Overview of the EnMAP Hyperspectral Mission

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on behalf of Luis Guanter and the EnMAP team
Hyperspectral remote sensing a.k.a Imaging Spectroscopy

→ Quantitative mapping for a wide range of research fields

→ Great potential for new (and unexpected!) applications

(see session Fachsession 4b)
EnMAP: Environmental Mapping and Analysis Program → Imaging spectroscopy for Earth observation

- Conceived as a high performance scientific mission

- Core funding from the German Federal Ministry of Economics and Technology

- Currently under construction phase (D), launch ~end 2020
High-performance imaging spectroscopy system for Earth observation

Key mission characteristics for scientific use of EnMAP:

- Up to 4 days revisit time with tilted obs.
- Ground segment distributing geometrically-corrected reflectance data
- Co-existence with Sentinel-2 & Landsat-8
- Open data policy for scientific use

\[ \text{FWHM} \approx 10 \text{ nm} \]
EnMAP space segment

- Instrument: Independent VNIR & SWIR spectrometers
- Curved prism design to maximize spectral and spatial uniformity

Guanter et al., Rem. Sens., 2015
EnMAP – Main Mission Parameters

- Push-broom imaging spectrometer
- Sun-synchronous orbit, 11h LTDN
- Spectral range
  - VNIR: 420 nm to 1000 nm
  - SWIR: 900 nm to 2450 nm
- Spectral sampling distance
  - VNIR ~6.5 nm
  - SWIR ~10 nm
- Data acquisition
  - 1000 km/orbit
  - 5000 km/day
- Swath width 30 km
- Ground sampling distance 30 m
- Revisit time
  - 27 d nadir
  - 4 d with 30º across-track pointing
- Mission lifetime ≥ 5 years

Guanter et al., Rem. Sens., 2015
Data Products & Acquisition Priorities

<table>
<thead>
<tr>
<th>Product</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 0</td>
<td>Time-tagged instrument raw data with auxiliary information (internal)</td>
</tr>
<tr>
<td>Level 1B</td>
<td>Radiometrically-corrected, spectrally- and geometrically-characterised radiance</td>
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<tr>
<td>Level 1C</td>
<td>Orthorectified level 1B</td>
</tr>
<tr>
<td>Level 2A</td>
<td>Atmospherically-corrected level 1C</td>
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</tbody>
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**Acquisitions:**
- Restricted to 1000 km/orbit and 5000 km/day
- Daily acquisition plan driven by user priorities and cloud forecast
- Acquisitions based on user requests
Main research lines:

- Agriculture
- Forest
- Ecosystems
- Soils & Geology
- Coastal and inland waters

Focus on the development of algorithms for the EnMAP-Box:

- Software for the pre-processing and scientific exploitation of EnMAP data
- Free, open source and platform independent

Download from [www.enmap.org/?q=enmapbox](http://www.enmap.org/?q=enmapbox)

Rabe, van der Linden et al. (HU Berlin)
EnMAP end-to-end scene simulations

Simulation of EnMAP-like L1b and L2 products for algorithm development, validation and calibration

Many (>100) simulated EnMAP data sets already available

Contact Karl Segl at GFZ if you need simulations for your study site!
Airborne hyperspectral images and associated in-situ data provided free of charge to science community under CC BY-SA Licence.

Search metadata portal at www.enmap.org → data

Datasets published as data publications (with DOI)

Technical Report will be provided with each dataset (documentation of data acquisition, processing, quality etc.)
Support to young researchers

- **PhD Programme**: 15 PhD projects currently ongoing on different research areas and groups in Germany
- **YoungEnMAP**: International Summer Schools organised every year

EnMAP summer school participants (Lauenburg, March 2015)
Thank you for your attention!