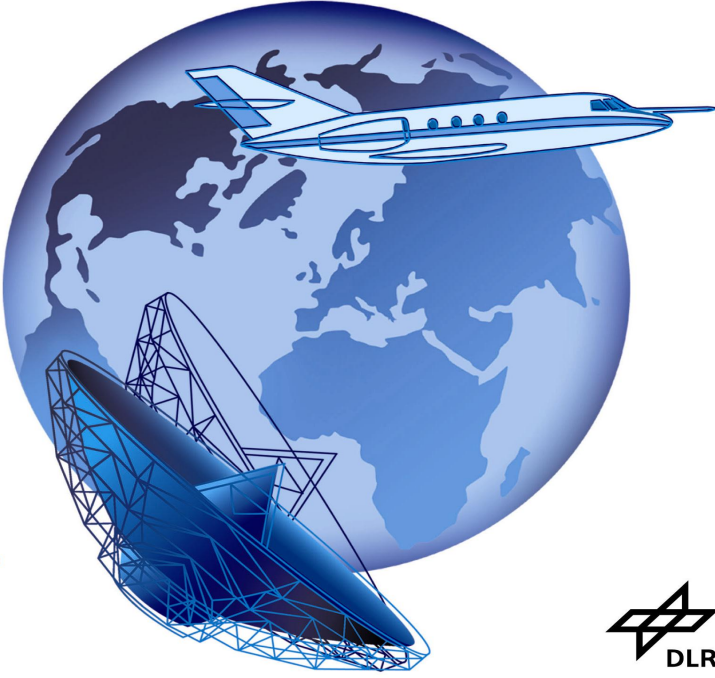


DLR_School_Lab

Oberpfaffenhofen



esa

Education Programs Synergies

Dieter Hausamann, DLR
Antonios Mouratidis, ESA

WGCapD-2 Meeting
March 4 – 6, 2013
Frascati, Italy



Our Goals

- Attract (young) people to EO
 - Technology
 - Missions
 - Software
 - Data
 - Applications
- Create awareness for the usefulness of EO – especially in developing countries
- Demonstrate advantage of combined expertise



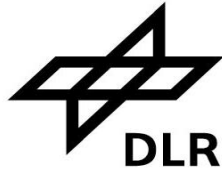
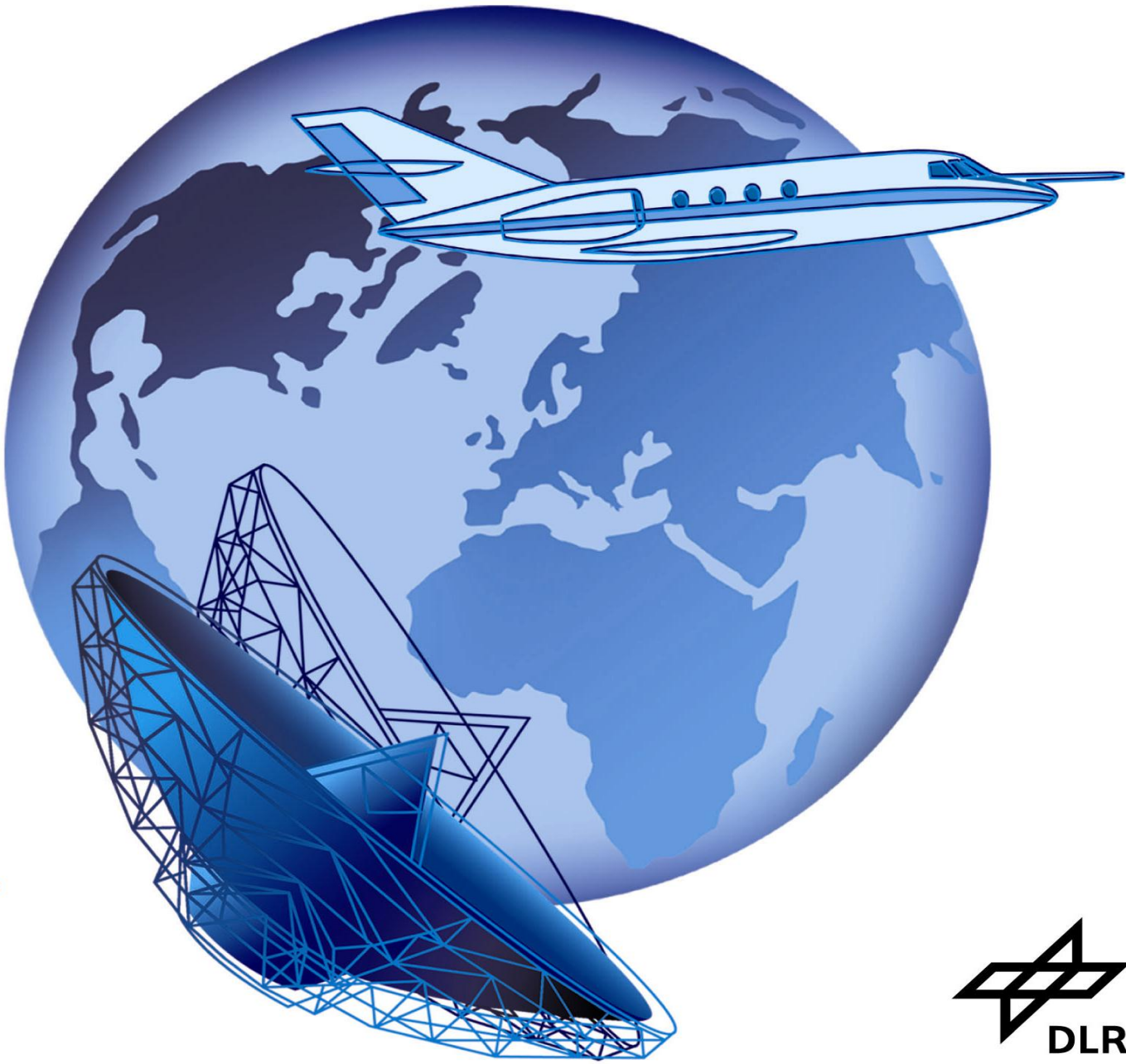
IEEE International Geoscience and Remote Sensing Symposium

