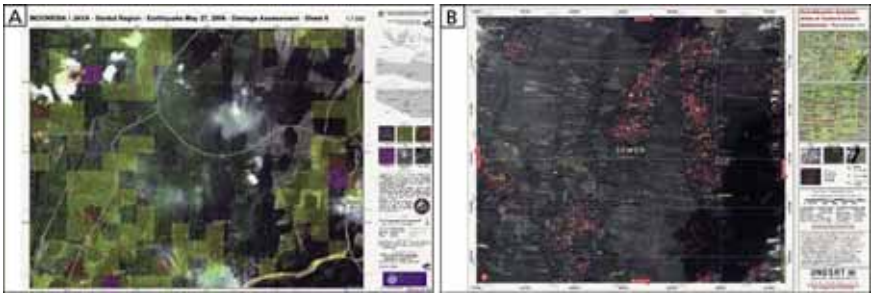

Figure 2 Example maps produced within days by (A) the German Space Agency (DLR-ZKI) and (B) UNOSAT, using satellite data provided by the International Charter.

In addition, there is a need for further research in such areas as microzonation for better earthquake risk mitigation, performance levels of different building materials, and more advanced image processing using segmentation and texture analysis - all of which could form topics for more UGM MSc students.

This work is also a contribution to ITC's CASITA project.

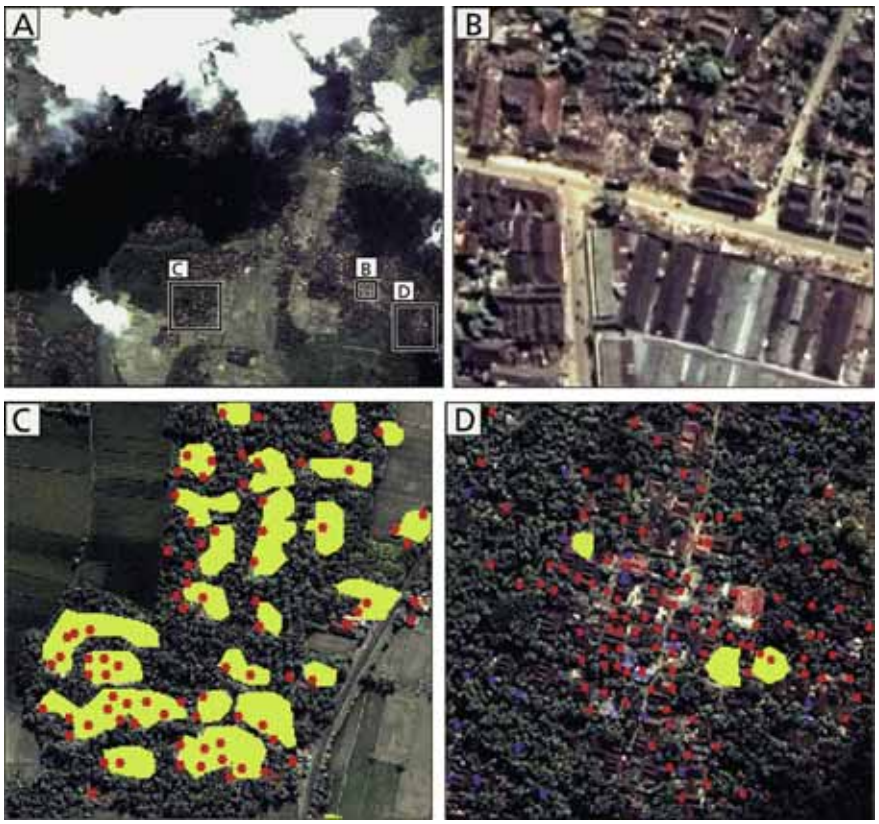

Figure 3 Post-disaster Quickbird image of part of the Imogiri district, showing building damage in detail (B), and as mapped by UNOSAT (in yellow). Red and blue dots indicate totally destroyed and severely damaged houses, respectively, as mapped by the UGM survey. This verification illustrates the difficulty of mapping building damage even in high-resolution satellite data.

education news

New Urban Planning and Management Course

Emile Dopheide dopheide@itc.nl

In September 2006, the former course Urban Planning and Land Administration (UPLA) was relaunched under the new name Urban Planning and Management (UPM) with a revised curriculum. This new curriculum was designed by an internal working group at ITC, with inputs from alumni, experts from UN-Habitat, academicians from universities in the South (Cape Town, Dar es Salaam, Singapore, Wuhan and Mexico) and in Europe (London, Utrecht; Delft and Twente), and of course from ITC itself.

