

**United Nations/Moldova/United States of America
Workshop on the Applications of Global Navigation Satellite Systems
Chisinau, Moldova, 17 – 23 May 2010**

**Development of a Complete Graduation
Training Centre for Geomatics and GNSS**

Alexandru BADEA

Romanian Space Agency & Faculty of Land Reclamations
and Environmental Engineering Bucharest

Tel: +40 21 212 87 22

Fax: +40 21 312 88 04

alexandru.badea@rosa.ro

www.rosa.ro



PREAMBLE

During the last 25 years, the blow up of new GNSS and EO technologies (both based on satellite data) was more dynamic than an educational system (unable to show ability for immediate reaction at the R&D activities and industry progress).

In order to ensure the synergy between the educational system and the technological evolution, it was necessary to replace some classical disciplines (as the detailed study of opto-mechanical theodolites or analogical photogrammetry) with new courses oriented to the study of satellite systems and their benefit for the domain.

The inherent conservative behavior of the geodetic community postponed the compulsory modification of classical academic syllabus.

As consequence, the introduction of new topics, permitting to get ready specialists with a competitive EO and GNSS knowledge, become a priority for some dynamic academic structures.

Land Reclamations and Environmental Engineering Faculty of Bucharest (FIFIM)

The Faculty of Land Reclamations of the University of Agronomical Sciences and Veterinary Medicine of Bucharest acts, since 1934, as Civil Rural Engineering educational structure. Evidently, several decisions modified the status and the location of the specialization, but any syllabus contained some geodetic disciplines (as special topography or geodesy 1934).



UNIVERSITATEA DE ȘTIINȚE AGRONOMICE
ȘI MEDICINĂ VETERINARĂ – BUCUREȘTI

FACULTATEA
DE ÎMBUNĂTĂȚIRI FUNCIARE
ȘI INGINERIA MEDIULUI



1990 year has to be considered as a first benchmark of modernization of the faculty's structure. First of all, adding as main specialization an Environmental Engineering department, the faculty enlarged the horizon of knowledge.

Even if both departments (Land Reclamations and Environmental Engineering) have included in the syllabus courses of Topography, it was necessary to complete the arch of specializations with a department for earth measurements and cadastre.

Starting 1997, the department Cadastre is acting as independent at college level specialization (3 years of studies).

Since 2005 (the second important benchmark), the Cadastre department is reorganized and upgraded at license level (4 years of studies) acting currently as “Earth Measurements and Cadastre” specialization.

Tacking benefit of Romanian Space Agency's support, a new syllabus was elaborated keeping in mind several criteria :

- A graduated engineer has to understand and apply the recommendations of UNISPACE III conference;**
- A graduated engineer has to understand what is the GNSS;**
- A graduated engineer has to be educated as an advanced GNSS user;**
- It is impossible to educate without a modern infrastructure;**
- It is impossible to educate without a multidisciplinary practicing group of professors (not only theoreticians).**

In fact the “Earth Measurements and Cadastre” specialization prepares engineers at license level for applying the cadastre in Romania by using methods for digital cartography, GIS and Earth Observation technologies.

Tacking into account the Bologna Accords (having as purpose the creation of an European Higher Education Area by making academic degree standards and quality assurance standards more comparable and compatible throughout Europe), starting autumn 2010 a master of science cycle on Applied Geomatics (2 years) will be implemented.

Proposed disciplines for “Applied Geomatics” master degree

- Spatial data infrastructures and data standards;**
- Digital processing of image data;**
- Constitutive elements of bio-geo-sphere;**
- Programs and applications for Earth Observation;**
- Thematic cartography;**
- Geoinformation for risks management;**
- Geopolitics and strategies of Space;**
- Interoperability of positioning systems**

The Supporting Infrastructure

6 specialized laboratories:

- Remote Sensing
- GIS 1
- GIS 2
- Photogrammetry
- Topography
- Cadastre

8 complementary laboratories:

- Computer graphics
- Geodynamics
- Meteorology and Climatology
- Geotechnics
- Soil science (Pedology)
- Cadastre
- Multimedia
- Computer sciences