Remote Sensing for a Dynamic Earth

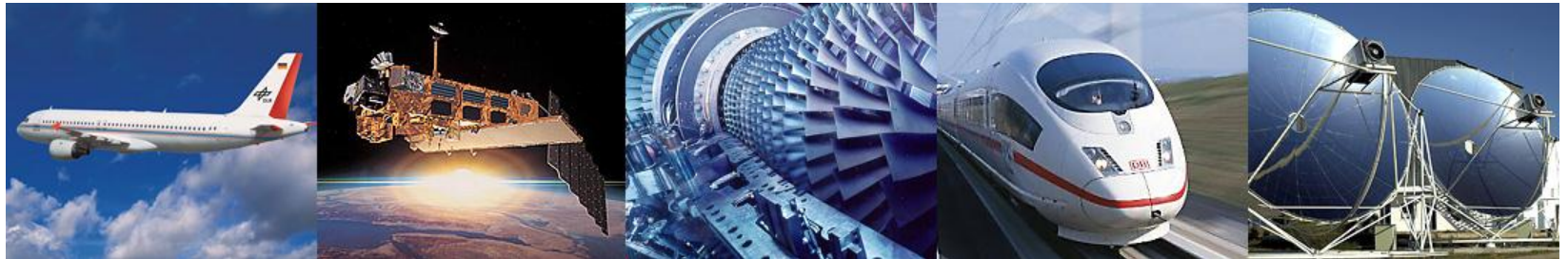
1 + 1 ≈ 5

DLR School_Lab

Oberpfaffenhofen



DLR German Aerospace Center



- Research Institution
- Space Agency
- Project Management Agency



DLR Site Oberpfaffenhofen

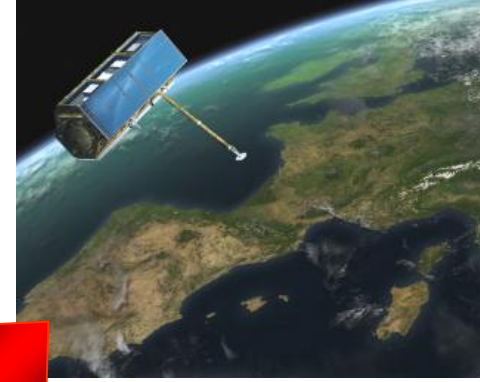
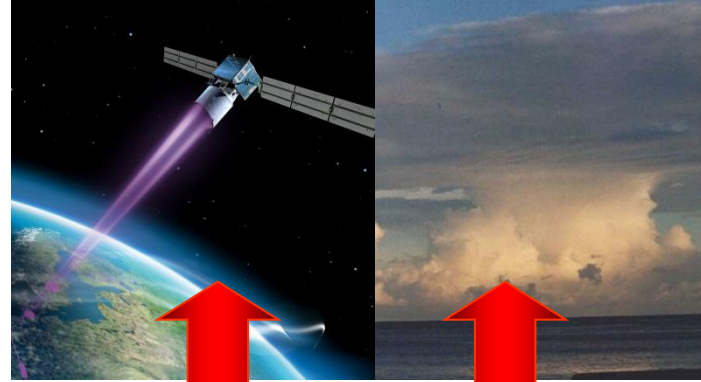
Employees: Approx. 1,700

Size of site: 245 000 m²

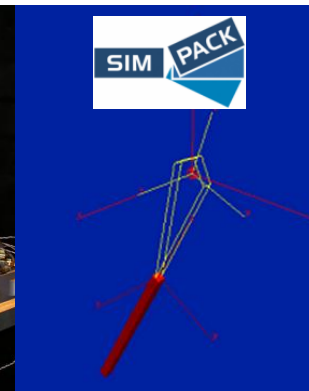
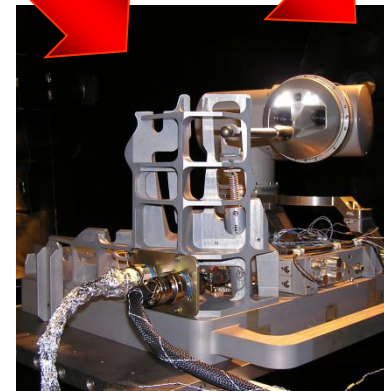
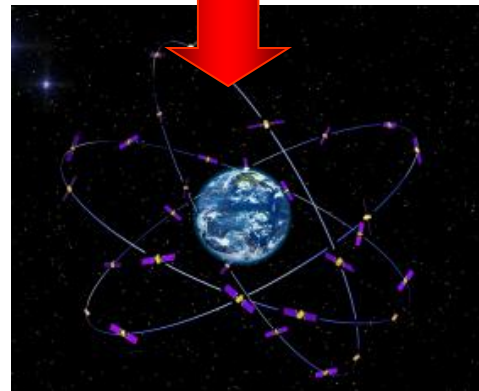
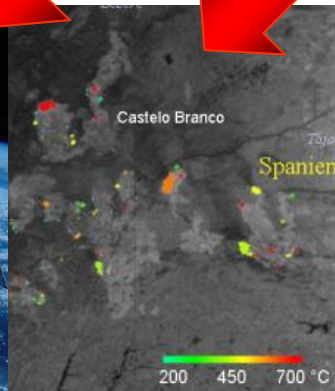
Research institutes and facilities:

- Microwaves and Radar Institute
- Institute of Communications and Navigation
- Institute of Atmospheric Physics
- Remote Sensing Technology Institute
- Institute of Robotics and Mechatronics
- German Remote Sensing Data Center
- Space Operations and Astronaut Training
- Galileo Control Center
- Flight Experiments