A major change is the stronger focus on research and more room for individual specialisation in relation to the MSc research project. In addition, the MSc research project will be closely linked with ITC research projects in the fields of urban poverty and slum reduction; urban transport; infrastructure and services; urban hazard mitigation; spatial planning and decision support systems; participatory GIS; and urban land use and land tenure. The opportunity to undertake relevant empirical research in the form of "fieldwork" in cities in the South has of course been maintained.

The course is structured in four major blocks:

- GIS and remote sensing
- Urban planning and management (including urban indicators and monitoring; analysis and modelling of urban processes; decision and planning support)
- Research methods, elective and specialisation subjects
- MSc thesis research.

The structure of the 18-month MSc course allows parts of the curriculum to be followed individually. The first nine months of the course, for example, can be followed as a Postgraduate diploma course - which would provide the basis for subsequently completing the entire MSc course.

The new UPM course started in September with 15 MSc students and nine Postgraduate diploma course participants. Some initial experiences will be reported in the next issue of *ITC News*.

For more information on the UPM course, please visit the ITC website (http://www.itc.nl/education/fields/urbanplanning.aspx) or contact education@itc.nl or the programme director Emile Dopheide (dopheide@itc.nl).

Presentation on poverty mapping by Germene Stewart (UPM 2005-2006 course)

UPM group on a study trip to the city of Rotterdam

First Graduate MSc Geographical Information Management and Applications

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On Wednesday, 21 June 2006, ITC staff member Lyande Eelderink successfully defended her MSc thesis "Towards key variables to assess national spatial data infrastructures (NSDIs) in developing countries". Lyande is the first graduate of the MSc programme Geographical Information Management and Applications (GIMA), an inter-university MSc course conducted jointly by Utrecht University, Wageningen University and Research Centre, Delft University of Technology, and ITC.

The MSc GIMA programme is offered as distance learning, with four periods of classroom learning. Its aim is to educate students to become all-round managers of geo-information and/or all-round geo-information application specialists. Students acquire knowledge of and skills in management methods and techniques (how to manage geo-information), substantial knowledge of geo-information application fields (how to apply geo-information), and technical-methodological geo-information skills (how to use geo-information technology). To this end, students are introduced to the theoretical, methodological, technological and organisational principles of processing and analysing digital geo-information, to the management and research aspects of geo-information, and to the innovative application of geo-information in a wide variety of spatial applications fields.

For more information about the MSc GIMA programme: www.msc-gima.nl

Lyande Eelderink: the first graduate of the MSc programme Geographical Information Management and Applications (GIMA)

First Staff Exchange within the Framework of JEP

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After having spent six weeks at ITC, Dr Alejando Velazquez, the UNAM (Universidad Nacional Autónoma de México) coordinator of the Integrated Landscape Management MSc course in Morelia, Mexico, ended his stay in the Netherlands. He marked this on 8 August by giving a presentation entitled "Building on capacity: joint collaboration between ITC and UNAM".

In his presentation Dr Velazquez not only touched on the background principles of capacity building, the fundamentals of integrated landscape management, the state of the art, and the UNAM postgraduate programme, but also reviewed his present short stay and examined some forthcoming issues. He first explained why Mexico had opted for ITC and for a course on integrated landscape management - which as such does not feature in the ITC curricula. He then summarised what he had done over the past six weeks. He felt it had been most useful and constructive with regard to further collaboration and cooperation with the ITC team involved in running the course in Mexico.

