Committee on Earth Observation Satellites

Living Planet Symposium Prep – Reframing the K12 Strategy

ESA, DLR et al.

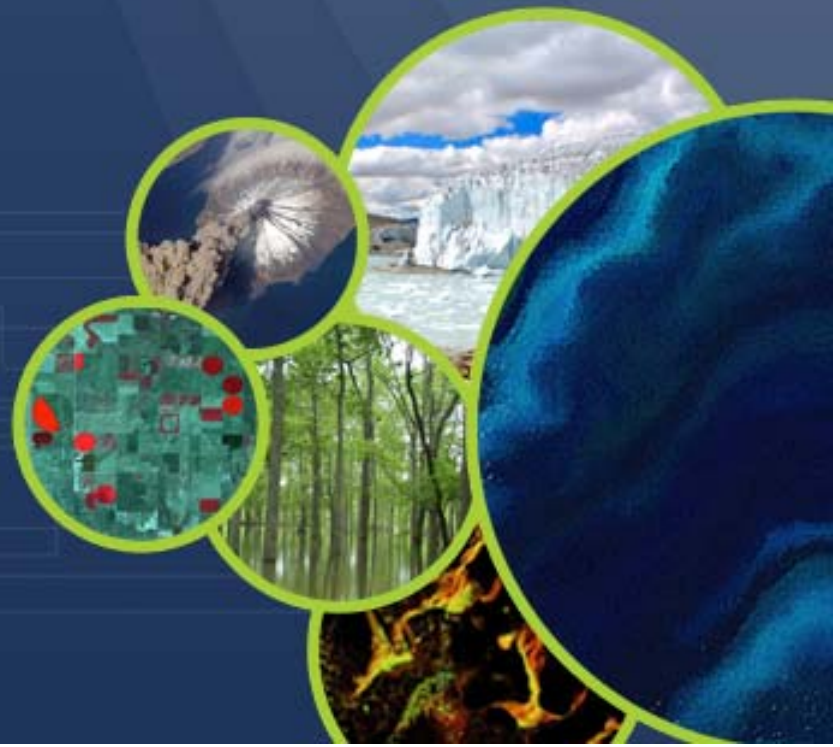
WGCapD-5 Agenda Item #35

Working Group on

Capacity Building & Data Democracy

Hampton, Virginia, USA

March 29th – April 1st, 2016



EO School Lab - General Concept

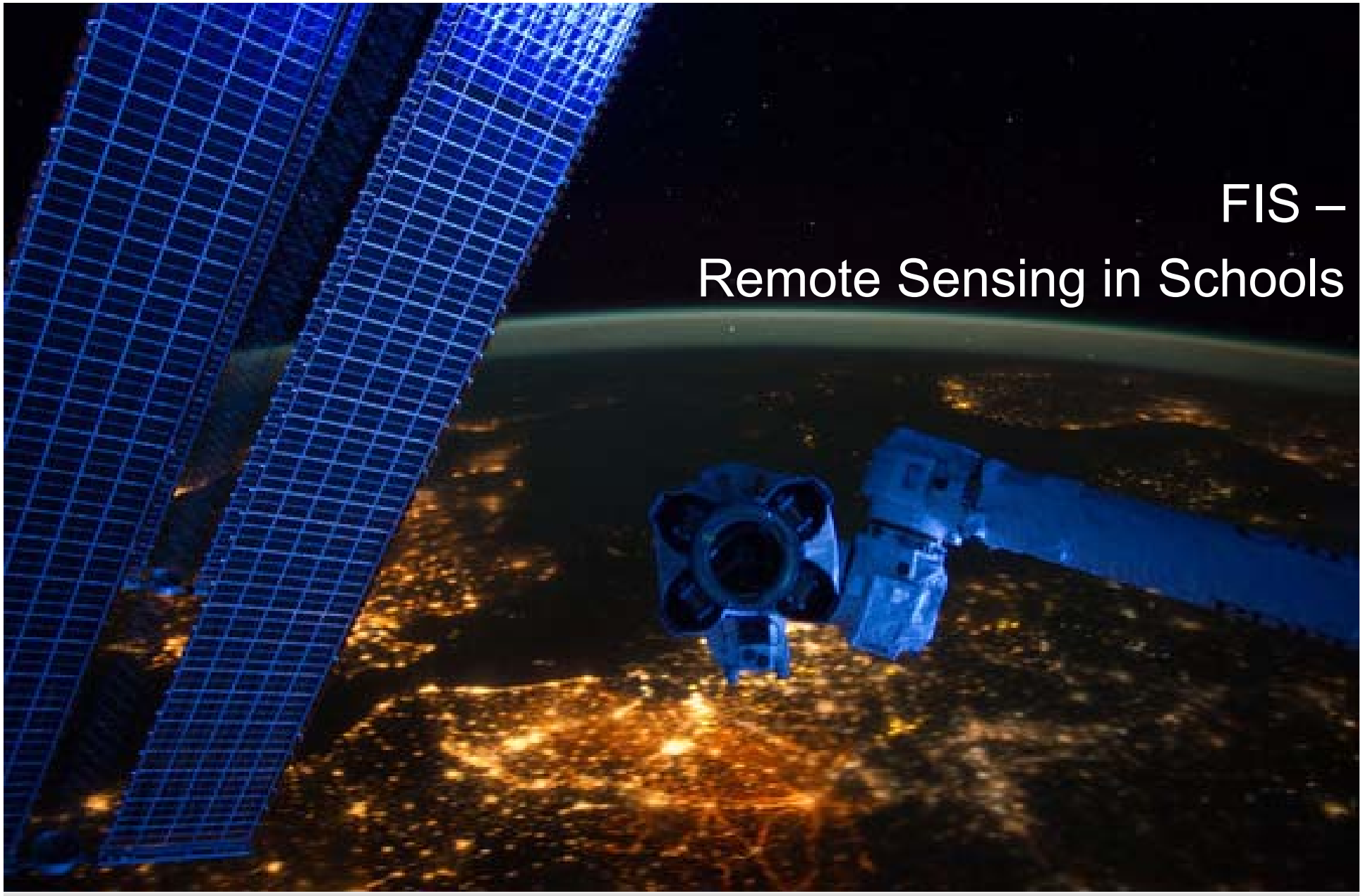
	Institution	Recipient	Instructor	Process	Product
Education	School	School Student	Teacher	Learning	Knowledge
Capacity Formation	School Lab	Sec. School Student Teacher	University Student Scientist	Attraction Stimulation Motivation	Interest Study Decision
Capacity Building	University Vocational Education	University Student Scientist Administrator	Expert	Training	Expertise & Application

Main efforts

- Increase awareness for EO data at the secondary school level
- Provide practical educational tools addressing remote sensing techniques and methods to analyse and process remote sensing data
- Provide access to practical Earth observation education facilities managed by participating Agencies
- Establish practical education showcases at international conferences
- Create and deliver educational toolboxes, including software, Earth observation data, and tutorials for user-friendly image processing at the secondary school level, as well as the lower university level
- Provide practical demonstrations for schools based on real experiments (e.g. use of spectrometers, radiometers, radar devices)
- Educate the general public about the benefits/applications of EO