DLR_School_Lab
Oberpfaffenhofen

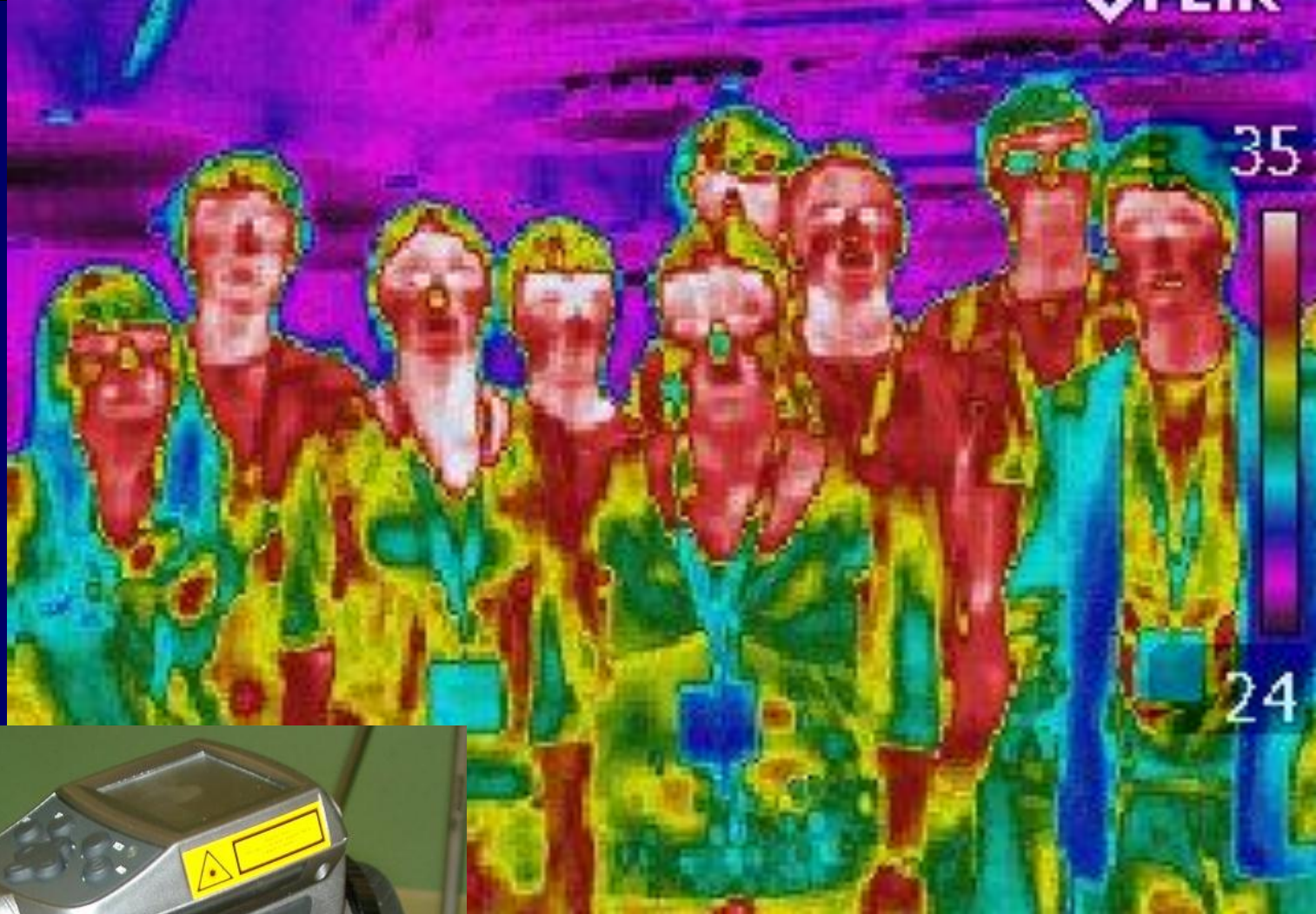


Experiments

DLR_School_Lab Oberpfaffenhofen

Experiment	Institute
<u>1. Infrared Technology</u>	<u>Remote Sensing Technology</u>
<u>2. Laser Technology</u>	<u>Physics of the Atmosphere</u>
<u>3. Radar Technology</u>	<u>Microwave and Radar Technology</u>
<u>4. Optical Remote Sensing</u>	<u>Remote Sensing Data Center</u>
<u>5. Weather and Climate</u>	<u>Physics of the Atmosphere</u>
<u>6. Satellite Data Analysis</u>	<u>Remote Sensing Data Center</u>
<u>7. Satellite Navigation</u>	<u>Communication and Navigation</u>
8. Robotics	Robotics and Mechatronics
9. Virtual Mechanics	Robotics and Mechatronics
10. Flight Team Simulator	Flight Operations
11. Mobile Rocket Basis	Space Operations
12. ASURonaut	Robotics and Mechatronics
13. Tunnel Boring Machine	Technical University Munich









Microwaves in Application

The Redevelopment of the DLR School Lab

CW-ISAR: The New Imaging Radar Experiment





Remote Sensing Experiments

Major Components

Experiment	Keywords	Instruments
Infrared Technology	thermometry, emissivity, black body, prism, BIRD, Herschel, Boltzmann	2 FLIR-Cameras, Pyrometer, special coated examination objects
Laser Technology	polarisation, emission, monochromatic light, quantum optics, signal transmission, LIDAR, HALO	Infrared Class IV Laser, Class II Laser for signal transmission, simulating 3D-Laserscanner
Radar Measuring Technology	microwaves, echo, Doppler effect, frequency, SAR, Tandem-X	Imaging Radar (SAR), One Dimensional Radar, Radar Speed Sensor
Optical Remote Sensing	sun spectrum, ozone, reflectance, hyperspectral RS, VNIR, NDVI	ASD-Spectroradiometer, Sun Photometer, Pyrometer
Earth Observation with Satellite Data	resolution, multispectral sensor, image processing, change detection, Landsat	LEOWorks image processing software, Landsat Data



Experimental Concept

Experiments represent the institutes' competence

- ... close relation to state-of-the-art research
- ... development by DLR scientific & technical experts
- ... combination of specialists' know-how and high-tech equipment
- ... continuous update and further development

Didactical transfer

- ... small team experiments (4-6 students – 1 supervisor)
- ... autonomous and haptical work emphasized
- ... results depending on students' age and capabilities
- ... time frame: 2 hours per experiment
- ... level of complexity adjusted to each individual group





The team

2013



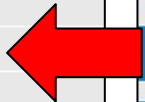
ESA – EDUSPACE

EO Education resources for secondary schools

In 8 languages

Choose your language


- Dansk
- Deutsch
- Español
- Ελληνικά
- Français
- Italiano
- Nederlands
- Português



The screenshot shows the ESA Eduspace website. At the top, the ESA logo and 'eduspace' text are displayed against a blue background with a satellite image of Earth. Below the logo, the text 'European Space Agency' is visible. A navigation bar contains links for 'ESA', 'Education', 'Home', 'Earth from Space', 'Environmental Issues', and 'Envisat for Schools'. The date '03-Mar-2013' is shown in the top right corner. The main content area is divided into two columns. The left column contains a sidebar menu with sections: 'About Eduspace' (with sub-links 'What is Eduspace?' and 'What tools does it offer?'), 'Choose your language...', 'Remote Sensing Principles' (with sub-links 'What is remote sensing?', 'Remote sensing in depth', 'History of Earth observation', 'Mapping and satellite data', 'Satellite orbits', 'Earth observation satellites'), 'Resources...', 'Multimedia' (with sub-links 'Image Gallery' and 'Video Gallery'), and 'Services' (with sub-links 'Contact us' and 'Search in Eduspace'). Below the services is a search box with a 'GO' button. The right column features a main article titled 'What is Eduspace?' with a sub-image of a teacher in a classroom. The article text states: 'The Eduspace website aims to provide secondary school students and teachers with a learning and teaching tool. It is meant to be an entry point for space image data, and, in particular, to a widespread visibility of Earth observation applications for education and training. The Eduspace website encourages teachers to use Earth observation data in their curriculum by providing ready-made projects. It is rich in didactical material, especially in local and global remote sensing satellite data. It is a source of ideas about how to introduce space-related matters into the classroom, where full scale examples are also presented.' Below the article is a section titled 'About Earth from Space' with text: 'This section provides high spatial resolution imagery acquired over the major cities and landscapes of the Earth. It aims to stimulate students and teachers to look at imagery obtained by Earth observation satellites, find their hometown and maybe even their school. Teachers and students are invited to work with this data by studying the various exercises provided in the different case studies. An objective of these case studies is to inspire schools to produce similar reports related to their own region.'


