THE REMOTE SENSING EDUCATION IN THE NEW UNIVERSITIES FROM ROMANIA. THE CASE OF VALAHIA UNIVERSITY OF TÂRGÓVIŞTE

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Abstract: The new universities from Romania are concerned with the high – technology promotion in curriculum and research programmes. As for remote sensing, a wide applicable technique in Earth and Environment Sciences, these universities have some specific problems: inclusion of Remote Sensing in university and postuniversity curriculum, elaboration of syllabus and handbooks, creation of remote sensing laboratories, university cooperation, joining professional associations, attending scientific meetings. All these problems are emphasized by examples from the activity carried on by Valahia University of Targoviste, founded in 1992.

Keywords: Remote sensing education, university and postuniversity curriculum, remote sensing laboratory, university cooperation.

Rezumat: Noile universități din România sunt preocupate de promovarea înaltelor tehnologii în programele curriculare și de cercetare. Privind teledetection, o tehnică larg aplicată în științele Pământului și în științele mediului, în aceste universități se ridică o serie de probleme specifice: includerea acesteia în curriculum universitar, elaborarea de programe analitice și manuale, crearea de laboratoare de teledetection, cooperarea interuniversitară, integrarea în asociații profesionale, participarea la manifestări științifice. Toate aceste aspecte sunt susținute cu date din activitatea noastră la Universitatea Valahia din Târgoviște, fondată în 1992.

FOREWORD

The private and public new universities from Romania are confronted with some specific problems regarding the remote sensing promotion in education and research. In this paper are presented some of these problems, because their solving is very important for these institutions, to be included among European modern universities. These problems are: inclusion of remote sensing in the university and post university curriculum; elaboration of syllabus and handbooks based on the newest information; creation of remote sensing laboratories; training the specialists; national and international university cooperation; affiliation with professional associations; attending scientifical meetings in our country and abroad. The analysis has been developed from necessity to achievements and perspectives and was based on the experience gathered at Valahia University of Targoviste, founded in 1992.

1. INCLUSION OF REMOTE SENSING IN THE CURRICULUM

Inclusion of Remote Sensing in the university and post university curriculum (master’s degree) for the specializations which study Space, Earth and Environment Sciences, is the main condition in promoting the most modern Earth and Space investigation techniques in education and research from new Romanian public and private universities. We take into account that these institutions are very numerous in Romania. If in 1989 there were only 7 universities, today their number is 56, from which 17 are public universities.

The university autonomy allows to be included subjects from spatial sciences and techniques in the curriculum of different departments and specialization. The experience of the new universities in elaboration of syllabus is poor, that is why we think it is favorable

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to know and to adjust the curriculum used in traditional universities from Romania and other countries according to their own needs and possibilities. So, we used as a model the curriculum from the geography departments of the universities of Bucharest, Iasi and Cluj-Napoca, where they teach the course of *Remote Sensing and geographical aerialphotographic interpretation*, from the Geography Institute of the University of Paris IV (Sorbonne), where they teach the course *Remote Sensing* and practical works *Initiation in Remote Sensing data interpretation*, from *Les outils de la géographie* modulus, and from the Geography Department from University of Zürich, where are two Remote Sensing specializations together with traditional ones (Physical, Human and Economic Geography). Therefore, at Valahia University of Targoviste the main remote sensing topics were included in the university curriculum of Geography and Environment Engineering specializations (Remote Sensing and Geographical photographic interpretation), informatics (Remote Sensing and Geoinformatics), as well as in master’s degree course (*Studying the environment with Remote Sensing, The remote sensing of the major risks*). The number of hours is still small: 2/1 hours of course and 2 hours of practical works per week, for 3,5 months. We insist on increasing the time needed to train students in this field.

