EARSeL Special Interest Group
Education and Training

4th Workshop on

Remote Sensing in Education and Training

Matera, 4 June 2013

Abstract Book

Sessions

9:00 – 11:00	**Education and Training Session 1**	**Hall C**
11:30 – 13:30	**Education and Training Session 2**	**Hall C**
14:30 – 15:30	**Education and Training Session 3**	**Hall C**
15:30 – 16:30	**LEOWorks Tutorial Part 1**	**Hall C**
17:00 – 18:00	**LEOWorks Tutorial Part 2**	**Hall C**
18:00 – 19:00	**Open Discussion on Joint Activities**	**Hall C**

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Mobilizing secondary school students to monitor local environmental problems with earth observation data

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Keywords: education, remote sensing, space science, environment, secondary school students, Slovenia

Abstract:
Secondary school students are very open to technology and because they are also enthusiastic Internet users they are well aware of satellite data. Increasingly they also have a rather good knowledge about environmental issues and high awareness of associated problems. However, some of the topics seem to be beyond their reach in understanding and providing real actions. Our experience shows that with appropriate support students can overcome this and become involved in "proper" environmental problem solving. In 2011 the Centre of Excellence SPACE-SI has therefore started the project Slovenia from Space. In total 12 secondary schools decided to participate in the project with almost 20 projects. Each of the secondary schools was addressing a different problem, related to the field of remote sensing, meteorology, astrophysics, micro- and nanosatellite technologies and materials. The projects are ranging from observation of the aurora phenomena, maritime security, detection of invasive plant species, bora wind observation, and archaeological site identifications to geology analysis, urban area change detection ... In the paper we will present the Slovenia from Space project, describe the working procedures, discuss the advantages and also the difficulties we have encountered. The project will be compared with similar activities in developed (e.g. USA, Europe) and developing (e.g. Thailand) space nations. The experience we have is very positive, since the students have been highly motivated and had the opportunity to get practical and theoretical knowledge about things that are only slowly getting in the school curriculum.

EURAC JUNIOR – Applied remote sensing workshops for high school students at the European Academy in Bolzano/Italy

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Keywords: workshop, high school, remote sensing, science communication

Abstract:
EURAC junior is a project at the European Academy in Bolzano/Italy that has established a permanent interface between schools and the research carried out at EURAC. To demonstrate how satellite images are used in the context of natural science we offer three different workshops for high school classes on the topic of "Applied Remote Sensing". The aim of those workshops is not only to communicate the research that has been conducted at the EURAC-institute for Applied Remote Sensing. Moreover we want to raise the students interest in natural science itself and highlight the importance of integrating the different disciplines as the key to applied science in general. In all of the three hour workshops we provide background information on different reflection characteristics of different land use types, satellite technique and image processing. Well adapted for each school type and age of the students during the workshop "Earth Observation" we detect changes in the landscape over time or map land use by different classification methods. The workshop "Ice & Snow" provides background information on glaciers, how to monitor them and touches the topic of climate change. Students are asked to digitise the different extents of a regional glacier during the past 15 years and discuss their results. In the workshop "GPS in an emergency operation" students receive information on the technique of the global positioning system. While simulating an emergency situation students divided in groups capture data relevant to the types of information required by the relief effort. Statistics derived from the evaluation forms for students and teachers show that students enjoy a break in the routine of every day school. Teachers use the plethora of information we give during their normal teaching.

