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Assessing and predicting vegetation structure in floodplain ecosystems: assimilation of imaging spectrometer derived variables into dynamic vegetation models

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New concepts for river management in northwestern Europe are being developed which aim at both flood protection and nature conservation. As a result, methods are required that assess the effect of management activities on the biodiversity of floodplain ecosystems. Dynamic vegetation models (DVM) can be adopted to predict future vegetation succession under different river management scenario's. However, actual information on the spatial distribution of the vegetation structure is required to initialize and validate these models.

This study focused on establishing a methodology for mapping and monitoring vegetation structure using imaging spectroscopy. Vegetation structure was defined according to the concept of Plant Functional Types (PFT) which is also the common input format for DVMs. PFTs were defined on the basis of plant traits (height, density and flexibility) as vegetation clusters that have a similar response to water flow impact. Field and airborne imaging spectroscopy data (HyMap, CASI) were acquired for a floodplain along the river Rhine in the Netherlands and used to derive spatial continuous PFT maps. Spectra of main PFTs (grass, short herbaceous, tall herbaceous, dwarf shrubs, shrubs and forest) were selected from the image data and identified as endmembers using a site-specific library. Spectral unmixing analysis (SMA) was performed to de-

tect changes of the distribution and abundance of PFTs over time. Results show that vegetation succession in the floodplain has resulted in gradual increase of shrub coverage at the expense of grass and herbaceous vegetation types. Comparison of the remote sensing derived PFT distribution with modeling results from the dynamic vegetation model SMART2-SUMO2 shows a comparable trend. Further work is required to upscale the approach from the floodplain level to the river catchment scale using medium-resolution sensors like MODIS and MERIS.