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## 2004number 4

## introduction

Normally an introduction to a year's closing issue tends to reflect, perhaps a tad philosophically, on the months gone by, while simultaneously building on the experience gained and turning expectantly to the New Year ahead. Unfortunately, today that's not the case. The transition from 2004 to 2005 was completely dominated by a single event: the devastating tsunami unleashed by the earthquake that occurred on 26 December west of Sumatra. Sudden, vast, consuming, and no respecter of countries or persons – the whole world watched in horror as scenes of destruction flashed across its television screens. It was a time when people ceased to rationalise that they lived in a global village, they actually felt it! And indeed they swung into action. Local rescue and emergency services working round the clock, the deliveries of humanitarian aid somehow getting through despite the mangled infrastructure, the amazing stories of heroism and determination. But the tragic cost in human life and suffering remains, a cost that will continue to be borne by the survivors.

In the days that followed, questions began to be asked. How did it happen? Why was there no warning? What can be done to prevent a repeat of such a disaster? In a main feature on page 3, Dr Mark van der Meijde, assistant professor in 3D geological modelling in ITC's Earth Systems Analysis department, explains several issues relating to tsunamis in general and in particular. Given ITC's specialist field of expertise and the various disciplines represented within it, it is more than probable that many links in its extensive alumni network will be called on to offer their professional skills and capabilities in the aftermath of this tragedy – an aftermath set to last for years to come.

So somewhat overshadowed, *ITC News 2004-4* makes its appearance at a time when once again we've all been reminded of what an unpredictable world of powerful forces we live in. Yet this issue, like its predecessors, covers a wide range of topics: some are undeniably success stories, some speak of developments that promise hope for the future. But with the tsunami and its victims still uppermost in our mind, we will leave you, our readers, to discover them in your own way and in your own time.

*Janneke Kalf*  
Managing Editor

## colofon

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# GI-NET Award for Mr Raphael Olaniyi Oyinloye

Janneke Kalf

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***Mr Raphael Olaniyi Oyinloye received the GI-NET Award to support the presentation of his paper during the 5th (AARSE) conference.***

Within the framework of sharing resources, and based on the principles agreed during the December 2003 founding workshop "Geo-information network for education and training" (GI-NET), ITC co-funded the participation of staff members of GI-NET partners in Africa in the 5th African Association of Remote Sensing for the Environment (AARSE) conference, held in Nairobi, Kenya, from 18 to 22 October 2004. Representatives of GI-NET partners were invited to apply. Mr Raphael Olaniyi Oyinloye, head of the Academic and Research Division of Rectas Ile-Ife, Nigeria, received the GI-NET Award to support the presentation of his paper "Geoinformatics capacity building in Africa: RECTAS perspective". A brief synopsis of the paper is given below.

The notion called geoinformatics became generally known in Africa more than a decade ago. This science and technology has been made possible by the rapid advance in information and communication technology. Geoinformatics, more or less an "all-purpose" multidisciplinary science, may be seen as concerned with obtaining reliable information about Earth's natural resources and the environment with the aid of high-speed high-capacity electronic digital computers. The nucleus of the science concentrates on geo-information production and management for the sustainable development of natural resources while ensuring a healthy environment. "Mapping", "monitoring" and "management" are among the key words in the field of geoinformatics when it comes to formulating policies and making decisions about natural resources and the environment. It is clear that Africa lacks adequate manpower in the field of geoinformatics. In fact, it has been identified that the requisite knowledge and skills are missing at three levels in Africa: the opera-

tional level, the middle manpower level, and the professional/managerial/technocrat level.

The Regional Centre for Training in Aerospace Surveys (RECTAS) offers opportunities to Africans for capacity building in the core fields and application areas of geoinformatics through its long-term and short-term training programmes and through the execution of projects. RECTAS, which is located on the campus of Obafemi Awolowo University (OAU), Ile-Ife, Nigeria, was established on 21 October 1972. Since then, it has passed through many developmental stages in its academic programmes. Currently, the centre runs Technician, Technologist and Postgraduate Diploma courses in Geo-information Production and Management, with specialisations in photogrammetry and remote sensing, geographical information systems, or cartography – in both English and French. So far, RECTAS has trained 1,131 regular students from 27 African countries, excluding the numerous participants for short courses.

Presently, RECTAS is in partnership with ITC, Enschede, under a joint education programme, and they are running an MSc degree course in Geoinformatics, which started in September 2004. The first six months of the programme take place at RECTAS and the remaining 12 months at ITC. It is planned that by 2008 the course will be run fully at RECTAS. Under the same joint education programme, plans are also in progress to run a joint MSc degree course in Remote Sensing and GIS in Natural Resources Applications, where the partners will be RECTAS, IIRS (Indian Institute of Remote Sensing, Dehradun, India) and ITC. The areas of specialisation will be agriculture and soils, forestry and ecology, geosciences, human settlement analysis, marine sciences, and water resources.



Raphael Olaniyi Oyinloye

# Tsunami in Asia: Cause, Impact and Prevention

Mark van der Meijde

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**Two large earthquakes occurred in the Indian Ocean around Christmas 2004. The impacts on society of these earthquakes were, however, very different.**

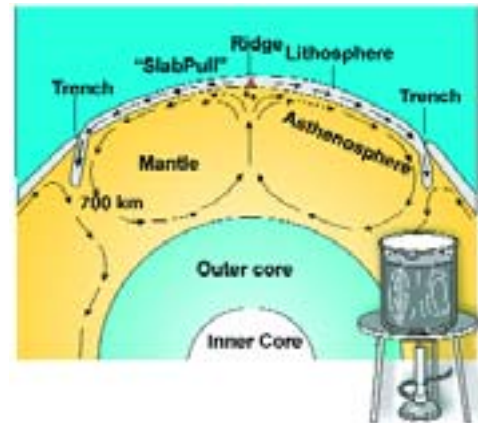
The earthquake with a magnitude of 9.0 that occurred on 26 December west of Sumatra caused a devastating tsunami, resulting in many casualties in many countries around the Indian Ocean and reaching as far as Africa. Three days earlier an earthquake with a magnitude of 8.2 had occurred 400 km south of New Zealand. No tsunami originating from this earthquake has been reported.

What is the driving mechanism behind earthquakes that sometimes causes a tsunami but generally does not lead to even the slightest elevation in sea level? Furthermore, what can we do to prevent such a disaster from happening again? Is a tsunami warning system the solution or is its effectiveness highly overrated?

## Tectonic Processes

To understand why one earthquake causes a tsunami and another does not, we have to understand the driving mechanism behind earthquakes. This driving mechanism is initiated deep down in the Earth, where a source of heat induces convective currents at depths between 100 and 2,900 km. These currents have such enormous strength that they can break up the Earth's hard rigid crust, the top 50 to 100 km on which we are living. At mid-oceanic ridges, these floating plates of crust move away from each other and new crust will be formed. At trenches, two plates collide or slide along each other (Figure 1).

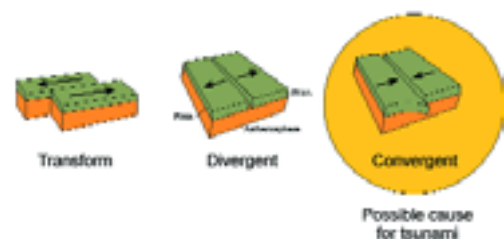
These variations in plate motions result in three different types of plate boundary: transform, divergent and convergent plate boundaries (Figure 2). Earthquakes that might cause tsunamis, such as the Sumatra earthquake, mainly occur at convergent



**Figure 1** In a rather simplistic view the Earth can be considered to be built up of three different layers: the rigid top layer we are living on (the crust), a warm thick layer with fluid properties (the mantle), and the deepest layer, which warms up the overlying layers (the core). This source of heat induces convective currents in the mantle that make the crust break into plates that will start floating over the Earth. Tectonic processes will take place at these plate boundaries: new crust is formed at ridges, old crust disappears at subduction zones (trenches).

boundaries. The New Zealand earthquake was of the transform type and therefore did not cause a tsunami even though the magnitude of this earthquake was almost as large as that of the Sumatra earthquake.

## Three types of plate boundaries



**Figure 2** There are three different types of plate boundary: transform faulting describes two plates that slide along each other; divergent plate boundaries are where new crust is formed and two plates are slowly getting separated; in subduction zones convergent plate boundaries are found, where two plates are colliding with each other and one of the plates is subducting back into the Earth.

**Dr Mark van der Meijde**

is assistant professor in 3D geological modelling at the department of Earth Systems Analysis at ITC. He obtained his MSc in geophysics (with specialisations in solid Earth and exploration geophysics) from Utrecht University in 1998. From 1996 to 1998 he was a researcher in the seismological division of the Royal Dutch Seismological Service (KNMI), working on seismic hazard analysis. From 1998 to 1999 he worked at the Netherlands Institute for Applied Geosciences (NITG-TNO) as a researcher on soil structure and composition. From 1999 to 2003 he was research assistant at the Federal Institute of Technology in Switzerland and obtained his PhD on 3D and 4D modelling of (upper-)mantle structure, with emphasis on detailed modelling of subducting slabs.

**Earthquake Characteristics**

The Sumatra earthquake was of the type that potentially can cause a tsunami, but there were additional factors that strongly influenced the devastating force of the December tsunami. The earthquake had a very large magnitude, one of the largest registered in the last 100 years. The length of rupture was over 1200 km (see yellow area in Figure 3) and had a lateral displacement of approximately 20 to 30 m. Still, lateral displacements have no influence on the occurrence of tsunamis; it is the vertical displacement on the fault that triggers such an event (Figure 4). The Sumatra earthquake had an unprecedented vertical displacement of approximately 15 to 20 m in the zone of highest intensity.