Virtual introduction to innovations in Earth Observation for secondary school students

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Keywords: virtual environment , interactive learning material, didactical theory, TerraSAR-X, RapidEye, EnMap

Abstract:
In this contribution we present an introduction to remote sensing for students in secondary schools that focuses especially on the recent innovations in earth observation. Therefore, we created a virtual environment in which students can explore the fascinating technology used in earth observation as well as its application in the field of environmental monitoring. Furthermore it serves as an introduction to a set of learning sequences which will be created within the next year. For the last six years, the German research project FIS (Fernerkundung in Schulen – Remote Sensing in Schools) has been developing interactive learning material for schools on behalf of the German Aerospace Center (DLR). This material is intended to give students in secondary schools a new understanding of the value of natural sciences by connecting curriculum-oriented topics with specific examples of application of remote sensing data and digital image analysis. Since 2012 the learning material is distributed in a comprehensive online learning portal along with a knowledge base about remote sensing, analysis tools, and learning management functionalities. Several aspects of remote sensing are addressed in different learning modules using a variety of tools. So far, the intention of the material was to create complete teaching units that stretched over several lessons. The new learning sequences will be much shorter trying only to highlight certain aspects of a topic with the help of remote sensing rather than covering the whole topic by the use of image data. The new virtual introduction to remote sensing ties the "loose ends" from the portfolio of those sequences together and presents the basic principles of remote sensing in an explorative manner. In that way, the new module also serves as a gateway to the other material in the learning portal. Several remote sensing systems are presented in this virtual introduction, representing the German efforts in earth observation, namely TerraSAR-X, RapidEye, and the forthcoming EnMap. These platforms

and their sensor technology are connected with different fields of application in environmental monitoring. The frame of the introduction is formed by a virtual globe letting users navigate to hot spots of environmental change and to the earth observation platforms. Here they get a first idea of the strengths and weaknesses of the different sensor systems (SAR – multispectral – hyperspectral), their preferred fields of application, all explained using sample imagery. For more detailed descriptions and for using digital image analysis tools with specific remote sensing data the students are redirected from this module to other parts of the FIS learning portal.

Training professionals to cope with the opportunities of VHR satellite data for environmental analysis and planning at local scale

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Abstract:
During the last decade numerous satellite missions for Earth Observation (both Public initiatives and Commercial leaded) have been successfully launched. As a consequence an overwhelming quantity of data is already available, and more will come to support Environmental Analysis at different scales. Of particular interest for Professionals are the opportunities of analysis at local scale, offered by the Very High Resolution (in the spatial sense) data that are by now available at a lowering unit cost. To exploit the informative power of these data, both the traditional techniques of image processing should be revised and some "new" procedures should be learned. For example, Object Based Image Analysis has its roots in Pattern Recognition Theory and it is not a novelty in itself; but it was mainly applied to Image Analysis in Medicine or in Industrial Automation. Only the increment in the spatial resolution of the new satellite data, has pushed toward the massive application of this technique also for Earth Observation tasks. The author is convinced that a course in Remote Sensing, oriented to VHR data analysis could be beneficial for experts and postgraduates willingly to widen their professional opportunities.

MODIS satellite products and GIS techniques for snow cover assessment in the upper Teleajen basin, Romania

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Keywords: MODIS, snow cover

Abstract:
Hydrological basins represent the main areas of snow accumulation and are the largest water reserves. With a good management, water is distributed for different uses, from electricity production to household consumption. Snow is distributed unevenly depending on altitude, slope and exposure of slopes, vegetation cover, soil types, etc., under the constant influence of meteorological factors (temperature, precipitation, winds). These conditions call for different snow cover monitoring in time and space, requiring the collection and processing of data from multiple sources: information from meteorological network, the medium and high resolution satellites, all gathered in a database and managed in a GIS environment. The study area is represented by the upper Teleajen river basin (246 sqkm), the river gathers its waters from Carpathians, down from the North-South direction on multistage relief (maximum elevation basin - about 1950 m). Topography was observed by using digital elevation model (DEM) derived from SRTM and for the influence of different vegetation land cover on the deposit and melting of snow, was drawn a vegetation map using Corine Land Cover database. Each altitudinal floors was intersected with forest, obtaining forested areas and percentages on each floor. The application is useful for evaluating snow water content, because they are different storage conditions and also the evolution and melting of snow in forested areas are different from the barren land. For this study, was used snow cover product from MODIS - MYD10A1 (250 m resolution), where the snow are coded "200" and were taken during the winter-spring season 2008-2011. The images was chose by certain criteria like a significant snow cover and with minimum or no cloud cover to define better the limits and spatial distribution of snow. The methodology and the results are taken into consideration to setting up of an efficient system to get, analyze and display information that is useful in snow water resource forecasting and management, helping managers and decision takers. Also the methodology was disseminated among meteorology and hydrology students like an easy way to perform a rapid assessment of snow cover and snow water content using free MODIS satellite data combined with in-situ data, all integrated in a GIS environment.

