Assessing a River Floodplain Status Using Airborne Imaging Spectrometer Data and Ground Validation – The HyEco'04 project

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PRESENTATION ABSTRACT

River floodplains are very dynamic systems and in Western-Europe they are often used to combine different functions: flood protection, nature, recreation, agriculture and extraction of sand, clay and gravel. For optimal management of these river systems monitoring of vegetation succession and hydrodynamic and hydromorphological processes is essential. In addition, dynamic models are adopted to assist management decisions by comparing different future river management scenarios. These models have a strong need for spatially continuous data that are often unavailable at present. Several recent studies have shown that imaging spectroscopy can be applied for quantitative retrieval of biochemical and biophysical variables (e.g., LAI, biomass, canopy nitrogen, vegetation structure) that are required for model initialization and calibration and for monitoring the floodplain status in general.

The objective of the HyEco'04 project was to explore the possibilities of imaging spectroscopy to assess the status of a river floodplain at the local scale-level that could be used as input for ecological and hydromorpological models. Imaging spectrometer data were acquired in the summer of 2004 with the HyMap sensor for the floodplain Millingerwaard along the river Rhine in the Netherlands. Several ground support teams supported the data acquisition during its overflight during two days in July and August 2004. Field measurements concentrated on two approaches: first, radiometric measurements supporting the linking between soil-vegetation-atmosphere transfer modelling (e.g., sunphotometer, leaf optical properties measurements, canopy reflectance, structural parameter measurements (gap fraction, leaf angle distribution, leaf area index) have been performed and secondly supporting additional measurements on

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vegetation (species mapping, destructive biomass sampling) and soil (moisture, temperature) have been carried out.

First, we will report on the data quality evaluation of the various data sources, and their integration into an integrated system, dealing with various aspects of spatial sampling schemes as well as uncertainty measures. Secondly, the point-based vegetation data were used as a training set to make geographically explicit predictions based on products derived from the HyMap sensor. Two examples are discussed: species abundance maps derived from the coupled model PROSAIL and LAI derived using a quantitative statistical based approach combining the approaches of Clevers (WDVI) and Chen (LAI bias correction). The products are discussed in view of potential incorporation into ecological or hydromorphological models that are used to assist floodplain management.