**How Can Earthquakes Generate Tsunamis?**

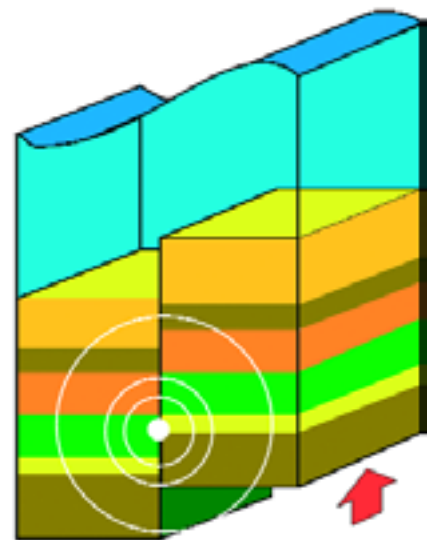
The official definition of a tsunami is “a wave train, or series of waves, generated in a body of water by an impulsive disturbance that vertically displaces the water column”. In general, anything that is capable of moving large water masses can cause a tsunami. Various sources, such as earthquakes, landslides, volcanic eruptions, explosions, and even the impact of cosmic bodies such as meteorites, can generate tsunamis. In the case of an earthquake, a tsunami can be generated when the sea floor abruptly deforms and vertically displaces the overlying water (Figure 4). The entire water column is disturbed by the uplift or subsidence of the sea floor. Waves are formed as the displaced water mass attempts to regain its equilibrium. These waves affect the whole column of water between the surface and the sea floor as they move from the region of origin in the middle of the sea towards the coast.

**Shallow-Water Waves**

A tsunami belongs to the group of shallow-water waves. The wavelength of the wave is much longer than the depth of the water the wave is travelling through. This is typically the case for tsunamis, which have wavelengths exceeding 100 km while travelling through water 5 to 7 km deep. Because the rate at which a wave loses its energy is inversely related to its wavelength, not only do tsunamis propagate at high speeds, they can also travel great, transoceanic distances with limited energy loss. This explains why



**Figure 3** Tectonic overview of the Indian Ocean. The devastating megathrust earthquake of 26 December 2004 occurred on the interface of the India and Burma plates and was caused by the release of stresses that develop as the India plate subducts beneath the overriding Burma plate. The India plate begins its descent into the mantle at the Sunda trench, which lies to the west of the earthquake’s epicentre. The trench is the surface expression of the plate interface between the Australia and India plates, situated to the southwest of the trench, and the Burma and Sunda plates, situated to the northeast. In the region of the earthquake, the India plate moves towards the northeast at a rate of approximately 6 cm/year relative to the Burma plate. This results in oblique convergence at the Sunda trench. The oblique motion is partitioned into convergence and transform faulting. The 26 December earthquake occurred as the result of convergence (source: USGS).



**Figure 4** Earthquakes that can trigger tsunamis occur at convergent plate boundaries. In the area of highest friction (as indicated by the circle) large movements can suddenly occur when plates start moving abruptly. Large parts of the Earth in this area will instantaneously shift upwards or downwards, causing a disturbance in the sea that might grow into a tsunami if the displacement is large enough.



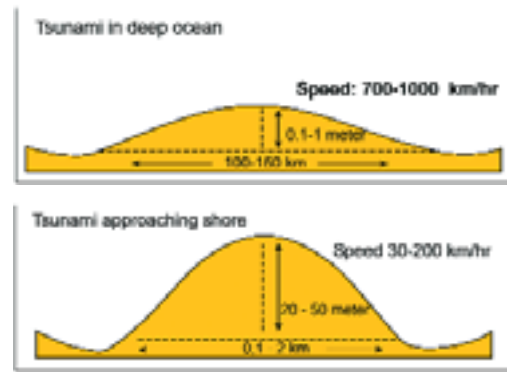
the coast of Africa was hit by a tsunami that originated over 5,000 km away. Shallow-water waves move at a speed that is equal to the square root of the product of the acceleration of gravity (9.8 m/s/s) and the water depth. In a 6 km deep ocean, a tsunami propagates at 875 km/hr – as fast as an aeroplane!

A tsunami is not a tidal wave or a wind-generated wave. Tidal waves result from the imbalanced, extraterrestrial, gravitational influences of the Moon, Sun and planets. Wind generates disturbance at the surface of the water column, whereas tsunamis disturb the whole water column from surface to sea bottom (Figure 5). Wavelengths for wind-generated waves are much shorter and amplitudes in the open ocean much higher than those for tsunami waves.



**Figure 5** Tsunamis are fundamentally different from wind-generated waves. Wind-generated waves can have wavelengths of up to 150 m, with a period of up to 10 sec. At the coast, wind-generated waves will hit the coast in rolling movements without invading the land, whereas tsunamis arrive as a “wall” of water rolling over the beach and invading the land lying behind. Such a wall of water (bore) is clearly visible in this picture although this bore is not caused by an earthquake but looks very similar. The flat sea is disturbed and uplifted for several metres over a very large area.

**Difference between Tsunami in Deep Ocean and Tsunami Approaching the Coast**  
The behaviour of a tsunami in the open ocean is very different from its behaviour in shallow coastal waters (Figure 6). A tsunami in the deep ocean has very long wavelengths and very low amplitude. Approaching the shore, its speed will decrease and its amplitude will increase dramatically. This is because the tsunami's energy flux, which is

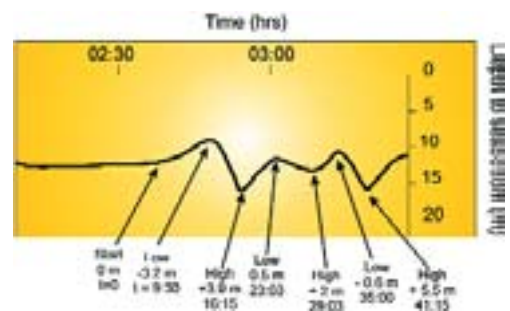


**Figure 6** Tsunamis in open sea and those close to the coast have distinctively different amplitudes, wavelengths and wave speeds.

dependent on both its wave speed and wave height, remains almost constant. Consequently, as the tsunami's speed diminishes as it travels into shallower water, its height grows. Because of this shoaling effect, a tsunami unnoticed at sea may grow to 10 to 50 m near the coast.

**Tsunami Effects**

Several specific characteristics clearly distinguish tsunamis from other types of waves and are the cause of their possibly devastating force. A tsunami consists of several wave trains following one another, which can appear as a rapidly falling or rising tide, waves or even a bore. It often causes a pattern of alternating high and low water levels which can last for several hours. This can be clearly seen in Figure 7.



**Figure 7** This recording is from a fishfinder on a Belgian sailing ship off the coast of Thailand. The fishfinder shows the depth from the boat to the bottom of the sea. This recording illustrates the patterns that characterise a tsunami wave. Clearly visible are the high and low “tides”, which correspond to several wave trains that will hit the Thai coast. The tsunami arrives at t=0 and first causes low water levels (-3.2 m relative to the original water depth), followed by elevated water levels. The peak to trough amplitude is over 7 m! This is followed by alternating low and high water levels for the next 30 minutes.

### Protection against Tsunamis: Truth or Fiction?

One important question provoked by this disaster is can and will it happen again? Unfortunately, it cannot be discounted. We cannot regulate the occurrence of earthquakes and tsunamis. Any large earthquake with the right mechanism can cause a tsunami. Furthermore, there are hardly any ways of protecting ourselves against tsunamis. A tsunami is too strong to be stopped by dykes and other water barriers, and even the relevance of tsunami warning systems is questionable.

At the moment, every politician claims that it is very important to install a tsunami warning system in the Indian Ocean. Considering the present tsunami disaster in Asia, however, a tsunami warning system would not have reduced the number of casualties in most of the affected countries. A warning from the fully operational tsunami warning system in the Pacific Ocean takes up to two

hours, from the origin of a tsunami, to reach the local people in countries with perfected means of communication. A two-hour response time means that the people in Banda Aceh, Thailand and Sri Lanka would not have benefited from such a system. The tsunami hit their coast between 15 and 120 minutes after the earthquake had happened – too fast to issue a warning.

Even if the response time could be improved, it is still questionable whether it would work in Asia. Many poor people living near beaches do not have the necessary facilities (such as a (working) TV or radio) to receive information in cases of emergency. It might prove more useful to carry out hazard studies to improve urban planning (high locations for crucial authorities such as the police, hospitals and government), to create places of refuge (most tourist hotels survived the tsunami without critical damage), and to educate local people on how to recognise the signs of a tsunami and how to respond.