Remote Sensing Laboratory



Disciplines

- Image processing
- Cartographical modeling
- Photo-interpretation



Remote Sensing Laboratory

Equipment	Year
21 PC systems, Pentium IV, HDD 150 GB 1Gb RAM, LCD SONY 19"	2007
Notebook – 1 buc	2009
Videoprojector Benq–	2007
SmartBoard	2007
Working Station HP 4600, XEON, HDD 250 GB, 2Gb RAM, placa video 1 MB, double display SAMSUNG 19"	2008
Plotter HP A0	2005
Scanner HP A4	2007
Printer color Hp 1800 c A3 format	2007
Laser Printer - Hp 2015 DN A4 format	2008
Photocopier Gestetner 3222, duplex, sorter, finisher, A3	2007
21 ARCGIS – ARCVIEW 9.3. licensed software	2008
Unlimited LEOWorks 3.0	2008
LEICA GEO OFFICE	2008
WINDOWS XP PRO, Microsoft Office Professional	2008

GIS Laboratory (1)

Disciplines

- Geographic Information Systems
- Information Systems in Cadastre



GIS Laboratory (1)

Equipment	Year
24 Systems HP Processor INTEL CORE 2 DUO, HDD 250 Gb, 2 Gb RAM, DVD writer, Samsung LCD WIDE 22"	2008
Working stations HP 4600, XEON, HDD 250 GB, 2Gb RAM, video 1 MB, double monitor SAMSUNG 19"	2008
Server HP PROLIANT ML 350, INTEL XEON	2008
Laptop ASUS K50IN, 15,6"HD/LED, procesor Intel pentium DUAL CORE T4200 : 2.0 GHz FSB 800MHz, 1M L2 Cache HDD 320 GB, 4 GB RAM, placa video NVIDIA GeFORCE G102M CUDA 512 MB, DVD-writer dual layer - 4 buc	2009
Smart board (Penboard)	2009
Plotter HP A0	2009
Plotter CANON IPF 710, color, A0+ format	2009
Scanner CANON COLORTRAC SMARTLF CX, A0	2009
Scanner HP SCANJET G3110	2009
Printer KYOCERA FS-9130 DN, Laser color, USB, ETHERNET	2009
2 synchronized videoprojectors	2009
25 licenses ARCGIS – ARCVIEW 9.3. –.3 D ANALYST LAB KIT PAK SPATIAL	2009

GIS Laboratory (2)

Disciplines

- Geographic Information Systems
- Information Systems in Cadastre



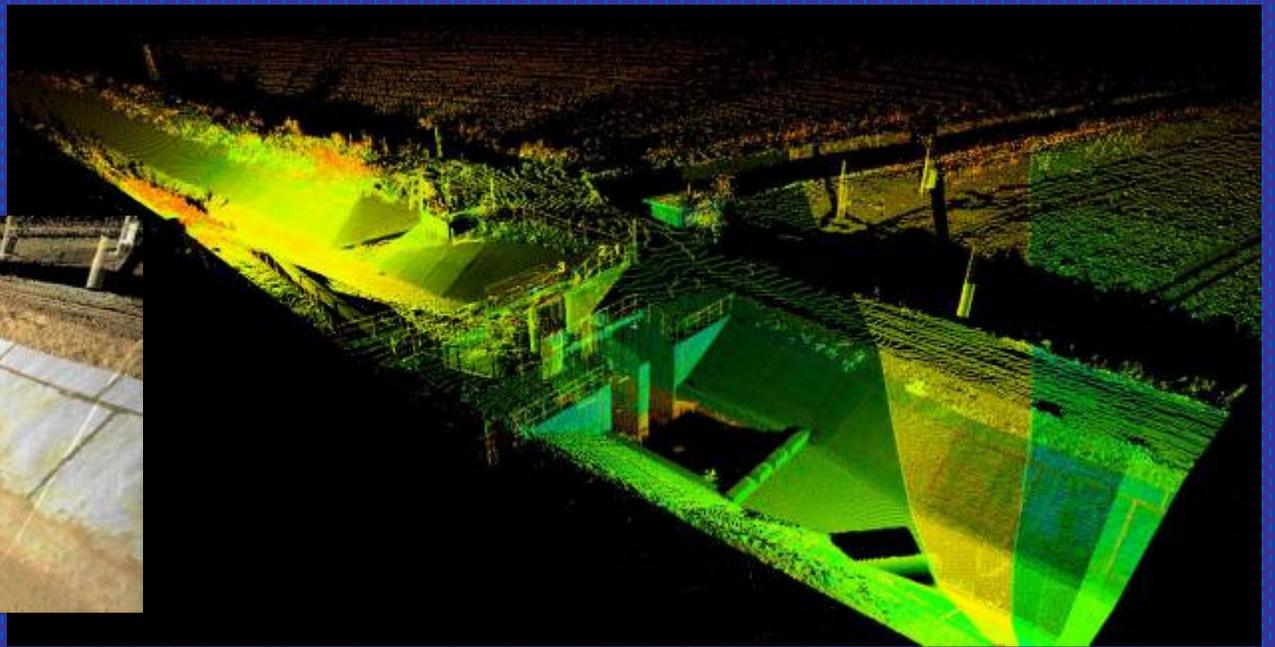
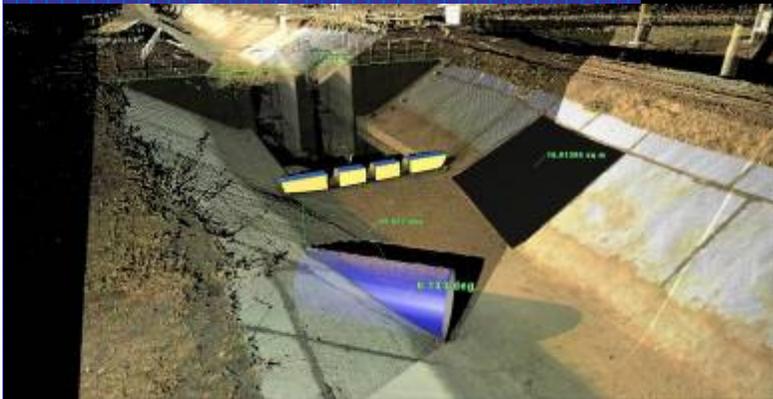
GIS Laboratory (2)