Drought monitoring using NDVI and NDWI indices over agricultural area from Romania

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Keywords: drought monitoring, NDVI, NDWI

Abstract:
Drought is a specific climate characteristic of Romania due to its excessive temperate climate with a large deviation from the normal values of climatic and hydrologic parameters. Remote sensing techniques can enhance and improve the drought analysis, especially considering the scarce availability of measured ground truth data. The advantage of multi-annual imagery availability allows the overlay and crosschecking of doughty, normal or rainy years. The Normalized Difference Vegetation Index (NDVI) plays a key role in the interactions occurring at the soil-plant-atmosphere interface and is derived from visible (red) and near-infrared spectral regions. Healthy vegetation absorbs most of the visible light that hits it, and reflects a large portion of the near-infrared light. Unhealthy or sparse vegetation reflects more visible light and less near-infrared light. Water is one of the most common limitations that cause drought. The Normalized Difference Water Index NDWI is a satellite-derived index from the Near-Infrared (NIR) and Short Wave Infrared (SWIR) channels. The SWIR reflectance reflects changes in both the vegetation water content and the spongy mesophyll structure in vegetation canopies, while the NIR reflectance is affected by leaf internal structure and leaf dry matter content but not by water content. The combination of the NIR with the SWIR removes variations induced by leaf internal structure and leaf dry matter content, improving the accuracy in retrieving the vegetation water content. In this study was processed and evaluated NDVI and NDWI indices derived from 500-meter MODIS surface reflectance data (MOD09A1 - 8-day composite), for a period between 2005-2012. The main objective of the study was to investigate methods for measuring and monitoring drought over agricultural areas from Romania and include the development of the corresponding climatological database, to establish a relationship between the NDVI, NDWI, and drought condition, the NDVI and NDWI time series analysis.

Human Capital Development in South Africa's EO community

A targeted spectroradiometric training course that provides a step towards creating a national spectral library

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Keywords: hyperspectral, HCD, spectrometry, spectral library, training

Abstract:
Historically South Africa has had a relatively small, but diverse community of Earth Observation (EO) data users. Of these EO users only a few had exposure to the use of hyperspectral data, either from field, airborne or satellite sources. In recent years a few national research institutions have purchased field spectrometers, and this trend now appears to be extending through to local universities and local companies.
In the international arena over the years many users of hyperspectral data make use and reference to spectral libraries developed by institutions such as the USGS or JPL. Spectral libraries if developed using consistent rigorous methodology can provide a valuable contribution to the earth observation community by for example providing input to developing land cover maps, or be used for testing the potential of upcoming satellites. Developing a freely available national spectral library of land cover surfaces would therefore be of great benefit to the South African EO community. The challenge in creating a national spectral library is to ensure the task does not fall on a single institute to collect all the data, but rather to get the numerous parties that are out in the field collecting data to be involved in this campaign. This requires participants to be willing to share their data, which is still currently an issue amongst South African EO practitioners.
Amongst the core tasks of the South African National Space Agency (SANSA) is mandated to supply and make earth observation data available to the South African community. This task requires not only the supply of data, but also training the community to use Earth Observation data effectively. Considering this role, the desire to create a national spectral library, and the recent purchasing by a number of institutes of spectrometers, SANSA is embarking on a program to train as many potential users and collectors of spectroradiometric data in best practices for data collection, storage and analysis. Training is delivered via a weeklong hands-on course that is presented either at universities to postgraduate level students, or at our training facility through to remote sensing professionals.
In this paper an overview of the course and experiences in the delivery of the course will be shared. We will in addition in highlight how through this training SANSA is trying to tackle the challenge of creating a national spectral library by gaining the support and by-in from the user community to actively participate in creating this library.