## announcements

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### Maps of Bhutan

Janneke Kalf

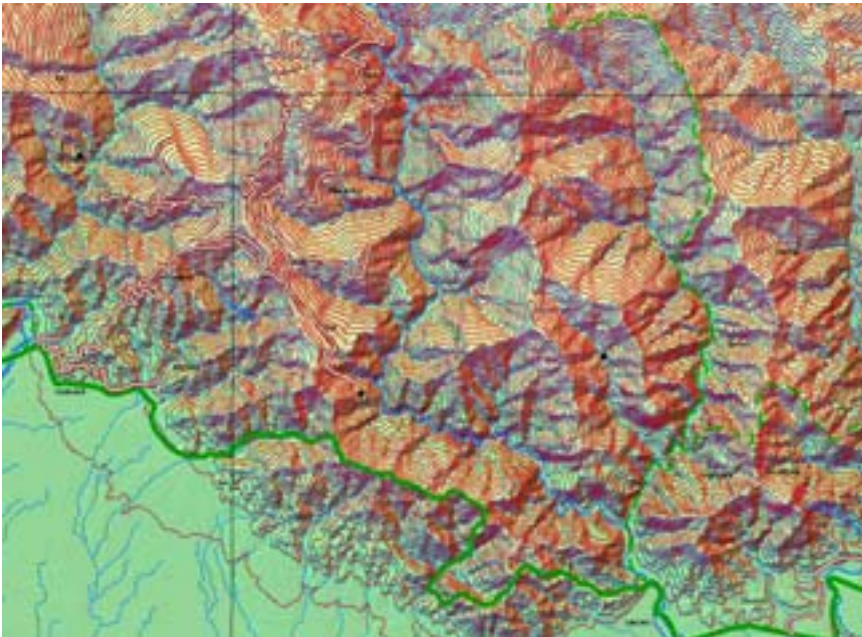
kalf@itc.nl

Two map versions of Bhutan have been produced: a scale 1:250,000 satellite image map in natural colours from Landsat TM data, and a topographic map at the same scale. The representation of the relief in the topographic map was derived from SRTM (Shuttle Radar Topography Mission) DEM images acquired in February 2000. Near-global DEMs were made from the C-band interferometric radar data, resampled to a 90 m resolution. Dr Niek Rengers presented the two maps to the director-general of the Survey of Bhutan. Both maps, however, still need a number of corrections and some additional in-

formation, and Dr Koert Sijmons has been invited by the Survey of Bhutan to assist in this work and prepare the maps for offset printing. The director-general of the Survey of Bhutan has proposed that these maps should be the official maps of Bhutan.

The following digital image processing software was used:

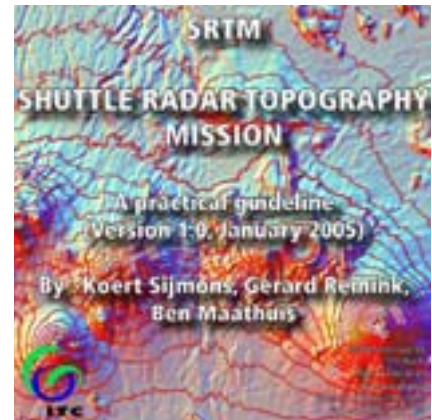
- Erdas Imagine 8.7 for mosaicing, projection change and creating an RGB colour composite of the hill-shading, in which an illumination model of three different directions (North, Northwest and West) was applied
- ENVI 4.1 for replacing bad values (owing to data voids in the radar data) in the SRTM DEM images
- ArcGis 9 (ArcMap) for cartographic representation
- Normal and index contour lines, as well as the hypsometric colour layers, were interpolated from the DEM images
- Using the newly developed Hydro Module in ITC's ILWIS software package, the entire vector drainage network could be derived from the SRTM DEM images. Vector data for roads, boundaries and names were supplied by the Survey Department of Bhutan.



Part of the topographic map produced at ITC

A practical guide in pdf on CD explains and illustrates the whole production procedure for the topographic relief map. This step-by-step explanation starts by describing how to download the SRTM DEM images from the World Wide Web, and then moves through the processing steps with the software used until the final cartographic representation is obtained. A PowerPoint presentation on SRTM and the hillshading model are also found on the CD.

During the GIS conference *Ruimte voor Wonen* in September 2004, a Dutch MapGallery was held for the second time. The map of Bhutan was one of the 20 presented posters. The jury, chaired by Professor Ferjan Ormeling, Cartography Section, Faculty of Geographical Sciences, Utrecht University, assisted by among others Mr. Jack Dangermond, President of the Environmental Systems Research Institute (ESRI), and ITC Fellow, awarded second place to the Bhutan map. "Here, a map that



A practical guide in pdf on CD explains and illustrates the whole production procedure for the topographic relief map

till now could only have been produced by hand has been created using digital means," observed Professor Ormeling.

Valuable contributions to this mapping project were made by:

- Gerard Reinink, Information Technology Department–Remote Sensing & GIS (processing the satellite images)
- Dr Ben Maathuis, Department of Water Resources
- Linchun Wang, Information Technology Department–Remote Sensing & GIS (applying the ILWIS Hydro Module).

For more information, please contact Dr Koert Sijmons ([sijmons@itc.nl](mailto:sijmons@itc.nl)).

## Iris van Duren Wins Henk Scholten Award 2004

Corné van Elzaker

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Immediately after the call for nominations was published, Iris van Duren contacted the secretary of the Henk Scholten Award Committee and asked her the date and time when she had to collect the award.

Of course, this was well before the committee had received the nominations or met to decide on the winner. It reflects the spontaneous character

of Iris, who had no expectation whatsoever that she would be nominated, let alone selected, as ITC's best team-builder and team-player in 2004.

But Iris very much deserves the Henk Scholten Award. Several students, as well as staff members, nominated her for her cheerful curricular and extracurricular team-building performances with students and staff alike.

Here is an anthology of the various motivations expressed:

- She organises happy hours and parties, bringing us students together.
- She organises all kinds of events to involve and challenge colleagues.
- She promotes the involvement of students and staff, not only during working hours but also at lunchtime and in free time.



- She integrates social get-togethers of students and staff in the curriculum, and makes this part of the learning process at ITC. For example, she stimulates the exchange of information between students of different academic years.
- She is always positive, but with a critical view when needed.
- Her enthusiasm makes you feel confident and part of a team.
- She is always attentive (e.g. birthdays and other personal events) and available to help or to listen, and never shows the slightest reluctance in any aspect.
- She organises outings for the department.
- She makes active contributions to organising the ITC International

Evening, the St Nicholas celebration and the ITC Sports Day.

- She is, so to speak, the sun in our house and is always in a good mood. This inspires anyone working and studying at ITC.

For these very reasons the Henk Scholten Award 2004 was presented to Iris van Duren by the rector during the ITC Dies Natalis celebration on 17 December 2004. Her initial reaction was to urge all staff and students to always take pleasure in whatever they did at ITC.

In 2005, ITC alumni will also be invited to submit nominations for the Henk Scholten Award.

The winner of the Henk Scholten Award was selected from a list of eight candidates nominated by staff and/or students. After inviting all staff and students to submit nominations, the committee selected the winner. This Henk Scholten Award Committee is composed of a representative of the SAB (Samuel Adu-Gyamfi), a representative of the PhD students (Roshanak Darvishzadeh), a representative of the Directorate (Marja Verburg), a representative of the ITC staff (Corné van Elzakker), and a representative of the personnel association InTerContact (Ellen Steur).



Professor Martien Molenaar addressing the winner of the Henk Scholten Award 2004

#### Criteria for the Henk Scholten Award

To qualify for the Henk Scholten Award a person should:

- be an ITC staff member or student or a former ITC staff member or student
- have stimulated the "we-feeling" or have demonstrated team-building capacities at the Institute for a considerable period of time (teams usually consist of both staff and students)
- have fostered and promoted social and working relationships within the Institute as a whole for a considerable period of time
- have done this voluntarily, over and above the usual tasks resulting from their function or participation in a course programme.

Previous winners of the Henk Scholten Award: Wilma Grootenboer, Johan Weggen, Ale Raza, Roelof Schoppers, Wan Bakx, Frans Gollenbeek and Sjef van der Steen.

## ESRI-ITC Internship 2004-2005

Umut Destegul

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It's almost two years ago that I first heard about the ESRI-ITC internship. We were at the beginning of our PM degree programme and had received an e-mail about it. Excitedly, I contacted our programme director to apply for this great opportunity. Unfortunately, I learned that I needed to hold an ITC MSc or be a candidate in order to apply.

At that time I had been accepted as a PM student and did not have any further exact plans. But a couple of months later my application to continue my education six months more and earn an MSc degree had also been accepted. Then it was down to waiting for the ESRI-ITC internship announcement. I thought it would be quite exciting and challenging at ESRI in California.

Well, I have been here for one and a half months, and there's already been plenty of excitement and plenty of challenges. First of all everything is bigger here: from meals to cars to cities. The American way of life favours less public and more individual mobility. Everyone has a car. To be a resident without a car is tough but, as you build up friendships, you become more mobile. And there is so





The American way of life favours less public and more individual mobility

much natural beauty to see all around!

ESRI (Environmental Systems Research Institute) is more focused on GIS software programming, but it also lays great emphasis on professional services and software education. I have been taking instructor lead courses on the new version of ArcGIS 9, and the software has improved so much since the ArcView 3x versions. I believe it is very practical GIS software, which earth scientists could use for their applications. The courses are quite dense, with the teachers throwing out a great deal of information in a very short time. In addition to the courses, the internship includes a project to work on. And for me, one of the biggest challenges has now started: I need to find a project that is related to geo-hazards. Redlands Institute, where I am based, does not have a directly linked project, so I have been trying to build up some connections through the university, ESRI and other sources. No conclu-

sion as yet, but I believe this in itself is a great experience. As they say here: "Sink or swim!"

One of the big events for the geophysics engineering community is the American Geophysical Union meetings. And luckily I was able to attend the meeting in San Francisco last fall – a great experience! I met scientists from all around the world, some of whom I knew from their work. And there were also two presentations relating to tsunami and geology where I had assisted in the fieldwork last summer.

Though this is just the beginning of the internship, I have already gained a lot of knowledge and skills that I will be using in my future career. Moreover, many people know about the two institutes ITC and ESRI, considering them to be among the greatest in the GIS community. And this gives me a very satisfying feeling – being an alumnus of ITC and an intern of both.

## The Biggest Aerial Photograph of Montevideo

Sebastian Ruik

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First let me introduce myself. My name is Sebastian Ruik, I'm an agricultural engineer from Uruguay, and I did my Professional Master's in geoinformatics/GIS at ITC, Enschede, the Netherlands.