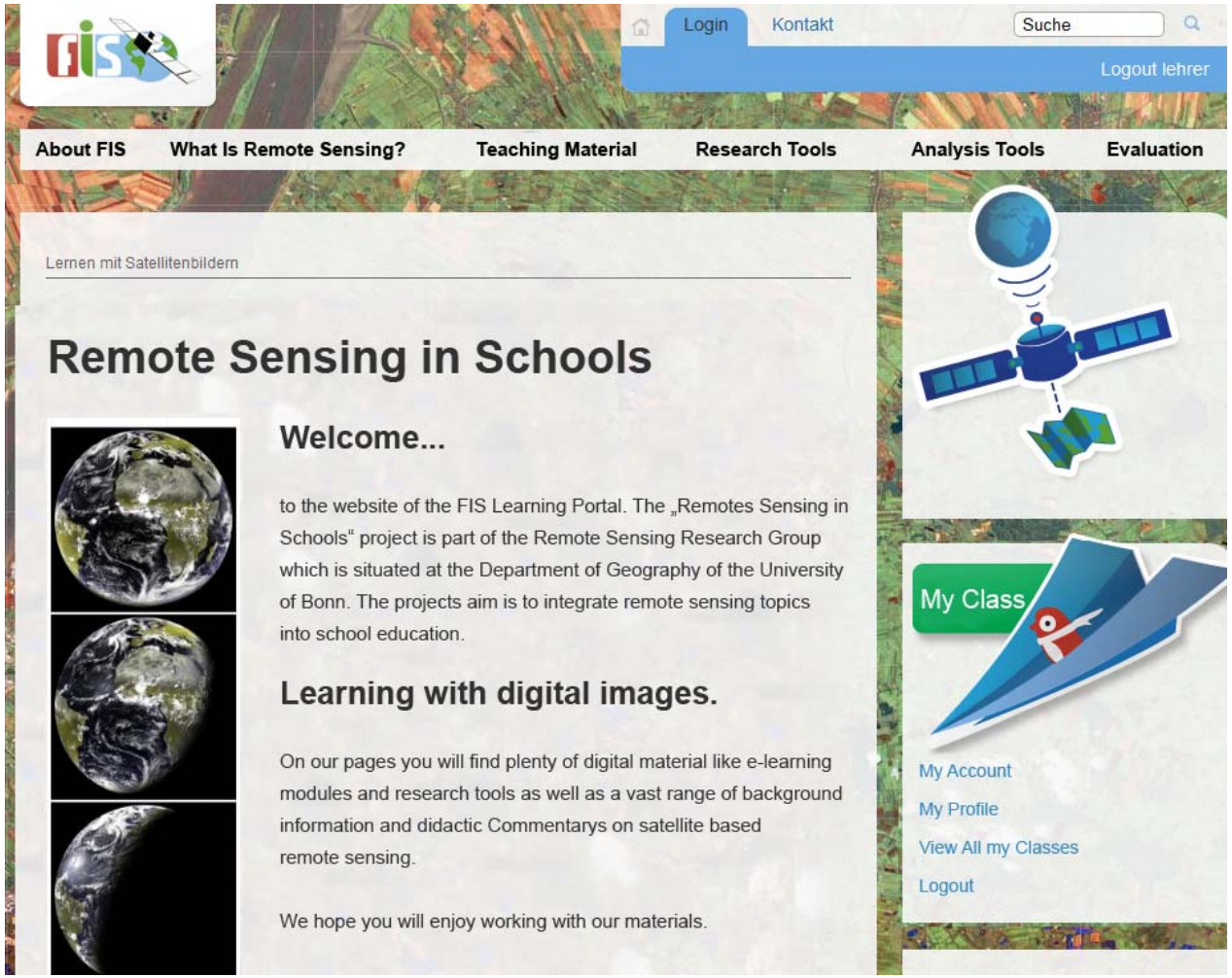
Realization #1

EO @ School
in Germany
- supported by
DLR Space Directorate


FIS –
Remote Sensing in Schools

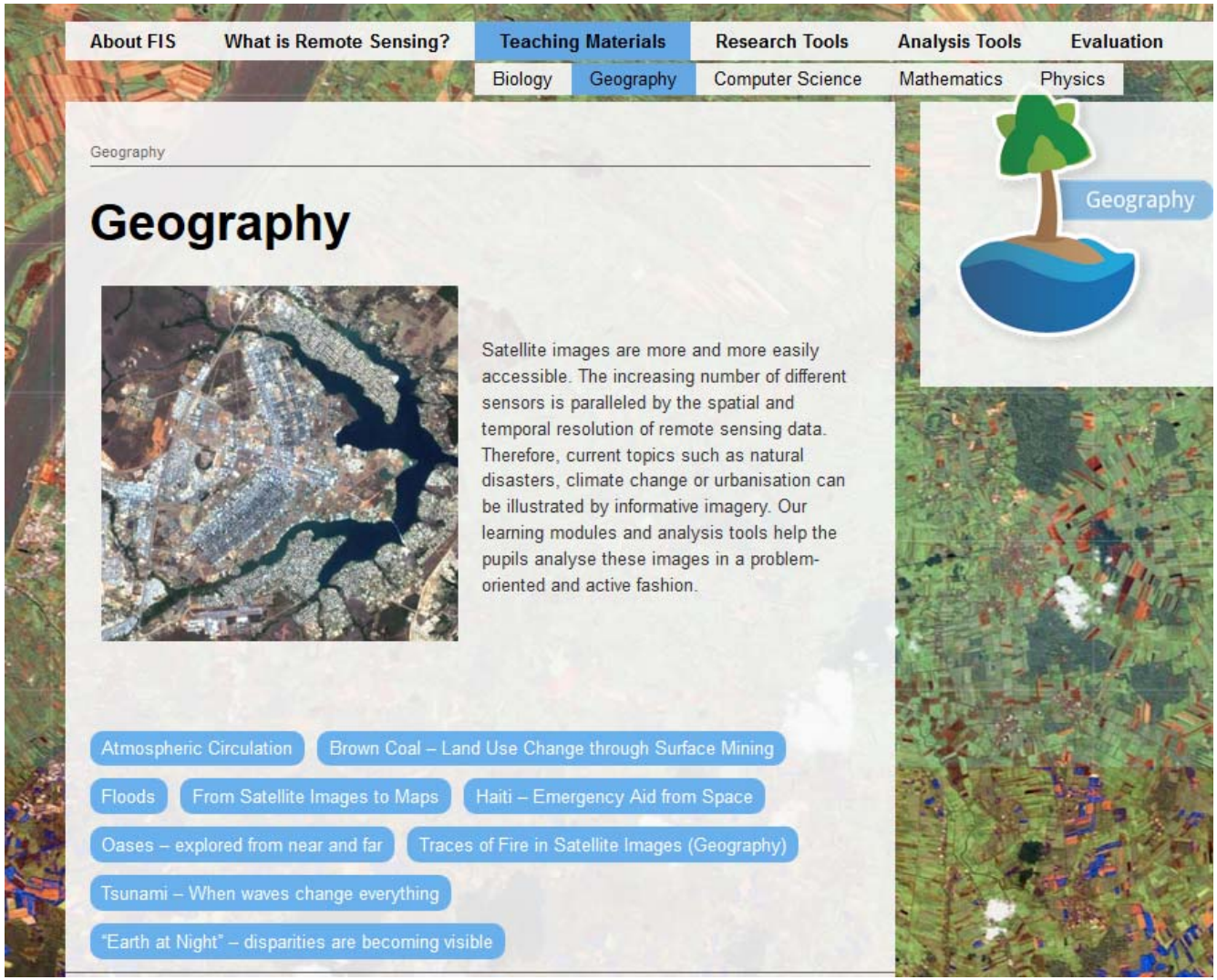
FIS – Remote Sensing in School Lessons

Learning Portal on Remote Sensing



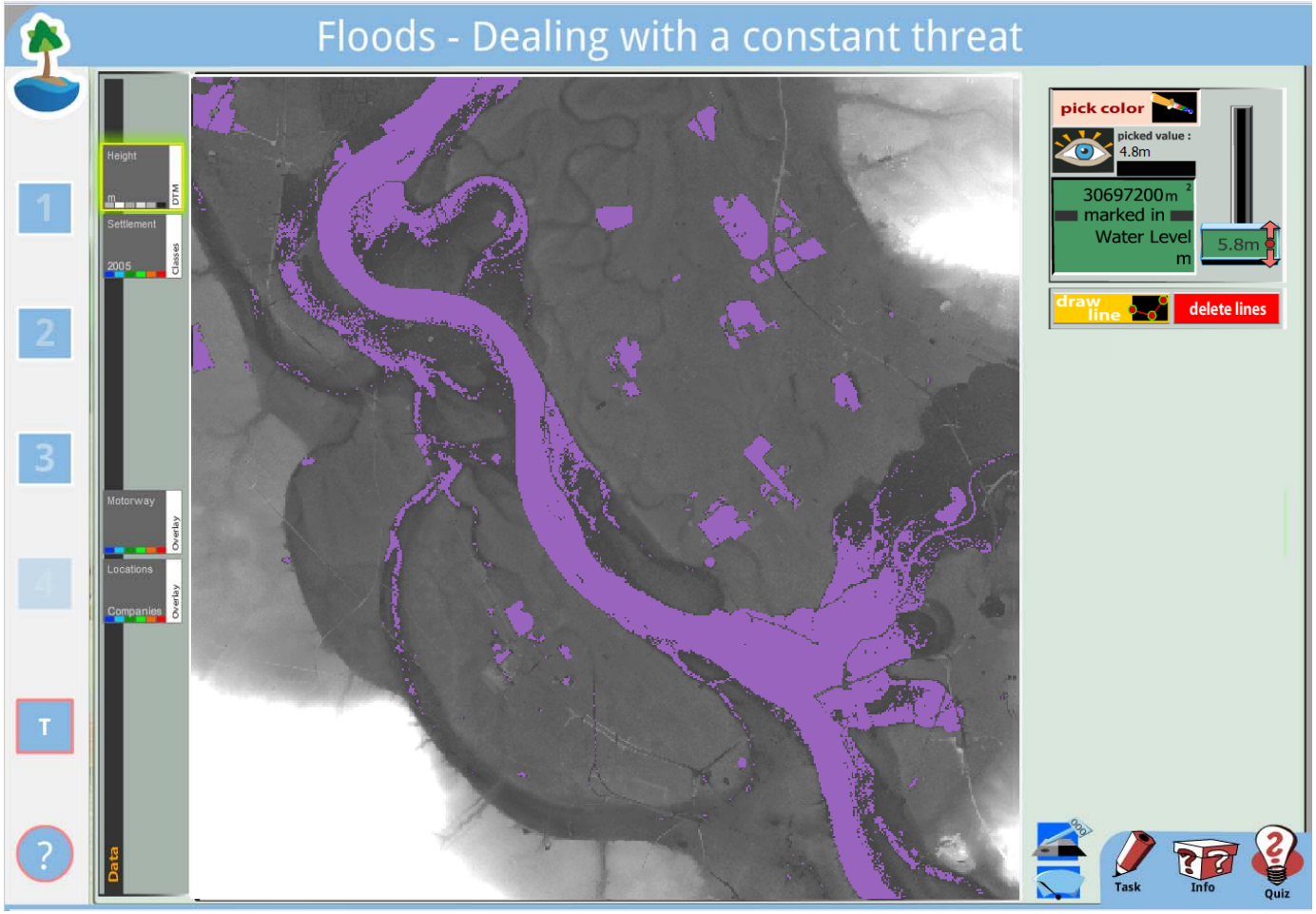
FIS – Remote Sensing in School Lessons

Teaching Materials



FIS – Remote Sensing in School Lessons

Teaching Materials – Floods-Dealing with a Constant Threat

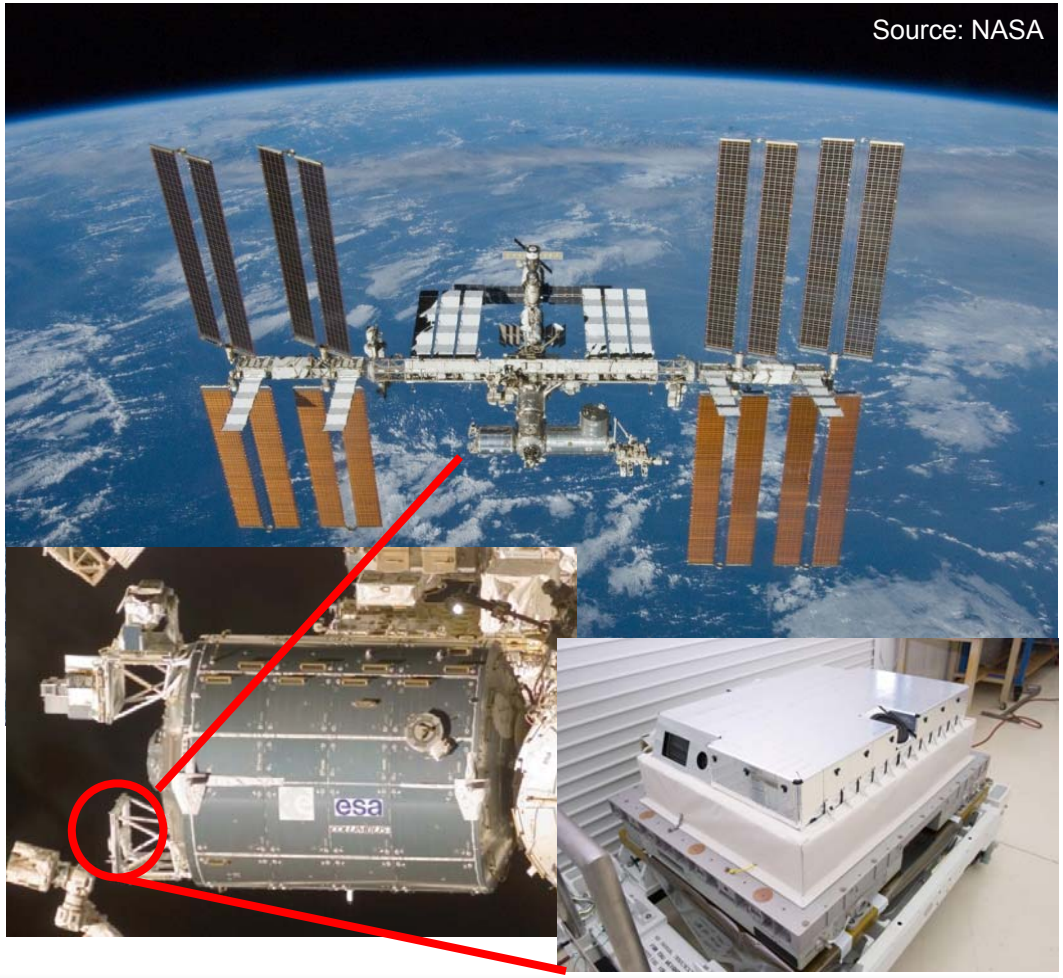



Columbus Eye –
Live Videos of the ISS in Schools

HDEV – High Definition Earth Viewing

4 HD-Video-Cameras on the Columbus External Payload Adapter

- Mounted on ESA Columbus Laboratory on 30 April 2014
- Ground resolution: ~ 280m
- On-Orbit-Test of 4 commercial HD-Video-Cameras
- During operating time the cameras are tested according to image quality
- 2 backward-, 1 forward- and 1 nadir-looking



HDEV – High Definition Earth Viewing

Four Cameras – Three Perspecitves

Panasonic – Aft View (Florida)

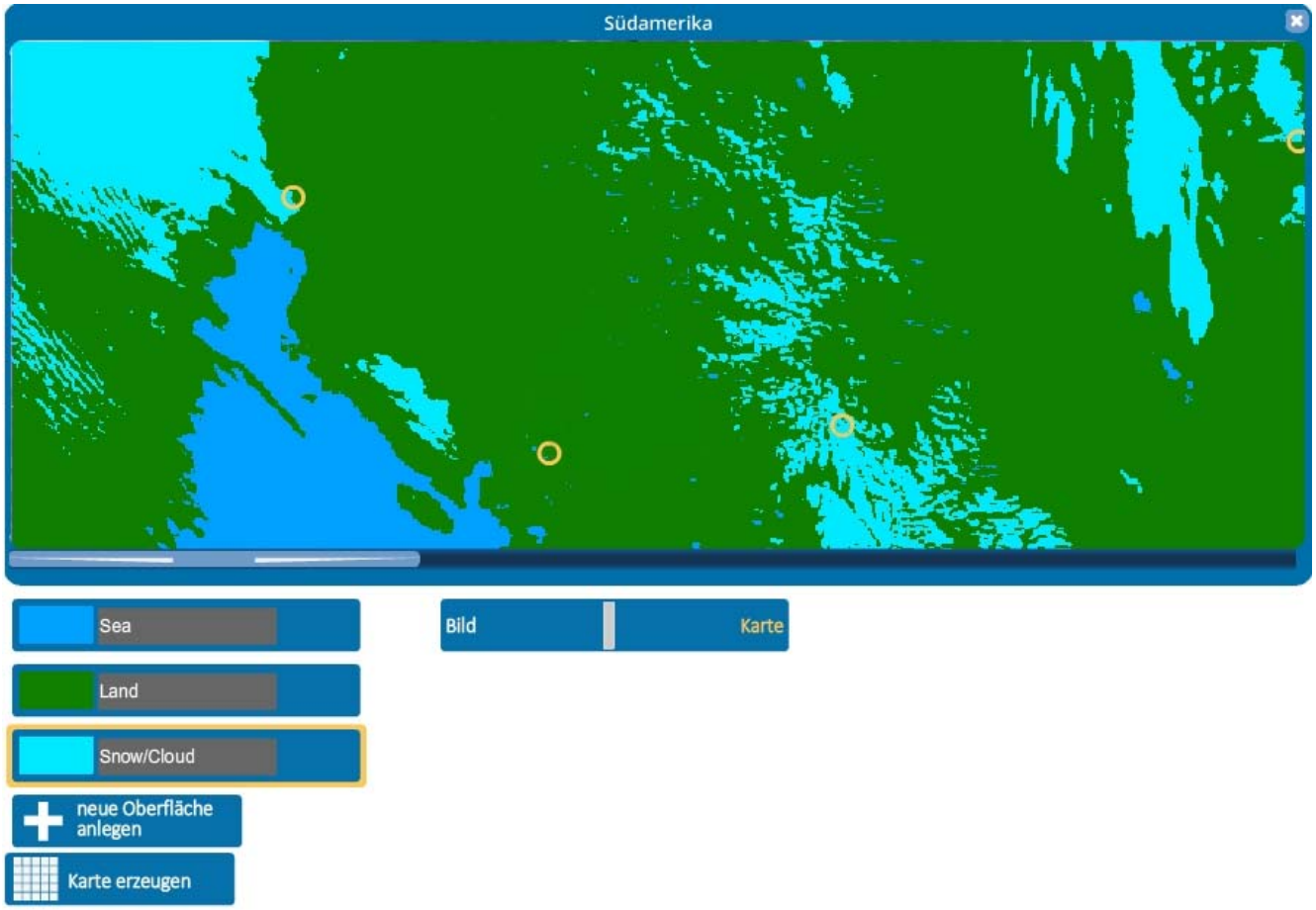
Sony – Aft View (overexposed)

Toshiba – Nadir View (Cuba)

Source: NASA

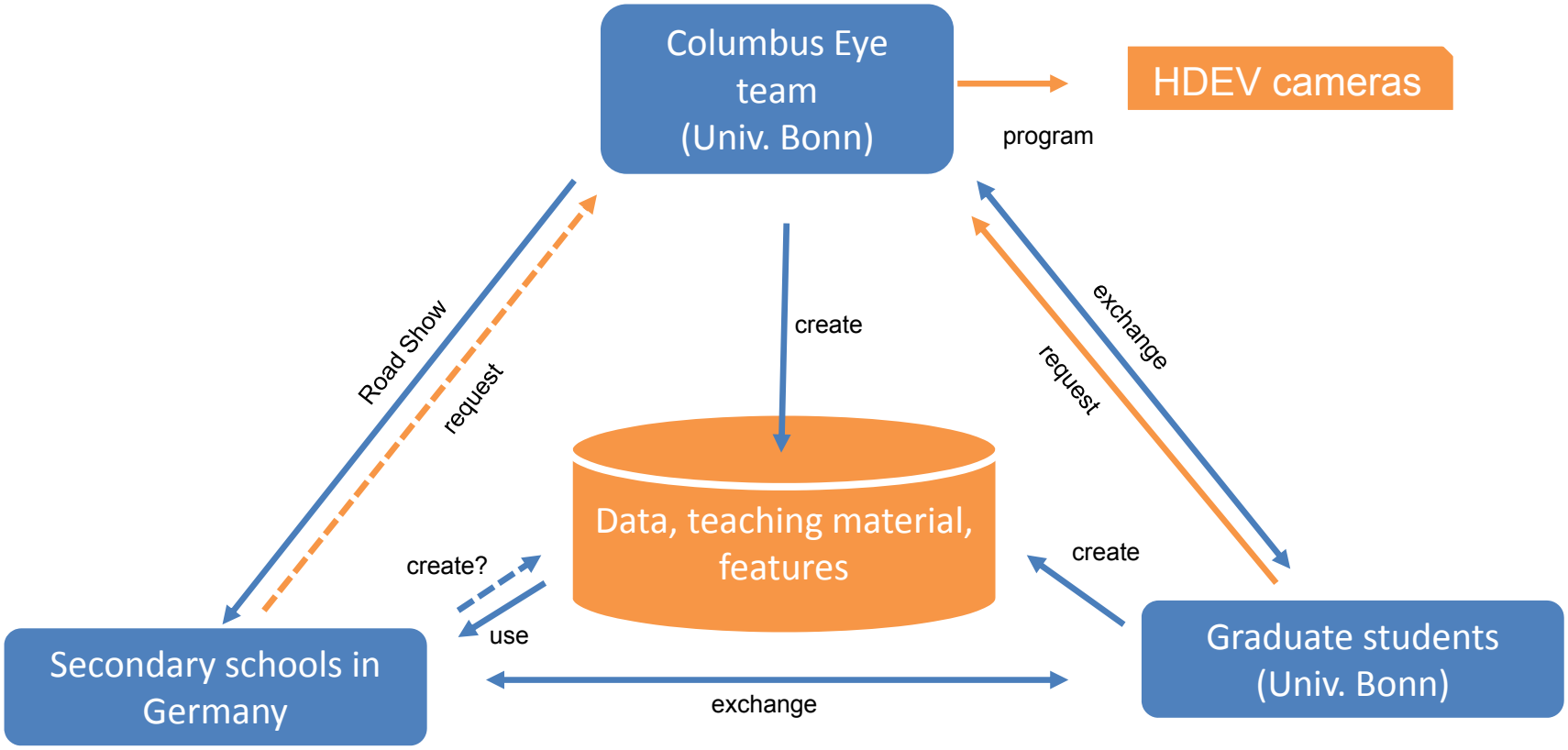
Columbus Eye – HDEV in Schools

Learning Tools on HDEV-Images of the ISS



Columbus Eye – HDEV in Schools

Communication within the Columbus-Eye project



Best Practice from Germany – *rgeo*: Heidelberg

Federal Ministry for Economic Affairs and Energy

Space Education & digital Geomedia

Fields of Competence & Aplications of the Research Group for Earth Observation – *rgeo*

Prof. Dr. Alexander Siegmund

University of Education & University Heidelberg

Dept. of Geography, Research Group for Earth Observation – *rgeo*

Ort, Datum

Pädagogische Hochschule HEIDELBERG University of Education

UNIVERSITÄT HEIDELBERG ZUKUNFT SEIT 1386

Best Practice: Remote Sensing – from Elementary to Secundary

(Geo)-Science & Space Education Research

Secundary II
over 10th grade

On the way: Adaptive Learning on EO

Web-based learning Environment: "Space*4*Geography"

Learning with original Satellite Data

(pre-prozessing, analysing, classification etc.)

Web-based software: "BLIF"

Secundary I
5th to 10th grade

Learning with pre-processed Satellite Date

(true/false color composits etc.)

