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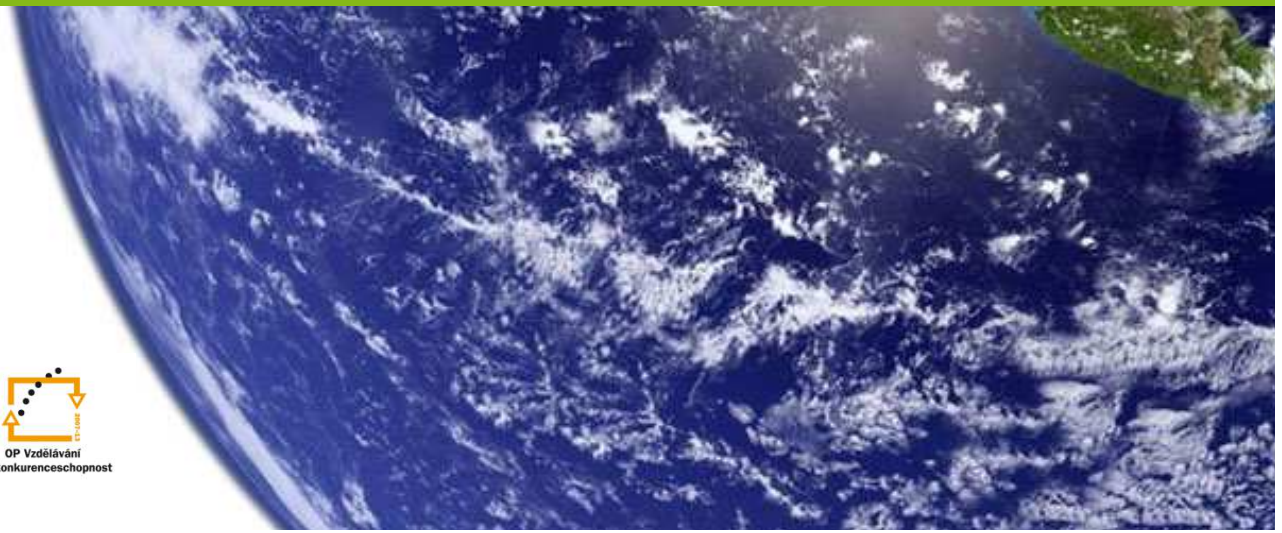
Department of Remote Sensing