http://www.esa.int/SPECIALS/Eduspace_EN/

Theory

			
ESA Education Home Earth from Space Environmental Issues Envisat for Schools			
		03-Mar-2013	
About Eduspace		 	
What is Eduspace? ▶			
What tools does it offer? ▶			
Choose your language... ▶		What is remote sensing? Remote sensing is a way of collecting and analysing data to get information about an object without the instrument used to collect the data being in direct contact with the object. For example, if you take a photograph of your house, and on the picture you see that the house is composed of a roof, walls and windows, all of which appear as different colours, then this is remote sensing. In remote sensing, three elements are essential. They are: 1 - a platform to hold the instrument 2 - a target object to be observed 3 - an instrument or a sensor to observe the target For example, when you take a photograph of your house, you are the platform, the photographic emulsion of the film inside the camera is the sensor and the house is the target object. A key additional element, and the main purpose of remote sensing systems, is: 4 - the information that is obtained from the acquired data, and how it is used and stored	
Remote Sensing Principles			
What is remote sensing?			
Remote sensing in depth ▶			
History of Earth observation ▶			
Mapping and satellite data ▶			
Satellite orbits ▶			
Earth observation satellites ▶			
Resources... ▶			
Multimedia			
Image Gallery ▶			
Video Gallery ▶			
Services			
Contact us ▶			
Search in Eduspace ▶			
Search			

Case studies

(introductions, background, data and exercises)




European Space Agency

ESA Education Home Earth from Space **Environmental Issues** Envisat for Schools

03-Mar-2013

Earth from Space: Image of the week



• Image archive

Weather and climate...

Global Change...

Disaster monitoring

Introduction

Cyclones...

Earthquakes...

Floods...

Oil slicks

Storm surges...

Volcanoes...

Resources...

Multimedia

Image Gallery

Video Gallery


Services

Search in Eduspace

Search

...


Glacier Ice Flow



Global warming has been shown to affect the ice flow of glaciers. With the use of Earth Observation satellites, scientists are able to study and monitor glaciers, even those that are located in remote areas.

[Full story](#)


Deforestation in Rondonia



In this case study, you will learn how remote sensing can aid in the monitoring of tropical rainforests, such as the Amazon rainforest. You will see how this forest disappeared over a period of 30 years, and how the rate of deforestation can be measured. You will also learn that, even in deforested areas, the process of vegetation growth still goes on.

[Full story](#)


Hurricane Katrina



On 25 August 2005, Hurricane Katrina hit the densely populated south-eastern part of the US state of Florida with squalls of 130 kilometres per hour at maximum speed, and caused extensive damage. Fatal floods were generated by the precipitations.

[Full story](#)

Software and Tutorials



European Space Agency

ESA Education **Home** Earth from Space Environmental Issues Envisat for Schools

03-Mar-2013

About Eduspace

- What is Eduspace? ▶
- What tools does it offer? ▶
- Choose your language...** ▶

Remote Sensing Principles

- What is remote sensing? ▶
- Remote sensing in depth ▶
- History of Earth observation ▶
- Mapping and satellite data ▶
- Satellite orbits ▶
- Earth observation satellites ▶

Resources

- Image processing software**
- Tools for schools ▶

Multimedia

- Image Gallery ▶
- Video Gallery ▶

Services

- Contact us ▶
- Search in Eduspace ▶

Software downloads

- LEOWorks 3
- LEOWorks 4 (Mac)
- LEOWorks 4 (Windows)
- LEOWorks 4 (Linux)
- ArcExplorer

Tutorials

- LEOWorks 3 Tutorial
- LEOWorks 4 Tutorial
- ArcExplorer Tutorial

Combine RGB

Select Red Band
RON1

Select Green Band
RON2

Select Blue Band
RON3

Output Type Byte

OK Cancel Help

Image processing software

Eduspace provides students and teachers with the proper tools to manipulate images.

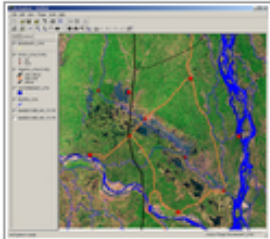
LEOWorks

LEOWorks is a major component of this educational resource, which makes the actual processing of satellite imagery on school computers possible. LEOWorks is able to perform many advanced processing operations including image classification, geometric correction, and pan-sharpening. Many image filters are available, and GIS tools enable the displaying and drawing of vectors on

images. LEOWorks is a didactical tool, and has very good help pages and an all-inclusive tutorial (see right of page). With the assistance of this help documentation, everyone is able to experiment with their own imagery to undertake their own processing. LEOWorks can process images in standard jpg, tif, bmp, and png formats.

