SPACE RESOURCES FOR THE CLASSROOM

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ABSTRACT

NAROM (Norwegian Centre for Space-related Education) offers education programmes for teachers and students at many different levels to ensure recruitment, promote appreciation for the benefits of space activities, and to stimulate the interest for science in general. NAROM is located at Andøya Rocket Range (ARR), and uses the unique technical facilities at ARR to provide an exciting educational experience.

In addition NAROM concentrates on being an important contributor in the provision of space-related resources for the classroom. The website SAREPTA, www.sarepta.org, was established to exploit the exciting, visible aspects of space activities to stimulate interest in Science and Technology and thereby ensure recruiting to space-related disciplines. Through the website sarepta.org, NAROM also aims to show young people how space activities can be used as a tool in the development of society and to appreciate and understand the benefits, challenges and importance of space for everybody.

FULL TEXT

The space resource SAREPTA offers fresh satellite images, space applications and technique put together in a pedagogical context. There is both an English and Norwegian version. The last years the website is considerable extended. There are e.g. resources for project tasks on weather and climate, ice in the Arctic, ocean currents seen from satellites, Earth Observation and GIS, exciting Sun activities, satellite navigation and communication, rockets, space station and space shuttle.

The satellite images in the SAREPTA Image Bank are freely available for education purposes, but users need to register. In September 2006, there were more than 5,500 registrations.

The website has available a lot of curriculum based teaching resources for science and geography classes in European upper primary and secondary schools. The resources are presented into different main themes with case studies including background information and exercises. The following gives an overview of some of the resources and satellite images.

Studies of the Sun, solar physics, has long traditions in Norway. We are also a small contributor to the SOHO (Solar and Heliospheric Observatory) project and participate with experiments on board. In the theme “The Sun” in SAREPTA we present a look at what the Sun is, how it affects the Earth, and how we conduct research on this exciting star. SAREPTA offers opportunities
of studying Sun storms when they occur, and of exploring how Sun storms affect the Earth. The mystery and activity of the Northern lights are parts of these. The satellites transmit thousands of images of the Sun every day. SAREPTA offers facts, animations and exercises.

Fig. 1: Northern Lights. Drawing by the Norwegian explorer, scientist and statesman Fridtjof Nansen (1911).

Into the theme “The Earth seen from satellites” we stress that information from Earth observation satellites are an important source of information for many research tasks and practical application both at local, regional and global level. The satellites help us to gain increased understanding of the planet where we live, and contribute to providing better foundations for decisions.

Also for the classroom the results from Earth observation satellites, such as Envisat, are invaluable in the monitoring of global warming, pollution and other environmental aspects. Example of topics in the theme “The Earth seen from satellites” are “Weather situations” using up-to-date weather satellite images, “The ocean in motion”, Sea ice in the Arctic, “Algae in the ocean”, “The Ozone layer” and “Oil spill and ship traffic”.

Fig. 2: NOAA image channel 2 from SAREPTA Image Bank covering Northern Europe 25th August 2006.

The SAREPTA resources in most part reflect space-related topics important in Norway and in the same time relevant to the Curriculum. The different content is developed in cooperation with Norwegian space specialists and teachers at various levels. The cooperation with the teachers are very important to secure that the resources are based on pedagogical concepts and didactical methods that are well proven. At the same time, ICT resources should stimulate the development of new concepts and methods for learning.

During the developing phase of a resource, e.g. new topic with case studies, there is a process with the teachers both to take part in discussions to define the need for new space resources for the classroom and to extensively evaluate the new content. The teachers give feedback related to the Curriculum and the pedagogical approach. As soon as the new resource is available on the web, the teachers initiate testing in real classrooms. Based on feedback from the teachers, there is a critically reviewing and updating. When the Norwegian version of the new resource is improved, we start the translating and publishing into English.
The school year 2006 has implemented the first year with new Norwegian Curriculum for the 10-year compulsory school and Upper Secondary Education. This gives both opportunities and new challenges related to the SAREPTA resources. The subject “Science and environment” is replaced with Science including a main theme called Space. Resources for this theme are mainly already covered in sarepta.org. Related to Science at Upper Secondary level, there is a new subject called Geoscience coming up. The Geoscience Curriculum include e.g. studies of the oceans, glaciers, the earth’s surface and its interior, volcanoes, earthquake, flooding, meteorology. As tools for the Geoscience are e.g. use of satellite images, weather maps, statistics, digital maps, GPS, GIS (Geographical Information Systems). One main theme into Geoscience is Geo-research. These include research and field study in the local area of the school focusing e.g. on the landscape, bedrocks and the deposits (Ice Age), but also a geo-research in an area outside Scandinavia.

Fig. 3: Using Images Processing Software (LEOWorks) for analysing the Ikonos image covering Oslo.

The new subject Geoscience will give several possibilities introducing Earth Observation into the classroom. Some are already present in sarepta.org into the main themes “The Earth seen from satellites” and “Satellites monitor the Earth”. To draw examples to support the Geo-research, we have established the main theme “Earth Observation and GIS”. Together with teachers we have started a process to prepare and publish case studies for use for the local area research. The proposed case studies includes facts, preparations in the classroom with analysis of satellite images, working in the field with use of the GPS, following-up with imaging and use of thematic geodata in a simple GIS. For each case study there are available data (satellite images, thematic maps) for downloading ready to be used in an Image Processing Software (LEOWorks) and a GIS-system. The software is free for use for the schools.

We are just in the early beginning regarding the development of case studies including data for the local area. We have experienced that geospatial technologies (GIS, Remote Sensing and GPS) have become increasingly important in society and education. They are important tools in supporting the search for solutions to complex and critical environmental problems. In the process we have faced some challenges and barriers to deal with. The key limiting factors are access to data (e.g. SPOT images and thematic maps) related to the local area, amount of time required to prepare data and finding locally relevant data. The next step for development will be to identify educational GIS/ satellite images “best practice” projects worldwide to be presented into sarepta.org and for use into the Geoscience classroom in Norway. Here we are looking for partnership around the world.

In conclusion, teachers and students using Geographic Information Systems and Satellite images have already began to prove their effectiveness as a powerful motivator for learning and an outstanding tool for data analysis in and out of the science classroom.