Now that I'm back in Uruguay, I'm working for a company that specialises in aerial photography. We work with GIS and remote sensing applications in the fields of agricultural forestry and urban planning. For example, the company takes infrared aerial photos of a certain area that will give information about the health of the forest or plants.

I'm in charge of the GIS and remote sensing department. I use GIS for image classification, map production, spatial analysis, and so on. In the example above, I would do the interpretation and analysis of the infrared aerial photos.

At the beginning of 2004, the government approached our company with another challenge: making a mosaic out of aerial photos of Montevideo, the capital of Uruguay. They wanted to place the mosaic on the floor of the municipality building so that the citizens of Montevideo could see where they live. To cover the whole area, approximately 150



The mosaic out of aerial photos of Montevideo on the floor of the municipality building

images had to be taken, digitised, mosaiced, 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 x 11 m, representing approximately 900 km<sup>2</sup> and covering the whole county of Montevideo and some surrounding areas. My job in this project was mosaicing the parts into a whole.



Newspaper headline

The project has turned out to be a success and has attracted the attention of large numbers of Montevideans. Now, nine months after the installation, the mosaic is still lying intact on the floor and has become a popular sight in the municipality building for both Montevideans and tourists.

## Dr Boon Indrambarya Medal Award for Prof. Dr John van Genderen

Janneke Kalf

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During the 25th ACRS Conference in Thailand, HRH Princess Maha Chakri Sirindhorn graciously presented the Dr Boon Indrambarya Gold Medal Award to Professor Tong Qing Xi from China, Dr N.S. Rathore from India, Professor Cheon Kim from Korea (South), Professor John van Genderen from the Netherlands, Mr Virgilio Santos from the Philippines, and Associate Professor Charat Mongkolsawat from Thailand. The Boon Indrambarya Gold Medal is awarded to outstanding and dedicated persons who, like Dr Boon Indrambarya, have made significant contributions to remote sensing of the Asian region.

*Citation:* ITC Professor John van Genderen grew up in tropical North Queensland, Australia. After graduating from the University of Queensland in Brisbane in 1966, he went to ITC in the Netherlands, where he obtained his MSc in 1969. He completed his PhD in remote sensing at the University of Sheffield, UK, in 1972. For more than 30 years since then he has devoted his career to transferring remote sensing technology to less developed countries, particularly those in Asia. His wife comes

from Indonesia. He has carried out research, projects, training courses and consulting assignments in almost all Asian countries.

At ITC he has hosted many PhD students, post-doctoral researchers and visiting scholars from the Asian region, especially from China. Back in the spring of 1978, before Deng Xiaoping's "Open Door" policy started, he was the first European remote sensing scientist to be invited to China. He has visited China more

than 100 times. He has been an honorary professor of remote sensing at the Xi'an University of Science and Technology since 1987, and also at the Wuhan University since 1996. He is also an honorary professor at the National University of Mongolia in Ulaan Bataar. Furthermore, he was recently appointed special professor at the Chinese Academy of Surveying and Mapping in Beijing. He has attended most of the Asian conferences on remote sensing since 1986 and has represented ITC at the Asian



HRH Princess Maha Chakri Sirindhorn graciously presented the Dr Boon Indrambarya Gold Medal Award to Professor John van Genderen

Association on Remote Sensing meetings for many years.

Professor van Genderen has been awarded honorary life membership of the European Association of Remote Sensing Laboratories, and of the UK's Remote Sensing and photogrammetric Society, from which he has also received the Gold Medal Award for 25 years' service to remote sensing. He is on the editorial board of several Asian remote sensing journals, such as the *Asian Journal of Geo-informat-*

*ics*, *Geocarto* and the *Malaysian Journal of Remote Sensing*. Currently he is president of the new ISPRS Commission VII on Thematic Processing and Analysis of Remotely Sensed Data for the period 2004-2008.

One of his leisure interests is long distance running, and he has run many marathons in the Asian region, including the Beijing marathon, the Bali marathon and the Bangkok marathon (twice).

His many contributions to conferences and workshops, and his work with students in the Asian region make him a highly deserving recipient of the Dr Boon Indrambaya Gold Medal Award.

## Third Edition Textbooks Principles of GIS and Remote Sensing

Rolf de By  
Norman Kerle

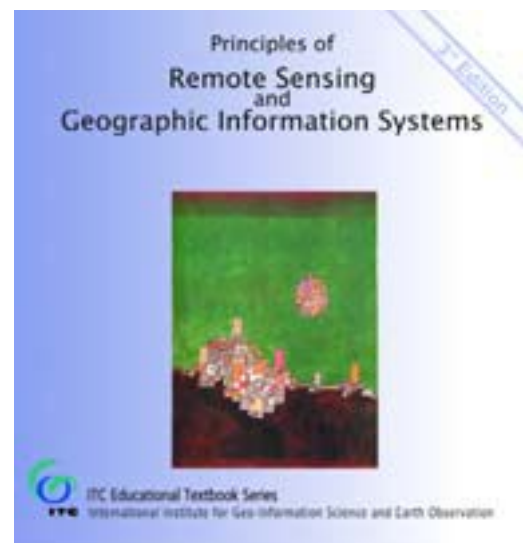
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The textbook *Principles of GIS* and its companion *Principles of Remote Sensing* have been published together again, now with their respective covers in orange/brown giving way to two shades of blue. The books are also distributed on a single CD as hyperlinked pdf documents optimised for on-screen use.

This third edition of *Principles of GIS*, which has 226 pages and is printed in full colour, is an update of the earlier editions, and the mistakes and inconsistencies have been removed. Special attention has also been paid to improving the clarity of the text. Although the chapter Spatial Data Quality (found in the previous edition) has been removed, its most important parts have been incorporated in other chapters. Furthermore, a long section on satellite positioning, including GPS, has been added.

*Principles of Remote Sensing* now has 250 pages. While retaining much of the structure of the second edition, significant changes have been made to the text. In addition to the general updating and editing of all chapters,

the chapter Multispectral Scanners has been extended to cover the relevant new satellites launched in the last few years. Moreover, several complete sections and chapters have been added to this new edition. Chapter 6 now includes a thorough introduction to airborne laser scanning, providing a more complete picture of active remote sensing. Chapter 8, which deals with atmospheric aspects, has been completely revised, and now contains a more detailed introduction to absolute correction methods, including radiative transfer models. A comprehensive overview of image fusion methods has been added to Chapter 10, while a new chapter, Chapter 13, deals with thermal remote sensing, providing a more in-depth discussion on the thermal concepts introduced earlier in the book. Chapter 14, which deals with the concepts of imaging spectrometry, is also new and, together with the new Chapters 8 and 13, emphasises the more quantitative side of remote sensing.



Both books continue to be used not only in all educational programmes at ITC, but also in other programmes around the globe that have been developed in collaboration with ITC. Korean translations of both textbooks were published recently, as well as a Malaysian translation of the GIS book. Furthermore, other translation projects are already underway.



# research news

## Research Workshop with Chinese Academy of Sciences

Cees van Westen

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A research workshop for scientists from the Chinese Academy of Science (CAS) and ITC was held on 19 and 20 November 2004 at the Institute of Remote Sensing Applications (IRSA), Beijing. This workshop was an initiative of the head of research and the deputy director of the Bureau of Science and Technology for Resources and the Environment of the Chinese Academy of Sciences. The Bureau is the managerial unit for 25 CAS research institutes throughout China, and the workshop took place at one of these institutes. The workshop programme, which ran close to schedule, comprised roughly a day and a half of thematic scientific presentations by ITC and CAS researchers and half a day for discussion groups to identify possibilities for joint research. There

were four thematic discussion groups and each presented an oral and written report, namely:

- Water cycle and food security
- Disasters
- Global change
- Landscape/ecology

The workshop yielded the intended results in that it identified some 19 joint research activities, mainly (but not exclusively) formulated as jointly supervised PhD studies.



## ITC Research Activities Presented at the UNFCCC Climate Convention (CoP10)

Jeroen Verplanke

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From 6 to 17 December 2004 the 10th conference of parties on climate change was held in Buenos Aires, Argentina. One of the research projects ITC is involved in, which deals with carbon sequestration issues, was presented during a side event. This research project, Kyoto: Think Global, Act Local, is headed by the University of Twente and is executed by partners in Senegal, Mali, Tanzania, Uganda, Nepal and India.

During a presentation entitled "Community forest management as an efficient, additional carbon sequestration strategy", each of the partners made short statements about the project work carried out so far.

■ Margaret Skutsch, University of Twente, emphasised the role of deforestation in global warming. She explained that "avoided deforestation" projects were currently not eligible under the CDM, but that the

project Kyoto: Think Global, Act Local aimed to provide scientific evidence for a policy change in the second commitment period. She said 25 community-based forest management projects in six countries were involved, with local communities trained to monitor forest areas and make standard biomass estimates.

■ Eliakimu Zahabu, Sokoine University of Agriculture, explained the methodology that local communities were trained to use in order to monitor carbon sequestration and as-



sess the state of the community forest. He said that the methodology aimed to reduce transaction costs, be user-friendly, and fulfil scientific requirements.

■ George Jambiya, University of Dar es Salaam/World Wildlife Fund for Nature, Tanzania, said the Kyoto project included six sites in Tanzania and one planned for Uganda. He outlined results from a Tanzanian village, including two forests, noting that these results indicated good forest management.

■ Bhaskar Karky, King Mahendra Trust for Nature Conservation of Nepal, said results from the Indian state of Uttaranhchal showed that community forests seemed to have had a positive impact on carbon storage, while results from Nepal indicated differences between local communities in forest management practices.

