

EDUCA SeRe PROJECT- GEOGRAPHY TEACHING IN GRAMMAR AND HIGH SCHOOL USING REMOTE SENSING DATA AND GIS

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Commission VI, WG VI/2

KEY WORDS: Remote Sensing, Geography, GIS, Education, Image, Satellite, Future

ABSTRACT:

Since 1998 the INPE Dissemination and Education Space Science Activities has been developing the EDUCA SeRe Program which main objective is the development of educational material using remote sensing data in grammar and high schools. In 1998, it was created the Remote Sensing and Digital Cartography Laboratory-LASERCA in the Vale do Rio dos Sinos University-UNISINOS. In 2003 INPE and UNISINOS have decided to developed in partnership the EDUCA SeRe Project III, a pilot project with geography grammar and high schools teachers from Porto Alegre metropolitan area and Sinos river valley area, Rio Grande do Sul State, where UNISINOS is located. This paper is about this educational experience.

1. INTRODUCTION

The National Institute for Space Research-INPE, in Brazil, is an institute of the Ministry of Science and Technology responsible for carry on space research in Brazil. Since 1998 the INPE Dissemination and Education Space Science Activities has been developing the EDUCA SeRe Program which main objective is the development of educational material using remote sensing data in grammar and high schools.

In 1998 it was created the Remote Sensing and Digital Cartography Laboratory-LASERCA in the Vale do Rio dos Sinos University-UNISINOS.

Since October 2001 INPE, through the EDUCA SeRe Project III, one of the EDUCA SeRe Program projects, has developed many image-maps about Brazilian state capitals and cities using CBERS images, and besides has given training courses for schools teachers about the use of this educational material in classroom.

In 2003 booth INPE and UNISINOS have decided to develop an educational pilot project together.

2. THE EDUCA SeRe PROGRAM

In May 20-23rd, 1997 the Latin American Remote Sensing Society-SELPER/ International's Teaching and Investigation Committee, INPE, Itajaí Valley University (UNIVALI), Lujan

National University (UNLu) and the ISPRS TCVI/WG1-Education and Communication organized the 1st Workshop on Education on Remote Sensing in MERCOSUL, aiming to gather the community interested directly in teaching remote sensing in order to discuss and present proposals for a regional action. As a consequence of this workshop INPE Dissemination and Education Space

Science Activities created the EDUCA SeRe Program which main objective is the development of educational material, using remote sensing data and GIS techniques, to teach geography and natural science in grammar and high schools. This Program is divided into five projects:

- EDUCA SeRe PROJECT I- Educational Handbooks for remote Sensing Teaching;
- EDUCA SeRe PROJECT II- CD ROM for remote sensing teaching;
- EDUCA SeRe PROJECT III- Development of Image-maps for remote sensing teaching;
- EDUCA SeRe PROJECT IV- Development of Homepages for remote sensing teaching.

In October 14th, 1999, INPE, in partnership with China, has launched the first China-Brazil Earth Resource Satellite-CBERS that carried on board three sensors systems (CCD Camera, IRMSS Camera and WFI Camera). The CBERS II was launched in October 21st, 2004. CBERS-1 and 2 are identical in their technical structure, space mission and payload. The CBERS data are free for INPE researcher and educational

projects. In few months these data will be free for all Brazilian community.

Since the launched of CBERS the EDUCA SeRe PROJECT III was adapted to develop image-maps using CBERS-CCD data. Two image-maps series was created: Brazilian cities series, and Brazilian state capitals cities series.

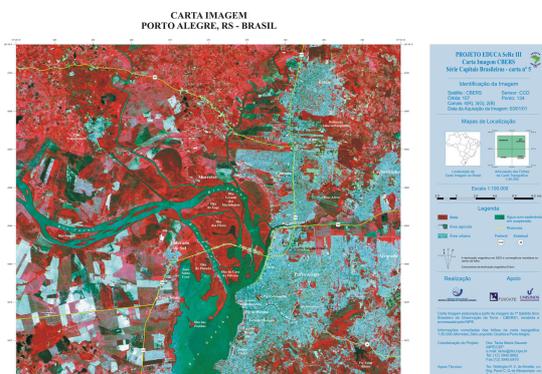


Figure 1. CBERS/CCD Image-map of Porto Alegre city, Rio Grande do Sul state capital, Brazil.

Up to now three Brazilian cities image-maps (Foz do Iguaçu, Cachoeira Paulista and São Leopoldo) and six Brazilian state capitals cities image maps (Brasília, Belo Horizonte, Cuiabá, Manaus, Natal and Porto Alegre), were developed.

This project has also developed, in partnership with INPE Image Generation Division, six CBERS/IRMSS Brazilian state mosaics (Rio Grande do Norte, Rio Grande do Sul, São Paulo, Minas Gerais, Paraná, Rio-São Paulo Corridor) and one CBERS/CCD Mosaic (Rio Grande do Norte).