Field equipment





**Field activities performed
by a Ph.D. student**



GIS Laboratory (2)

Working station HP 4600, procesor XEON, HDD 250 GB, 2Gb RAM video 1 MB + monitor SONY 19" - 4 buc.	2008
Laptop ASUS K50IN, 15,6"HD/LED, procesor Intel pentium DUAL CORE T4200 : 2.0 GHz FSB 800MHz, 1M L2 Cache HDD 320 GB, 4 GB RAM, placa video NVIDIA GeForce G102M CUDA 512 MB - 12 buc	2009
Smart board	2009
Ploter CANON IPF 710, color, format A0+	2009
Scanner CANON COLORTRAC SMARTLF CX, format A0	2009
Printer HP CP 3525 DN, Laser color A4	2008
PrinterHP 8600, Laser color A3	2008
Videoprojectore Toshiba - 1 buc	2009
LEICA HDS LASER Scan Station 2	2008
LEICA SMART STATION 1200+	2008
Autor GIS – VW Multivan 4 MOTION	2008
16 ARCGIS – ARCVIEW 9.3. –	2008
3 D ANALYST LAB KIT PAK si SPATIAL	2008
Leica Cyclone	2008
Leica Geo Office	2008
WINDOWS Server, WINDOWS XP PRO, Microsoft Office Professional	2008

Topography and Cadastre laboratories



THE DISTANCE LEARNING ROOM





The modern facilities already offered the possibility to organize international training events on the GNSS / EO domains

1. GEOSS capacity building workshops, Bucharest, Romania, May 3-4, 2010

BRINGING GEOSS SERVICES INTO PRACTICES WORKSHOP

for teaching participants how to install, configure and deploy a set of open source software to publish and share data and metadata through the Global Earth Observation System of Systems (GEOSS) using OGC web services & ISO standards.

GEPIC WORKSHOP

In the framework of the enviro GRIDS projects, a workshop on the GIS-based EPIC model.

2. Romanian Space Agency (ROSA) in cooperation with the European Space Agency (ESA) and the German Aerospace Center (DLR) organized a five-days "INTENSIVE RADAR REMOTE SENSING COURSE" between 26 – 30 October 2009.

The training course was focused on radar remote sensing theory and applications:

- theoretical fundamentals of radar remote sensing and introduction to SAR applications**
- practical sessions using SAR data with focus on TerraSAR-X imagery for applications in water / oil detection and mapping**

FINAL REMARKS

As shown previously, the actual infrastructure offers the possibility to host complex training events and support activities for UN or other international organizations.

The active participation of the faculty staff at each scientific activity stimulates the understanding of GNSS and EO technologies in view of permanent use in environmental projects.

In fact, the benefit is evident and fair for both parties, organizers and hosting faculty...

Thanks for your attention !