

# ITC - a Centre for Earth Observation Education

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## 1 INTRODUCTION

The International Institute for Geo-information Science and Earth Observation (ITC) is a centre of excellence in international education, aiming at capacity building and institutional development of professional and academic organizations and individuals specifically in countries that are economically and/or technologically less developed. The knowledge field of ITC is geo-information science and earth observation, which consists of a combination of tools and methods for the collection - through aerospace survey techniques -, storage and processing of geo-spatial data, for the dissemination and use of these data and of services based on these data.

ITC's approach is application-oriented, directed at finding solutions for and strengthening civil society in addressing issues of local, national and global dimensions such as the multifunctional use of scarce resources, including space, the effects of climate change and environmental security.

The Institute fulfils its mission through deploying its staff in three core processes: research, education and project services.

As an associated institution of the United Nations University (UNU), ITC contributes to the UNU mission, which is "to contribute, through research and capacity building, to efforts to resolve the pressing global problems that are the concern of the United Nations, its Peoples and Member States". The cooperation between ITC and the United Nations University is directed at developing and carrying out joint programmes on Capacity Building in Disaster Management and on Land Administration, and at disseminating knowledge on these and directly related issues.

## 2 A SHORT HISTORY

The International Institute for Geo-Information Science and Earth Observation (its original name was International Training Centre and the institute still uses the acronym ITC) was founded in 1950 by Professor Willem Schermerhorn. The original focus was on airborne surveying and stereo-photogrammetry, which was gradually changing to space-borne remote sensing and geographic information systems. The recent name well represents the development in the discipline: geo-information science refers to the holistic approach to the spatial aspects of informatics, and earth observation

expresses the multi-level, multi-technological approach of monitoring the processes on our globe.

The non-changing factor was the geographic region where the students have been arriving to the institute: the developing countries. Major political and economic changes took place in this part of the world since the foundation of ITC; colonies collapsed and were liberated, new countries were formed and many nations started quick development, but ITC did not lose the focus and educated students from those countries which were in the largest need using fellowships provided by the Dutch government as part of its development cooperation policy.

In the beginning, the courses provided certificates and diplomas. In the seventies and eighties the Master of Science degree was the highest qualification that ITC provided, whilst in the beginning of the nineties a PhD programme started in cooperation with several universities in the Netherlands and abroad.

The speciality and the challenge of ITC lies in the virtual contradiction: teaching the use of front-end and expensive technology (geo-information science and earth observation) to students coming from economically weaker countries. To get an insight into how ITC meets this challenge, we seek answers to three basic questions in the following sections.

## 3 IS SPACE TECHNOLOGY BASED INFORMATION NEEDED FOR LESS DEVELOPED COUNTRIES?

Economically strong countries have developed strong spatial information infrastructures by building extensive measurement and observation networks and databases in the nineteenth and twentieth centuries in many fields, like hydrology, agriculture, meteorology, cadastre etc. Understanding the transboundary nature of many processes and phenomena, these infrastructures were merged at a higher level into international networks, like the synoptic station and reporting network of meteorology.

In the mean time, in the weaker countries, the national infrastructures were not developed, or became deteriorated after a weak start. Some focal points are maintained, e.g. the compulsory measurements at the international airports, but there is a large information gap that makes management very difficult.

This is where earth observation technology can contribute to the needs of the countries. It is obvious that it cannot replace all and every kind of in-situ measurements and spatial information, but it can largely contribute to closing the information gap.

Inverting the reasoning, let's have a look how the student numbers of ITC express the needs of these countries for earth observation related knowledge.

From its foundation in 1950 to 2006, ITC trained more than 18000 students from 171 countries. About 80-85 % of them were coming from the less developed countries; the largest numbers are from Sub-Saharan Africa, South-East Asia and Latin America (Figure 1). An overwhelming majority of them went back to their countries of origin to utilize the learnt knowledge over there.



Figure 1 Organized alumni network of ITC (source: Jaarverslag 2006)

#### 4 WHAT ACADEMIC LEVEL IS ADEQUATE?

It is not so simple to answer this question. Looking at the development level of the target countries, it seems that they participate with a financial and technological handicap in the global arena. But it would be a mistake to think that only basic, or 'second class' scientific knowledge is sufficient for them. In fact, that approach would not close, but open the information gap.

Therefore, ITC is specialized to capacity building for less developed countries with the target of implementing the most adequate and most developed scientific results.