■ Libasse Ba, ENDA, said Senegal, Mali, Burkina Faso and Equatorial Guinea were involved in the Kyoto project, and he presented results from Senegal. He said villagers in the Tamba region had been trained to use field methodology, and had listed



The panel answering questions from the audience (from left to right: Mike McCall, George Jambiya, Margaret Skutsch, Libasse Ba and Peter Minang)

local priorities, including fire control, access to water, and the development of agriculture and resources to fight poverty.

■ Jeroen Verplanke, ITC, discussed ways of capitalising on indigenous knowledge. He said communities involved in the project had learnt how to use high-tech equipment without difficulty, and noted that the cost of such technology was not high and was even expected to decrease.

■ Peter Minang, ITC, analysed ways of making Cameroonian community

forestry policy compatible with the CDM, highlighting the need to clarify ownership of carbon credits and change forest taxation and timber extraction rules.

■ Mike McCall, ITC, outlined policy developments in community carbon forestry in India, Nepal, Cameroon and Mexico. He emphasised that community forestry could be developed to deliver additional environmental, economic and cultural benefits.

For more information, see <http://www.communitycarbonforestry.org/>  
Source: <http://www.iisd.ca/climate/cop10/enbots/17dec.htm>

## Successful PhD defence by Gyozo Jordan

Tsehai Woldai

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On 23 November 2004, Gyozo Jordan successfully defended his thesis entitled "Digital terrain modelling with GIS for tectonic geomorphology: numerical models and applications" at Uppsala University, Sweden.

Gyozo stayed at ITC for six months under the supervision of Dr Tsehaie Woldai (also a member of the Examination Board) and Dr Chris Mannaerts. Gyozo's thesis deals with systematic GIS procedures for digital tectonic geomorphology, the auto-

matic extraction of surface-specific points, ridges and geological lineaments, and extending its univariate and bivariate methodology with texture (spatial) analysis methods, such as trend, autocorrelation, and spectral and variogram and topological analysis. In the application of digital terrain analysis for detailed tectonic geomorphological investigation, his model was tested in two areas: using high-resolution DEM in the Kali Basin, Hungary, and low-resolution DEM in northwestern Greece.

Dr Jordan has published eight articles on his thesis (including some co-authored with Woldai and Mannaerts) in prestigious refereed journals. He is now working with the Hydrogeology Division, Geological Institute of Hungary (MAFI), Budapest, Hungary, and can be reached at [jordan@mafi.hu](mailto:jordan@mafi.hu)

## Summary of Masterclass with ESRI's Jack Dangermond

Ellen-Wien Augustijn

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On Friday morning, 1 October, a group of some 30 PhD students gathered for the unique opportunity of a masterclass with Jack Dangermond, founder and director of the ESRI software company.

The meeting started with an overview of the research topics of current PhD students by Grace Nangendo. For this purpose, Ms Nangendo had read and classified most PhD research abstracts. The PhD research was classified into two groups: methodology-oriented research and application-oriented research. For both groups, she gave an overview of the issues handled, the knowledge base required, and the value of the research to society. The presentations triggered a question from Jack Dangermond regarding collaboration in research. Was there a research network within ITC in which all PhD students could participate and that could function as a means of sharing information? The answer from the students was loud and clear. Although there were several small content-oriented groups, for example, the disaster management group and the groundwater group, collaboration at the ITC-wide level was scarce.

The next item on the agenda was a presentation by Jack Dangermond, but he started by giving the audience the opportunity to ask any questions they wished. These were highly diverse. Some questions related to the limited distribution of ESRI software in countries such as Iran and Cuba; some to the use of GIS by "normal" citizens; some to the issue of interoperability or functionality, or the lack of it, in the current version of ArcGIS.

While answering these questions, Jack Dangermond described his company's philosophy and the evolution of geo-information technology in general. He explained that his company currently had a list of some 9,000 functions that users wanted included in the software. He also explained how users lobbied on behalf of certain functionalities. He said that such functions were prioritised to determine which would be integrated. He went on to examine the process of software engineering along three lines: user requests, changing technology (such as Internet or faster computers) and ideas generated by research.

He gave several examples of the use of GIS for regular citizens. These ranged from navigation tools, to an automatic signal sent to towing companies when a car was involved in a crash, to a real estate application that provided a lot of GIS information about properties for sale. However, users did not realise that behind these tools lay an extensive GIS application. Jack Dangermond addressed the interoperability issue on two levels: the technical interoperability level and the content level. He made no secret of the fact that he thought the real issue here was the integration of content rather than the technical issues. This led directly to his first presentation – on integrated mapping.

The audience heard that terrain mapping can be done in two ways: parametric mapping and integrated mapping. Parametric mapping maps one parameter at a time, for example, soil, vegetation or land use. Integrated mapping divides the landscape into visually similar units and maps the landscape as a system. Both systems have their own disadvantages. The parametric approach leads



Jack Dangermond

to inconsistency between the parametric layers: the lines in your soil map do not coincide with the boundary on the vegetation layer. In integrated mapping, this problem does not occur but the quality of the end product depends to a great extent on the quality of the survey team. A solution that ESRI had used in the seventies was an integration team in the office that would integrate the parametric layers based on imagery. Jack Dangermond illustrated his presentation with numerous examples of old ESRI projects. At the end of the presentation the new software possibilities (technical solutions) were presented.

Jack Dangermond's second presentation focused on new software solutions. In rapid tempo, Jack Dangermond discussed the philosophy behind ArcGIS 9.0 and the new functionality and changes to come in the next version. He said that, with the coming of ArcGIS 9.0, ESRI had broken with older versions of its software and had started to develop a component library. Components could be used as the engine for cus-

tom applications. Future developments would be more in the line of an enterprise solution. He said that for the desktop the next version of ArcGIS would bring more usability (fewer clicks, faster display, multiple windows) and, hopefully, more fun. A few examples were given, such as “intelligent cartography”, a lot more 3D tools, more geoprocessing tools,

multidimensional data sets, data models that could handle time and moving objects, and – for the model builder – iteration.

After the masterclass, most students were very enthusiastic about the meeting. The effort and time that Mr Dangermond had taken to exchange ideas was highly appreciated. As Ms

Gabrielle Iglesias mentioned in her opening remarks: “This was the first PhD masterclass, but we hope many more will follow.”

## 2nd ITC PhD Research Conference: Geospatial Data Modelling and Management

Martin Yemefack

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On Wednesday, 27 October 2004, the one-day PhD Research Conference was held at ITC for the second time – two years after the ITC PhD community first hatched the idea of an annual research conference. This year’s success indicates the potential of this event taking a central place in ITC’s calendar. A major highlight was the involvement of participants from other universities, as well as the intended publication of a special issue of JAG based on peer-reviewed papers presented at the conference. The conference brought together about 100 participants from 10 universities and six countries. A total of 28 presentations were made: two keynote lectures, six oral presentations, and 20 poster presentations by PhD researchers.

The PhD Research Conference is an international scientific conference that seeks to offer opportunities for scientific exchange and social contact between the ITC PhD student community (IPC) and fellow PhD students from other universities and research schools. It facilitates the sharing of ITC research results, while also enabling these budding researchers to develop their skills in organising

scientific meetings. Moreover, other ITC students can be expected to seize this opportunity to sharpen up research ideas for their own MSc thesis work.

The 2004 edition of the conference, which was organised on the theme of modelling and managing geospatial data, brought together PhD researchers working on the development of methods, techniques and

**The internalisation of the PhD Research Conference gave it a new impetus this year. It offered us the opportunity to listen to and interact with researchers and students from other universities. The subjects presented were quite innovative and covered a broad spectrum of disciplines within the geo-information sciences. In my opinion, papers presented by ITC PhD students were of a higher quality, while the poster presentations were even more explicit than the oral presentations.**

*Moses A. Cho*  
PhD Candidate

applications of geo-information in all aspects of geosciences and natural resources management. With the ever-increasing technological development in earth observation, scientists are now processing abundant geospatial data for improving our understanding and monitoring of processes on Earth. These developments are rapidly changing and vary in potential applications, a situation that demands the constant exchange of knowledge among practitioners and researchers – hence the motivation for the choice of conference theme.

During the opening speech, ITC’s rector, Professor Martien Molenaar, lauded the IPC for its initiative and urged the participants to make an in-depth scientific input to the conference. The participants enjoyed excellent contributions from two distinguished guest speakers: Professor Michael Schaeppman from the Centre of Geo-Information Science and Remote Sensing of the University of Wageningen, the Netherlands, and Professor Werner Kuhn from the Institute for Geoinformatics of the University of Münster, Germany.

Professor Schaeppman gave an excellent lecture on imaging spectroscopy data modelled and managed. This contribution focused on data acquisition and the modelling of the at-sensor-radiances, using well-defined models and case studies. The computing requirements for imaging spectroscopy and for hyperspectral data processing were discussed on the basis of state-of-the-art super-computers. Professor Kuhn introduced the afternoon session with the semantics of geospatial data and services. Using several examples requiring improved semantic modelling methods, he provided a taxonomy for semantic interoperability problems and a framework for solving them, based on the idea of semantic reference systems. The role of ontologies applied to the semantic annotation of data and services was discussed, as well as open issues and research questions.