Some 19 years ago, Dr Velazquez followed the postgraduate course in the Department of Rural Survey (then headed by Professor Zonneveld, who also attended this session). He repeatedly highlighted the changes at ITC, which he considered in line with global trends in scientific and technological advances. He ended his pres-

entation with a slide showing his achievements during the past six weeks. He acknowledged the efforts of many ITC staff members, in particular those from P&O, Education Affairs, and External Affairs.

At the end, I, as the ITC course coordinator, opened up the session for questions and discussion. This part was also useful and encouraging. Dr Velazquez was then thanked for his efforts and was presented with an ITC tie (for when visiting high-ranking Mexican officials, whose support is vital to get things done in Morelia) and an ITC hat (for when working in the field) as tokens of appreciation. The session ended with refreshments.

Dr Alejandro Velazquez delivering his presentation

Some of the audience

For more information about the Integrated Landscape Management (ILM) MSc course in Morelia, Mexico: (http://indy2.igeograf.unam.mx/ua_morelia/posgrado.html)

announcements

ITC Textbooks on Principles of GIS and Remote Sensing Translated into Vietnamese

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On Thursday, 22 June 2006, Professor Nguyen Cao Hua, dean of the Geographic Faculty of Hanoi University of Science (HUS), signed the agreement for the translation into Vietnamese of ITC's textbooks Principles of GIS and Principles of Remote Sensing.

ITC alumna Ms Nguyen Chan Huyen expects to finish the Vietnamese versions of the textbooks by the end of 2006. This will benefit not only the students at HUS but also the Vietnamese students following ITC's short courses, tailor-made training courses, and degree programmes.

After the signing ceremony, the ITC staff present gave a guest lecture for staff and students of the Faculty of Geology and the Faculty of Geography entitled "Facing challenges: planning the future with GIS and RS".

Professor Nguyen Cao Hua signing the agreement, witnessed by three ITC staff members (Dr Mark van der Meijde, Marjan Kreijns and Chris Hecker)

Best Presentation Award for Dr John Carranza

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Dr John Carranza of ITC's Department of Earth Systems Analysis received the Best Presentation Award for his paper entitled "Regional-scale geothermal prospectively mapping in West Java (Indonesia) by application of data-driven evidential belief functions".

The paper was co-authored by Mr Hendro Wibowo of the Laboratory of Volcanology and Geothermal, Geology Department, Institute of Technology Bandung (ITB), Bandung, Indonesia. John presented his paper in the thematic session Geostatistics, GIS and Potential Mapping at the 9th International Symposium on Mineral Exploration held at ITB from 19 to 21 September 2006.

The paper can be downloaded from: www.itc.nl/papers/2006/abst_proc/wibowo_dat.pdf

Prestigious Medal for Professor John van Genderen

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Professor John van Genderen of ITC's Department of Earth Observation Science has received the prestigious Leading Officer of Education Medal and Award from the Mongolian government.

The medal and award were presented to Professor Van Genderen on 9 October 2006 during the opening ceremony of the 27th Asian Remote Sensing Conference in Ulaanbaatar, Mongolia, by the Minister of Education, Culture and Science, His Excellency Dr U. Enkhtuvshin.

Professor Van Genderen was selected by the government of Mongolia to be the recipient of this award because of his great contribution to research and education in the field of remote sensing in Mongolia. It is the highest honour the government of Mongolia can bestow on a scientist.

In his address, the minister praised Professor Van Genderen for his ability to connect with scientists in other disciplines. He said that this attribute had been very important in providing a clear channel for the practical study and application of remote sensing that are so important to society in such a large country as Mongolia. Another striking ability of Professor Van Genderen that the minister mentioned was his capability as a facilitator - putting different disciplines, different departments and different groups of people into contact with one another, and encouraging cooperation.