As we saw it, the taught disciplines were changing with the technical and scientific developments by the time. Besides numerous short courses and distance education programmes, ITC provides an accredited MSc degree programme in Geo-information Science and Earth Observation. It consists of seven courses:

- Applied Earth Sciences
- Geoinformatics
- Governance and Spatial Information Management
- Land Administration
- Natural Resources Management
- Urban Planning and Management
- Water Resources and Environmental Management.

All these courses are related to earth observation. In this sense ITC is providing MSc degree in one discipline – but in several application fields.

The scientific flagship is the graduate programme. In the beginning of 2008, about a hundred PhD candidates were registered at ITC, about 15-20 % of them are from developed countries. To see how this programme was evolving, it is worth having a look at the statistics of the defended PhD theses (Figure 2). Based on the number of registered PhD candidates, a further increase in the annual number of defences is expectable, which will stabilize after a few years, according to the plans, around 25-30.

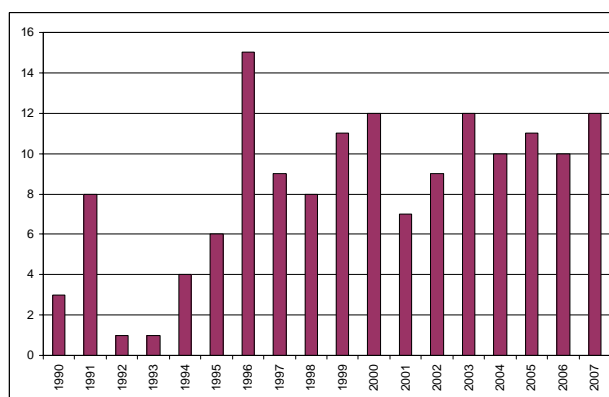


Figure 2 Number of defended PhD theses

#### 5 HOW TO EXPAND THE OUTREACH?

It is obvious that just sitting in ITC and giving courses there is not sufficient for capacity building all around the world. Therefore, several additional ways of earth observation related education are followed in the institute:

- Distance education courses
- Refresher courses
- Contract education (short courses abroad)
- Joint education (and research) programme

The joint education programme is an interesting way of decentralizing activities, and reaching out to the most important target countries (Figure 3). It is a flexible setup, where ITC transfers its curricula to the partner in a joint effort, according to the actual needs of the target country.

In case of degree courses, the joint education programme integrates education and research. The participants spend a shorter-longer part of their studies in the partner institutes, and selected ones can join a period in ITC too.

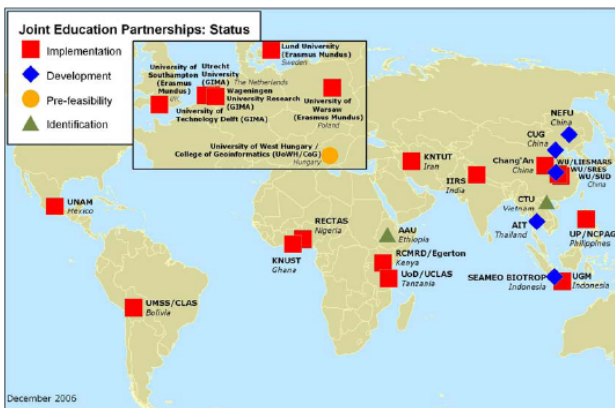


Figure 3 Joint education partners (source: Jaarverslag 2006)

Another important partnership was recently developed with the United Nations University. It is directed at developing and carrying out a joint programme on capacity building in disaster management and in land administration, and at disseminating knowledge on these and directly related issues. The programme activities are accommodated in two schools:

- School for Disaster Geo-Information Management
- School for Land Administration Studies

## 6 CONCLUDING REMARKS

This short review cannot introduce a whole institution in detail, so we tried to focus on a very specific aspect of ITC: how education in space-based information technology can be useful for developing countries, and what academic level is needed for fulfilling this mission. We can conclude that without earth observation technology, the information gap cannot be closed for the successful management of the economically less powerful countries. Only those institutions can train the required experts, who are themselves in the lead of the development of earth observation technology and applications.

The International Institute for Geo-information Science and Earth Observation has a long history in training specialists from the developing world, and its ever increasing scientific output proves that ITC is a centre of excellence in its field. Its broad alumni network includes thousands of professionals at different levels of academia, technology and public administration related to earth observation, a number of them reaching the highest managerial positions. The cooperation network of ITC ensures its embedding in the international research and education networks.

## 7 ACKNOWLEDGEMENTS

All the above-mentioned data, figures, and even much more information are available on the official home site of ITC: <http://www.itc.nl>.