Web-based Learning Platform: "GLO*KAL* Change"

Elementary

Learning on a Game Level

Web-based Learning Game: "SILC" – Satellite Image Learning Center

Space4Geography

Nationwide analysis of curricula and definition of relevant topics

Concept of the web-based learning environment

Learning modules

- 10 geographical key topics
- Examplary application of remote sensing
- Problem-oriented web-based learning
- Interactive multimedia content, e.g. 3D-visualisations and animations prepared in cooperation with *DLR/DFD*

Web-based remote sensing software
Image processing and analysis (BLIF)

Geo-Mapserver
Satellite image database (*RapidEye, TerraSAR-X, Landsat 5/7/8*)

Evaluation

Testing phase (*DLR_School_Lab Oberpfaffenhofen, GIS-Station*)

Nationwide dissemination (promotion and training of multipliers)

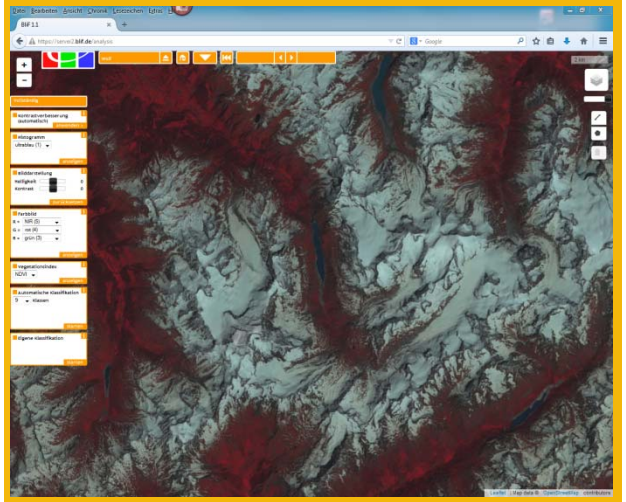
Gefördert durch: Bundesministerium für Wirtschaft und Technologie aufgrund eines Beschlusses des Deutschen Bundestages

Space4Geography

Geographical Topics & Environmental Challenges

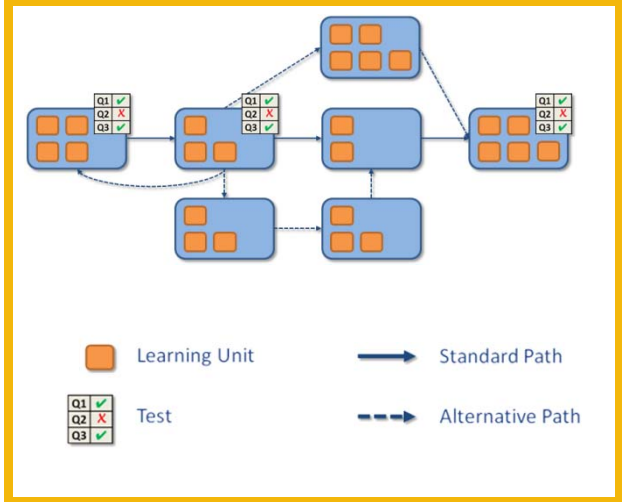
- Sek I + II Geography
- Close link to the curricula
- Topics: land use conflicts, urbanization, natural hazards, renewable energies, urban climate, deforestation, glaciers, agriculture,…

Remote Sensing Image Analysis



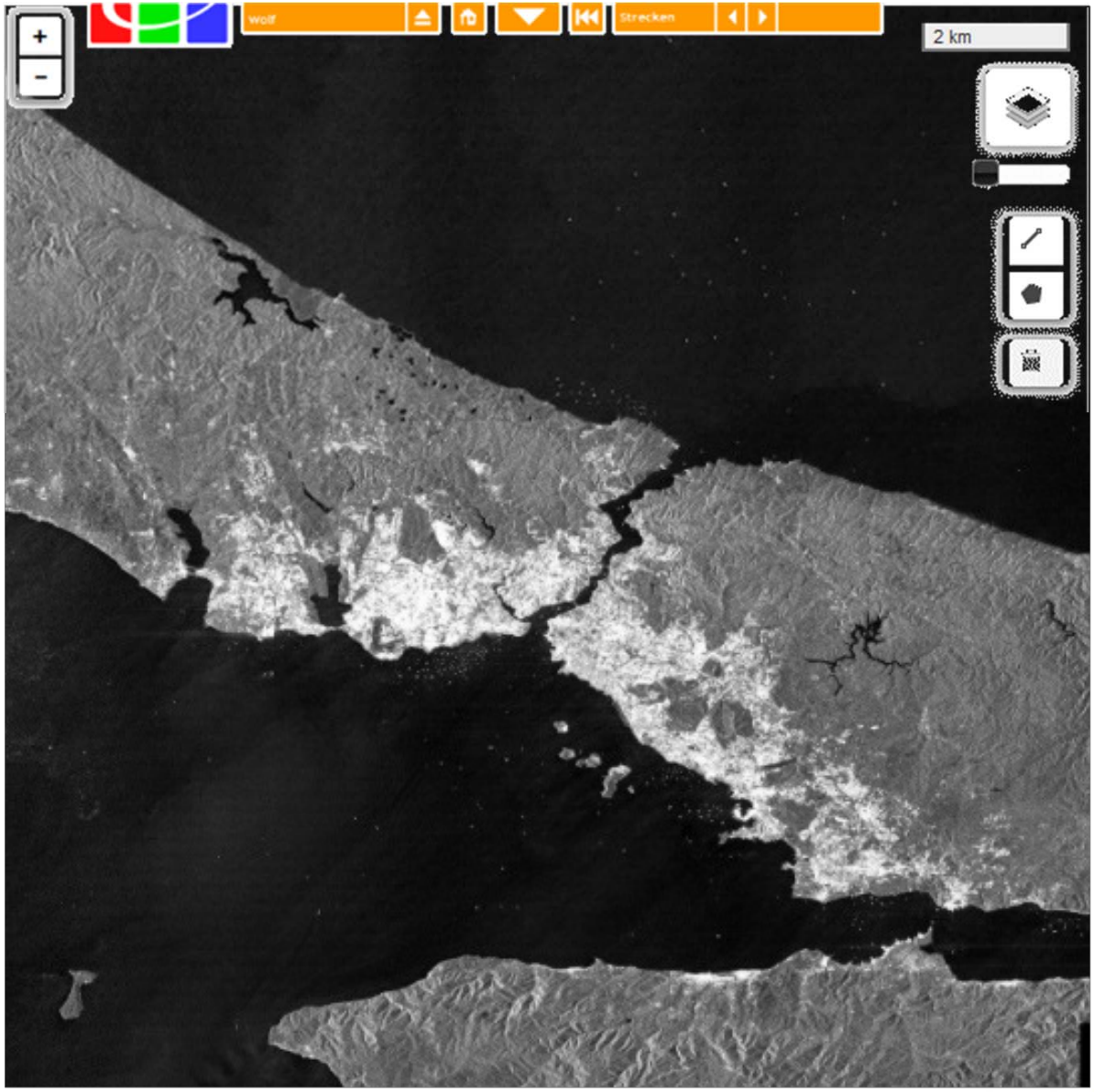
- …with the integrated educational remote sensing software *BliF*
- Provision of original satellite data: *RapidEye, TerraSAR-X, Landsat*, …
- Processing chain:
  a. data import & AOI definition
  b. image enhancement
  c. band composites
  d. vegetation indices
  e. image classification & change detection

E-Learning Educational Approach



- Multicodal & interactive
- Individual learning: adapts and personalizes learning content to meet individual skills, needs and preferences of the learners
- Instant feedback for the learners
- Learning transfer & problem-oriented learning
- Course management functions

Active RS-Data: Analysing urban footprint with **TerraSAR-X**



Realization #2

ESA Activities Secondary Schools - Training and Education in the Frame of International Cooperation

Education for secondary schools

Creation of Tools for secondary schools:

- Books and posters (also for general public)
- Atlases, i-books (also for general public)
- Apps for Tablets (also for general public)

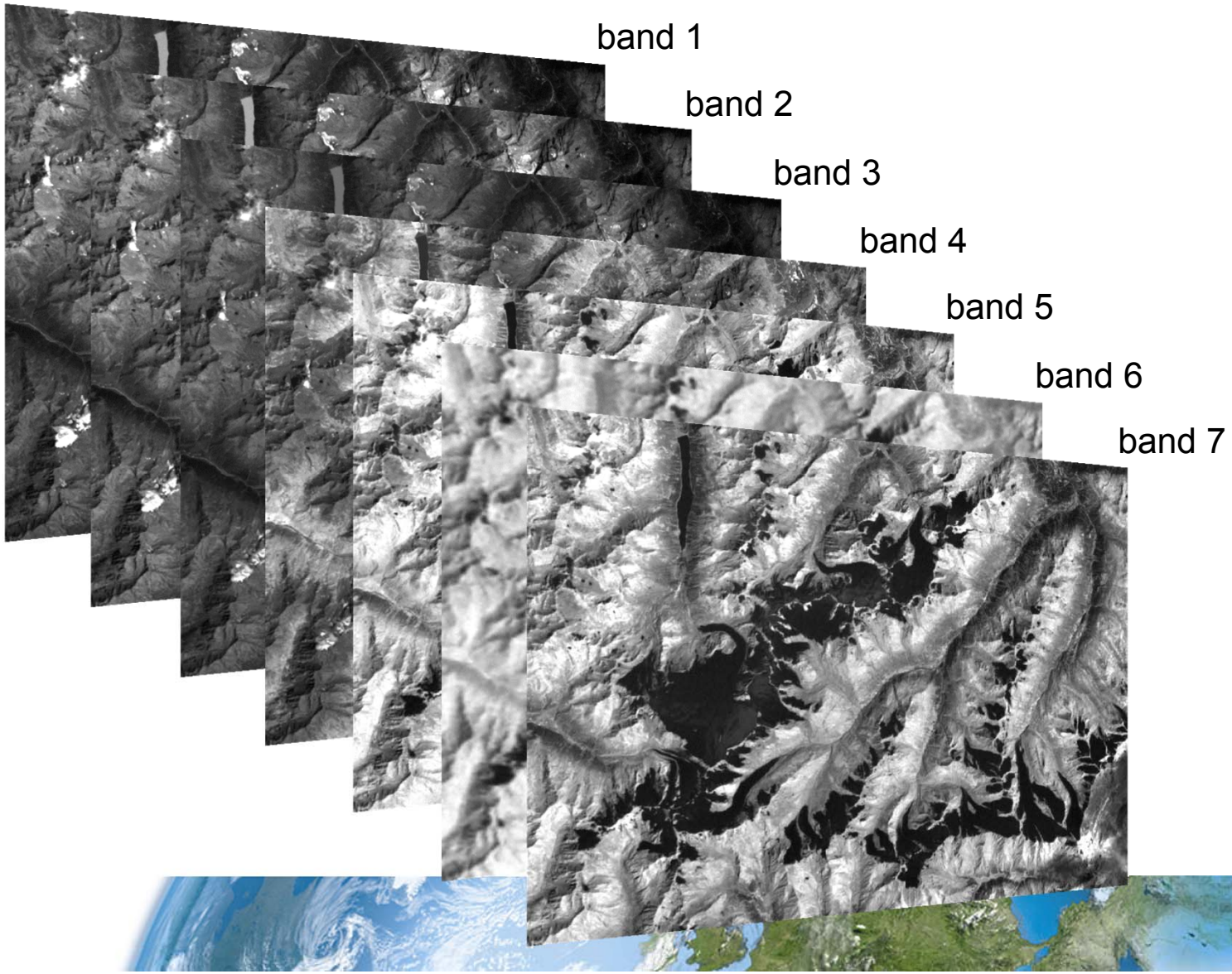
- Multilingual web-based tools (EDUSPACE),
- educational SW package for Image Processing and GIS (LeoWorks),
- School Lab
- Collection and distribution within ESERO project (European countries / curricula)

Eduspace: ESA web-based EO Educational tool for secondary schools

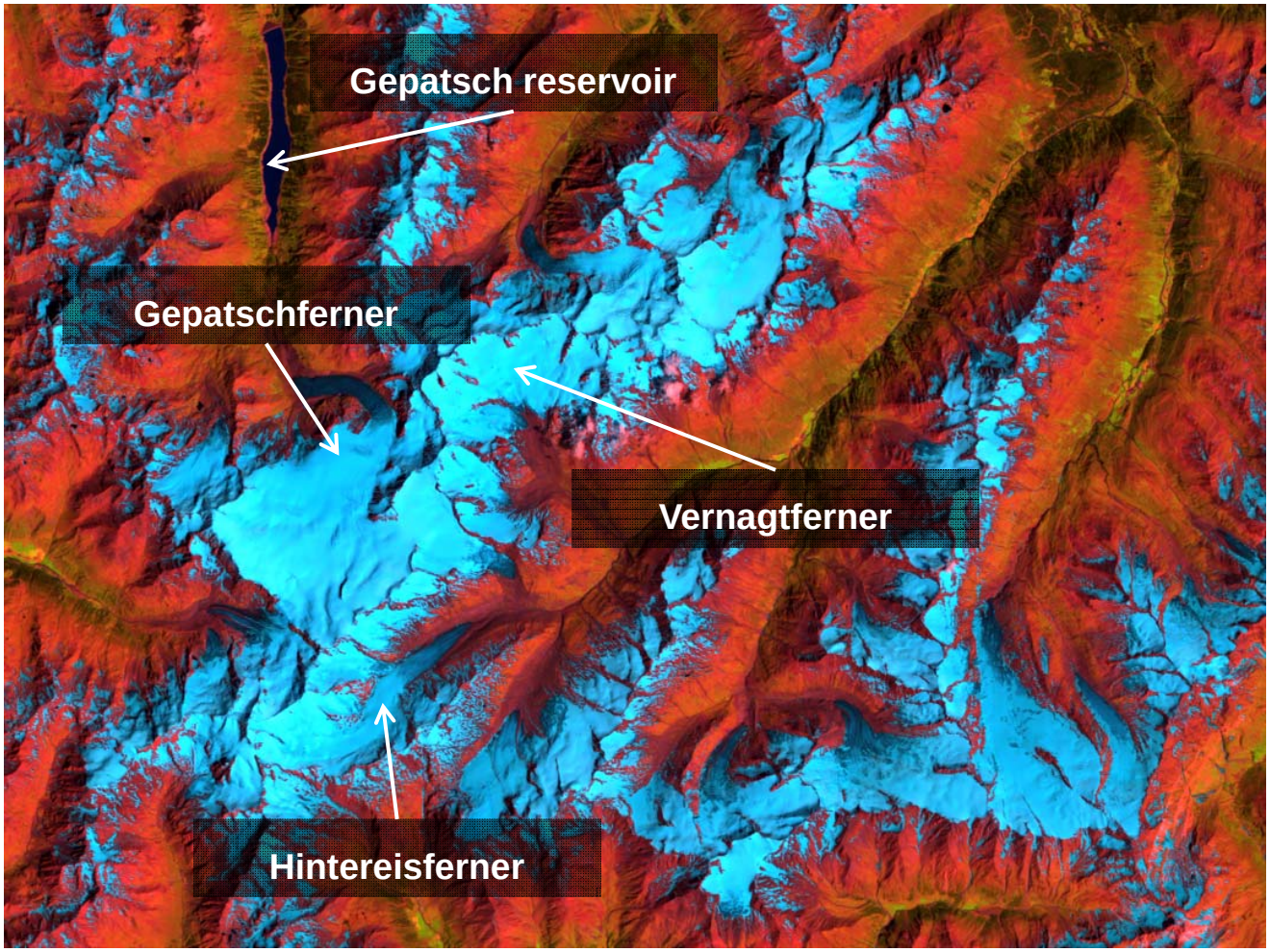
LEOWorks 4.0

- View images, histogram, pixel values, header info
- Crop, invert, stretch, layer stack, etc
- image arithmetic, filters
- Classification, PCA, geometric correction, pan sharpening
- Radar and optical module (multimission, including Sentinel data)
- GIS tool
- Open-source, Java-based