His Excellency Dr U. Enkhtuvshin presenting Professor John van Genderen with the Leading Officer of Education Medal and Award

events

ESRI User Conference 2006

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Mark Noort m.noort@itc.nl

Like last year, a delegation from ITC attended the ESRI User Conference in San Diego, California, held this year from 7 to 11 August. The conference always starts off with an opening address by ESRI's president, Jack Dangermond. "Communicating Our World" was this year's theme: "Our world needs better understanding, and GIS is the medium that helps us communicate and understand our world."

During the opening address, three large video screens displayed map images created from live data accessed via the internet. ESRI staff showed new features in ArcGIS 9.2, which is being released this autumn.

ITC was represented by Lyande Eelderink, Javier Morales, Mark Noort, Jeroen van den Worm and Andreas Wytzisk, who staffed the ITC information booths at both the Education Fair and Show Case, and organised an ITC alumni reception, which was attended by some 30 alumni. Javier Morales also presented a paper at the conference.

Jack Dangermond paid a visit to the alumni reception, which was very much appreciated by the ITC alumni and staff. The president of ESRI also confirmed the agreement reached on software licences for ITC's joint education partners and students.

Lyande Eelderink in the ITC booth at the ESRI User Conference in San Diego, USA

Jack Dangermond, president of ESRI, was a welcome guest at the alumni gathering

Map Asia 2006: "GeoICT for Good Governance"

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Map Asia 2006, held from 29 August to 1 September 2006, was jointly organised by GISTDA and GIS Development under the theme "GeoICT for Good Governance". There were 400 participants from Thai and international organisations, and 41 exhibitors displayed their technologies on geographical information technology and applications.

Map Asia 2006 was the fifth edition of the annual Map Asia conference, a conference that has become a platform for all stakeholders (such as researchers, users, technology developers and policy makers) to discuss, deliberate and share knowledge and experiences for the benefit of the Asian geoinformatics community.

Three ITC staff members participated: Sjaak Beerens, director external affairs; Dr. Arbind Tuladhar of the PGM department; and Ms Marjan Kreijns, ITC representative for Thailand and Vietnam.

This latest Map Asia conference was an effort to highlight the issue of

penetration of geo-information technology within governing structures. The event had an enthralling inaugural ceremony, which was presided over by Lt Gen (Dr) Vichit Satharanond, who is the director of the Royal Thai Survey Department, chairman of GISTDA, and a highly distinguished ITC alumnus.
Map Asia was a good occasion to meet friends from ITC's Asian network, and during the musical and colourful Gala dinner we had the chance to share memories with many of them.

Sjaak Beerens, ITC's director external affairs, was one of the key speakers. Among the mostly technical contributions, his presentation "GeoICT for governance: will society benefit?" provided a moment of relaxation and food for thought.

life after itc

Digital Aerial Sensors: A Way to Satisfy a Growing Demand for Aerial Photography

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At the beginning of 2004, the government of Uruguay approached 2000 Aviation Systems with a request to make a mosaic out of aerial photos of the capital Montevideo. They wanted to place the mosaic on the floor of the municipality building so that the citizens of Montevideo could see where they lived. To cover the whole area, approximately 150 images had to be taken, digitised, mosaicked, plotted and glued to the floor – approximately at a scale of 1:3,850 and a resolution of 80 cm. The size of the mosaic was 9 m x 11 m, representing about 900 km2 and covering the whole county of Montevideo and some surrounding areas.

Since the mosaic has been installed in Montevideo, the demand for aerial photography, and particularly mosaics, has soared. To keep up with new technologies and to satisfy the demand, 2000 Aviation Systems has bought EnsoMOSAIC, which is a digital aerial imaging and image processing system developed by Stora Enso Oyj and the Technical Research Centre of Finland (VTT).

EnsoMOSAIC
Thanks to the short flight periods required and computerised data processing, the costs of the new digital system are lower and processing times are shorter than those of the traditional methods of aerial photography previously used. EnsoMOSAIC images are taken with a digital still camera at low altitude. The whole process is fully digital - from image capturing to the creation of image mosaics. The EnsoMOSAIC software rectifies thousands of digital images in one run, applying block adjustment, and then joins them together to form a large georeferenced mosaic. The location of every image is measured with the GPS during the flight.