Remote sensing education for life long learning across the East Midlands region

G-STEP; Innovation in GMES and GIS Education and Knowledge Transfer

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Keywords: Remote Sensing, GMES, GIS, Professional training, Life Long Learning

Abstract:
Over the last decade, Remote Sensing technologies have provided useful tools for a diverse range of sectors. G-STEP (part funded by the ERDF) is the University of Leicester's flagship project for innovation, training and education in GMES and GIS based technologies. G-STEP (GMES–Space Technology Exchange Partnership) is the first GMES accelerator initiative in the UK and is breaking new ground in the application of GMEs and GIS.
The core G-STEP team initiates and develops Knowledge Exchange Practices between the University and Life Long Learning partners in the East Midlands Region, through training packages and collaborative research projects. The programme integrates novel research, to direct downstream

applied training packages, supported by analytical processing of attendee assessment data. The collation of this information presents a unique opportunity to incorporate a statistically viable feedback cycle, making G-STEP the interface between pure and applied research, thus initiating downstream dissemination to groups and small business. Education and training is delivered through short 'Breakfast' workshops, full day events and bespoke sector driven activity. Cross-disciplinary topics, such as 'Pictures and Processing', 'GMES for Solar Panel Location' 'Introduction to GIS', 'Open Source Workshops' and 'The Built Environment', have drawn in a diverse cohort from which bespoke education development and training can be piloted.

In this paper we outline the GMES and GIS training packages, and the route to market to increase uptake of underused data streams via both university entrepreneurs (start-ups) and established small business with a core interest in utilisation and dissemination of these novel technologies in sustainable lifelong learning.

Education and training needs in the specialized field of Geospatial Technology

Education And Training

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Keywords: Education, Training, Policy, Remote Sensing, Geospatial Technology

Abstract:
Education and training play vital role in the utilization of the technology. The science and technology are advancing every day. The use of this technology in the natural and built environment helps the human to improve the quality of life. Government policies and decisions are supporting the use of geospatial tools in various sectors of governance, The urban planning, environmental planning, industrialization, slum upgradation (mapping), land management are some of the areas where the geomatics has reached as baseline for decision making at national level. The basic question for the country like India is when the IT sector of the country is on the high ground and the space technology has made up the forefront in an international sphere then why it is slow pace of application of this technology? There is an emergence need to adopt multi-specialisation approach to examine the issues and challenges of research in such a valued topic of education and training in multi-disciplinary areas. The emergence need is for training, education, research and dissemination. The most important dimension is global in nature. It suggests the inter-organisations, academia, industry, government and also international collaboration. The demand for skilled manpower is observed increasing every day with the advent of technology development. The corporate sector is experiencing changes, in the early 1990s, most the space science related companies relied on outsourced business from overseas market with US, UK, Europe and other developed nations which is now changed to national (Indian) projects. 'Education in Space Science' is one of the important factors play a very important role here in bridging the gap between the demand and the market. A good education has direct and positive relations with the quality of the human resources generated. A measurement of the marginal productivity becomes meaningful. The marginal productivity of skilled manpower earns the higher GDP for the nation. The geomatics education offered by the universities is largely offer at post graduation level in India whereas it is offered from k-12 level to undergraduate and higher level in developed countries. A very important issue is to standardize the geomatics education worldwide, simultaneously it is essential to fill the gap through incorporating the newly developing fields in education syllabus, research agendas and outreach programmes to a grass root level. The technology is developing on fast rate, the implementation of the infrastructure and financial projects are also observed at fast rate, the emergence need is to give legal (policy) recognition so as the availability of human resources become boundary-less. This paper is an attempt to discuss the issues and challenges against the academia, government and industry in regard to the development and innovation takes place in this dimension and to explore and expand the scope. The paper emphasizes the education system and the generation of trained manpower, it also addresses the issue of standardization of the education, education system and research globally and attempting towards the suggestions in the policy direction.

