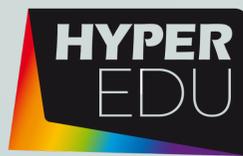


HYPERedu

A new online learning platform for hyperspectral remote sensing

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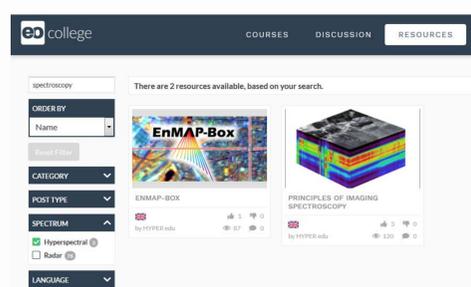
Background

Hyperspectral imagers have demonstrated to be a source of accurate and quantitative information about terrestrial and aquatic ecosystems required in various application fields. While the current availability of hyperspectral image data is still limited in both temporal and spatial coverage, data availability is expected to increase substantially in the near future with a rising number of imaging spectrometers deployed on airborne platforms and the launch of space-borne imaging spectroscopy missions such as EnMAP. In view of these developments, an increasing need for Earth Observation education and training activities with a focus on hyperspectral imagery is expected in the next few years.

Objectives

Therefore, the development of HYPERedu, an online learning platform for hyperspectral remote sensing to be hosted on EO College has started as part of the EnMAP education initiative. HYPERedu will provide presentations, hands-on tutorials and short educational films on principles, methods and applications of imaging spectroscopy at master's level, addressing students as well as professionals in research, companies, and public agencies. The first resources were published in September 2019 and will subsequently be extended. In addition, the development of a hyperspectral MOOC with several modules and certificate is planned to be opened in 2021.

Hosting and Content



EO College platform hosting HYPERedu

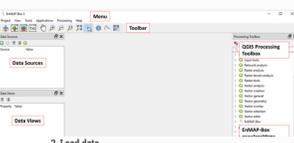
Exercise A: Urban land cover

Albion imaging spectroscopy data is well suited for urban mapping. The high spectral and spatial resolution enhances the separability of surface types and preserves the spatial detail of many urban features. This exercise...

- provides an insight into how urban areas are depicted by airborne hyperspectral images and introduces a hierarchical classification scheme commonly adopted for urban mapping
- introduces basic functionalities of the EnMAP-Box. You will get to know the graphical user interface, and you will learn how to load data, visualize raster and vector data, and use the basic navigation tools

Duration 15 min 1. Start the EnMAP-Box

Start QGIS and click the icon in the toolbar to open the EnMAP-Box. The GUI of the EnMAP-Box consists of a Menu and a Toolbar, panels for Data Sources and Data Views, and the QGIS Processing Toolbox including the EnMAP-Box geotools.



2. Load data

The EnMAP-Box offers simple drag & drop capabilities to load data from an external explorer. Drag the following datasets from your explorer into the Data Sources panel:

- Raster: [lsmv1_jeff_1km_2000.tif](#), [lsmv1_jeff_1km_2000.tif](#)
- Vector: [landcover_berlin.shp](#)
- Spectral library: [library_berlin.tif](#)



Visually explore your fraction map. You may open 'lsmv1_jeff_1km_2000.tif' in a separate Map Window for comparison. You may use the Identify tool together with the Identify cursor location values option to display fraction values of pixels.

Extract from a published tutorial



Content and structure of the HYPERedu online learning resources (to be further extended in the future)

Basics

- Principles of imaging spectroscopy
- Principles of sensor technology & data acquisition
- Data preprocessing
- Sensor simulation

Methods

- Dimensionality reduction and transformation
- Classification methods
- Quantification methods

Applications

- Forests
- Agriculture
- Natural ecosystems and gradients
- Carbon cycling
- Soils
- Geology
- Urban areas
- Water
- Ice and snow
- Hazards
- Atmosphere and gases

Software and data

- Data sources (lab, field and imaging spectroscopy)
- EnMAP Box introduction

HYPERedu in a nutshell

- Contents:** Annotated slide collections, hands-on tutorials using the EnMAP-Box software, educational films, interactive graphics and videos on principles, methods and applications of imaging spectroscopy (currently under development); Hyperspectral MOOC with several modules (planned to be opened in 2021)
- Target group:** Students and professionals at master's level (English language)
- Hosting:** EO College online learning platform (eo-college.org)
- License:** All content is provided free of charge under a CC BY-SA 4.0 International License
- Funding:** Within the EnMAP scientific preparation program under the DLR Space Administration with resources from the German Ministry of Economic Affairs and Energy (BMWi)
- Developers:** GFZ Potsdam, Humboldt Universität zu Berlin, Universität Jena / EOS with contributions from the EnMAP Science Team and beyond

EnMAP-Box software

All tutorials are based on the EnMAP-Box software that is being developed within the EnMAP science program. The EnMAP-Box is a free and open-source plug-in for QGIS for visualizing and processing imaging spectroscopy data and spectral libraries.



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