System Description
The whole new system consists of hardware and software installed in an aircraft, with further processing being carried out on a normal PC.

Imaging hardware:
- Control box, including GPS and integration electronics
- Laptop computer for navigation
- Digital still camera

Processing hardware:
- Standard PCs

EnsoMosaic software:
- Flight planning
- Navigation
- Orthomosaicking

Equipment Onboard a Normal Twin-Engine Aircraft

- GPS unit
- Laptop with NavCam navigation and camera control software
- Camera control box
- Digital camera
- Flight bar

Using this digital aerial imagery is a way of satisfying the growing need for rapid and accurate data for monitoring the Uruguayan forest resources. It is an excellent tool for rapid image map making. Being fully digital and georeferenced, the mosaic can be integrated into any information system, and it can also complement traditional inventory and satellite images as one GIS data layer.

Bundle Block Adjustment

The bundle block adjustment (BBA) is an iterative mathematical process to solve the orientations of the images and locations of the perspective centres simultaneously as a large image block. Geometrically, the mathematical model states the condition where the point in object space, the perspective centre of a camera, and the projection of the point on the image plane are on a straight line. This is called the collinearity condition. A group of all lines running through the perspective centre are thought to comprise a virtual bundle of light rays for each image. The process combines the bundles of adjacent images through the common object points seen on these images, resulting in one large block of images.

Project Description

Area:	250,000 ha
Working days:	20
Location:	Uruguay
Images taken:	036
Image resolution:	80 cm
Product description:	Orthomosaics, DTM

The digital outputs are compatible with any GIS application (ArcInfo, ArcView, Mapinfo, ERDAS, etc.) that understands data in the raster format.

All these mosaics are part of a big GIS for forestry uses, which includes satellite data, land use data, soil data, DTM and forest inventory data. All these gathered data are used for forest management, strategic and operational planning, road planning and silvicultural planning, as well as for checking the state of forest areas.

Working Steps

Flight planning

To achieve the optimum result, a number of variables are taken into account in flight planning, such as total area, resolution of the final image mosaic, image overlap along and between the flight paths, flying altitude, camera opening angle, and aircraft speed. The flight planner enters initial flight parameters into a FlyPlan program worksheet. The program then works out the flight plan, which consists of both numeric data and graphically depicted flight paths. The flight plan is transferred to NavCam, which is the program for aircraft navigation and camera control.

Flight navigation and image grabbing

A laptop computer equipped with NavCam software gathers navigation information for the pilot and for locating the images with a GPS unit.

NavCam also triggers the camera at predefined positions and keeps track of the image frames. The camera is synchronised with the GPS, thus eliminating positioning error caused by aircraft movement.

During the project we had favourable conditions (clouds at 6000 ft or more above ground level), allowing us to image about 30,000 ha an hour (Figure 1).

Mosaic processing

After the flight, the mosaics are created semi-automatically on a standard PC. To obtain a result of good radiometric and geometric quality, a photogrammetric mosaic is made, correcting for camera distortion, terrain elevation differences, sun angle differences, local radiometric differences, and suchlike.

Every image was linked to the next one, and tie points were located on the imagery manually. Every point located was an object in the field that was well recognised in the images (Figure 2). Using one computer, up to 15,000 ha of mosaic could be processed per day.

Final Products

The final mosaic was divided into 100 subzones in order to avoid slow processing, and a system was developed to search these subzones so that only the required images were be used (Figure 3).

