# Innovative Geography Lessons with Remote Sensing Methods

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## 1 Introduction

A basic competence requested in numerous national and international standards of education is the ability to extract, interpret, and evaluate geographic information from aerial and satellite images independently (DGfG 2007, NCGE 2009). Thus, the call for a competent dealing with digital remote sensing data is playing a major and increasing role (DITTER et al. 2011, VOSS et al. 2008). In order to meet this requirement, an appropriate learning environment including an intuitive user guidance and a range of functions suitable for the target group „pupils“ is needed. The workshop demonstrates different ways of integrating remote sensing in innovative geography lessons. The chances and potentials will be demonstrated by means of different learning environments and illustrative examples for lessons.

## 2 Workshop Concept

The workshop's centre is the specific use of and direct working with digital learning environments created by the projects *„Focus on Remote Sensing (**Bli**ckpunkt **F**ernerkundung, BLIF) – A Remote Sensing Web Application for Competence Oriented School Education“* and *„Remote Sensing in Schools (**F**ernerkundung **in S**chulen, FIS)“*. The education material range from the software "BLIF", developed for the use in schools, different digital and interactive learning modules up to a digital encyclopaedia for remote sensing. Besides the presentation of the single learning environments' functionalities, the intersection of the "BLIF" software with parts of "*FIS modules"* will be presented in the workshop.

The workshop is divided in theoretical and practical topics. Whereas the theoretical part presents different learning material, the participants apply these in different teaching examples and on the basis of specific teaching materials. The participants have therefore the opportunity to deal with the selected material intensively in small groups. In practical application an in panels, the participating teachers develop basic competences for the use of satellite images in school lessons.

By dealing with different didactic approaches on their own, basic competences for the use of remote sensing methods in teaching are developed. It is our aim to show teachers new ways of using topics related to remote sensing in school lessons. In the context of a contemporary problem- and action-oriented learning programme, intuitive use of learning environments is in the focus. The conception of software, learning modules, and related working material takes especially the moderate-constructivist form of "new thinking" into account (VAKAN et al. *2007,* RIEMEIER 2007*)*. Research tasks have, normally, not only one solution. The learners have to deal actively with the geographic question in order to find an appropriate solution. Thereby, it is focused on independent researching with satellite images as the methodical form of action. The teacher acts as a learning advisor in the background, supporting the pupils by helping them to develop suitable learning strategies. The

Jekel, T, Koller, A., Donert, K. & Vogler, R. (Eds.) (2011): Learning with GI 2011.

didactical approaches of BLIF and FIS allow not only an application in a geographical context. On top of that, the dealing with remote sensing data provides added didactical value in scientific lessons as well as in mathematics and computer science. This applies especially for interdisciplinary and subject-connecting teaching (HASSENPFLUG 1996, JÜRGENS 2003). By dealing with real investigation areas, considerable authenticity is transferred to the daily life of teaching and, therefore, learning close to reality is made possible (BRUCKER 2006, KLAFKI 2007, GUDJONS 2008).

In order to prevent any restriction of the pedagogic potential because of administrative constraints in school, software as well as learning modules are designed as web applications. In doing so, every pupil and teacher has direct access to the applications from anywhere without tedious installing.

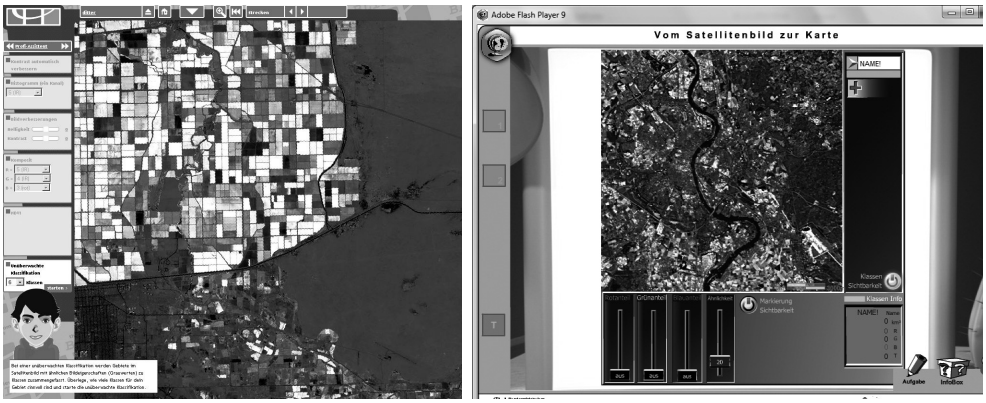


**Fig. 1:** a) BLIF learning software in the assistance mode „Professional“ (left), b) FIS-module „From Satellite Images to Maps“ (right)

# 3 The Learning Environments

## 3.1 Education Software BLIF

BLIF provides a web-based software for remote sensing for free, which enables a successive establishment of remote sensing in schools in combination with selected, competence-oriented working materials (cp. DITTER et al. 2010). For this, the user has all basic functions of mostly high complex desktop remote sensing software at hand.

Basically, two different modes are available for the user. On the one hand, an “open mode” in which all implemented software functions can be used without limitation. On the other hand, an assisted mode in three different degrees of difficulty (beginner, advanced, professional), in which the learner familiarizes with the program step by step. The assistant “Lewis” (derived from “Learning with Satellite Images”) gives instructions for each processing step as well as helpful background information, and offers further assistance. (see Fig. 1a). The degree of difficulty is responsible for the functions available. The user interface of BLIF is identical in all three levels of assistance. In every level, only the step of

analysis the assistant presents is active. After the pupil has completed one step of processing, another instruction follows and the next window for processing is activated.

The conceptional aim of this methodical stringency is to familiarize the user with the „quasi-prototypical“ user guidance and to strengthen the routine procedures on the one hand and, on the other hand, to deepen the methodological competence for further qualification progressively.

### 3.2 FIS-Learning Modules

The integration of remote sensing topics in school lessons takes place via digital and interactive learning modules in FIS (see Fig.1b). On the basis of a problem concurring to the curriculum, the learning modules provide different interactive tools for carrying out classical remote sensing analysis. To realize usability appropriate to pupils, multi-media presentation options, like movies and animations, are integrated into the modules. In the sense of moderately constructivist didactics, the interactive modules bring forward the independent deducing and solving of problems through additional background information, figures, animations, and tasks.

The digital learning modules are not limited to computer work, but include ideas e.g. encouraging for a discussion in small groups. For this reason, the realization of the didactic concept can be assigned to blended learning. Additionally, the concept takes the pupils' different previous knowledge into account. By developing a scaled, digital encyclopaedia, the „InfoBox“, the pupils have the opportunity to learn new information on remote sensing according to their previous knowledge.

### 3.3 Intersecting BLIF and FIS

Single parts of FIS modules are included in the BLIF software. They represent a special form of support. The BLIF user has the opportunity to deal with basics of remote sensing in an illustrative and interdisciplinary way. The holistic and compatible methodical and media mix offers different motivating accesses to remote sensing for learners.

## 4 Perspective

For closer integration of remote sensing methods in school lessons, a comprehensive offer of teacher trainings is needed in future. It has to be the aim to show ways and possibilities how topics of remote sensing can be integrated in school lessons with an adequate preparation effort.

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