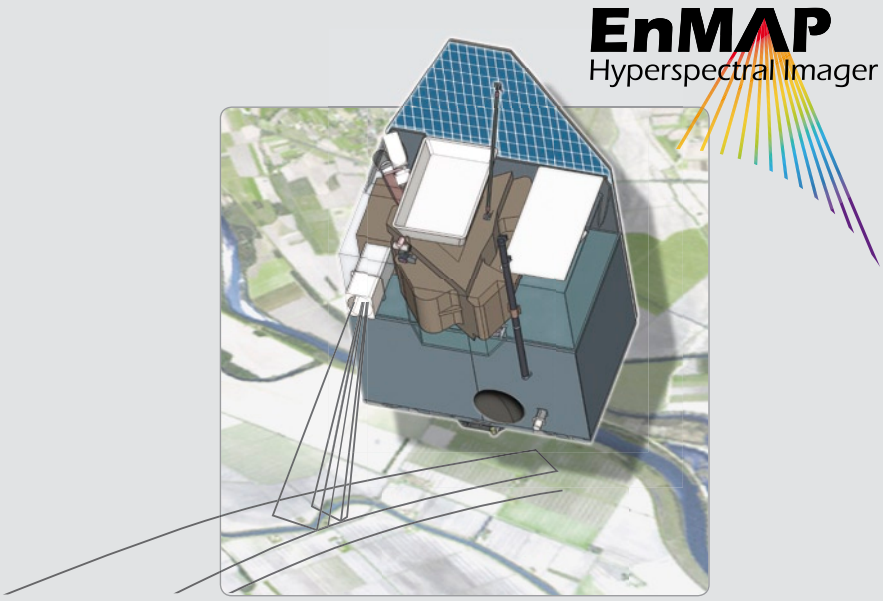
EnMAP

The Hyperspectral Earth Observation Satellite

Environmental Mapping and Analysis Program



- Future German hyperspectral satellite mission with over 200 channels within the broad spectral range from 420 nm to 2450 nm and a ground resolution of 30 m
- Global determination of spectral highly resolved ecosystem parameters as well as biophysical, biochemical and geochemical variables
- Allocation of high-quality data for the preparation of improved models and the extended comprehension of biospheric and geospheric processes
- Mission data will be used for the preparation of future commercialization and operative services

GAF AG · GFZ Potsdam · KAYSER-THREDE · OHB System – Ein Unternehmen der OHB Technology AG · DLR

Mission Parameters, Performance & Hyperspectral Data

Description of the Satellite Mission and Classification of the EnMAP Measuring Data

Mission parameters for EnMAP

Orbit		
■ Sun-synchronously	:	at 643 km
■ Inclination	:	97.96°
Equator overflight time	:	11:00 h LTDN
Imaging concept	:	"push-broom" with 30 km swath width, pointing feature ±30°
Target revisit time (pointing angle)	:	4 days (±5°)
Maximum ground coverage per day	:	5.000 km x 30 km
Data storage capacity	:	512 Gbit
Data downlink rate	:	320 Mbps via X-Band
Instrument Mass	:	< 300 kg
Instrument power consumption	:	< 250 W
Channels/Bands		
■ VNIR	:	420 – 1030 nm (96 bands)
■ SWIR	:	950 – 2450 nm (122 bands)
Satellite total mass	:	850 kg
Satellite attitude		
■ Accuracy	:	better than 500 m
■ Knowledge	:	better than 100 m
Life time	:	5 years

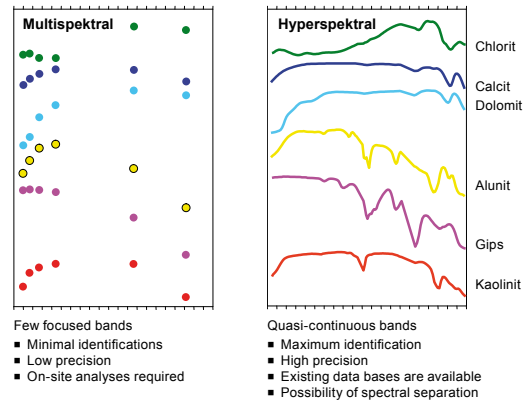


Fig. 2: Comparison of multispectral and hyperspectral measuring data

Performance

Fig. 1 shows EnMAP characterized by the resolution capability and the number of spectral bands compared to other multi- and hyperspectral systems. EnMAP enables the global retrieval of ecosystem parameters with high spectral and spatial resolution with a simultaneously high repetition rate.

EnMAP provides unique data and is due to its performance outstanding compared to all existing similar satellite systems. The hyperspectral data of EnMAP do not only provide new answers to current scientific problems; they do also have a huge potential for several future commercial applications (see next page).