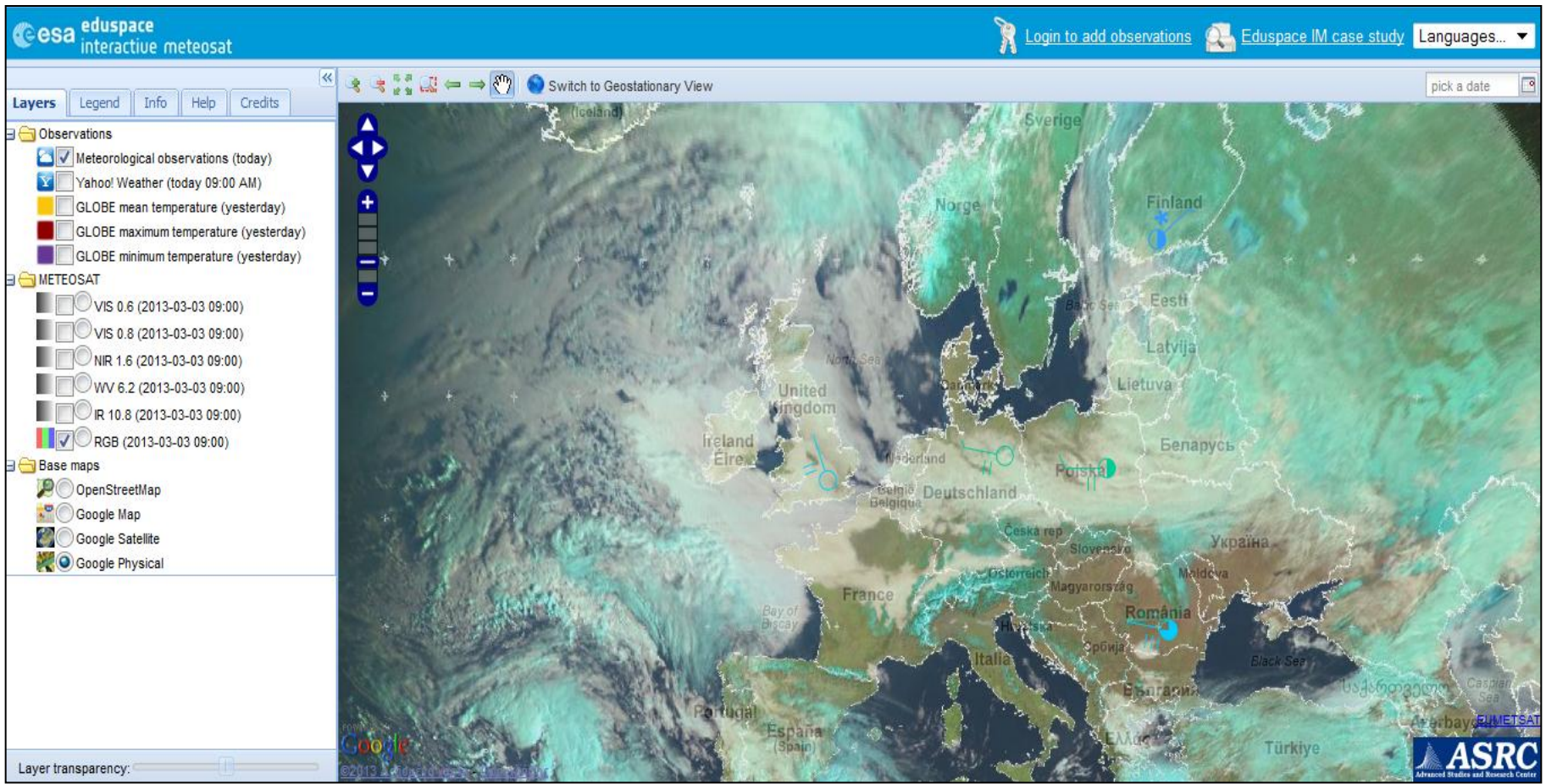
ArcExplorer

ArcExplorer is a freeware used to display and analyse layers of Geographical Information Systems (GIS). It includes a complete user guide that has been made available by ESRI, one of the leading providers of GIS software and GIS solutions.



Interactive Meteosat online application

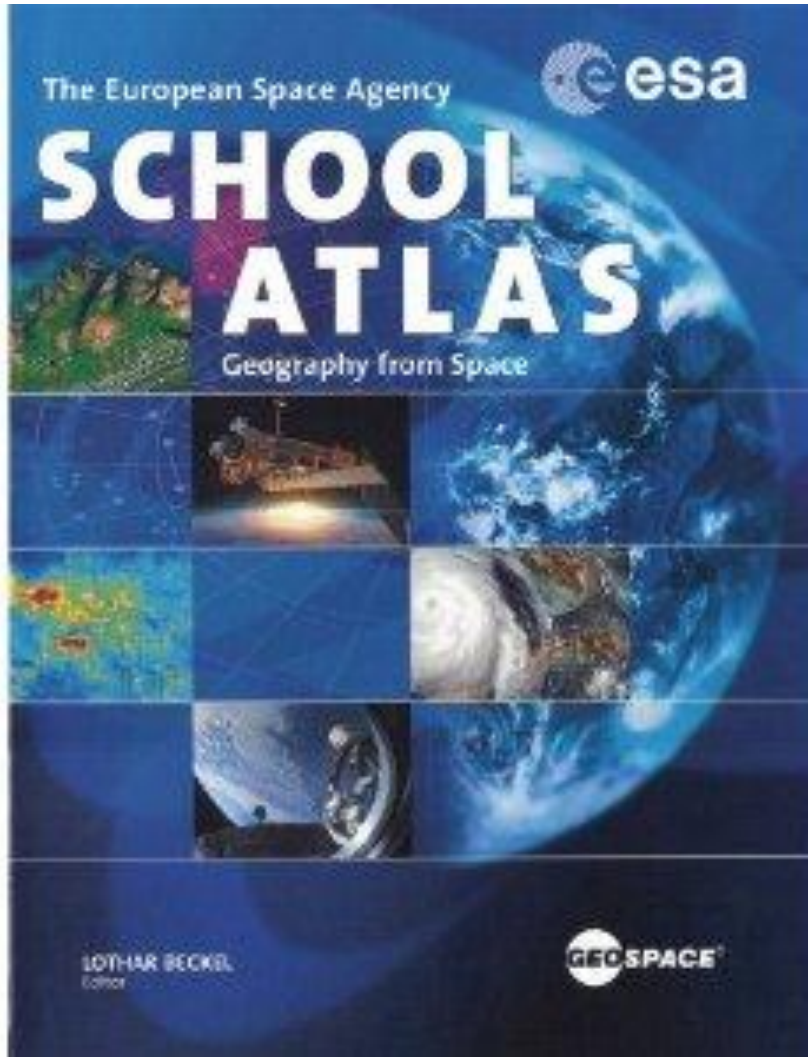
A web-based interactive application for exploiting satellite meteorology in secondary schools