Other presentations of the day could be grouped under two main headings: scale issues and spatio-temporal modelling. Pertinent topics on scale issues covered algorithms for detecting natural rounded shapes, finding the right pixel size, and sub-pixel mapping. Topics on spatio-temporal modelling covered moving object trajectories, urban land price patterns, urban infrastructure siting, time-series remote sensing data, climate change,

The 2nd PhD Research Conference organised by ITC took place on 27 October 2004 in Enschede, the Netherlands, under the theme "Modelling and managing geospatial data". About 65 participants followed the day's conference programme, with eight oral presentations and 20 poster presentations. Two keynote speakers and several PhD students presented their current research ideas and progress made in respect to the conference theme. Professor Michael Schaeppman from Wageningen University (Netherlands) looked at the theme from the view of image spectroscopy. Harald van der Werff from ITC (Netherlands) presented an overview of his PhD research and his effort to detect natural rounded shapes by hyperspectral imagery. Different aspects of scale issues were addressed by Dr Tomislav Hengl (Croatia) in his attempt to find the right pixel size. Lieke Verbeke from Ghent University (Belgium) continued on scale issues, explaining a novel approach for sub-pixel mapping. Professor Werner Kuhn from Münster University (Germany) considered the semantics of geospatial data and the importance of a proper description of real-world objects. Nirvana Meratnia from Twente University (Netherlands)

showed her PhD research on modelling moving object trajectories. Panos Manetos from the University of Thessaly (Greece) addressed more spatio-temporal modelling issues, this time dealing with the identification of spatio-temporal urban land price patterns. The last speaker, Ulanbek Turdukolov from ITC (Netherlands), addressed a visualization approach for time series of remotely sensed data.

In the morning there was also a poster session, where PhD students presented their research ideas. These posters covered a wide range of topics related to geospatial data and various application disciplines.

The 2nd PhD Research Conference was a successful event where many new ideas on modelling and managing geospatial data were shared among the ITC PhD student community and fellow PhD students from other universities and research schools. The intention to bring together PhD researchers working with new developments in the field of geo-information – both technical and applied – was fully achieved.

*Daniel van de Vlag*  
AIO

land use and land cover change, and disaster risk monitoring. In the concluding session, Dr Rolf de By nicely wrapped up the day by dealing with e-words in an evaluation based on *education, environment, eloquence, evolution, examples, excitement, explicitness and expectation*.

The programme ran smoothly and deliberations were well organised and

productive. The general lesson learnt from the conference was: *Dare to develop robust methods of spatial data management to provide sound support to decision making in natural resources management*. A booklet of all the abstracts was distributed to the participants attending the conference. Selected full conference papers will be published in a special issue of the *International Journal of Geo-*



Participants during the poster session



Professor Michael Schaeppman of Wageningen University presented the first keynote paper, entitled "From the Earth's surface up to satellites in space and back to the surface – imaging spectroscopy data modelled and managed". In his paper Professor Schaeppman addressed the chain of field measurements, modelling at leaf and canopy scale, and upscaling to airborne and spaceborne instrumentation, focusing on problems related to APAR and biomass estimates and biophysical parameter assessment. Surprisingly, radiative transfer models developed in the late 1980s are still in use, although now better interconnected and refined to the so-called "flight model". Much emphasis was put on the use of BRDF information, looking towards the potential of future ESA payloads such as SPECTRA. Unfortunately it has been recently decided to put SPECTRA on hold.

ITC *promovendus* Harald van der Werff presented a paper with the intriguing title "Algorithms for detecting natural rounded shapes". In this paper, he argued

that most if not all classifiers and information extraction tools that use remote sensing data work on a pixel-by-pixel or sub-pixel basis, thus neglecting important information in images, namely the context and texture. Harald showed examples of using shape parameters to separate spectrally similar objects. In addition he showed a new template matching method to combine spatial and spectral information in image analysis.

Although technically speaking the session did not address issues related to scale (promised in the programme), it offered the chance to explore some of the developments in the field of spectroscopy in both vegetation science and geology. The presentations, as well as the posters, led to scientific discussion that stimulated staff and researchers.

*Professor Freek Van de Meer*

Chairman of the Department of Earth Systems Analysis

#### *Information Science and Earth*

*Observation (JAG)*, as agreed with the journal publisher, Elsevier BV, and with the editor-in-chief. These contributions are now going through the scientific review process.

In my capacity as president of the organising committees of the two editions of the ITC PhD Research Conference, I would like, on behalf of the IPC and on my own behalf, to express profound gratitude to the rector, the research coordination team, the facility management team, the guest speakers, the chairpersons of the sessions, the members of the two organising committees, fellow PhD students from other universities, and members of the IPC, who contributed in diverse forms to making these conferences successful. Special thanks also go to our numerous guests and invitees who made themselves available for the whole programme.



Some of the audience in the auditorium

***Rendezvous Edition Three:  
Come Next Year!***

## Successful PhD defence by Daniel Limpitlaw

Tsehai Woldai

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In November 2003, Daniel Limpitlaw, who had followed the ITC inverted sandwich programme, successfully defended his PhD thesis entitled "An assessment of mining impacts on the environment in the Zambian Copperbelt" at the University of Witwatersrand, Johannesburg, South Africa. His promoter and ITC supervisor was Dr Tsehaie Woldai.

In his thesis, Daniel traced environmental changes around mining centres in the Zambian Copperbelt over a period of nearly 30 years. This mineral-rich region has been the site of large-scale mining and the metallurgical processing of copper and cobalt

for most of the 20th century, and is consequently environmentally degraded. Daniel used various remotely sensed data to evaluate the impact of mining wastes and metallurgical processes on soil, water and the atmosphere. He also tried various geo-statistical and integration techniques to model the impact of pollutions present in the study area.

Dr Limpitlaw has been appointed Director of Sustainability in Mining and Industry within the School of Mining Engineering, University of the Witwatersrand, Johannesburg, South Africa. He can be reached at Limpitlaw@egoli.min.wits.ac.za



## visiting itc

### Professor Du Qingyun at ITC

Dick van der Zee

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ITC and the School of Resources and Environmental Science of Wuhan University recently started the joint course Geo-Information for Natural Resources and Environmental Management. The course is part of the ITC Natural Resources Management (NRM) programme and will be executed partly in Wuhan and partly at ITC.

The Chinese coordinator of this course, Professor Du Qingyun, recently visited ITC. He discussed the management of this course with various ITC staff members, such as Dr Weir (Natural Resources Management programme director) and Professor De Gier (chair of the programme

board). Professor Du Qingyun prepared himself for one of the modules which he will be teaching in Wuhan.

He considered it a very useful and pleasant trip, and hopes to return to ITC sometime in the future.



Wuhan University

# education news

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## GFM2 Graduation Ceremony in Dehra Dun

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On Friday, 17 December, a GFM2 graduation ceremony took place in Dehra Dun, India. Eight students from the Indian Institute of Remote Sensing (IIRS) received their MSc degrees in the presence of professors Stein and Kraak of ITC and Dr Navalgund, director of the National Remote Sensing Agency (NRSA). This GFM2 course is one of the new decentralisation courses now rapidly emerging from within ITC. In this course, teaching was carried out first in Dehra Dun, covering core topics in GIS and remote sensing, as well as several more advanced topics. Then the students came to ITC for more specialised modules and also to write and defend their thesis proposals. For their research, they returned to India, where they were supervised by local staff, as well as by ITC staff via e-mail.

The ceremony started with the lighting of five candles. After that, speeches were delivered by IIRS

Director Dr V.K. Dhadwal and by the program director on the Indian side, Mr Jeganathan. Having presented the students with their awards and ITC alumni pins, Dr Navalgund went on to give the ceremonial address. The chairman of the GFM board, Professor Stein, gave an evaluation of the decentralisation effort, and finally the ceremony came to a close with a vote of thanks proposed by Dr Raju.

Clearly, much went well during this course. There was strong support from within both IIRS and ITC; the theses focused on interesting scien-

tific topics and were generally well written; and the course records were good. The success of the course could only be achieved thanks to the dedicated staff at the two institutes – furthermore, the regular and skilful use of Internet and e-mail facilities proved indispensable.

It is once again evident that IIRS is a natural partner for ITC, and in the years to come it will be a challenge to secure and expand the relationship and accomplish further true capacity building.



Professor Stein lighting the candle at the start of the ceremony



Dr Navalgund presenting the MSc degree to IIRS student Swaran Chhabra

## staff news

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### Appointment of ITC Professors

Prof. Dr J.L. (John) van Genderen received the Dr Boon Indrambarya Gold Medal Award from the Remote Sensing and GIS Association of Thailand (RESGAT) during the 25th ACRS conference in November 2004 (see also page 10)

Prof. Dr J.L. (John) van Genderen appointed Honorary Professor of the Chinese Academy of Surveying and Mapping, Beijing, China

Prof. Dr F.D. (Freek) van der Meer appointed Adjunct Professor of the Asian Institute of Technology (AIT), Bangkok, Thailand

### Staff promotion

Dr Connie A. Blok Dynamic Visualisation variables in animation to support monitoring of spatial phenomena (19 January 2005)

# events

## 5th African Association of Remote Sensing of the Environment Conference

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The Nairobi Conference is a biennial conference held under the auspices of the African Association of Remote Sensing of the Environment (AARSE). AARSE was formed in 1992, and has been a registered regional member of the International Society for Photogrammetry and Remote Sensing (ISPRS) since 1994. AARSE is also the umbrella organisation for all GIS and remote sensing activities in Africa. One of its primary objectives is to increase the awareness of African governments and their institutions, as well as the awareness of the private sector and society at large, of the empowering and enhancing benefits of developing, applying and utilising responsibly the products and services of geo-information technology.

The main goal of this conference is to promote the use of geo-information and ICT technologies in the sustainable development and management of Africa and its environment. In this context, strong emphasis is laid on the applications of various remotely sensed data (e.g. optical, microwave, hyperspectral, high to low resolution data) in resources assessment, management and monitoring. The conference also explores the challenges and options for bridging the information technology gap that currently exists on the continent.