Using the 'magic' of satellite images as support for an educational package: Understanding climate change effects on small island developing states

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Keywords: Remote sensing, education, awareness raising, Small Islands

Abstract:
The activity described herein addresses the thematic of space science and technology, in particular remote sensing, to support awareness raising and education with respect to natural and human induced threats including the effects of climate change that are affecting Small Islands Developing States (SIDS). This activity is being managed at the United Nations Educational, Scientific and Cultural Organization (UNESCO) and is being implemented jointly with the University of Ghent. SIDS are particularly vulnerable to natural hazards and the effects of climate change. Communities in SIDS are generally living close to sea level and influenced by large ocean atmosphere interactions such as hurricanes, trade winds, El Niño and the monsoons. SIDS are already feeling the impacts of climate change with increased intensity in the climatic patterns, increased frequency of extreme weather events, and sea level rise which increases vulnerability to flooding and natural disasters. In addition to effects of climate change some SIDS also suffer severely from geohazards as it has been, for example, the case of Haiti who has faced strong severe earthquakes. Many SIDS are characterized by the concentration of urban settlements with associated economic and social activities at or near the coast. In SIDS, natural resources such as biodiversity, fisheries, arable land, freshwater, and natural beauty (critical for tourism industry) are increasingly under pressure from urban and rural development, climate change, and natural hazards. The main objective of this initiative is to create awareness among local decision makers about the benefits of using remote sensing in support to the various threats that SIDS are suffering. In addition such an awareness programme will also be packaged in a pedagogical form in order to constitute an educational package about the contribution of remote sensing for SIDS. Remotely sensed data is being used in order to elaborate, for each selected SIDS island: a satellite mosaic covering the whole island; 3D models of the whole island; the capital city is illustrated with high-resolution imagery. Finally for each island there are showcases illustrating the use of remote sensing in topics like: climate change, sea level raise, coral bleaching, uncontrolled tourism development, uncontrolled urban development, severe deforestation and selected natural hazards. By the time of the EARSeL workshop the initiative will be able to show the whole educational and awareness raining package as well as some initial prototype results.

SAR-EDU

An education initiative for applied synthetic aperture radar remote sensing

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Keywords: SAR, radar remote sensing, remote sensing education

Abstract:
Since the 1970s, radar remote sensing techniques have evolved rapidly and are increasingly employed in all fields of Earth sciences. Applications are manifold and still expanding due to the continuous development of new instruments and missions and the availability of very high-quality data. The trend worldwide is towards operational employment of the various algorithms and methods that have been developed. However, the utilization of operational services does not yet keep up with the rate of technical developments and the improvements in sensor technology. With the enhancing availability and variety of space borne Synthetic Aperture Radar (SAR) data and a growing number of analysis algorithms the need for a vital user community is increasing. Therefore the German Aerospace Center together with the Friedrich-Schiller-University Jena and the Technical University Munich launched the education initiative SAR-EDU.
The aim of the project is to facilitate access to expert knowledge in the scientific field of Radar remote sensing. Within this effort a web portal will be created to provide seminar material on SAR basics, methods and applications to support both, lecturers and students. The overall intension of the project SAR-EDU is to provide seminar material for higher education in Radar remote sensing covering the topic holistically from the very basics to the most advanced methods and applications that are available. The principles of processing and interpreting SAR data are going to be taught using test data sets and open-source as well as commercial software packages. The material that is provided by SAR-EDU will be accessible at no charge from a DLR web portal. The educational tool will have a modular structure, consisting of separate packages that broach the issue of a particular topic. The aim of the implementation of SAR-EDU as application-oriented Radar remote sensing educational tool is to advocate the development and wider use of operational services on the base of pre-existing algorithms and sensors on the one hand, and to aid the extension of Radar remote sensing techniques to a broader field of application on the other. SAR-EDU therefore combines the knowledge, expertise and experience of an excellent German consortium.