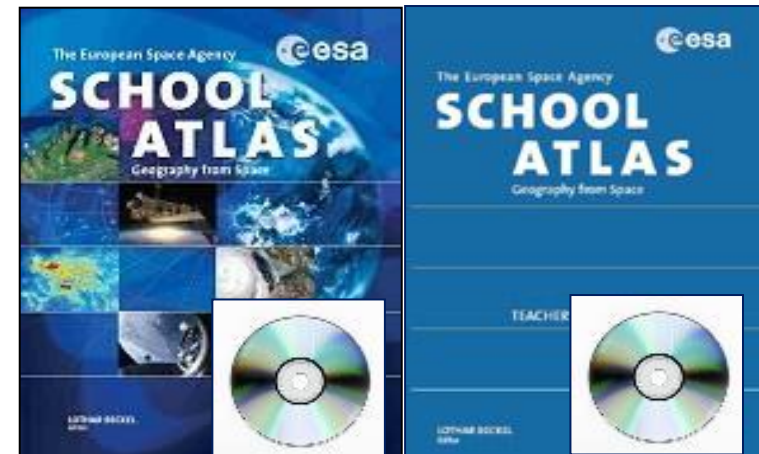
(also connected to Eduspace case studies)

http://www.asrc.ro/imeteosat_beta/map_view.php

ESA School Atlas/Geography from Space *(Incl. teacher's handbook and DVDs)*



...bridging the gap between the classroom, space technology and Earth observation

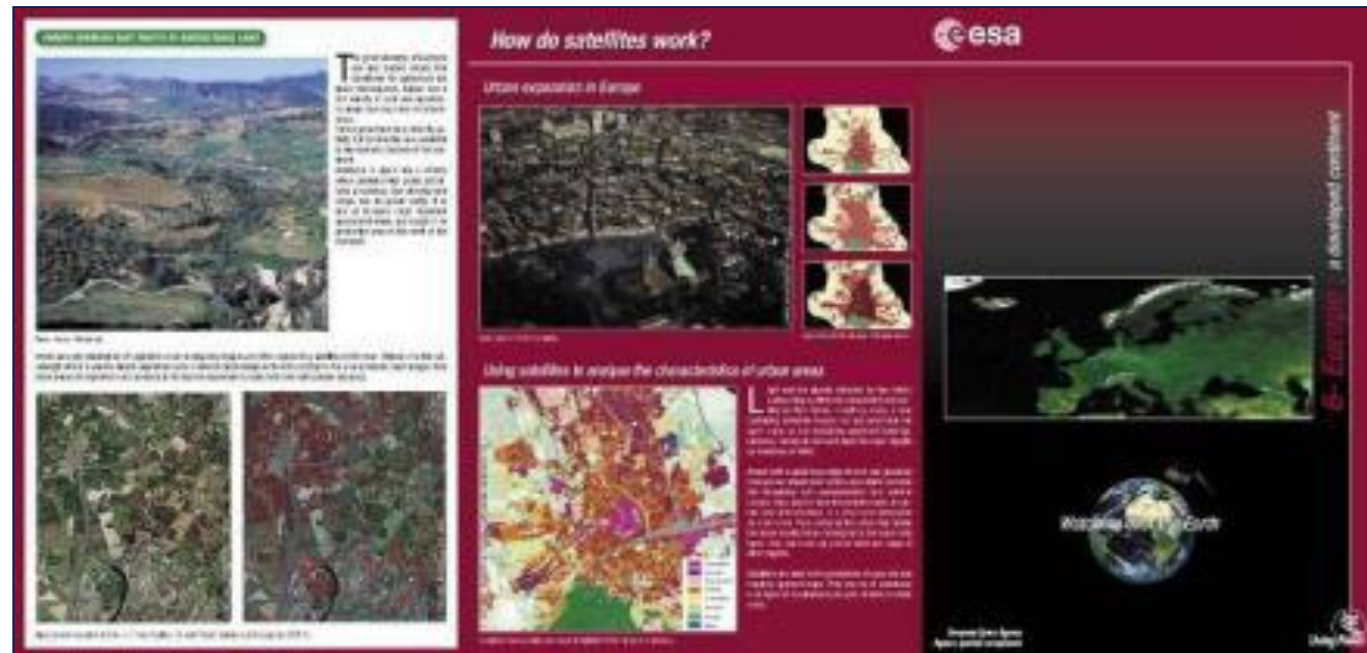


Teacher's Pack

(hard copy and DVD)



- 11 worksheets on “Watching over the Earth” topics
- Available in 6 languages (Deutsch, English, Español, Français, Italiano, Nederlands)

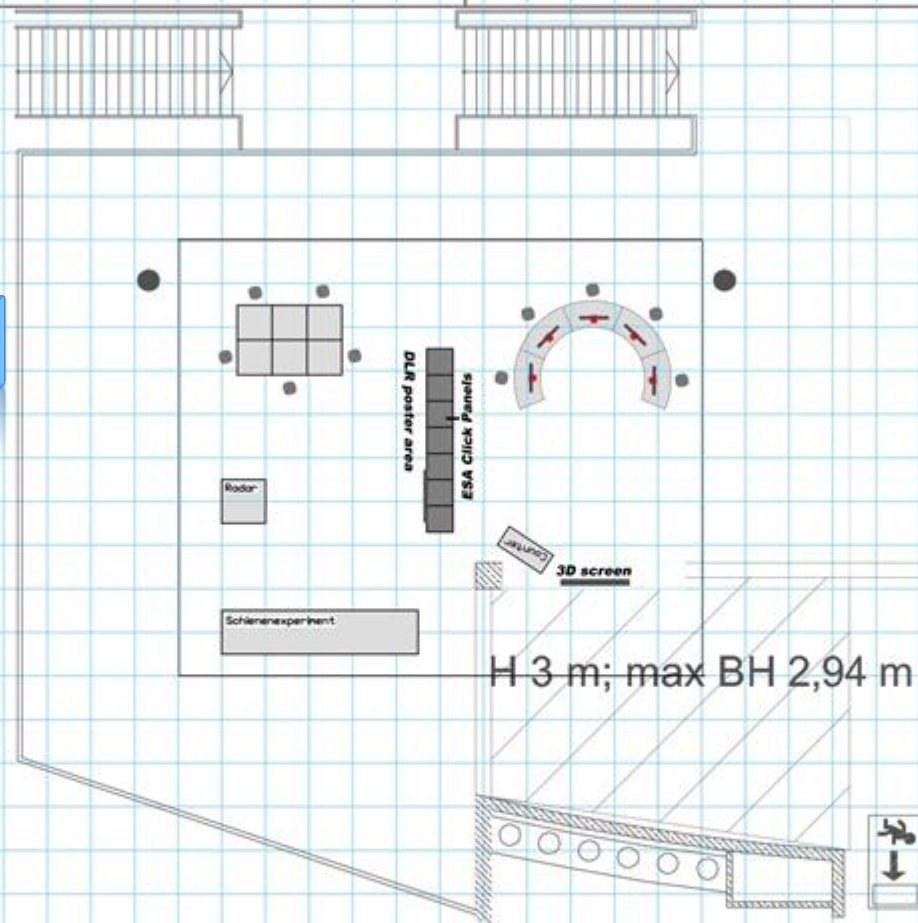


Joint DLR/ESA EO Education stand at IGARSS 2012 in Munich

Combined lab experiments, training sessions and 3D Demonstrations



DLR-ESA EDUCATION STAND IGARSS 2012



Exponat	Deckensegel hoch	Plasma-Stand	Tisch	32A CEE
Podest	Deckensegel niedrig	50" Plasma	Stuhl	220V Schuko
Vitrine	Decken-Blende	27" Moc	Wasser	Tel./Fax/LAN
Sitzfläche	Rigging	23" Cinema-Display	Sessel	DigCLIC
		Projektion	Hocker	