The training courses are not sufficient to teach the students properly. Therefore, for future it could be possible to create a Remote Sensing specialization in a future Earth Sciences department. We are aware of the Geography Department from University of Zürich, which has two specializations of this kind (*Remote Sensing and Using Spatial Data*) and two educational and research laboratories (*Remote Sensing and natural resources and The Use of Remote Sensing)*.

2. ELABORATION OF SYLLABUS AND PUBLICATION OF HANDBOOKS

Elaboration of syllabus for courses and laboratory work and publication of handbooks based on the newest sources of information which use well known experiences, it is binding for a higher education in Remote Sensing, a domain which needs a permanent high technology. That is why we need to develop relations with universities and specialists with high reputation in our country and abroad, to know the present day results from the numerous fields of application, as they are presented in scientifical meetings or are variously published (articles, treatises, web-sites). These are problems which are very difficult for those who work in the new universities, which are less known in the academic world. In Romania there is a certain lack of handbooks, treatises and reviews of this speciality. But the Internet information became available.

We use as much as possible, various and actual documentary sources in order to elaborate syllabus, courses and university handbooks. For example, for “Studying Environment with Remote Sensing” course I used recently published volumes of scientifical papers (*Observing our environment from space*, edited by Gérard Bégni, A.A. BALKEMA PUBLISHERS, 2002; *Geoinformation for European Wide Integration*, Edited by Tomas Benes, Millpress, Rotterdam, 2003; *New strategies from European Remote Sensing*, 2005, Edited by Marinko Oluć; *Global Developments in Environmental Earth Observation* from space, Edited by André Marçal, Porto, Portugal, 2005; *Geoinformation in Europe*, Edited by Mario A. Gomarasca, Millpress, Rotterdam, 2008), some CD-ROMs (*Resources in Earth Observation*, CNES, 1998; *Text books on Remote Sensing and GIS*, NASDA RESTEC AIT ACRORS, 1999; *Remote sensing basics*, Wageningen University, Centre for Geo-information, 2000; *Earth Observation Handbook*,CNES,ESA,2005) and some universities, research institutes and Remote Sensing web-sites. Therefore, in the chapter *Studying the Earth’s waters using Remote Sensing* it was possible to approach the following subjects in courses and laboratory work: the sea dynamics and its risks (tsunami,
strong tide, El Niño, global growth of the sea level), the sea surface temperature (S.S.T.), the sea ice, the sea phytoplankton (the chlorophyll concentration, the proliferation of dangerous algae) the sea coasts pollution.

In 1998, it was published The Earth Spatial Remote Sensing, based on such documentary sources. This textbook has two main parts: Remote Sensing fundamentals (principles, systems, techniques and technologies) and Remote Sensing use in the Earth Sciences.

In 2004 has been edited the handbook (conventional and electronic) The remote sensing of major risks, with two parts: Earth Observation. Policies programs, techniques; Geography and Remote sensing of major risks. Also, in 2008 will edited the course Remote Sensing. Applications in Geography.

3. CREATION OF REMOTE SENSING LABORATORIES

It is well known that Remote Sensing laboratories from universities were imagined and organized in order to accomplish two interdependent functions: education and research. They are used for practical training of the students and to train researchers, which are very few in Romanian new universities. This is the most complex and difficult problem because of the lack of financial resources and specialized staff which the new universities are confronted with. To solve this problem they have to use both the poor resources of the universities and those from some programmes with external funds.

The Remote Sensing laboratory from Valahia University of Târgoviște, began to function in March 2002, as a result of an old project, moral and financial supported by the University management. Its purpose is:

- to improve the acquisition of theoretical and technical knowledge and the cultivation of ability in Remote Sensing use in the Earth and Environment Sciences.
- to join the educational process with research and socio-economic practice.
- to attend different national and European research programmes by using remote sensing data.
According the project, the laboratory is planned to be created in three stages: 2001-2002, 2003-2004 and 2005 – 2010. In the first stage, we used our own funds to equip the laboratory. Thus, it was created the informatic infrastructure – a network of 6 P.Cs, connected to Intranet and Internet, it was bought a software for image analysis (Arcview, Geomedia, etc) and was developed the spatial data base (spatial maps, satellite atlases, CD-ROMs). At the moment we can have access to information due to over 100 websites.

