ChangeHabitats2

Network for Habitat Monitoring by Airborne-supported Field work
— an innovative and effective process in implementation of the Habitat Directive

VITUKI
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International Workshop

on
Advanced remote sensing methodology development to support Natura 2000 management actions across EU

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Short description of a presentation

Presentation title: Assessing the impact of metals loads and other contaminants in large freshwater bodies using hyperspectral remote sensing. A challenge for the future of lakes and rivers management.
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Short description of the presentation:
The characterization of heavy metals and other polluted elements derived from active and abandoned mining sites and from agricultural over-erosion regions, is a complicate task due to the variable spatial distribution of metals and therefore, a diffuse contamination in the soils, freshwater systems and surrounding area. Traditionally, the evaluation of the degree of contamination in a drainage basin requires a dense net of sampling sites, followed by a complex set of chemical and mineralogical analysis. Moreover it is essential to have up-to-date spatial informations about the loads and diffusion of the contaminants, a monitoring campaign to control the hydrological balance, in order to propose adequate measures for the rehabilitation of these freshwaters. This is an intensive, costly and time-consuming labour, which becomes impractical in most research projects and sometimes inapplicable due to the poor accessibility of some areas.

The use of remote sensing to estimate water quality parameters, such as suspended sediments, metals and nutrients distribution, seems to be a useful technology to use as a preliminary study in large freshwater bodies. Empirical models based on the relationships between spectral measurements and water and sediments quality analytical data, will decrease the number of sampling sites in the basin, since remote sensing is a considered a potential method to estimate water quality variations.

In order of having a synergy between hyperspectral data and geochemical, mineralogical and hydrological information, we would like to use the hyperspectral remote sensing technology in two different scenarios: (1) A contamination area by intense agriculture and (2) A contamination area by mine industry.

(1) In the Douro vineyards, a World Heritage Patrimony in Portugal, the aim of the study is assessing the impact of an ancient activity in the quality of sediments and water in the Douro River. While the tradition and the economic benefits of the wine vineyards are considerable, fertilizers and pesticides, intensely used in this crop, associated to intense loads of heavy metals and nutrients, are intensely leached by erosion processes from soil surface layers, to streams and catchments. The main objective of this work is to investigate the relationship between the soils and element concentration in the river sediments, assessing the impact in the water quality and estimating the risk posed to biota;

(2) Several regions of Brazil, in particular Minas Gerais State, holder a huge hydro potential and an intense mining activity since the last hundred years. The extraction of iron, gold, nickel and other metals of commercial interest, have contribute to the release of wastes which constitute a major form of heavy metal contamination in soils and in the water systems. Large loads of metals are released into the São Francisco River, the longest river entirely Brazilian. One of the main studies to carry out in this region is to characterize large drainage basins with strong mine impact and to evaluate its environmental quality in order of proposing measures to its rehabilitation. Currently, it has been conducted several studies in order of evaluating the availability of transposing a part of São Francisco waters to the driest regions of the country, at NE, which need a strict monitoring of their quality.