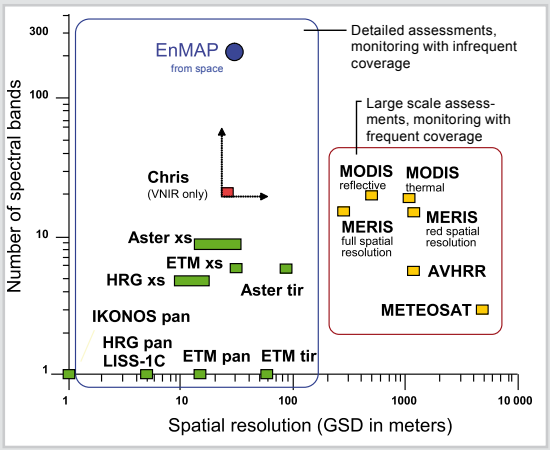


Fig. 1: Description of the EnMAP performance compared to other air- and spaceborne multi- and hyperspectral systems

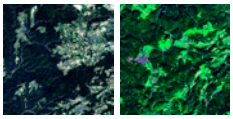
EnMAP Data Sets

Fig. 2 shows measuring data of a multispectral sensor (left), which only give a small chance to identify the different materials (here minerals). Compared to this, Fig. 2 (right) exemplarily shows the respective hyperspectral measurement signals (spectra). They are clearly differentiated and enable a definite diagnose and improved classification of the corresponding materials.

Science & Market Potential

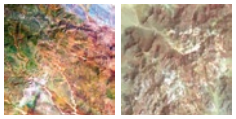
Scientific & Commercial Applications

EnMAP was targeted as user-driven mission and therefore generates a respective data base for detailed analysis and consequently for a better understanding of the processes on earth's surface. The interaction of science and commercial users within the EnMAP user community is strengthening both the science and the value adding industry. Thus, they can inherit an international pathfinder role in the forward-looking optical remote sensing sector. Some important fields of application are exemplarily shown below:



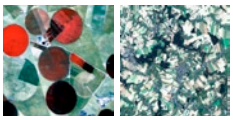
Forestry

EnMAP data enable an improvement of the classical forestry monitoring and management due to its high significance. This is relevant for the fields of regeneration assessment as well as forestry utilization.



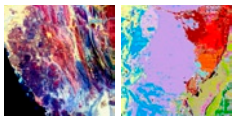
Soil and land management

The classical tasks of the public institutions are supported by improved differentiation, higher quality and cost reduction.



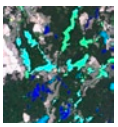
Agriculture

Concerning the assessment of quantity and quality of plant growth, hyperspectral data enable a significant improvement in comparison to the presently used multispectral data. This allows accordingly the provision of high-quality statistical services (forecasts), an improved subsidy control and enables agricultural risk management up to "precision farming".



Geology and prospection

The application potential of the hyperspectral data largely exceeds the one of the so far available multispectral data. It enables the efficient diagnostic mapping and analysis as needed for the research of raw materials, the disposal of brownfields and the environmental monitoring. Additionally, by means of hyperspectral data, it is possible to carry out an effective catastrophe management.



Inland waters and costal regions

Satellite based hyperspectral data facilitate realtime and plane water monitoring which was possible so far only at selective measuring points with respective allocation of human resources. This leads to cost savings with simultaneous quality improvement in the field of assessment and forecast.

About Kayser-Threde GmbH

Space • Automotive & Process Control Systems

Kayser-Threde GmbH is a leading systems house specializing in the design and development of high-technology solutions for astronautics, science and the industry. The broad array of solutions includes applications in manned and unmanned space missions, optics, telematics, crash test data acquisition, and process control for the rail sector.

Kayser-Threde has successfully delivered over 100 scientific instruments, systems and sub-systems for manned space stations, satellites and interplanetary missions. Optical systems and subsystems for eight space telescopes and space cameras for astronomical and earth observation have been implemented. Within the field of telematics, Kayser-Threde offers solutions for locating and monitoring mobile goods such as wagons, containers or construction machinery using GPS/GSM/UTMS combined with IT technologies.

The Kayser-Threde MINIDAU® on-board data acquisition system leads the market in automobile crash tests with about 70% of installations world-wide. In addition, further innovative products and services as well as complete crash facilities are on offer. In the field of process control systems, Kayser-Threde's installed base in traction power supply of German Rail includes 7 process coupling systems for network control centres, over 230 substation control systems and 150 protocol converters with more than 7000 embedded systems in total. The automotive and process control applications have their origins in Kayser-Threde's astronautics activities. Thus, they are examples for successful transfer of technology into now well established market products and services.

Kayser-Threde has almost 130 customers in 22 countries ranging from industry, to space agencies, governments and ministries and the scientific community – all of whom are leaders in their respective field. Kayser-Threde is well respected for working closely together with its customers, from a project's start through to completion, including all aspects from studies, analyses, systems design, special developments, production, testing, implementation, operation and support.

Born out of the rigorous requirements demanded in the aerospace business, Munich-based Kayser-Threde has developed outstanding quality standards reflected in the reliability of its products, systems and processes. Consequently, in 1994 Kayser-Threde was awarded an ISO 9001 standard: one of the first European aerospace companies to do so. Kayser-Threde's comprehensive and solutions-oriented approach has cemented long-standing customer relationships and in some cases these have lasted over decades and generations of products.

Founded in 1967, Kayser-Threde has grown to 40.8 million Euro in turnover in 2006 and around 220 employees, supported by a world-wide team of representatives and alliances. Offering a broad spectrum of high-technology solutions, the group (with share holdings and subsidiaries also in the US, Russia and China) supports customers in the acquisition, utilization and management of information from research and measurement – all over the world and in space.

www.EnMAP.de
Hyperspectral Imager

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