Climate studies and Earth Environmental Engineering

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Abstract:
The rapid industrial development and increasing demand of new technologies of the last centuries lead to the largest human impact on earth climate since the evolution of the human race on earth. The anthropogenic alterations of the earth environment can still be corrected with the right education and development of green technology devices that could replace the highly polluting systems. In this regard an interdisciplinary, introductory, a new course is being offered at NYCCT for both science and non-science majors, and it provides students with a comprehensive study of the principles of Climate Science while simultaneously providing classroom and homework applications that focus on the rapidly evolving interdisciplinary field of Climate Science and the Environment. This interdisciplinary CUNY Pathways course explores the complexity and wonder of the Earth's climate system and introduces students to tools that will enable them to explore, analyze, and interpret the workings of Earth's climate. Students explore the great diversity of the Earth Systems and develop an understanding of the interactions between these systems by means of observations and instrumental records. They learn to appreciate Earth Environment and respond to changes in Climate due to biogenic as well as anthropogenic sources. Aside from scientific study, students learn to apply their new knowledge to everyday social interactions in their own lives and community by mitigating the carbon footprint, understanding the policy factors and governmental regulations. Topics include: the Earth's energy budget; water, heat, and heat transfer, global atmospheric circulation – Rossby waves, global water cycle, climate change and climate change mitigation and adaptation strategies, the monitoring of the earth's systems via satellite and ground-based Remote Sensing applications, instrument based climate records, and geoengineering. Considering this, an implementation approach has been developed specifically for students in engineering. This approach involves collaboration of faculty from engineering and geosciences as well as guest lectures and online modules to be used outside the classroom. The collaboration was further extended to the American Meteorological Society Climate Change study group which provides teaching modules and support for in and out of the class materials. These materials will also be used in a stand-alone Climate Change Studies course that will be offered as part of the new department of Environmental Science and Engineering to be created.

The Copernicus Academy – linking research, academia, service providers

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Keywords: GMES/Copernicus, academic programs, innovation for service evolution

Abstract:
The Copernicus Academy intends to enhance the role of the academic and R&D communities in the evolution of EO & GI services. The GMES4Regions G4R initiative, aiming to strengthen the link between Copernicus (Global Monitoring for Environment and Security) and European regions, inaugurated the Academy at the University Mozarteum of Salzburg (Austria) on 13th - 14th September 2012. This academy has been created with the objective of fostering a dialogue among the private sector, local and regional administrations (LRA) and the academic and research community, in order to improve the development of Earth Observation (EO) and Geographic Information (GI) services. On this occasion, Z_GIS, the Interfaculty Department of Geoinformatics of Salzburg University, hosted the round table "Fostering Downstream Services for the Regions - contributions from Research & Academia," during which the participants had the opportunity to discuss with representatives of the European Commission (EC) and the European Space Agency (ESA) the future role of the academic community in this domain. Stakeholders from the academic and R&D world adopted the 'Salzburg Declaration on GMES related Research', calling for strengthening connections between research activities and educational programmes to improve GMES services. The Declaration calls mainly for: • fostering education and training on GMES/Copernicus • ensuring cooperation among the academic and research community through the Copernicus Academy • maintaining a political commitment towards the implementation of such academic initiatives. The Copernicus Academy is established as a platform with six components: The Copernicus Academy is established as a platform with six components: GATEWAY - the directory of Universities and Research Centres BRIDGE - an inventory of research briefs documenting the latest offerings from research to effective applications FACILITATOR - a portal to seek or propose internships or contract research across Europe and addressing outreach and advocacy: LINK - Access to the repository of on-going GMES related research projects in the EU EDUCATION - a compendium of courses offered by universities in the field of GMES/Copernicus LECTURES - G4R offers to arrange lectures on GMES/Copernicus at interested universities and institutions The initiative by G4R (copernicus4regions.eu) invites collaboration to strengthen the role of research and education for the evolution of Copernicus services.