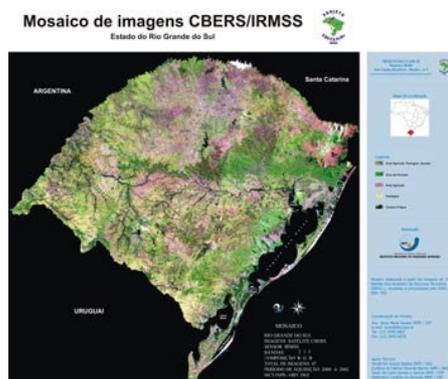


Figure 2. Rio Grande do Sul State CBERS/IRMSS Mosaic.

Besides, INPE has given training courses for schools teachers about the use of this educational material in classroom. More than 150-school teachers trained by INPE. This is a three days long course where the schools teachers have to attend lectures about fundamentals of remote sensing, satellite systems, image interpretation, cartography and GPS, field work activities, remote sensing applications and how to use the images in classroom.



Figure 3. Exercise about image interpretation in the training course, in UNISINOS facilities.

2.1 The EDUCA SeRe Project III in UNISINOS

In 2003 INPE Space Education and Communication Area and the UNISINOS Geology Post-Graduation Program and the Digital Cartography and Remote Sensing Laboratory-LASERCA have decide to develop together a Pilot Project with geography grammar and high schools teachers from Porto Alegre metropolitan area and Sinos river valley area, Rio Grande do Sul State, where UNISINOS is located.

The main objective of this project is to qualify and encourage the schools teachers to use remote sensing data (LANDSAT, CBERS) and GIS techniques (SPRING and TERRAVIEW-INPE free softwares) as educational material for geography teaching.

Considering the National Curricula Parameters-PCN for Geography the project goals are:

- To show to the geography teachers the potentiality of remote sensing data and GIS techniques as educational resource in classroom;
- Through the use of remote sensing data and GIS techniques in classroom to become the geography discipline more attractive for the students;
- To qualify the geography teachers to develop classroom activities using remote sensing data and GIS techniques;
- With the help of geography teachers to search for new methodologies to use remote sensing data and GIS techniques as educational material.

For this Pilot Project INPE has developed two image-maps (Porto Alegre and São Leopoldo) and the Rio Grande do Sul state mosaic. One thousand and two hundred copies of each image-map were printed, from this amount five hundred and forty copies were distributed to the schools that took part in the Pilot Project. The other six hundred and sixty copies were distributed to the community and others schools in the region. UNISINOS has funded the image-maps printer services.

All the additional satellite images used by the schools during the project were provided by INPE (CBERS, LANDSAT, NOAA and GOES). Besides, the school teachers have learned how to search and to get satellite images from internet.

The Educa SeRe Project has a homepage where the school teachers could find texts about remote sensing, cartography and image-maps about the Brazilian state capitals and mosaics about the Brazilian states.

Nine private schools and one public school, 26 teachers and around 700 students took part in this project.

The project was developed from May to December in 2003 and a second edition will take place in the period of May to December in 2004.

In May 2003, twenty-two schools directors and educational coordinators were invited to attend a seminar about the EDUCA SeRe Project III and how to use the remote sensing techniques in classroom. These schools were invited to take part in the pilot project, but just nine have accepted the invitation.

In August 2003 it was held, in UNISINOS facilities, a training course for the teachers that took part in the Pilot Project. The course topics were: remote sensing fundamentals, spectral behavior, sensor systems, cartography, GPS, remote sensing applications, fieldwork activities and how to use the images in classroom. INPE researchers that are involved with remote sensing activities in the last 20 years and in education activities in the last 15 years gave the course.

Actually, initially just geography teachers were invited for this training course. But, after the seminar, because of the positive influence of the school directors, many other teachers from related disciplines, like history, chemistry, mathematics, and physics have asked to the project coordination to joint to the project. This made the exchange of information, more interesting and fruitful, during the development of the Pilot Project.

It is necessary to explain that this project is not designed just for geography teachers. The initial idea was to work with only one discipline, just because in this way it is easier to manage all project phases.

The initial idea was to begin with the geography discipline and after that, in future phases to extend to other disciplines that are in the regular curricula in grammar and high schools.

After the training course each school have to propose the development of four months project about the use of remote sensing in geography, with INPE and LASERCA advisory

In December 2003 it was organized an exposition and two seminars, in the UNISINOS campus, about the projects results. The first seminar was designed for the teachers to present and to explain about their experiences and activities developed during the project.

In the afternoon was organized a seminar where the students presented the results of the projects and explained their experiences.



Figure 4. Students' seminar at UNISINOS facilities.



Figure 5. The exposition at UNISINOS facilities.