The second stage needs more funds and that is why we try to include our project in one of the European finnancial programmes. In this phase we want to obtain new softwares (ERDAS), different scale satellite topographic maps (1:25.000; 1:50.000; 1:100.000) for that part of Romania which interest us most. Thus, we will contact SPOT Image, Eurimage, Orbimage and remote sensing and spatial mapping institutes, such is Geospace from Salzburg, from which we have already had an offer, Vito from Mol, Belgium. Once again, the problem is only to find money: from universities funds (mostly small, especially for public ones), from sponsors (unsure and insufficient), from foreign financial programmes (difficult to join them because they are oversolicited).

In third stage, we want to set a reception station for remote sensing satellites. This means that we need to obtain licenses from the societies which administrate the satellite information. We hope that university remote sensing laboratories will have more favorable conditions to develop.

We want to emphasize that as the technical base will develop it is possible to intensify the research activity through interdisciplinary projects.

4. AFFILIATION OF REMOTE SENSING LABORATORIES

Affiliation of remote sensing laboratories to national and international professional societies, their connection to the research programmes is a compulsory condition for extending professional relationships, for involving in educational and research far-reaching programmes, for wide accessing the latter day information and the results of the basic and applied researches.

Therefore, the remote sensing laboratory from Valahia University of Targoviste has joined since the beginning the European Association of Remote Sensing Laboratories (EARSeL), with all the advantages and duties which follow the membership. Our studies are directed to the following special Interest Groups: Disaster Management, Land-use and Forestry Projects in Developing Countries.

5. UNIVERSITY COOPERATION

Cooperation with Romanian and foreign universities is a priority for the young universities. In these programmes must also be included the remote sensing laboratories. Thus, some problems can be solved, such as: the development of infrastructure, giving technical aid, organizing special professional training courses, implementation of common research programmes.

The difficulties of the beginning will be easily passed through cooperation. The foreign proposals and facilities are numerous but they are still less available for our students. There are also some limits which must be surpassed by ourselves, such as knowing foreign languages (English, French, German) and training degree in remote sensing field. We take into consideration, among others, to send our younger colleagues to attend the summer courses from the University of Applied Sciences from Stuttgart (International Master Degree Programme – Photogrammetry and Geoinformatics), International Space University (Strasbourg), International Institute for Aerospace Survey.
and Earth Sciences (Enschede, The Netherlands), etc. At the same time, we look for other offers which intend to train specialists for developing countries.

An interesting collaboration is developing with Castilla La-Mancha University (Ciudad Real). In March 2007 I and George Murătoareanu have presented at this University the course Remote Sensing Basics, as invited of the Geographical and Territorial Management Department (Professor Elena Gonzalez Cardenas).

6. ATTENDING SCIENTIFICAL MEETINGS

Continuous attending to national and international scientifical meetings is a necessity in order to train the staff which work in the remote sensing field. Thus, we can inform about our results, new experiences can be acquired, therefore a real integration in the scientifical community and in the informational system of this domain can be possible. Our active attending to scientifical meetings is a very courageous action (because of our informational gap as against the advanced countries), very expensive (because of the small funds), but absolutely necessary (because of the benefit). We can appeal again to our own experience, to emphasize what we said.


CONCLUSION

After 1990, the complex domain of remote sensing use as a modern method of investigation in Earth and Environment Sciences, with its theoretical, technical and practical problems, is searching for its special and specific place in education and scientific activities from new Romanian universities.

The main problems of education in this domain are connected with its position in the curriculum, the development of the laboratories and training the professionals and finally with integration of the remote sensing university laboratories in the European network and the scientifical community. The case of Valahia University of Târgoviște is convincing.