The AARSE conference is a premier forum in Africa, and in October 2004 it brought together more than 500 students, scientists, practitioners, educators, researchers, vendors, and policy and decision makers to discuss advances, applications, capacity

building and the promotion of geo-information technologies in the sustainable development of Africa. The conference proved to be a forum in which participants could learn and exchange ideas on the latest developments in these technologies and their applications in different fields. Strategies for promoting and using the technologies in Africa were also discussed. Around 70% of the participants were Africans – contrasting with past experience when Africans were under-represented. An important development in this conference was the call to the African diaspora, and it was very rewarding to see so many present (particularly from the USA and Canada) during the conference.

ITC was represented by Director External Affairs Sjaak Beerens; staff members Tsehaie Woldai, Robert Becht, Remco Dost, Wouter Siderius, Yussif Hussin and Jan Turkstra; PhD and MSc students; and numerous

alumni. Furthermore, an ITC booth was staffed by Tom Loran and Janneke Kalf.

The AARSE Council held their annual meeting, and elections resulted in the following council appointments: ITC's *Dr Tsehaie Woldai*, (as president); ITC alumnus *Dr Wilber K. Ottichilo*, Director General, Regional Centre for Mapping of Resources for Development, Nairobi, Kenya (as secretary



The ITC booth was staffed by Tom Loran and Janneke Kalf



The exhibition was opened by Hon. Stephen Kalonzo Musyoka, Minister for Environment and Natural Resources



general); ITC alumnus *Dr Olajide Kufoniyi*, Director General, Regional Centre for Training in Aerospace Surveys (RECTAS), Ile-Ife, Nigeria (as secretary); and *Dr Evelyn Mbede*, Associate Professor, Department of Geology, University of Dar es Salaam, Dar es Salaam, Tanzania. Of the seven members serving on the Executive

Council three are ITC alumni and one is an ITC staff member!

It was clear from the presentations, discussions and initiatives that geoinformatics capabilities in Africa have dramatically increased. The African Resource Management Satellite Constellation (ARMSC) initiative con-

firms that a number of governments are aware of the importance of this field and are willing to offer support. In his closing address, the Minister of Lands and Housing of Kenya, the Hon. Amos Kimunya MP, specifically expressed his gratitude for the work done by ITC in building capacity for Africa.

## ITC Delegation Visits ACRS and ACS Conferences in Thailand

Janneke Kalf

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The 25th Asian Conference on Remote Sensing (ACRS) held 22 to 26 November 2004 was organised by the Geo-Informatics and Space Technology Development Agency (GISTDA), a public organisation. The conference was managed by Dr Wicha Jiwalaij, chairman of the Executive Board, and Executive Director Dr Suvit Vibulsresth (both ITC alumni), in cooperation with the Asian Association on Remote Sensing (AARS) and the Remote Sensing and GIS Association of Thailand (RESGAT).

The objective of the conference was to provide a forum for exchanging academic and technical information, as well as to promote regional cooperation in geoinformatics. Approximately 500 participants came from around the world to attend the meeting.

Conference topics included the new generation of sensors and applications, data processing, remote sensing applications, GIS, GPS and photogrammetry. ITC had a booth at the exhibition, where the latest technology and findings were highlighted.

Concurrently, GISTDA, the International Institute for Asian Studies (IIAS) and ITC organised the 1st Asian Space Conference, a new forum on space



technologies and their implications for society, the economy and culture.

ITC was represented by 11 people: Sjaak Beerens, Freek van der Meer, John van Genderen, Ali Sharifi, Youssif Hussin, Drubha Shrestha, Paul Hofstee, Paul Schoonackers, Ed Westinga, Marleen Noomen and Bobba Bharath. ITC staff and PhD candidates presented papers, chaired sessions, and were a distinctly visible presence.



Ms Marleen Noomen (right) received the award for best paper presentation

HRH Princess Maha Chakri Sirindhorn graciously presided over the opening ceremony and presented the Dr Boon Indrambarya Gold Medal Award of the Remote Sensing and GIS Association of Thailand (RESGAT) to a number of persons, including ITC's John van Genderen. She also opened the conference exhibition, visited the ITC booth, where she was presented with ITC materials, and presided over a lunch, where ITC's Professor Freek van der Meer and Director External Affairs Sjaak Beerens were among the guests.

At the closing ceremony, ITC PhD candidate Ms Marleen Noomen received one of the awards (sponsored by the Japan Remote Sensing Association and open to candidates from developing countries) for best paper presentation.

## Workshop on Standardisation in the Cadastral Domain, Bamberg, Germany, December 2004

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One of the big problems in the cadastral domain is the lack of a shared set of concepts and terminology. International standardisation of these concepts (i.e. the development of an ontology) could possibly resolve many communication problems. It should be emphasised that a cadastral system entails land registration (the administrative/legal component) and (georeferenced) cadastral mapping (the spatial component). Together, these components facilitate land administration, and a land registry/cadastral system provides the environment in which this process takes place. Data are initially collected, maintained and – probably the most relevant issue in standardisation – used and updated in a distributed environment. This means that the data can be maintained by different organisations, such as municipalities or other planning authorities, private surveyors, conveyancers and land registrars – depending on local traditions.

Standardisation of the cadastral domain is relevant because computerised cadastral systems can support a customer- and market-driven organisation with changing demands and requirements. Customers want to have an efficient online information service that is linked to the database(s) of cadastral organisations. The application software to support cadastral processes is continually being extended in many countries because of changing requirements. In the future, the volumes of cross-border information exchanges are expected to increase, particularly within the European Union. The more remote the data user is from the data source, the more important it be-

comes to ensure that the data are well defined, as obviously remote users are less likely to have sufficient local knowledge to assist them in interpretation. Trying to make the meaning of the data explicit is therefore an important step in facilitating meaningful information exchange across greater distances. The concepts used have to be well defined and structured (i.e. related to one other), and this entails the development of a cadastral domain ontology. One potential way of expressing parts of this ontology is UML (Unified Modelling Language) class diagrams.

Standardisation of the cadastral domain is in the initial phase and many non-coordinated initiatives can be identified.

Within the scope of the European COST (Coordination in the field of Scientific and Technical Research) Action G9 Modelling Real Property Transactions, and jointly with FIG (International Federation of Surveyors) Commission 7 Cadastre and Land Management, a workshop on standardisation in the cadastral domain was held in the Aula of the University of Bamberg, Germany, on 9 and 10 December 2004. The main objective of Action is to improve the transparency of real property markets and to provide a stronger basis for the reduction of costs of real property transactions by preparing a set of models of real property transactions that is correct, formalised and complete, according to stated criteria, and then assessing the economic efficiency of these transactions. The organisation of the meeting in Bamberg was a co-production of ITC, the

Technical University of Delft, and the University of Bamberg.

An initial model has been developed based on the results of a first workshop held at ITC in March 2003, and this was used as a reference during the workshop. However, the workshop in Bamberg was not limited to this specific model alone but also dealt with (1) efforts at the national level that do not (directly) aim at an international standard, and (2) work that goes beyond the current scope of the core cadastral model and addresses, for instance, process modelling.

### Workshop Goals

The specific goals of this workshop were to:

- further develop the administrative/legal aspects of the model (people's rights to lands, customary and so-called "informal" rights, 3D aspects, legal and survey-based source documents)
- further formalise the model (semantics ontology, knowledge engineering)
- test the current model in different countries (evaluation)
- involve the geo-ICT industry and standardisation institutes (support for model implementations).

The land information initiative of the Open Geospatial Consortium (OGC) could be of great importance for the implementation of interoperable cadastral and land information data.

### The Workshop

The workshop brought together 61 experts, representing 19 countries, from different communities and disciplines involved in the cadastral domain: for example, legal specialists,

surveyors and ICT specialists from different organisations. During the presentation and discussion sessions, 20 papers were presented, with keynote addresses from Professor Andrew Frank of Austria and Juerg Kaufmann of Switzerland. These papers and related presentations have been published on the Web. Abstracts submitted earlier were reviewed by the Scientific Committee, and papers were selected based on these reviews.

### Conclusions

Regarding the question of whether there should be one general legal model or many, it was concluded that there should be a common procedure where differences may occur in methodology. Common steps in workflows have to be identified, and the legal situations in different countries have to be modelled. Although a single standard model may not be possible, a core model based on common concepts should be achievable. There should be a common set of concepts, as this allows talking across boundaries. The test performed in and between different countries indicated that no two systems were alike.

The core cadastral domain model is the least common denominator. Additions to the core model are needed. The issues surrounding the core cadastral domain model are now under scientific debate, and further activities have to be identified in the international context, involving the ICT industry, academia, COST, EULIS and other professionals, and with the participation of, and a strong focus on, users. The core cadastral domain model might be the central part of a complex with interfaces, data exchange and interoperability. The geo-ICT industry will be driven by the market and, if needed, the models will be developed. The semantic aspects still require further attention.

### Recommendations

From the European perspective, it can be expected that financial institutes such as banks, mortgage lenders and other users could be the drivers of the development of a core cadastral domain model. But who will take the leading role? The search is on for an authority that will drive the development of the core cadastral domain model further, for example, FIG with its network. A coordinating group is needed that can identify the driving force more clearly. The model boundaries (what should or should not be included) require further investigation. Rights, restrictions and responsibilities related to land should be included, as well as an extension of fiscal rights and responsibilities. Better communication regarding the core cadastral domain model is of the utmost importance.

#### Websites

All papers and related presentations are available at [www.oicrf.org](http://www.oicrf.org) (select "Events" and then the Bamberg event) and at [www.fig.net](http://www.fig.net) (select "Commissions" and then "Commission 7")



Within the scope of the European COST Commission 7 Cadastre and Land Management, a workshop on standardisation in the cadastral domain was held in Bamberg, Germany

# life after itc

## Introducing the Faces behind the Alumni Interaction System

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Many of you have already been benefiting for years from the alumni services that ITC provides – in the beginning by mail and nowadays also via the Internet. Over the past two years ITC has been planning and working to upgrade the alumni network to meet today's standards.