Satellite Data: Landsat TM
Available at Glovis / USGS



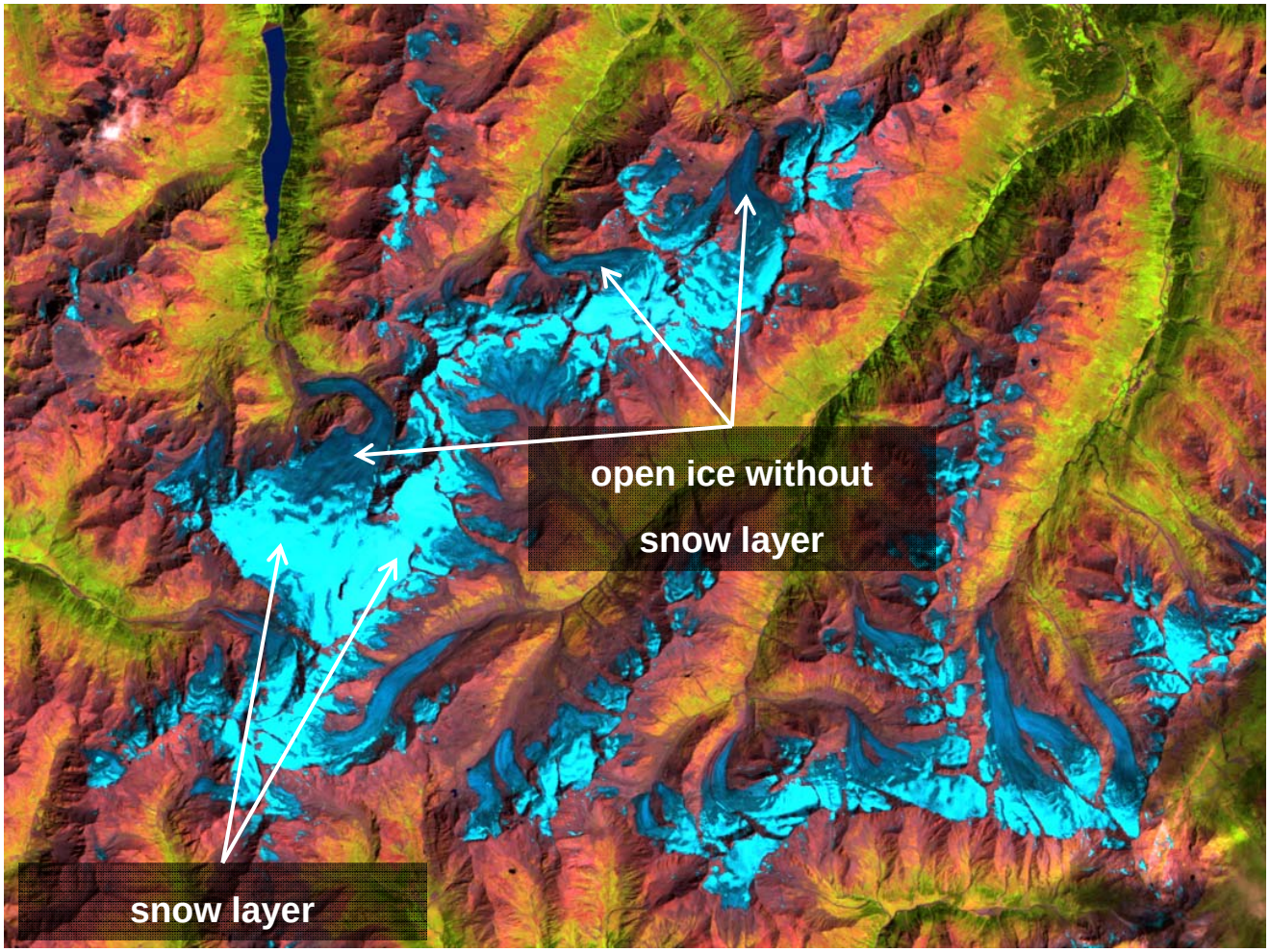
Ötztal Alpes, Austria
September 1986



Landsat TM, RGB 5/4/3

DLR

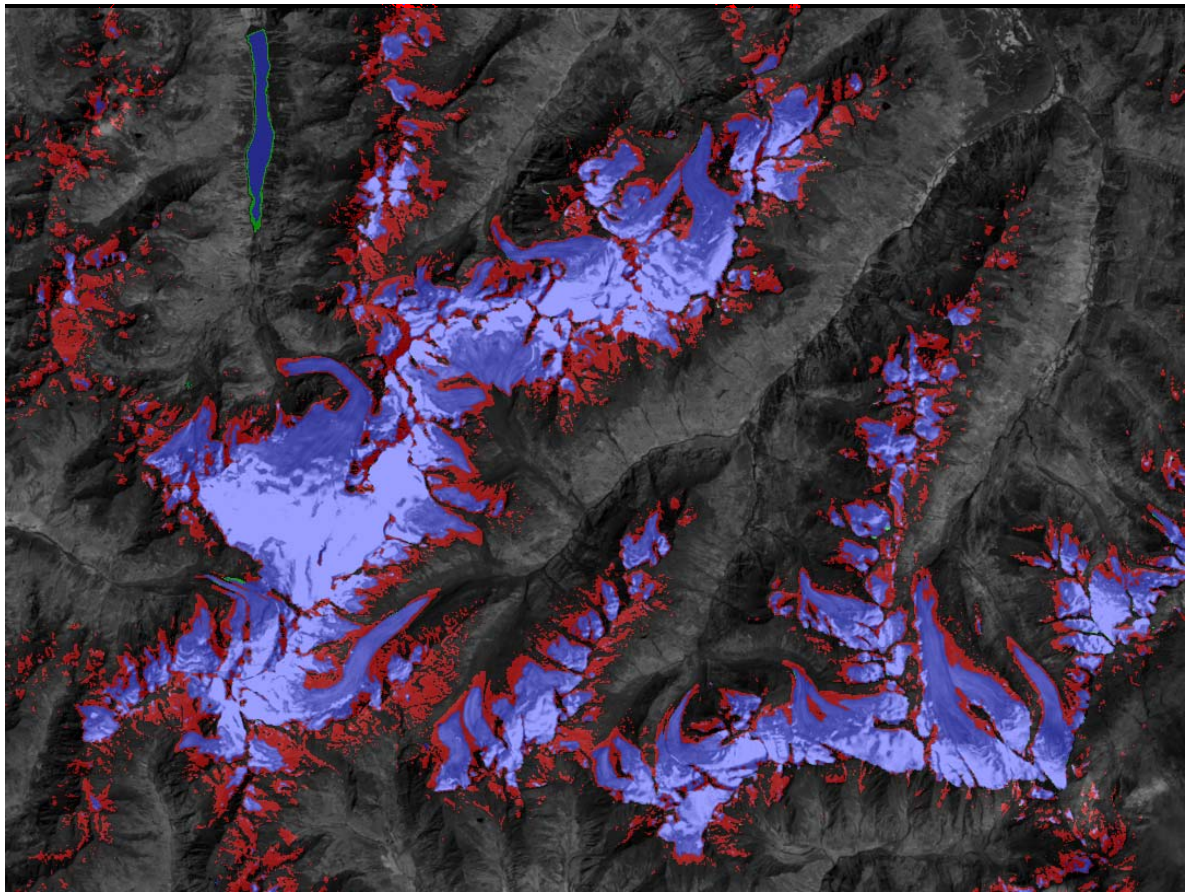
Ötztal Alpes, Austria
September 2003



Landsat TM, RGB 5/4/3

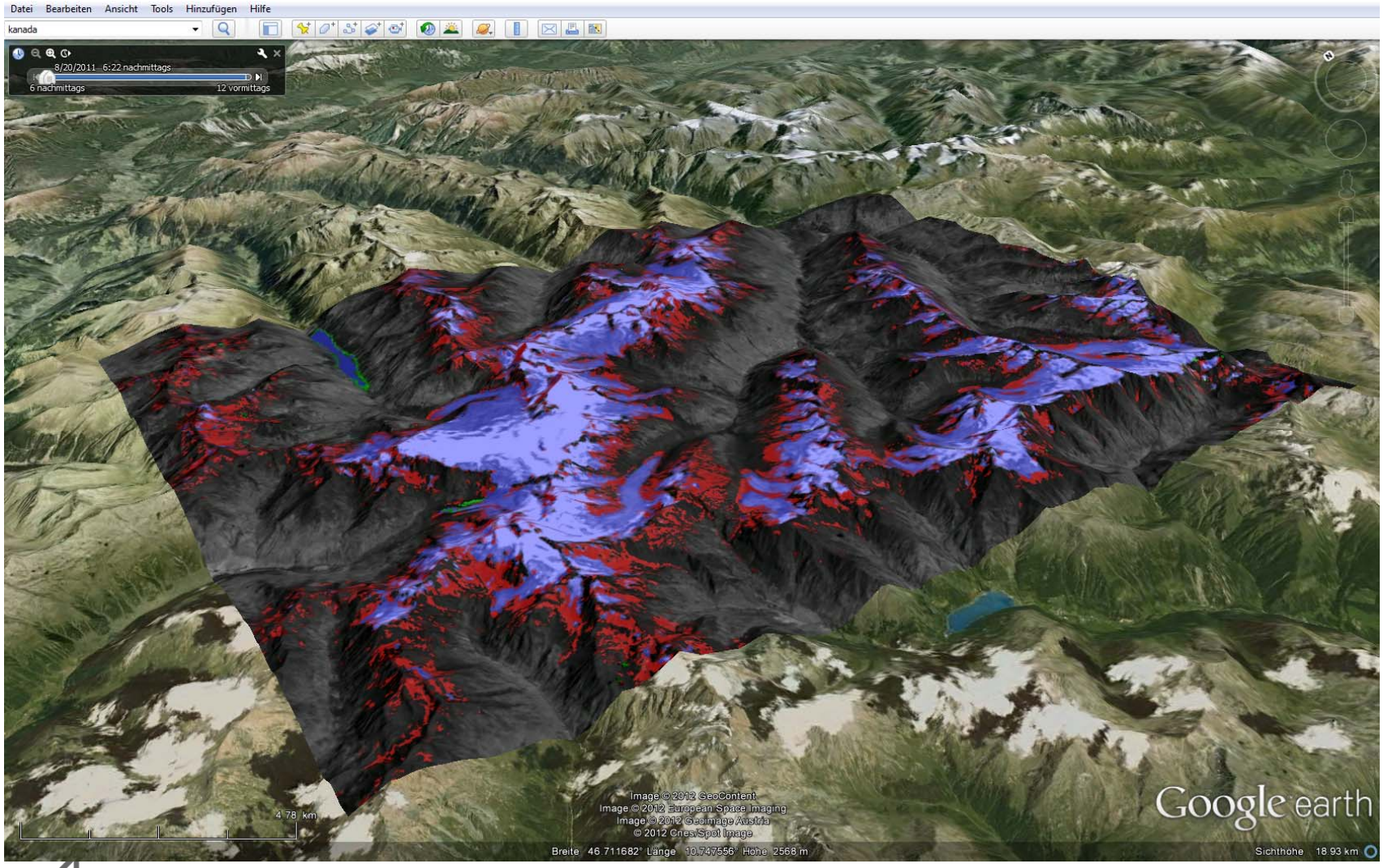
DLR

Change Detection
Combination – transparent overlay



DLR

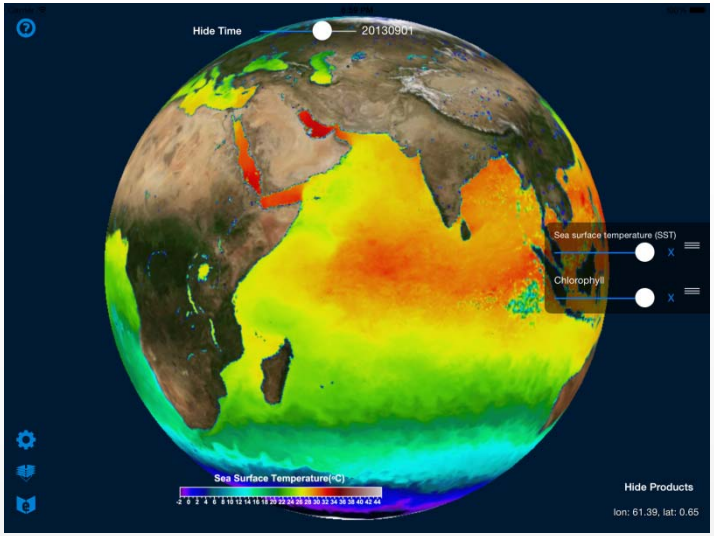
Change Detection
export image to Google Earth

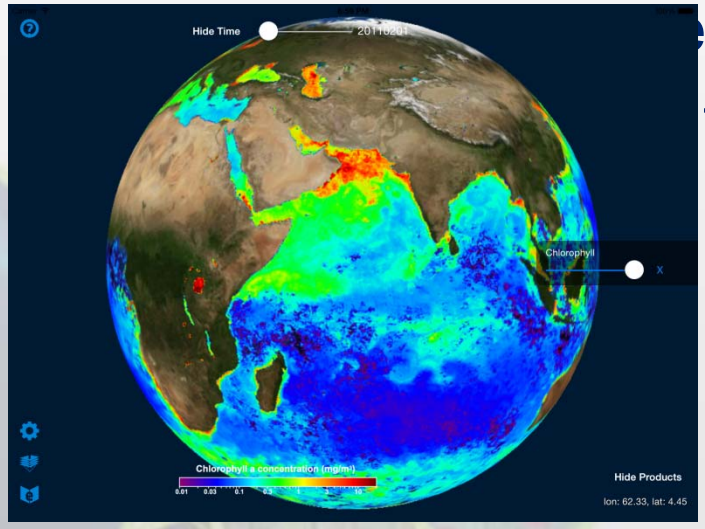


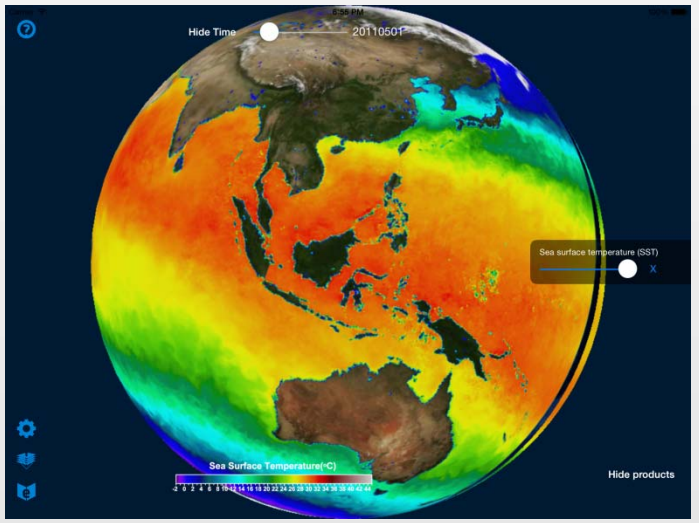
DLR

Educational App for EO

- For iOS tablets (iPad, iPad mini)
- Can be used as presentation tool and as support to school or
- the