Figure 1: Flight execution and navigation control interface

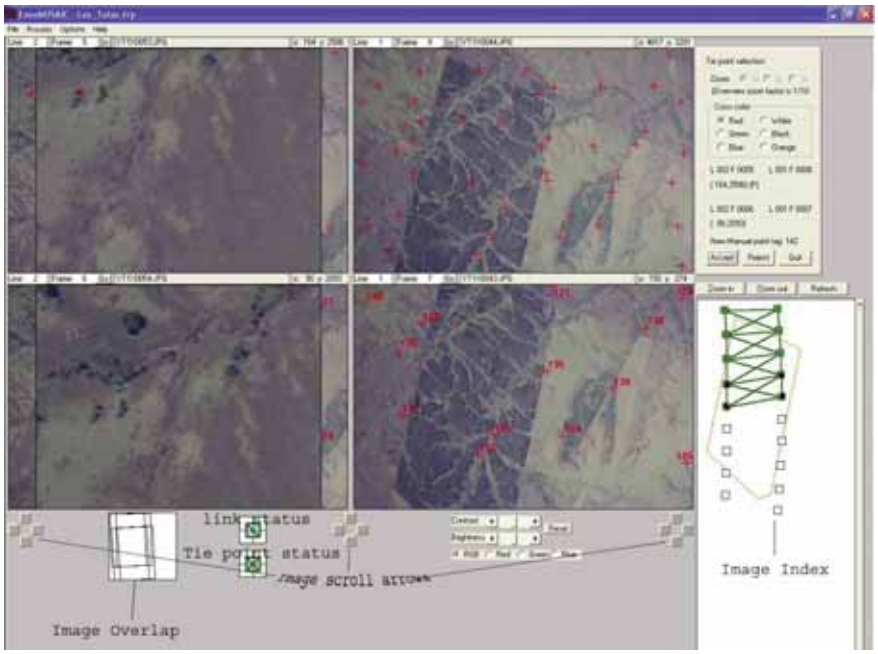

Figure 2: Image process interface

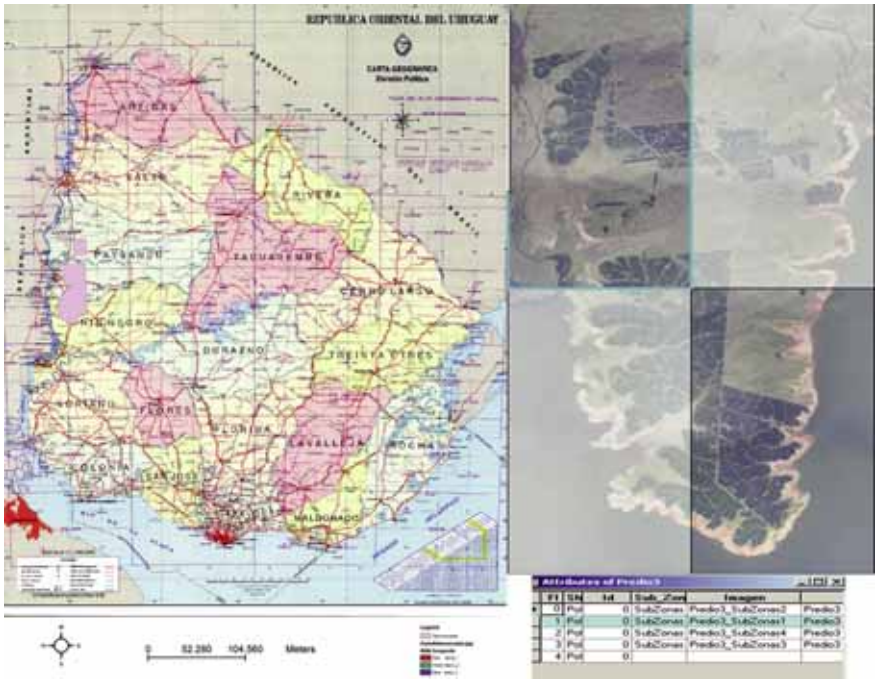

Figure 3: Area of interest and mosaic example

Advantages of New Digital System

If we compare our new digital system with our conventional aerial photography system, we come to the following conclusions in favour of the digital system:

- faster, less costly and target-specific
- quick response by flying under cloud cover
- reliable acquisition (image quality can be assessed immediately)
- high-resolution and geometric accuracy
- end-to-end digital flow line (no chemical film processing or scanning)
- high-quality DTMs from stereo sensor data
- smooth data flow
- greater geometric accuracy
- quality control during flight.