The large number of alumni that we try to connect requires constant effort on our part to improve our technology and services. With each new opportunity, your demand increases accordingly. The quarterly *ITC News* is the backbone of ITC communications and certainly well appreciated, but developments move too fast for the alumni network to rely on a quarterly update.

To satisfy the e-mail habit acquired at ITC, you can now enjoy the advantages of a free and lifelong mailbox to receive up-to-date news from ITC

and your friends. ITC is in the process of making a more dynamic and fun alumni Internet site, where you can interact both professionally and socially.

But these services do not exist in a vacuum. A team of ITC staff is continuously working to serve you in the best possible way, keeping your

alumni network up and running. Anti-Spam services have been installed, logon problems need solving, websites must be updated, and the address database needs regular maintenance. Whenever you contact us with your questions and requests, one of us will attend to them. And now you know the faces behind the network. Nice to meet you!



The A(lumni) team (from left to right): Michel Erdmann (e-mail accounts and alumni who's who), Jorien Terlouw (address database and administration), Martin Blankestijn (e-mail accounts and alumni who's who), Janneke Kalf (editor *ITC News*) Rens Brinkman (web coordinator), Petra Budde (web coordinator), Jeroen Verplanke (alumni coordinator)

## Alumni Gathering Nairobi, Kenya

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Following the successful alumni gathering in November 2001, an alumni gathering was organised again at the PanAfric Hotel in Nairobi, Kenya, on 20 October 2004. About 100 ITC alumni gathered on the poolside terrace of the hotel. The reception coincided with the 5th AARSE conference. As a consequence many alumni from outside Kenya were in Nairobi and were able to attend the reception.

Deputy Head of Mission Mr Duijfjes and Fellowship Officer Ms Grace represented the Royal Dutch Embassy in Nairobi. A special word of thanks went to Ms Grace, who has been guiding the way to the Netherlands for many years.

Unfortunately Mr Daniel Omolo, initiator and coordinator of the Kenyan ITC Alumni Association, was unable to attend the gathering. Dan is cur-



Mr Duijfjes and Ms Grace (left) represented the Royal Dutch Embassy in Nairobi



rently in the United Kingdom following the new European MSc course Geo-information Science and Earth Observation for Environmental Modelling and Management (GEM). He is still engaged in the process of establishing the alumni association via e-mail, but his ILRI colleague and ITC alumnus Dr Patrick Kariuki has kindly agreed to take over the coordination responsibilities.

The recently launched Netherlands Alumni Association of Kenya (NAAK) was represented by Mr Kip, and he addressed the audience and expressed his willingness to have formal links with the ITC alumni association as soon as it is launched.



## ITC Alumni Gathering Chiang Mai, Thailand

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A very successful alumni event was organised at the Chiang Mai Traditional Cultural Centre on 24 November 2004. The reception was highly appreciated by some 40 alumni, one even coming from Bangkok especially for the occasion.



## Refresher Courses 2005

Ten refresher courses will be organised in 2005. Refresher courses are short (mostly two-week) courses organised for alumni in their regions or home countries, and are meant to increase the impact and prolong the effect of earlier training.

For more information:

[http://www.itc.nl/alumni/refresher\\_courses/2005/default.asp](http://www.itc.nl/alumni/refresher_courses/2005/default.asp)

### Bolivia

Decentralised spatial planning (Ordenamiento territorial)

### Colombia

Geo-information tools for community-based disaster management in Colombia

### Eritrea

Novel approaches in earth observation and geo-information science for earth systems analysis

### Ethiopia

Modern data acquisition and processing tools for integrated water resources management

### Ghana

The use of geo-information as a tool for combating bush fires in West Africa

### Guatemala

Flood risk management in Central America

### Kenya

Spectroscopy and dynamic GIS modelling

### Rwanda

Geo-informatics for hydrological modelling

### Uganda

Geo-information for natural disaster management in Eastern Africa

### Vietnam

CASITA: capacity building in Asia using information technology applications in disaster management

## Alumni Event in Vietnam

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When two refresher courses were held in Hanoi, Vietnam, with a one-week overlap, this seemed to be an excellent opportunity to organise an alumni event.

The courses concerned were the Refresher Course on Geo-information for Management and Planning of Coastal Lagoon Systems: From River to Coast and the Refresher Course on GIS for Environmental and Land Use Planning in Southeast Asia, each attracting between 25 and 30 participants, some from outside Vietnam.

When the *Coastal* course participants invited the *Planning* course participants to their farewell party, the scene was set for the largest assembly of alumni that could be envisaged in Vietnam at this time. So the party was awarded the additional status of "alumni event". This meant a short speech on behalf of the alumni coordinator, inviting the alumni to keep in touch or re-establish contact with ITC by supplying their current address details. As for the rest, it was a real party, with excellent food, live music and spirited conversation, naturally with the alumni from the two courses and various countries digging up memories of the times they were together at ITC. Thanks again to the organisers – and let the pictures speak for themselves!



Something's cooking



Fun at the Indonesian table



A delicious meal



Anticipating dinner



## Refresher Course in Guatemala on Geospatial Data Infrastructure for Central America (GDICA)

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The Faculty of Agronomy of the University of San Carlos (FAUSAC) in Guatemala hosted the GDICA refresher course from 18 to 30 October 2004. Twenty-seven people participated, representing seven countries in Central and South America: Guatemala, Mexico, El Salvador, Costa Rica, Nicaragua, Ecuador and Argentina. The course dealt with geospatial data infrastructure (GDI) concepts and practices, and covered not only technical aspects, such as information standards and architecture, but also institutional and economic issues relevant to data exchange, such as copyright and cost recovery.



Group photo

Most participants gave presentations on their experiences with GDI in their respective countries. Some of the presentations from Guatemala were directly related to the ongoing ITC-FAUSAC project on capacity building in land administration. In addition, it appeared that one of the most urgent needs for such a data infrastructure – and therefore a strong driving force – emerged after Hurricane Mitch. Consequently, part of the course was conducted at the National Organization for Disaster Reduction (CONRED). The fiscal cadastral office of the local municipality was also visited during the course.

The course evaluation showed that GDI/SDI remains a hot topic in Central America. According to most participants, any follow-up activities should be geared especially towards decision-making and teaching/professorial staff, because these two groups seem to have the highest influence on capacity building in the country. Costa Rica was mentioned various

times as an optimal place for such a course, as it is seen as one of the frontrunners of ICT implementation in the region. Moreover, it would be helpful to learn from similar experiences in the region, and from success and failure stories from other parts of the world. As the GDI theme and concepts are still rather new and multifaceted, a follow-up in the form of a website, regular e-mail information bulletins, or even another refresher course on this theme would be considered useful. FAUSAC proposed a follow-up course on the topic of SDI implementation in local government in Guatemala – as is happening in Chiquimula, for example ([www.sigchiquimula.com](http://www.sigchiquimula.com)). Such a course could also seek to update FAUSAC professors and other teaching staff.



Smiling exercise



Strategy session

## Refresher Course on GIS for Environmental and Land Use Planning in Southeast Asia

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From 25 October to 5 November the refresher course GIS for Environmental and Land Use Planning in Southeast Asia was held in Hanoi, Vietnam, organised by ITC in cooperation with the Vietnam Research Institute of Land Administration (VIRILA), and the Forest Inventory and Planning Institute (FIPI). Course coordinators were Dr Dick van der Zee and Ir Louise M. van Leeuwen. A total of 28 persons participated: 20 from Vietnam, five from Indonesia and one each from Mongolia, Thailand and the Philippines. The majority were ITC alumni, half of the participants being female.

The participants discussed the concepts and procedures of environmental and land use planning, carried out a situation analysis, and elaborated problem and objective trees. This was followed by the development of alternative scenarios and suggestions for possible solutions. The work was based on a number of different case study areas for which data sets were available: Dao Tru–Tam Dao, Kali Konto and Bach Ma. Elaborate use was made of the computers installed

by VIRILA, but a lot of work on the case studies was also carried out on the laptops that several participants had brought with them. This allowed more groups to simultaneously address the same case study from different points of view. Individual presentations by participants on their current work back home added to the exchange of experiences.

The use of mobile GIS tools was demonstrated and practised during a field visit to the Dao Tru–Tam Dao case study area. This area is located some 80 km northwest of Hanoi and has some problems because local farmers are still using resources inside the national park. After introductions at the headquarters of Tam Dao National Park and in the community hall of Dao Tru, the group went to visit one of the villages of the commune. Then the group was divided into two teams: one continued with a more elaborate village survey, interviewing farmers and registering points in the field; the other went up to the summits of Tam Dao to gain an impression of the quality of nature there. The participants were very enthusiastic about this trip and wished more time could have been devoted to it.

The evaluation by the participants shows that the topics and issues addressed and the way in which the programme was organised were well received and appreciated. Participants have expressed a wish to stay in con-



The participants discussed the concepts and procedures of environmental and land use planning

tact and exchange experiences in implementing new ideas and tools acquired from the course.

The social aspect was not neglected, and an alumni event took place in cooperation with another refresher course also being held in Hanoi (see page X). In addition, a guided city tour was arranged for the participants from outside Hanoi, including a visit to the Ethnology Museum, the Temple of Literature, and other places of interest. The tour was greatly enjoyed by the participants. On the evening of the second Thursday a farewell party was organised on a boat on the West Lake. After a delicious meal set off by lively conversation, the party drew to an end with participants and VIRILA staff alike singing songs from different countries.

On the closing day the final presentations by the various teams showed that something had certainly been learned in this short time. So staff and participants can look back with satisfaction on these two weeks.



The use of mobile GIS tools was demonstrated and practised during a field visit to the Dao Tru–Tam Dao case study area