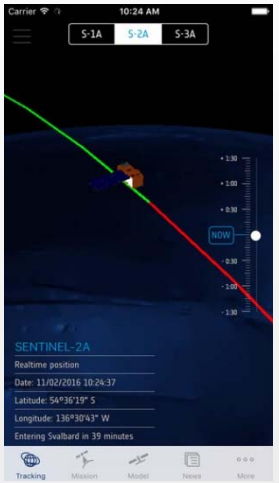
Sentinel App

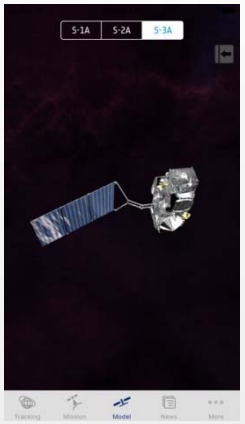
esa sentinel

Available on the App Store and iPad

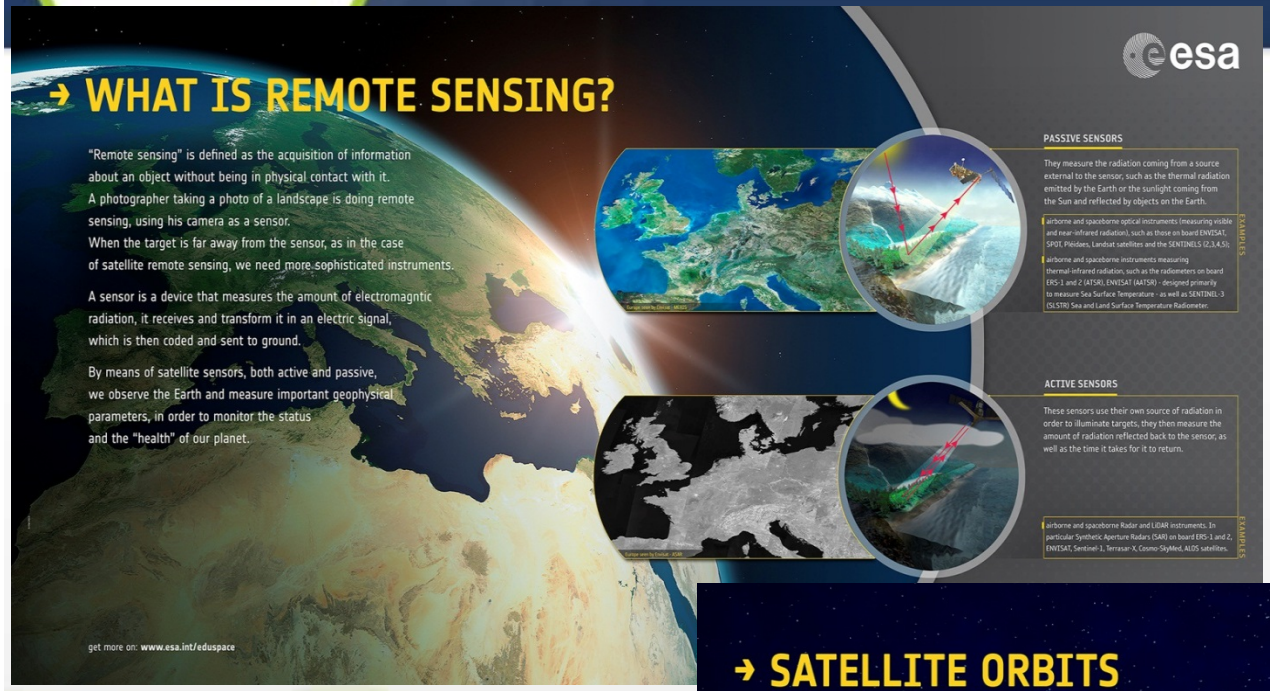
- Will be also on Google Play (Android phones, tablets) in April

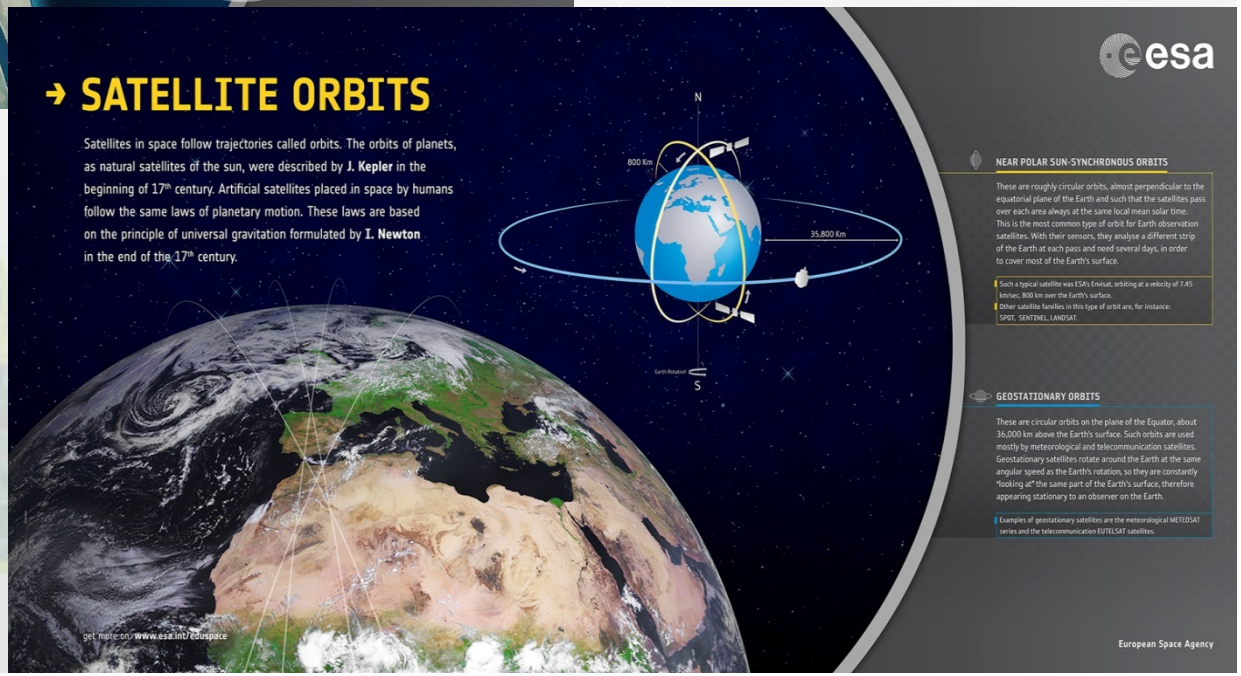
- See where the Sentinel satellites are in real-time
- See the last and next time they have been and will be over your location; Move them to the time of the last data transmission and smoothly move them back to their current location over the 3D globe
- Explore the Sentinel satellite 3D models
- Get information and news about the Copernicus Programme
- Get information about access to Sentinel data
- Set Notifications to be warned when satellites are flying by.





Creation of posters for schools

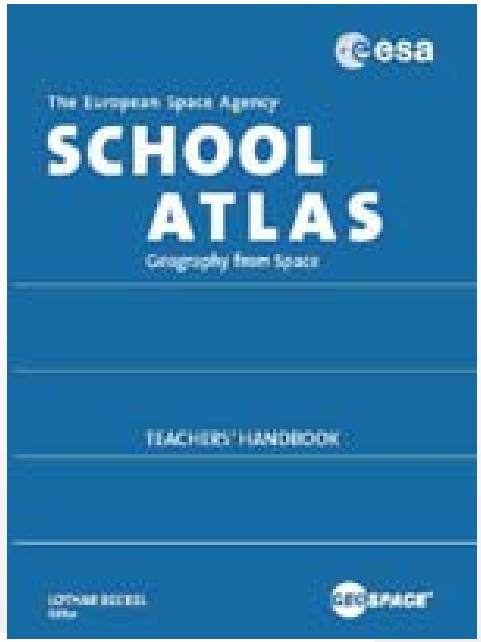


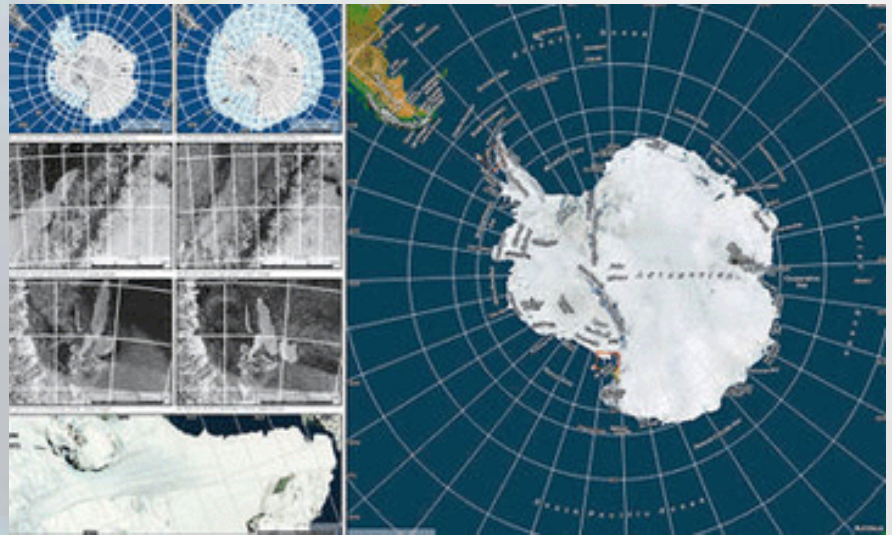


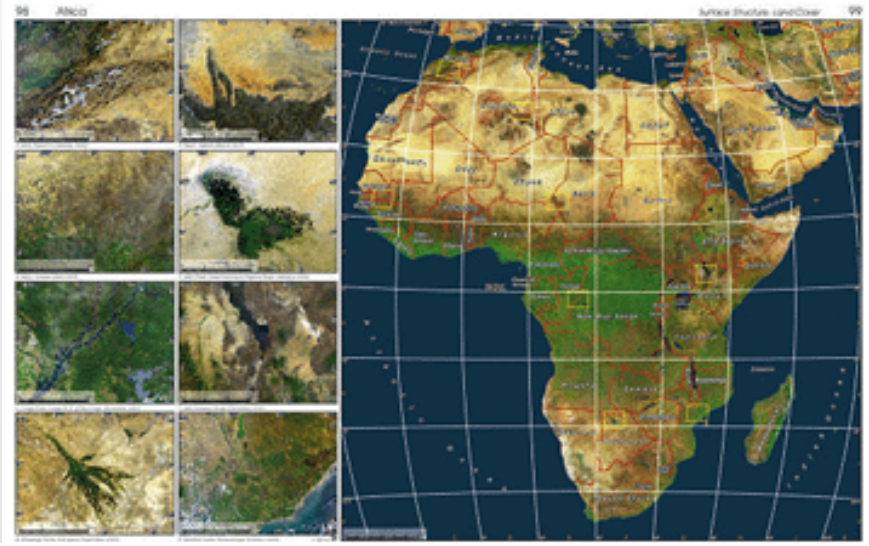
ESA School Atlas
new ESA Water Atlas

Introduction to ESA; Earth Observation; Global Overview; Continental Overview; the Natural Sphere; The Cultural Sphere.

Annex: Teachers' Handbook, DVD-ROMs with the original bands of the satellite data, handbook content and exercises, connected to Eduspace and its SW Leoworks







Training & Education in the frame of International Cooperation: Earsel network

Long-term cooperation in organising joint Workshops for Secondary School teachers with Earsel (European Association of Remote Sensing Laboratories)

EARSeL European Association of Remote Sensing Laboratories

Special Interest Group

Remote Sensing in Education and Training

4th June 2013 University of Basilicata, Matera, Italy

- Home
- Topics
- Programme
- Abstract Book
- Committees
- Call for Papers
- Proceedings
- Venue
- Contact
- SIG Homepage

4th EARSeL Workshop on Education and Training

to be organised in the framework of the 33rd EARSeL Symposium

Remote sensing of the earth covers many topics that are significant for natural science disciplines in school and university curricula. Satellite imagery and data derived from satellite sensors enable studies ranging from local phenomena around schools, up to large-scale perspectives showing the diversity of nature in the various climatic regions on earth. This allows thus to point out the dependence between local and global scales. Remote sensing data are used to observe and understand actual conditions on earth, but they also ingested into models allowing the prediction of future developments (e.g., of the climate).

All relevant institutions and interested individuals are invited to participate. In particular the workshop is also addressing the **Global Environment and Security (GMES)** programme of the European Commission and the European Space Agency. The success of GMES services and information products, especially in the fields of environment, climate change and natural disasters depends on specific training activities which include remote sensing for earth observation as a core element.

Moreover, the workshop will focus on the planned foundation of the **International Remote Sensing Academy (IRSA)**, initiated by EARSeL in early 2012. The goal will be to discuss the strategic framework of the Academy.

recent Earsel Workshop and Training in ESRIN on RS for Archaeology (Nov 2015)

Preparing Bonn (June 2016), Bejing (July 2016) and Krakow (Sept 2016) Earsel training events

ESA ESEROs - European Space Education Resource Offices

Target: European students starting from an early age (primary and secondary education)

Goal: using the space context to make the teaching and learning of STEM subjects more attractive

ESERO offers an annual series of national or regional training sessions for both primary and secondary school teachers, offered in collaboration with national partners

Presently located in:
Belgium: Planetarium of the Royal Observatory of Belgium in Brussels
Czech Republic: Prague, with Charles University of Prague and others
UK: based at the National STEM Centre in York
Ireland: Dublin, with the Science Foundation Ireland
Netherlands: at the Nemo Science Learning Centre in Amsterdam,
Nordic ESERO: Denmark, Finland, Sweden and Norway (based at NAROM),
Poland: in the Copernicus Science Centre in Warsaw,
Portugal: in the Knowledge Pavilion, Lisbon,
Romania: based in the Romanian Space Agency

Training courses - centralized web page

The content of most training courses can be linked from the central web page for ESA EO Education and Training:

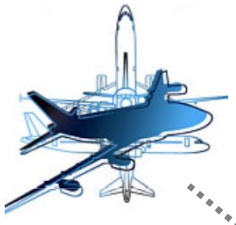
https://earth.esa.int/web/guest/eo-education-and-training

Realization #3

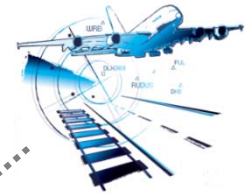
DLR_School_Lab

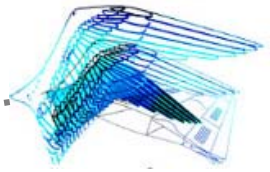
Promoting the Next-Generation Scientists

DLR_School_Labs

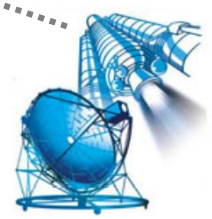













Stade
Hamburg
Neustrelitz
Trauen
Bremen
Berlin
Dortmund
Braunschweig
Aachen
Göttingen
Köln
Bonn
Dresden
Lampoldshausen
Stuttgart
Augsburg
Oberpfaffenhofen
Weilheim

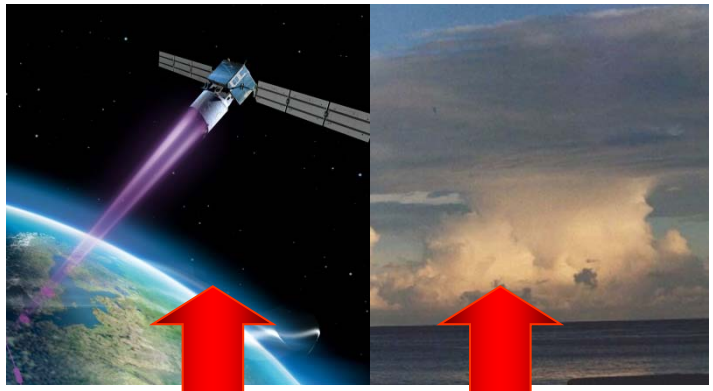
DLR

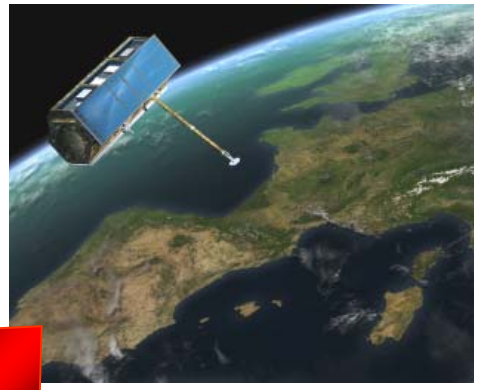
DLR Site Oberpfaffenhofen

Employees: Approx. 1,700
Size of site: 245 000 m²
Research institutes and facilities:

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

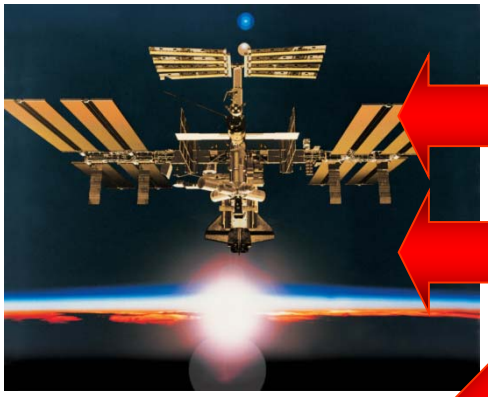
DLR

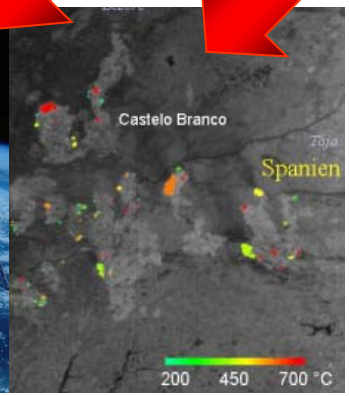


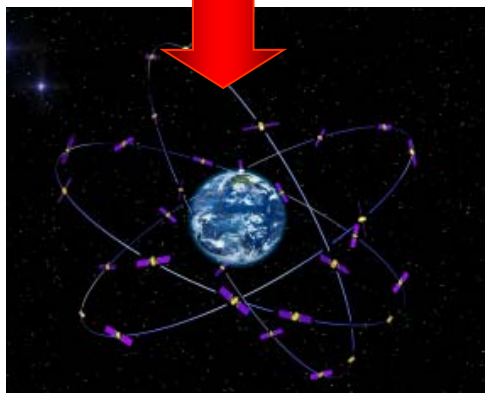


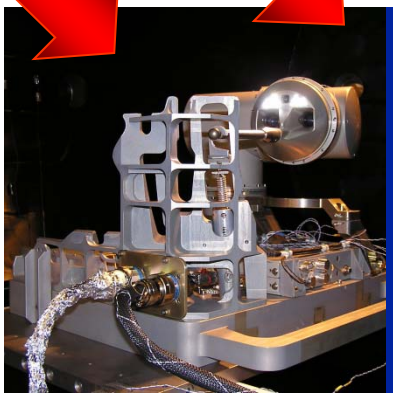
DLR_School_Lab

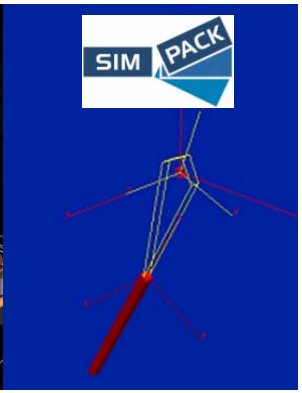
Oberpfaffenhofen











Experiments @ DLR_School_Lab Oberpfaffenhofen Represent the Research of All 10 DLR Institutes

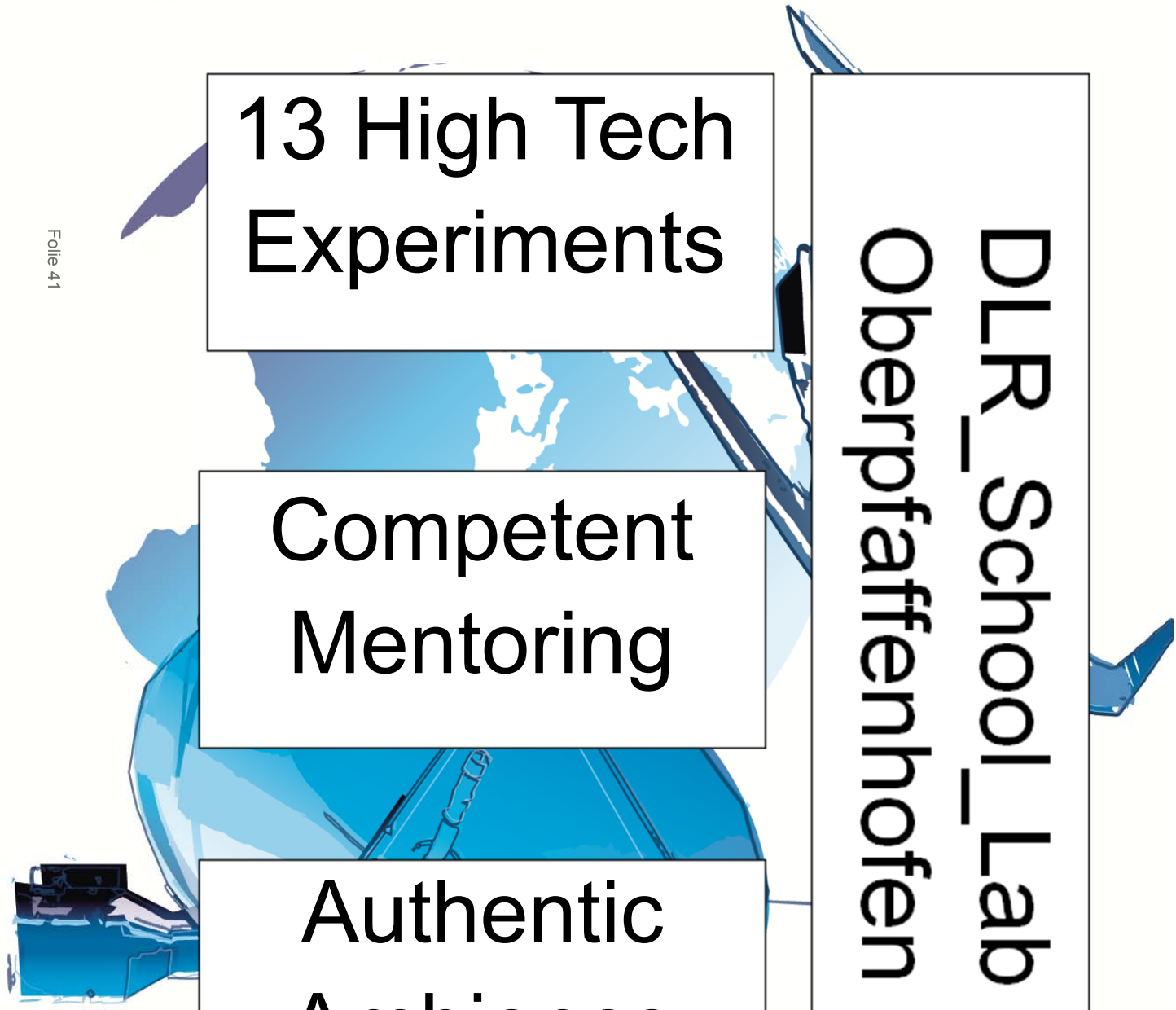
Experiment	Institute
1. Infrared Technology	Remote Sensing Technology
2. Laser Technology	Physics of the Atmosphere
3. Radar Technology	Microwave and Radar Technology
4. Optical Remote Sensing	Remote Sensing Data Center
5. Weather and Climate	Physics of the Atmosphere
6. Satellite Data Analysis	Remote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

DLR


draußen
L.A. EAST
AVEN.
7TH
UMWELTFO
The Team

DLR_School_Lab

Oberpfaffenhofen



13 High Tech Experiments

Competent Mentoring

Authentic Ambience

DLR_School_Lab Oberpfaffenhofen

DLR

Experimental Concept

…Representing the DLR-Institutes' Competence

➔ **Authenticity**

…Didactical Transfer

➔ **Inquiry-Based Science Education**

DLR_School_Lab Oberpfaffenhofen

- 13 years
- 30.000 secondary school students
- 3.000 teachers

- 3.500 MINT talents
- 300 teachers of the gifted

Realization #4

EO School Lab
@ International Conferences
- an ESA-DLR Initiative

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

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

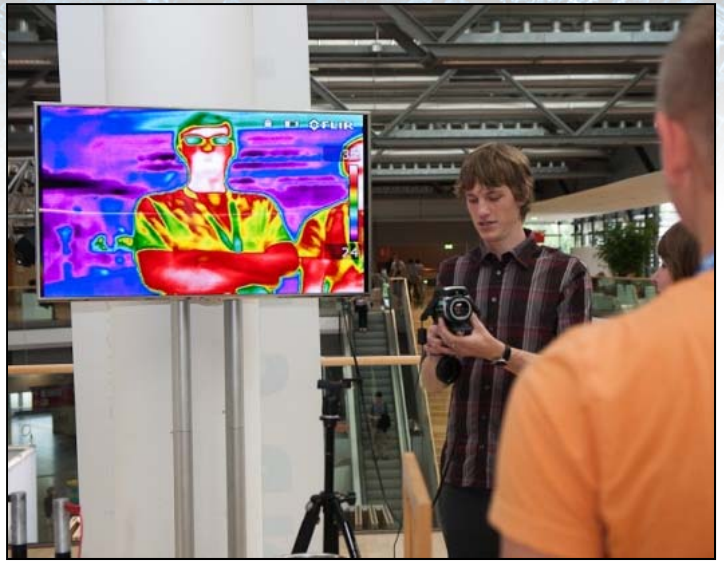
Combined lab experiments, training sessions and 3D Demonstrations

2012 MUNICH IGARSS

IEEE GRSS DLR esa

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

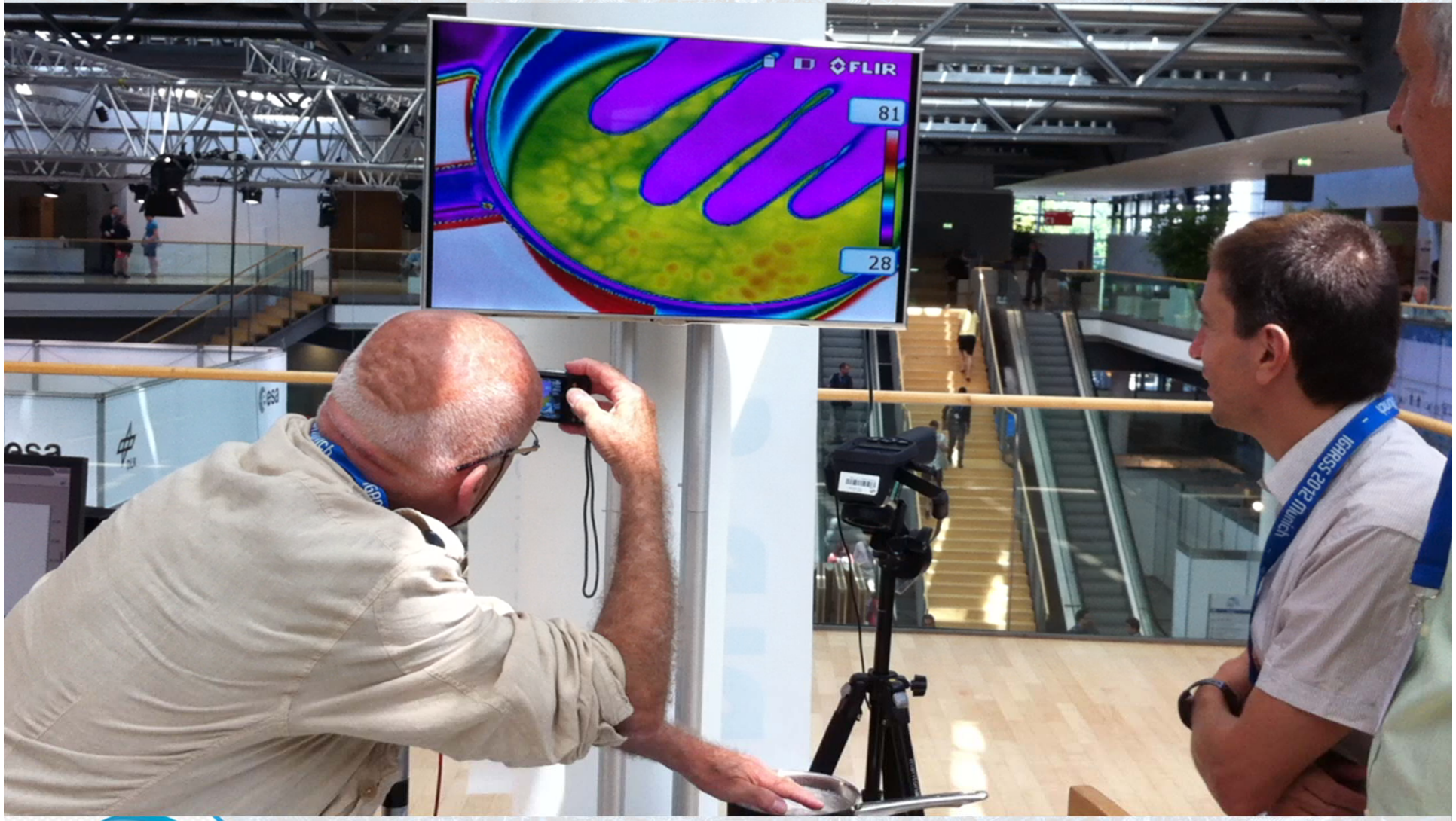
EO training sessions for high schools delivered by ESA.

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

esa education European Space Agency

2012 MUNICH IGARSS

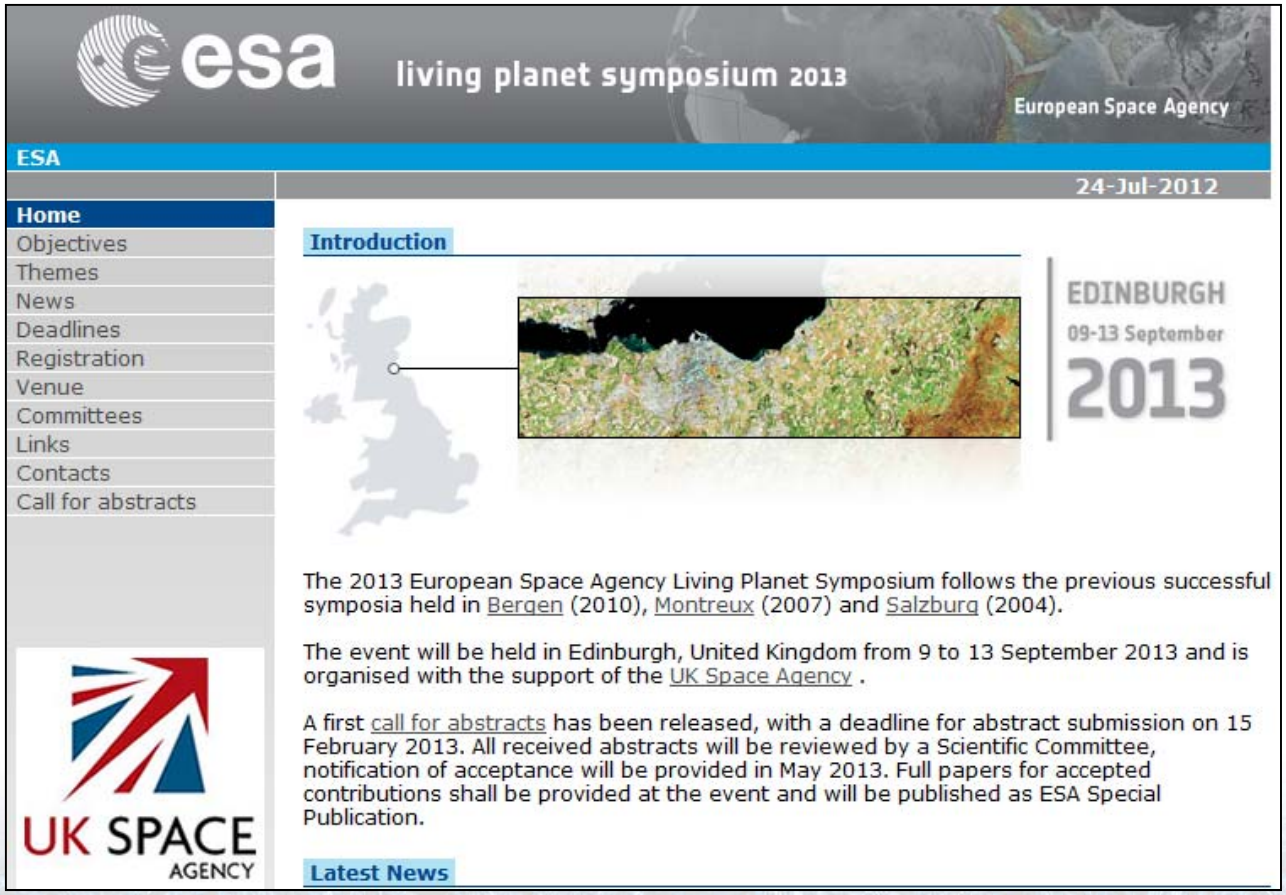
IEEE GRSS DLR esa


FLIR
81
28

Living Planet Symposium 2013

Edinburgh, United Kingdom, 09 - 13 September

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



living planet symposium | EDINBURGH 09-13 September 2013

LPS School Lab

Edinburgh International Conference Centre
10 - 13 September 2013

Learn about the science and technology behind Earth Observation through half day sessions of lab experiments and demonstrations. Includes an exhibition tour at a major science conference.