Sebastian Ruik, an agricultural engineer from Uruguay, gained his Professional Master's in geoinformatics/GIS at ITC, Enschede, the Netherlands. He works for 2000 Aviation Systems, a company that specialises in aerial photography. The company works with GIS and remote sensing applications in the fields of agricultural forestry and urban planning. Sebastian is in charge of the GIS and remote sensing department, where he uses GIS for image classification, map production and spatial analysis, among other things.

Party ITC Alumni Association of Pakistan

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We are happy to announce that the ITC Alumni Association of Pakistan (ITC-AAP), which was established last year, organised another successful party on 1 September 2006 in the Marriot Hotel Islamabad. The purpose was to welcome Director External Affairs Sjaak Beerens, who had come to Pakistan to attend the ICAST conference in Islamabad.

As I was expecting the party to last only two hours, I booked a hall in the hotel accordingly, but such was the interest of the alumni that the party continued past 10 pm up to mid-

night. This party provided not only an opportunity to reunite old friends who had graduated from ITC, but also a platform for discussing future plans and collaboration, and for formulating strategies to further strengthen the Association. Sjaak Beerens received a very warm welcome, and the alumni discussed various issues with him, including developments that had occurred since their graduation from ITC.

Despite the call from various political parties in Pakistan for a countrywide strike on 1 September, some 32 alumni managed to attend the party. They came not only from the provinces of Baluchistan, Punjab, Sind and North West Frontier but also from the more distant districts of Lahore, Peshawar and Hafizabad. Among those gathered in the hotel were senior alumni (for example, Raja Atta Ullah and Jalil Ur Rehman), as well as new students due to join ITC the same month (namely Mr Shafiq and Ms Sumbal, research associates of the National Center of Excellence in Geology, University of Peshawar). Mr Attaur Rahman, patron of the ITC-AAP, formally welcomed the alumni and chief guest Sjaak Beerens on this occasion.

As the post of Punjab provincial coordinator was still vacant after the last meeting, an election was held this time round. Ms Farah Sattar, lecturer at the GIS Center, University of Punjab Lahore, volunteered for the position and the alumni present gave her a vote of confidence.

During his speech, Sjaak Beerens summarised the improvements and developments at ITC. He thanked the alumni and the executive body of the ITC-AAP for organising the successful gathering, and also distributed souvenirs among the alumni.

During the meeting, the following issues were discussed:

- The majority of the alumni are actively working on GIS and remote sensing in their respective organisations but, owing to rapid changes and advances in these fields, it was felt that ITC should organise more refresher courses inside and outside Pakistan and give alumni the chance to refresh their knowledge. For this reason, the alumni requested that a refresher course be organised in Pakistan so that most of the alumni could participate.
- There was also an urgent request for a course on the use of GIS and remote sensing in disaster risk management - much needed after the devastating earthquake in Pakistan.

The meeting concluded with discussions and light refreshments, during which several group photos were taken.

At the gathering were ITC alumni from the provinces of Baluchistan, Punjab, Sind and North West Frontier, as well as from the more distant districts of Lahore, Peshawar and Hafizabad

staff news

Welcome to ITC	Ms H.A. van Aken	Promovendus Department of Water Resources	1 July 2006
	S.L.M. Wesselman MSc	Lecturer Department of Natural Resources	1 August 2006
	Dr M.J. Verkroost	Education Specialist Bureau Educational Affairs	1 August 2006
	Dr O. Huisman	Lecturer Department of Geo-Information Processing	15 August 2006
	Dr J.A. Martinez Martin	Assistant Professor Urban and Regional Planning and Geo-Information Management	28 August 2006
Staff leaving	Dr T. Bouloucos	Department of Earth Observation Science	1 July 2006
	Dr C.J. Brookes	Department of Geo-Information Processing	21 July 2006
	Ir M.F. Gelens	Department of Natural Resources	1 September 2006
	Dr R.O. Strobl	Department of Water Resources	15 September 2006