



Hyperspectral Data Analysis in R: The new hsdar-package

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The comprehensive and new R-package hsdar focuses on the processing, analysis and simulation of hyperspectral (remote sensing) data with a special focus on remote sensing of environments. The package provides a new class (Speclib) to handle large hyperspectral datasets and the respective functions to create Speclibs from various types of datasets such as hyperspectral images acquired by sensors on drones or aircrafts. Beside the implementation of the frequently used vegetation reflectance simulation models PROSPECT and PROSAIL, the package includes functions for all processing steps during a common hyperspectral analysis: 1) pre-processing methodologies of hyperspectral reflectance data encompasses e.g., noise reduction, spectral binning and continuum removal. 2) Functionalities regarding the analysis include over 100 already implemented vegetation and soil indices, linear spectral unmixing, the calculation of normalized ratio indices and feature selection algorithms. For statistical analysis, a convenient access to the multivariate analysis tools is provided, which allows to directly use the hyperspectral datasets in the functions of the caret package. The contribution shows a subset of available methods which are demonstrated by the analysis of 3D hyperspectral data taken to investigate effects of CO₂ enrichment on grassland vegetation.