Projekt DLR/IGARSS School_Lab
 Jobnummer 22705
 Datum 08.05.2012
 Fassung 2.0
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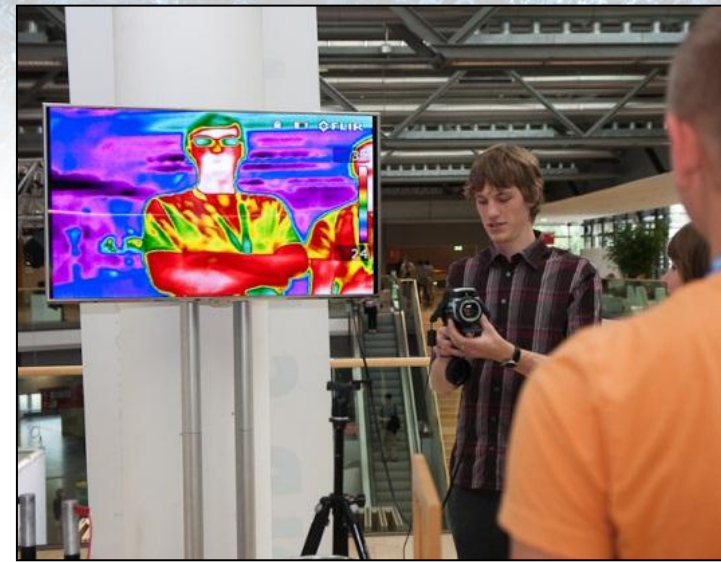




Radar experiment



Spectroscopy



Infrared techniques

The DLR School Lab experiments presented at IGARSS.

(More info at: <http://www.dlr.de/schoollab/desktopdefault.aspx/tabid-1991>)

The School Lab was combined with ESA lectures and computer practicals based on Eduspace

(http://www.esa.int/SPECIALS/Eduspace_EN/) in a joint ESA/DLR EO Education stand for school visits





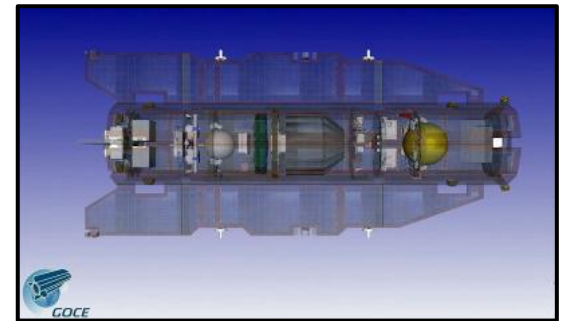
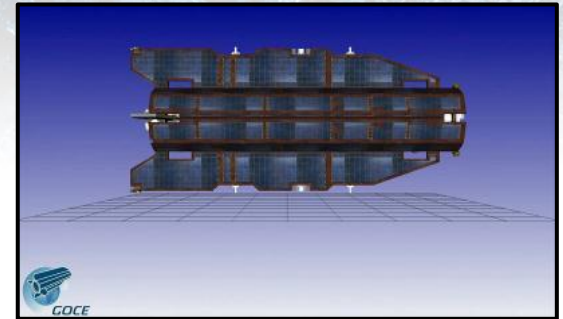
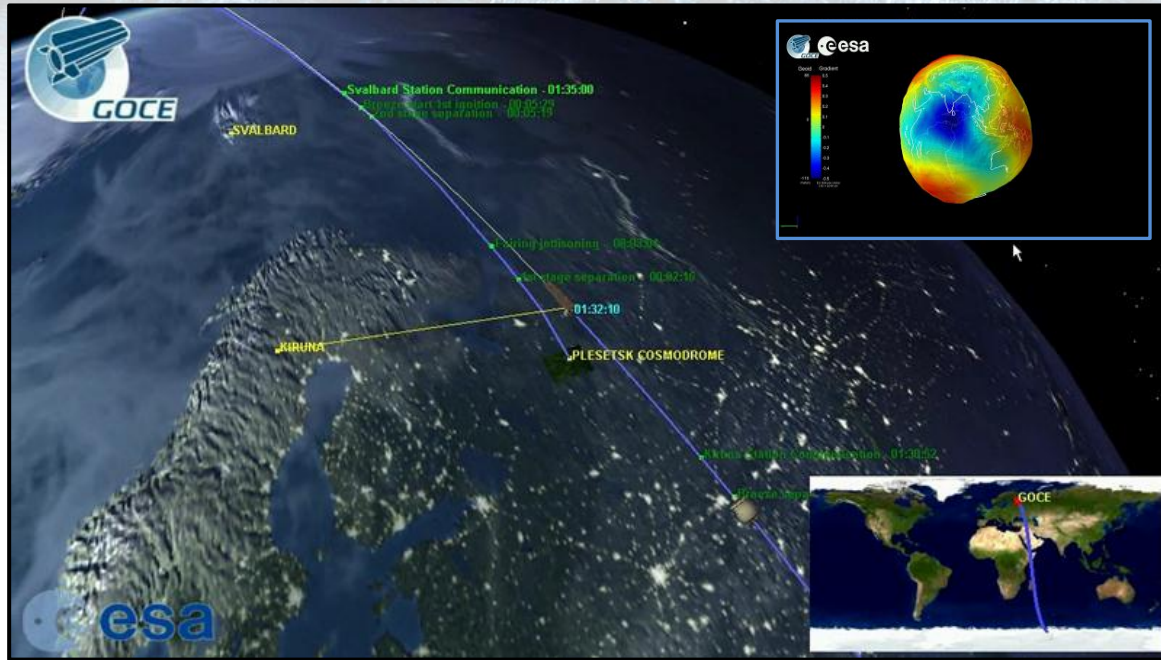
EO training sessions for high schools delivered by ESA.