Suitable for:

- Groups of ~15 students at S5 or S6 level*
- CPD sessions available for educators

* Includes content that complements the Biology, Chemistry Geography, Physics Highers and Advanced Highers and provides a clear example of interdisciplinary science

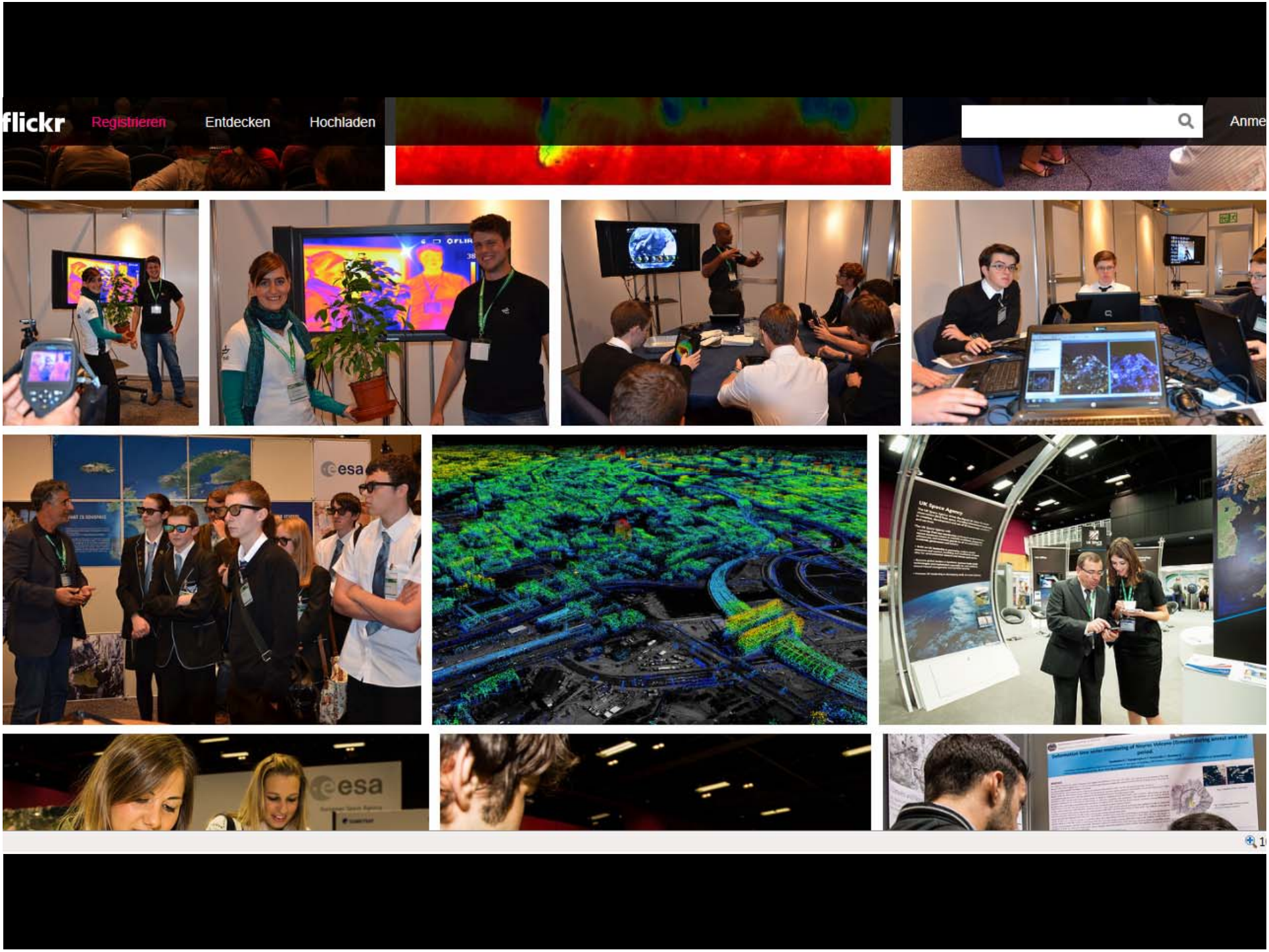
For FREE registration and information visit:
http://www.bis.gov.uk/ukspaceagency/news-and-events/2013/Jun/register-for-living-planet-symposium-school-lab

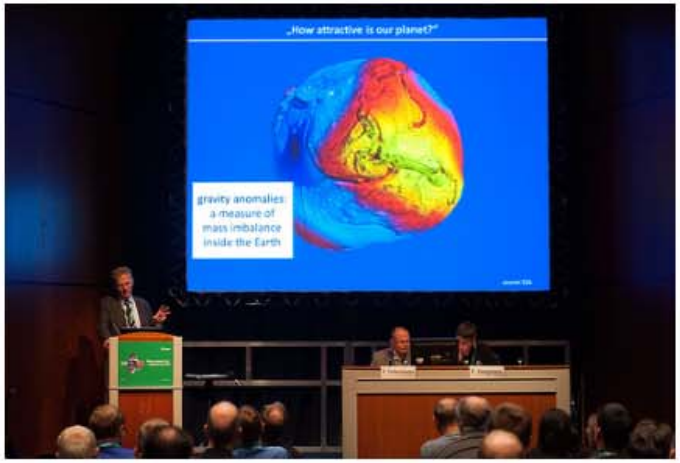
Image credit: ESA and DLR

DLR German Aerospace Center

UK SPACE AGENCY

esa


flickr
Registrieren
Entdecken
Hochladen
Anme
esa
esa



LPS16

Home

Registration

Programme

Authors

Events and Keynotes

Sponsors

Partners and Exhibitors

Guidelines for Presenters

EC Grant

News

Important Dates

Special events

Venue and Accommodation

Objectives

Themes

Abstract Submission

Committees

Links

Contacts

LPS16 > Home

Living Planet Symposium 2016

The 2016 European Space Agency Living Planet Symposium follows the previous successful symposia held in Edinburgh (2013), Bergen (2010), Montreux (2007) and Salzburg (2004).

The event will be held in **Prague, Czech Republic** from **9-13 May 2016** and is organised in cooperation with the Ministry of Transport, Ministry of Environment and Ministry of Education, Youth and Sports of the Czech Republic and the local support from Charles University in Prague.

A first announcement has been released, with a deadline for abstract submission on 16 October 2015. Authors can check here their submitted abstracts. All received abstracts have been reviewed by a Scientific Committee, notification of acceptance has been provided in early February 2016. Registration to attend the event (free of charge) has been opened in February 2016 with deadline on 22 April, after the publication of the preliminary programme. We thank our Sponsors for the support.

Full papers for accepted contributions shall be provided at the event and will be published as ESA Special Publication. An Exhibition will be running from 9 to 12 May 2016. Before the official opening on Monday 9 May, keynote presentations are scheduled.

Latest News

23-March-2016: A School lab is organised during LPS16!

German Aerospace Center (DLR) | National Space Academy | Charles University in Prague | esero | esa

living planet symposium 2016

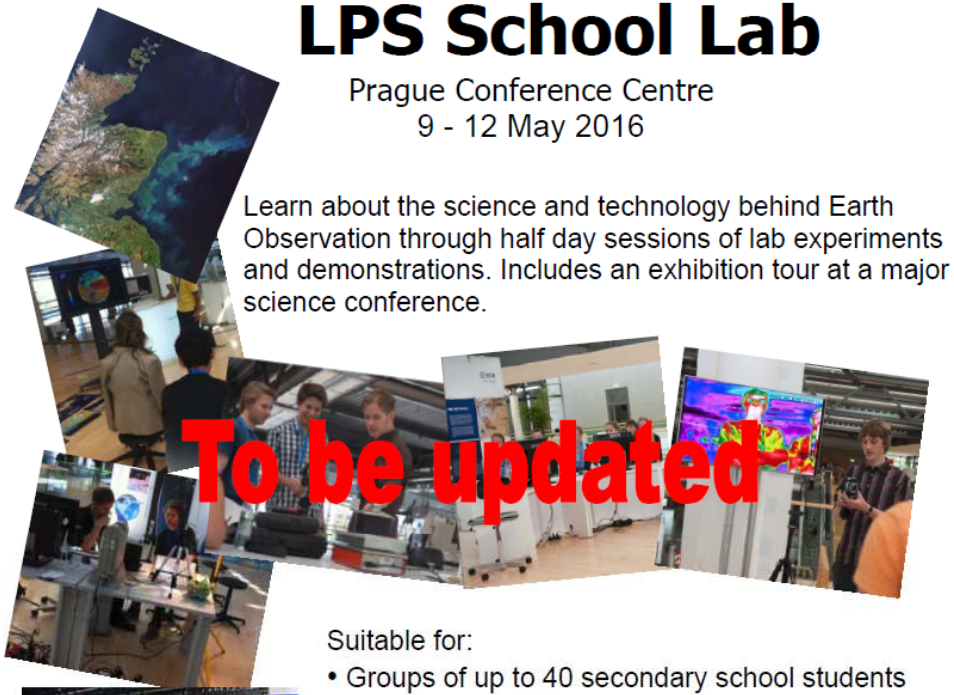
esa

ESA

LPS School Lab

Prague Conference Centre
9 - 12 May 2016

Learn about the science and technology behind Earth Observation through half day sessions of lab experiments and demonstrations. Includes an exhibition tour at a major science conference.



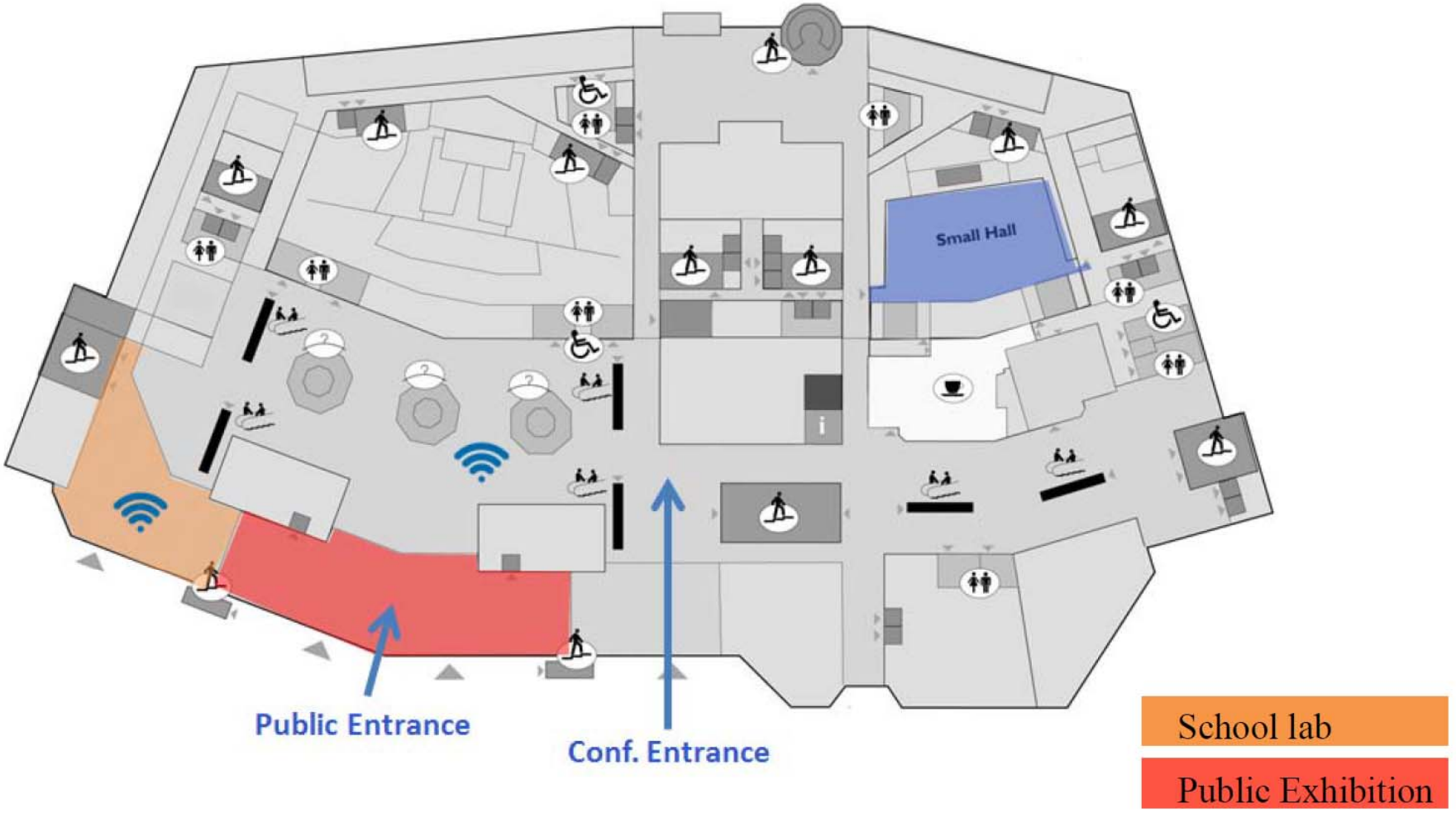
Suitable for:

- Groups of up to 40 secondary school students
- Sessions available for educators