2.2 The schools projects

The schools developed the following projects:

- Colégio Israelita –Study of the environmental changes in the Third Perimetral- High schools students, private school (15-16 years old);
- Colégio Israelita- Remote sensing applied to thermo chemist; Comparative study of forest and burning area, the CO₂ production and its contribution for the green house effect, through satellite image - High schools students (16 years old), private school;
- Colégio Maria Auxiliadora-Canoas city urban process development: past and future- High schools students (16 years old), private school;
- Colégio Anchieta- The spatial organization in Porto Alegre city-Grammar school students (11 years old, private school);
- Instituto de Educação Ivoti- The geographical importance of the Sinos river-Grammar school students (11 years old, private school);
- Colégio Coração de Maria-Environmental changes as a consequence of the Trensurb (urban train) establishment-Grammar school students (11 years old, private school);
- Colégio São José- Analysis of climatic conditions in July, years 2001,2002 and 2003 in São Leopoldo City- Grammar (11 years old) and High schools students (16 years old), private school;
- Colégio Salesiano Dom Bosco- Exploring the Rio Grande do Sul state from 1835 up today- Grammar (12 years old) and High schools students (16and 17 years old)-private school;
- Colégio Sinodal-Imperatriz Leopoldina-The environmental socio-economic impact provoked by human settlement in

- swamp areas- High schools students (16 years old), private school;
- Escola Pindorama-Old Hamburgo suburb (1996-2001)-How the human settlement changed the environment-Grammar students (10 years old), private school;
- Instituto Estadual de Educação Prof. Pedro Schneider-Man made reservoirs and energy distribution in the South region in Brasil-High schools students (15 years old), public school.

During the school projects development (from August to December) INPE has advised the school teachers how to use remote sensing information in classroom.

This was done through regular meetings (September, October and November) in UNISINOS facilities, where the INPE Project coordinator has advised the schools teachers. As INPE instructors are settled in INPE facilities, in São José dos Campos, 1200 km far from the schools location, in the periods between the meetings, the communication was through internet.

The internet was used by the student as well to contact INPE researchers in order to help them in their projects.

3. RESULTS

The school teachers and the students were quite motivated about their project. During the project, they have developed the following activities:

- Maps generation;
- Models generation;
- Graphics and tables generation;
- Technical visits to institutions that develop activities related to the school project subjects;
- Fieldwork in the study area;
- Data collecting in the study area;
- Data collecting in private and public institution that develop activities related to the school project subjects (hospital, agriculture, meteorology, cartography, urban planning and urban train offices);
- Environmental and urban change area monitoring;
- Climate monitoring using historical dates;
- Search for satellite images in the internet;
- Search for temporal satellite images and temporal ancillary dates;
- Search for ancient dates (photography, aerial photography, maps, statistics);
- Some schools have invited professionals' expert to give lectures about the projects subjects.

4. CONCLUSION

At the end of the Pilot Project was possible to realize that:

- The school teachers enjoyed very much the experience and they will continue to use remote sensing information in the classroom;
- The school teachers are very interested to attend additional courses about remote sensing and GIS techniques in order to increase their background in this area;
- This Pilot Project was a really excited and challenged activities for all students and very often their parents got involved or helped them to develop some tasks;

- The project subjects chose and activities developed by the schools were beyond the expectation and surpassed the initial ideas proposed by the Pilot Project coordination;
- Some projects were developed by the schools as a small scientific project in remote sensing. The students and the teachers were really very involved with this activity and the teachers took advantage of this opportunity to introduce scientific methodology and procedures to the students, examples: the projects developed by the Colégio Israelite, Colégio Sinodal and Colégio São José. These projects were a real mini-research projects;
- Initially the students' seminar was not planned; just the teachers' seminar was planned for the end of the Pilot Project. The students have decided to give presentations about their activities during the project and the results they have gotten. This seminar was much more important and fruitful than the other one;
- In the exposition there was a PC available, with all students presentation files, to be accessed by the exposition visitants. This PC was surrounded by the students and visitants all the time;
- The result of Pilot Project was a very good opportunity for the Educa Sere Project to improve the information about the use of remote sensing in classroom.

As a consequence of this Pilot Project in 2004, INPE and UNISINOS another training course and will develop the same kind of project with others schools in the region. Besides, will be given a course (44 hours) about how to use GIS techniques in classroom, using the free software's SPRING and TERRAview developed by INPE.

INPE and UNISINOS are signing an agreement in order to continue this partnership in educational activities. The idea is to have this program on continuous way, with a new edition every year.

These two institutions intend:

- To create a research activity in order to developed curricula and education material to introduce the remote sensing and GIS in the grammar and high schools regular curricula;
- To develop and establish a specialization course for school teachers, about remote sensing teaching in grammar and high schools.

There are many specialization courses about remote sensing and spatial information systems around the world, but all of them are designed to professional that developed application projects. Usually these professional are involved with natural resources and environmental activities and it is natural to use these technologies in their professional live.

But, this not happens with the grammar and high school teachers' community. Usually they do not have any information about remote sensing and GIS systems or how these information could be useful as educational resource. The idea of this specialization course is to qualify the school teachers and to help them to educate the young students.

At the end of the Educa SeRe Program it is expected that this technology will be added to the geography and normal superior under graduation courses curricula, specially designed for grammar and high school teachers.