(More info at: http://www.esa.int/SPECIALS/Eduspace_EN/)



European Space Agency





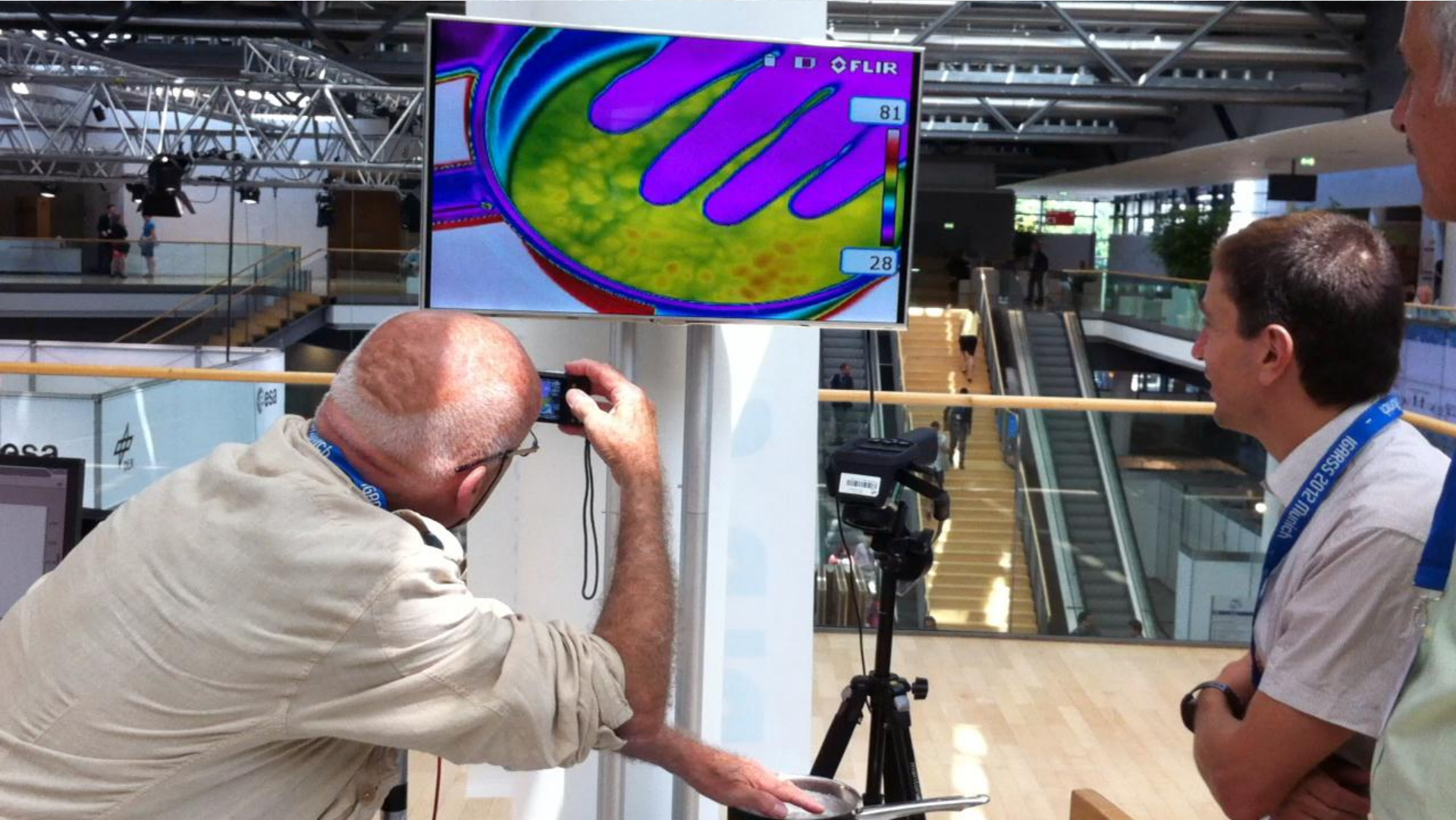
3D demonstrations on EO, were also made for the general public throughout IGARSS, at the ESA/DLR Education area.

The material used belongs to the ESA virtual reality theatre.

(More info at: <http://vrt.esrin.esa.int/tiki-index.php?page=Shows>)







Our Vision

- Establish Practical EO Education and Training Centers in many places
- Special Focus: Developing Countries
 - Africa
 - Asia
- Use Existing Expertise of Space Agencies
 - DLR
 - ESA
 - UK Space
 - ...

Next Step: Living Planet Symposium 2013

Edinburgh, United Kingdom, 09 - 13 September



→ a DLR/ESA/UK Space Agency EO education stand based on the IGARSS 2012 one

esa living planet symposium 2013
European Space Agency

ESA 24-Jul-2012

- Home
- Objectives
- Themes
- News
- Deadlines
- Registration
- Venue
- Committees
- Links
- Contacts
- Call for abstracts

Introduction




EDINBURGH
09-13 September
2013

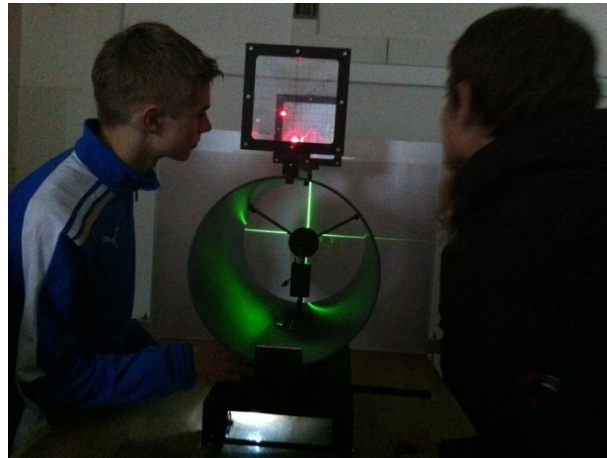
The 2013 European Space Agency Living Planet Symposium follows the previous successful symposia held in [Bergen](#) (2010), [Montreux](#) (2007) and [Salzburg](#) (2004).

The event will be held in Edinburgh, United Kingdom from 9 to 13 September 2013 and is organised with the support of the [UK Space Agency](#).

A first [call for abstracts](#) has been released, with a deadline for abstract submission on 15 February 2013. All received abstracts will be reviewed by a Scientific Committee, notification of acceptance will be provided in May 2013. Full papers for accepted contributions shall be provided at the event and will be published as ESA Special Publication.

Latest News





Thank You for Your Attention!

