The SEOs Project

Science Education through Earth Observation for High Schools

Tutorial 1: A World of Images

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Aims of Module 1

“A World of Images”... a first approach to remote sensing

- Make the students **curious** about EO
- Show how **beautiful** is Earth from space
  Raise awareness about how **fragile** it is
- Discover new places in the world
- Explain how satellite images are used to **monitor** and **understand** many processes at work on our planet
- Propose a **variety of images** illustrating remote sensing applications
- Introduce the other SEOS modules
- ... in a **friendly** and **dynamic** tone!
How can satellites help to study and protect coral reefs?

Corals are of great importance for animals and human beings living nearby. Study and monitoring of coral reefs would be very difficult without the help of satellites images to:

- Map the sea-floor and localize coral reefs
- Determine the different kinds and forms of reefs
- Retrieve information about reefs communities (corals, fishes, ...) and surrounding areas (seagrasses, sand, rocks, ...)
- Monitor the changes around coral reefs and produce risk maps

Discover coral reefs by satellite in Module 3!

Corals are in danger!

Coral reefs are extremely sensitive. Slight changes in the reef environment may have detrimental effects on the health of entire coral colonies.

Coral bleaching occurs where the algae is expelled from the coral tissue, progressively losing its colour and eventually dying.

The precise reason for coral bleaching is unknown but the phenomenon is associated with increased water temperatures, low salinity and high sunlight levels.
Online tour

- A look at the module pages


- A look at the Teacher’s corner
To learn about Earth observation and satellite images

Tutorials, worksheets - Eduspace website

Subjects: Geography, Science.

Overview: The website aims to give to the youth of Europe a portal to space applications and in particular to a wide-spread visibility of Earth Observation as co-ordinated by the European Space Agency (ESA) and its European and National Partners. The website is being developed under the umbrella of EURSYS and offers to teachers and students of secondary school in Europe means to bring Earth Observation into the classroom.

Materials: An internet access to the Eduspace website (available in French, Dutch, English, Danish, Spanish, Portuguese, German and Italian).

Source: Eduspace.

Tutorial - EOEdu website

Subjects: Geography, Science.

Overview: An educational website to discover satellite Earth Observation. The website is divided into 5 parts: Introducing remote sensing (a tutorial explaining the basis of remote sensing, data acquisition, image processing, radar and GIS), Applications (a list of projects and applications based on Earth observation techniques), Satellites and sensors (a list of satellites and sensors, with detailed explanation on whether satellites and interpretation of cloud images), Teacher’s corner (a list of educational resources and news), Links and Glossary.

Materials: An internet access to the EOEdu website (available in English, French and Dutch).

Source: EOEdu © Belgian Science Policy. All rights reserved.

Tutorials, worksheets - Outreach material from the Canada Center for Remote Sensing

Subjects: Geography, Science.

Overview: A selection of tutorials about Fundamentals of remote sensing, Digital images and digital analysis techniques, Satellite data reception, Radar remote sensing, polarimetry and stereoscopy and an Image interpretation quiz.

Materials: An internet access to the website (available in English and French).

Source: Natural Resources Canada/CCRS.

Worksheets - Earth Observation in the classroom

Subjects: Geography, Physics, Chemistry.

Overview: A set of 5 fiches demonstrating the usefulness of remote sensing to be used in the science curricula: Introduction to remote sensing, Calculating cyclones’ speed, Mapping floods, Monitoring photosynthesis and Tracking oil spills.

Source: Natural Resources Canada/CCRS.
Testing in high schools

• 3 tests in Belgium and UK
• Pupils visited the module while seeking answers to one of the quizzes
• Pupils gave useful comments to improve the module
• Feed-back:
  - Straightforward navigation
  - Nice layout, nice pictograms
  - Scientific content but easy to understand
  - Images sometimes difficult to interpret but very well explained
  - Interesting topics
  - Beautiful images

→ Successful first approach of RS and EO
Test UK – Sept. 2008 (16 pupils)

- **What did you like?**
  - beautiful images
  - nice symbols, nice structure
  - helpful explanation about each picture

- **Improvements?**
  - Quiz too long
  - Colour codes, labels, more information on the image details

- **Motivated to learn more?**
  - Yes. "It makes you look at the world in a different way. A fresh look."

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**Has the module motivated you to learn more about remote sensing?**

- 1 (very much)
- 2
- 3
- 4 (not at all)

**In which subject did you use satellite images?**

- Environmental science
- Physics
- Biology
- Geography
Test Belgium – Oct. 2008 (18 pupils)

- What did you like?
  - beautiful images + zoom
  - nice symbols
  - the quiz
  - clear explanations

- Improvements?
  - Another language
  - Global overview would help navigating

- Motivated to learn more?
  - Not really. "It’s nice to catch new things but I’m not really interested in that topic."

![Bar chart for personnal increase of knowledge about the module topic]

![Bar chart for satellite images in class]
What did you like?
- beautiful images
- pictograms
- diversity
- explanation boxes

Improvements?
- Another language
- Shorter loading time

Motivated to learn more?
- Yes, maybe. "You learn that remote sensing techniques are used in a lot of researches about current environmental problems and how to map these problems. You are surprised by the diversity."
Teachers’ comments

• Teacher A about Teacher's Corner:
  - *It is very clearly set out and at the appropriate level, with excellent resources which challenge the usual ideas and therefore shows the benefit of remote sensing.*

• Teacher B:
  - *I loved the intuitive navigation, going from one image to another through nice visual little icons was great. It is visually very nice. It was interesting and topics were worth knowing about.*

• Teacher C:
  - *Very interesting but not really related to the curricula.*
Dissemination - outreach

• Prerequisite: translation

• European level:
  – Presentation in educational or RS conferences
  – European websites

• National level:
  – Teacher trainings
  – Demonstrations in schools or in special events
  – Outreach through associations of geography teachers
  – Articles in teachers’ publications and websites

• Online:
  – www.seos-project.eu
  – www.eoedu.be
  – http://www.esa.int/SPECIALS/Education/
  – Education websites:
    www.eschoolnet.org, http://www.scienceinschool.org, ...
www.seos-project.eu

Thank you for your attention