Easy-to-use image processing

The FIS Analysis Tools

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Keywords: learning portal , pupils, teacher, analysis tools, classification, weather observement, change detection, cyclogenesis, NDVI calculation

Abstract:
The project FIS (Fernerkundung in Schulen – engl. Remote Sensing in Schools) aims at a better integration of remote sensing in school lessons. In addition to the strengthening of natural science education and working on present questions, the use of satellite images in class offers further advantages in strengthening learning mechanisms based on the moderate constructivist learning theory. But when it comes to the use in schools these advantages are often neutralized. This is often because of a combination of two reasons: the use of remote sensing data is normally not part of teacher training; and the available software is not prepared in a way that it can be integrated in school lessons without instruction. For this reason, FIS developed a comprehensive and well-structured learning portal on the subject of remote sensing. The interactive FIS learning material form the backbone of the learning portal. In addition, an "Analysis Tools" section invites to further experiment with satellite images by working with predefined sets of images and tools. The presentation deals with the technical implementation, application possibilities, and experiences with these intuitive tools. The FIS "Analysis Tools" offer means to analyze digital images directly and independent from their embedment in a learning module. They address pupils as well as teachers and the interested public in particular. The 'Image Calculator' enables users to perform simple arithmetic calculations with digital images, for example the Vegetation Index NDVI or simple image differencing. The 'Image Classificator' delivers the functions needed for the derivation of a thematic map from a satellite image. The 'Swipe" tool simply enables a visual change detection. Beyond digital image analysis, some remote sensing products offer the possibility to observe current processes in a very high temporal resolution. The 'MeteoViewer' shows images of the geostationary Meteosat-10 satellite (MSG-3), which are reloaded every 15 minutes automatically. Besides near true color images, the

'AirMassViewer' provides imagery showing air masses in different colors. This imagery is highly suited to differentiate cold and warm air masses, identify the jet stream, and to observe cyclogenesis.

The GMES programme and the Sentinel space missions

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Keywords: GMES, Copernicus, Sentinel

Abstract:
The Global Monitoring for Environment and Security (GMES, now being renamed to Copernicus) is a European flagship Earth Observation Programme, intended to provide accurate, timely and easily accessible information to improve the management of the environment, understand and mitigate the effects of climate change and support civil safety and security. This includes a wide range of applications, like environment protection, management of urban areas, regional and local planning, agriculture, forestry, fisheries, health, transport, climate change, sustainable development, civil protection and tourism.
In order to support GMES, the European Space Agency is developing five families of missions called the Sentinels, scheduled for first launches between 2013 and 2014. These missions carry a range of technologies, such as radar and multispectral imaging instruments for land, ocean and atmospheric monitoring.

Tutorial on LEOWorks 4 of the European Space Agency

A new, platform-independent image processing and GIS software for Secondary Education

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Keywords: image processing

Abstract:
The purpose of this tutorial is to provide teachers with additional, attractive tools and resources for teaching Science in secondary Education, using Earth Observation (EO) data.
For this purpose, LEOWorks 4, ESA's new image processing and Geographical Information Systems (GIS) educational software will be used, in order to visualize and process EO data. Case studies from ESA's EO website for secondary schools ("Eduspace"), as well as other ESA education resources will be used, addressing a variety of topics in Geography and Environmental Science (e.g. Natural Hazards, Global Climate Change).
Participants will get hands-on experience in using LEOWorks 4 and will be given all necessary information on where and how to access relevant material and use it directly in the classroom, in order to enhance the learning outcome.