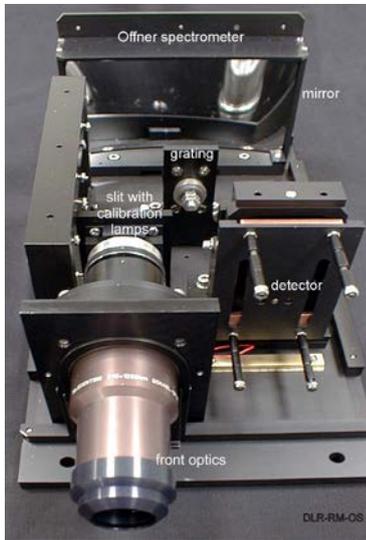




# DESIS

## DLR Earth Sensing Imaging Spectrometer for the MUSES Platform on the ISS

DLR Optical Sensor Systems Berlin-Adlershof  
Department Optical Sensors and Electronics



DESIS engineering model

### DESIS

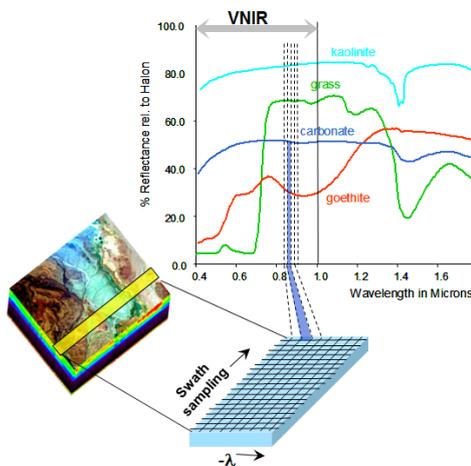
DLR Earth Sensing Imaging Spectrometer (DESIS) is an advanced hyperspectral instrument for the Multiple User System for Earth Sensing (MUSES) platform by Teledyne Brown Engineering (TBE). With a minimum of optical components the robust and compact Offner design covers the visible and near-infrared regions of the electromagnetic spectrum at a high resolution. The mechanical and optical characteristics qualify DESIS for applications like large-scale precision farming, forestry, land cover analysis and multitemporal environmental monitoring. Data will be jointly provided by TBE and DLR to serve commercial and scientific partners starting in 2017.

### DESIS features

- Compact Offner spectrometer with a minimum of components
- Rotatable mirror (pointing unit) for off-nadir measurements and hyperspectral stereo
- Telecentric lens objective
- High spectral and spatial resolution in the VIS/NIR range
- Complete suppression of the second order spectrum
- Minimized polarization sensitivity

### DLR research goals

- Chlorophyll fluorescence effects on vegetation
- Spectral distribution of night sky brightness in cities
- Cloud characterization over cities at night
- Spectral analysis of cloud-to-cloud lightning
- Influence of the surface BRDF for atmospheric correction (in conjunction with high-resolution optical images)



Spectral sampling principle of DESIS



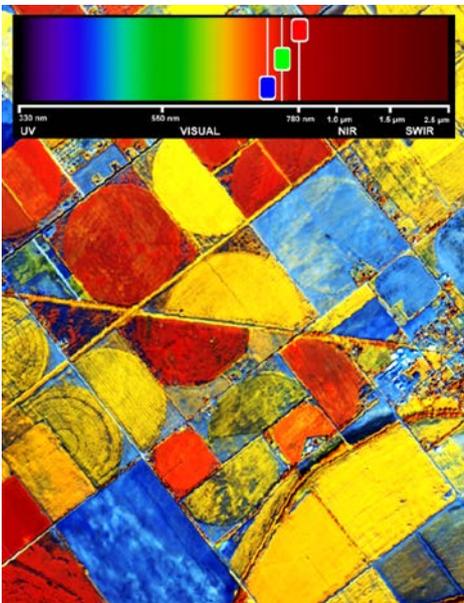


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### DESIS specifications (prelim.)



Plant maturity determination from the VIS/NIR narrow bands (visualization based on AVIRIS data by NASA/JPL-Caltech)

Imaging sensor	BAE CMOS CIS2001
Line pixels	1024
Focal length	320 mm
Target GSD	30 m
Spectral range	400 – 1000 nm VIS/NIR
Spectral resolution	2.5 nm
Number of channels	235
BRDF angle	+/- 40°
SNR	>150 (Sept 15, 11 am, 30° sun)
Polarization sensitivity	< 2%
In-orbit calibration	two internal lamps, LED field, dark
Dimensions	430 x 190 x 135 mm (spectrometer)
Ready for operation	2017



Teledyne MUSES platform on the ISS

### DESIS on MUSES

The MUSES platform by Teledyne Brown Engineering (TBE) precisely points high-resolution earth imaging instruments from the International Space Station (ISS). Once operational it will accommodate DESIS in one of its four inertially stabilized and robotically serviceable slots enabling the spectrometer to cover thousands of square kilometers every year.