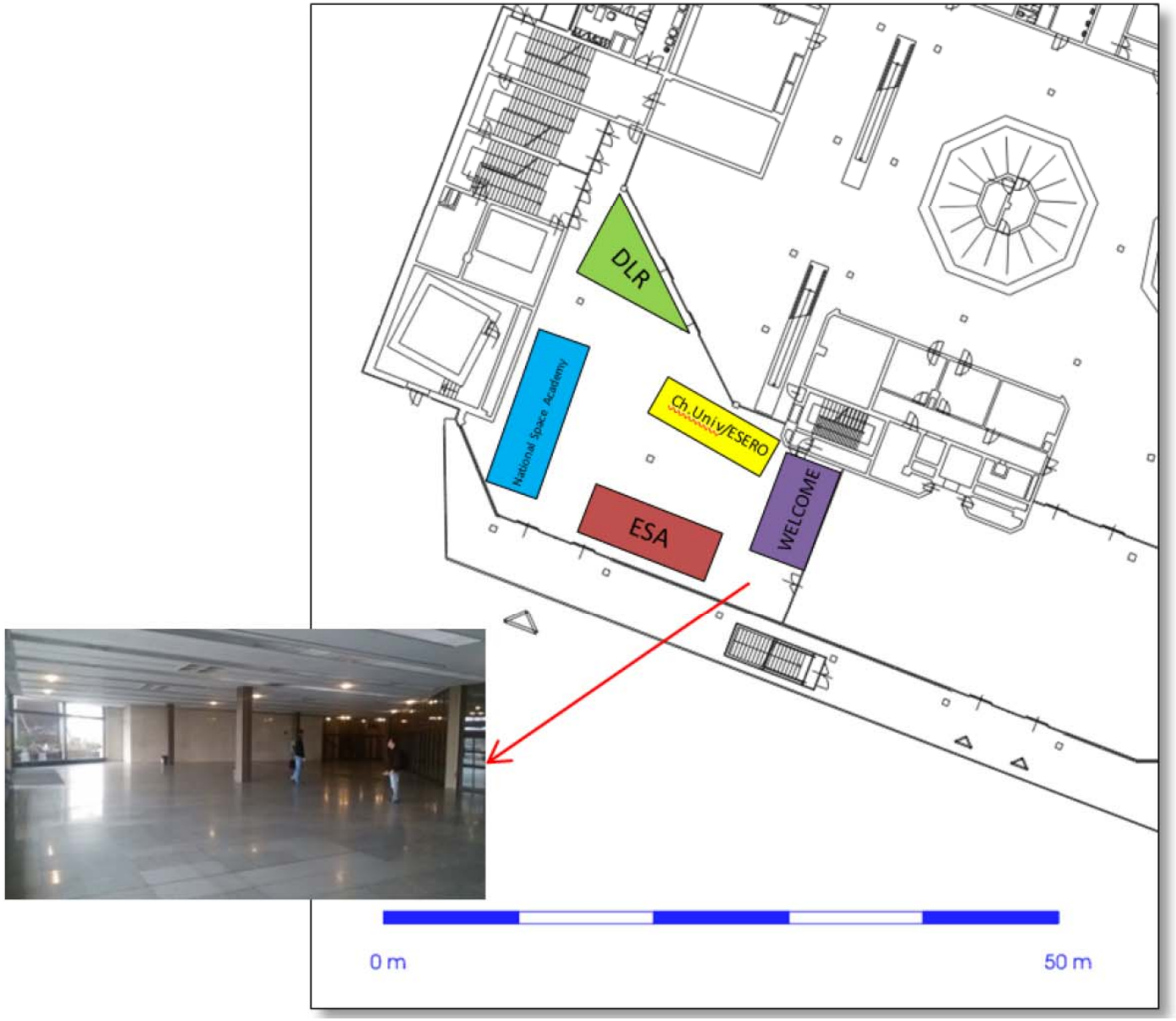
* Includes content that complements Biology, Chemistry Geography, Physics and provides a clear example of interdisciplinary science

For FREE registration and information visit:
http://www.xxxxxx....

Image credit: ESA DLR ESERO etc



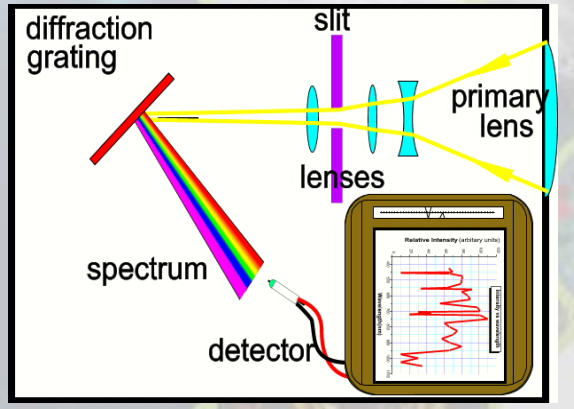
Plan of the School Lab zone with areas assigned to each agency. The WELCOME area is planned for the introduction (first 15 minutes of each session) and for the feedback collection (last 15 minutes of each session).

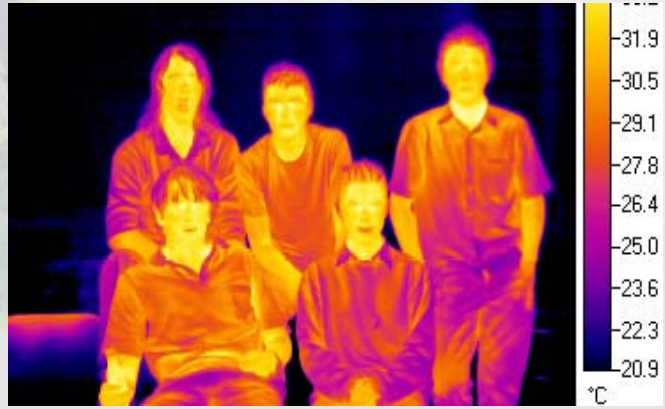

DLR
National Space Academy
Ch.Univ/ESERO
ESA
WELCOME
0 m
50 m

(i) Education in the frame of International Cooperation with other space agencies

Creation of joint School Labs with ESA, DLR, UKSA and UK national space academy, Charles University.

Such as IGARSS 2012 and LP Symposium 2013 and LP Symposium in May 2016. Demonstrating RS to schools using instruments such as: Field Spectrometer, Thermal camera, UV light, Stereo Optical Camera, possibly enriched by many other experiments and 3D / oculus technology



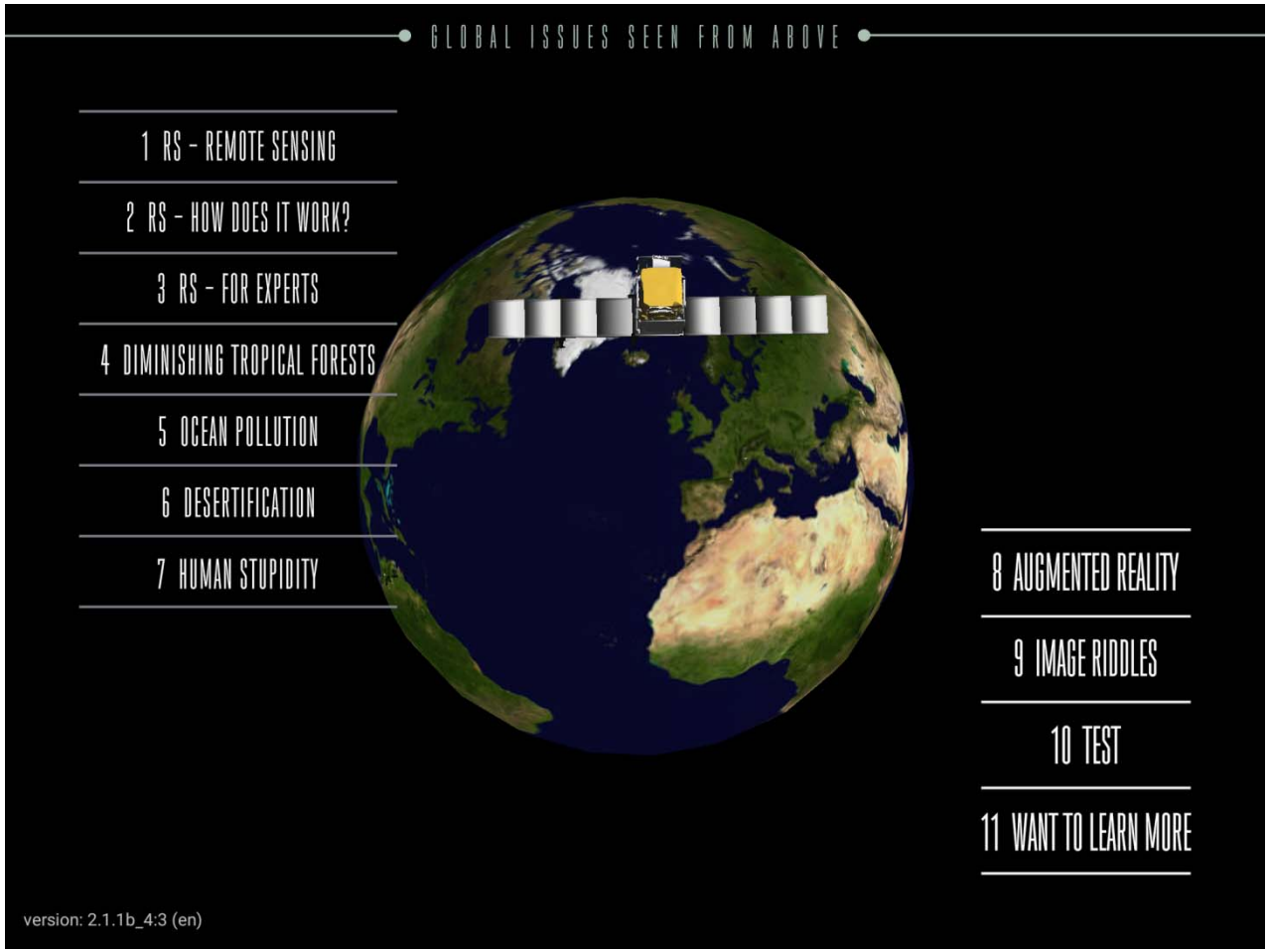


1) Global Issues from Above (EO tablet app)

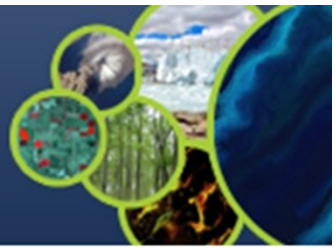
For Android (now) and iOS (July 2016)

Czech and English,
other languages possible

Introduction to EO
and Global issues
applications



2) Two textbooks and 18 educational programmes for basic and secondary schools



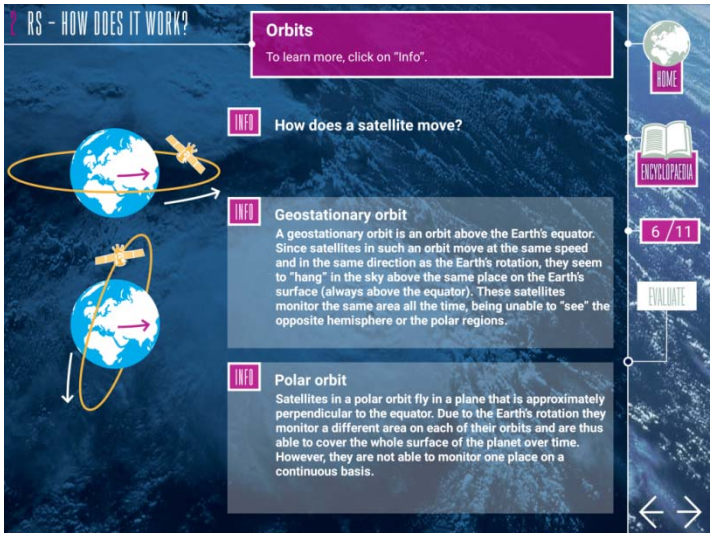
Thank you

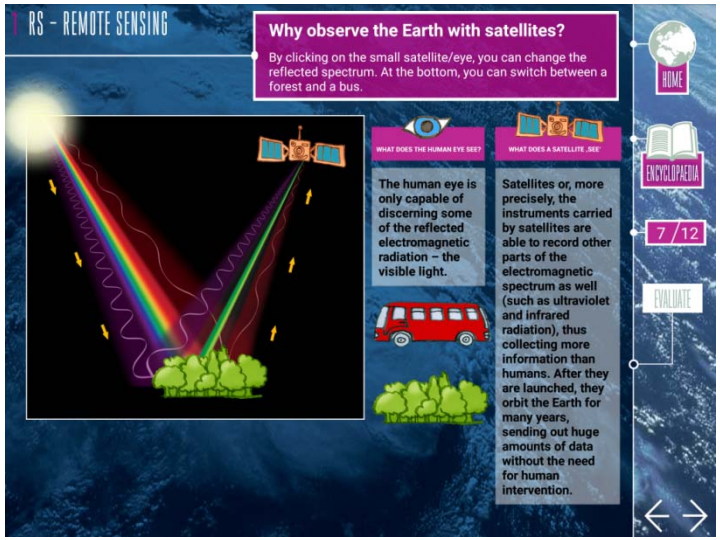
USEFUL ADDRESSES

- ESA education portal: www.esa.int/education
- to order EO material: education@esa.int or eohelp@esa.int
- Eduspace: www.esa.int/eduspace
- ESA EO Education web page: http://eo-edu.eo.esa.int
- DLR_School_Lab: http://www.dlr.de/schoollab/en/desktopdefault.aspx/tabid-1738/

► Remote Sensing

(introduction to principles and function)





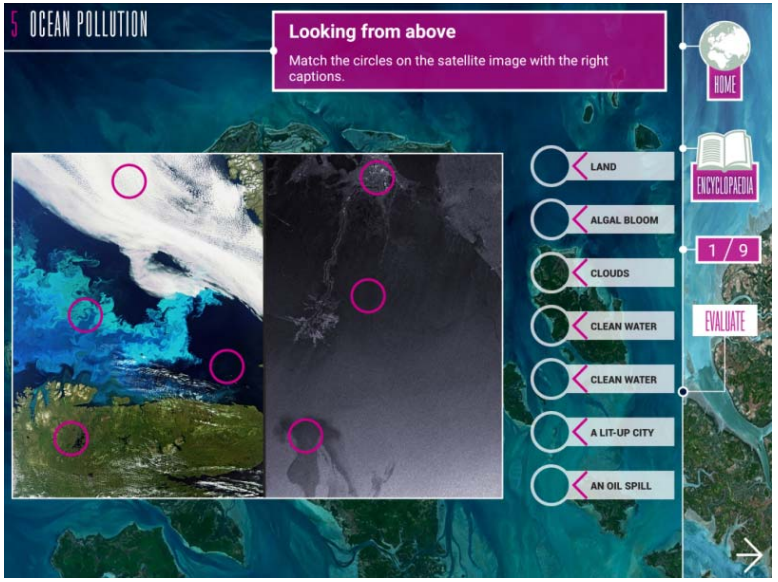
► Global issues – EO applications

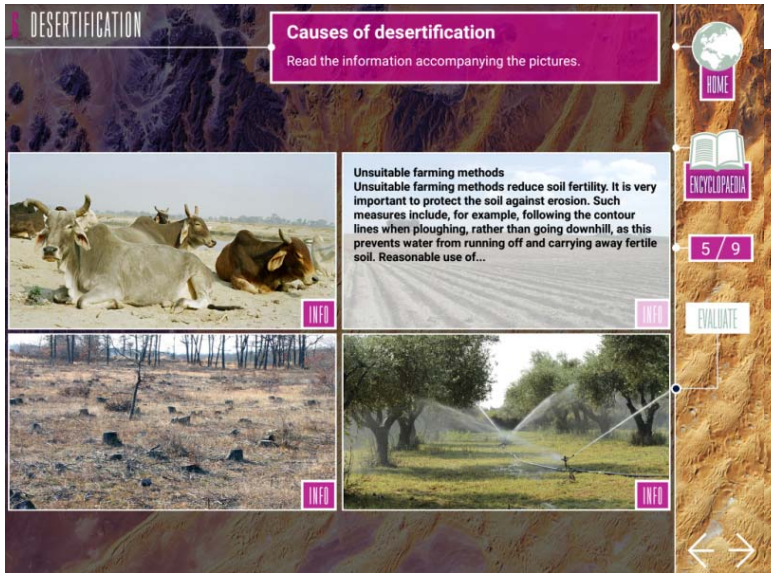
Diminishing tropical forests

Ocean pollution

Desertification

(Human stupidity)





4) E-learnings for basic and secondary schools