

Wetlands delineation and characterization from CASI hyperspectral data

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PRESENTATION ABSTRACT

The main purpose of the current research consists in assessing the capabilities of airborne hyperspectral imagery for the delineation and the determination of the composition of wetlands. The study is specifically focused on valley bottom wetlands included in agricultural landscapes. These small areas, located in the bottomlands of the headwater catchments, and scattered in the rural landscape, are often neglected in national and regional wetland inventories, although they strongly influence hydrology, water quality and biodiversity over the whole catchment area.

The potential and accuracy of CASI data were assessed for determining the extent of effective or existing wetlands, and for their characterization in the framework of a new methodology for the inventory of valley bottom wetlands based on the functional analysis of Potential, Existing and Efficient valley bottom Wetlands (the PEEW approach). Hybrid methods were used both for wetland delineation and characterization. A conventional photo-interpretation and a spectral unmixing approach were performed on the hyperspectral images. A classification scheme based on support vector machines was also applied in order to determine the farming practices on meadows.

Initial results were obtained over a complex wetland area located in Brittany, France. Results assessed from wetland field sampling indicated that the CASI images provide information related to the surface hydromorphy, vegetation and farming practices such as pasturing or mowing. CASI data allowed certain species or combination of species to be distinguished, and the presence of surface hydromorphy and the trophic type to be interpreted.

It was shown that high spatial and spectral resolution airborne hyperspectral imagery was able to detect wetland vegetation, and also to provide improved characterization of hydrologic features and conditions. Moreover, CASI data can help to delineate potentially efficient wetlands defined through a given function, such as flow or pollutant regulation. Hyperspectral data can contribute to help environmental managers in determining the areas where rehabilitation and other intended management actions should be implemented within the existing or potential wetland areas.