evropský sociální fond v ČR

EVROPSKÁ UNIE

MINISTERSTVO ŠKOLSTVÍ, MLÁDEŽE A TĚLOVÝCHOVY

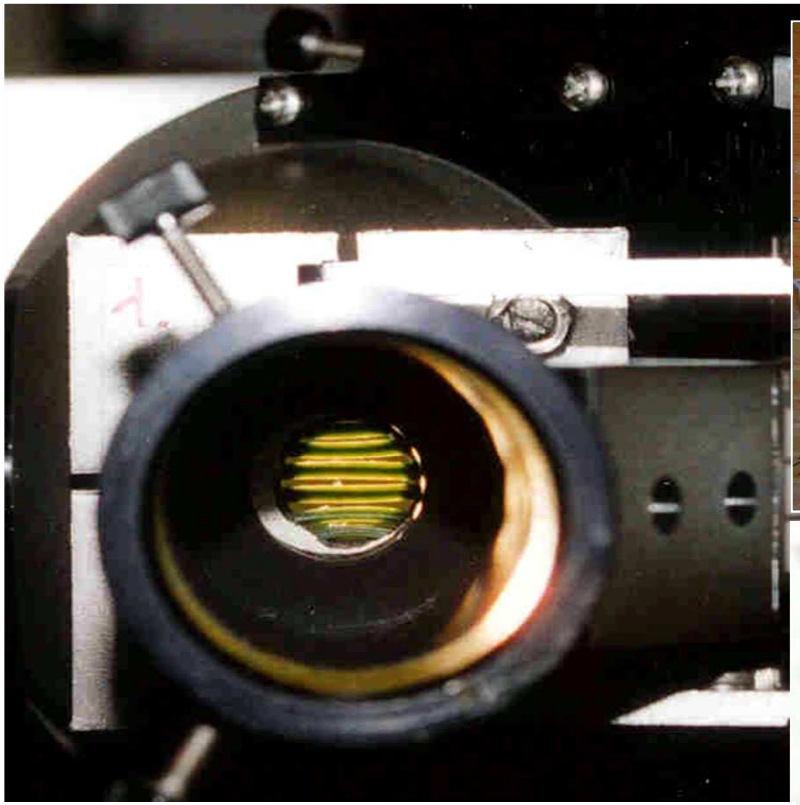
OP Vzdělávání pro konkurenceschopnost

INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

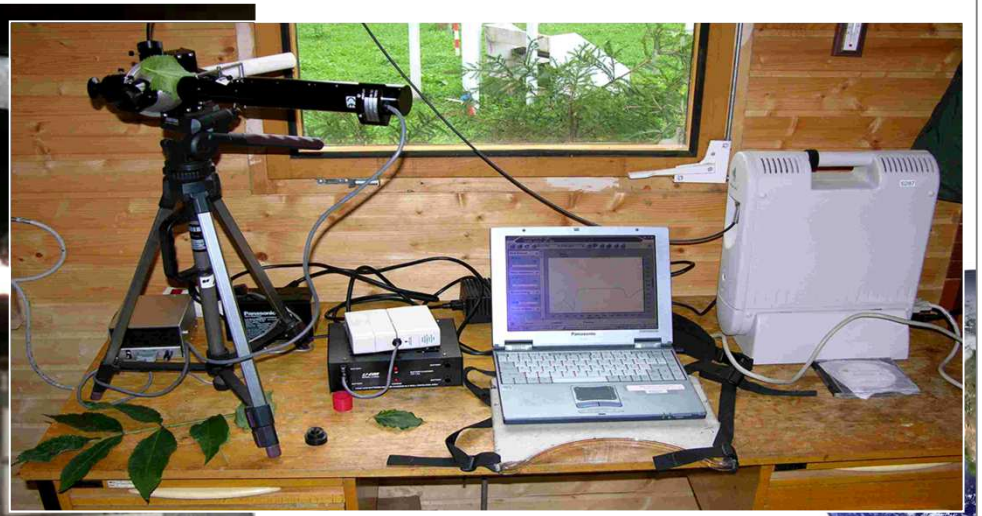
Focus

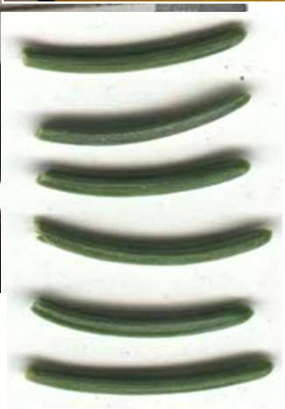
- **Laboratory/field spectrometry (leaf optical properties)**
- **Imaging spectroscopy (ground & airborne & satellite)**
- **Ground support of hyperspectral flight campaigns**
- **Pre-processing of hyperspectral image data (radiometric, geometric, atmospheric corrections)**
- **Radiative transfer modeling (DART model)**
- **Quantitative remote sensing (e.g. chlorophyll estimation using imaging spectroscopy)**

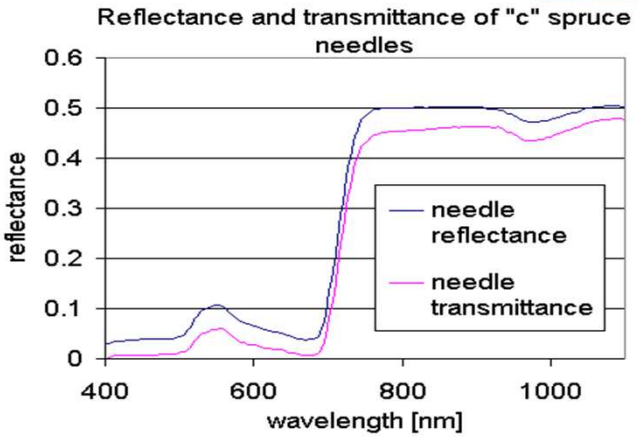
Needle optical properties - measurement



Li-Cor integrating sphere Li 1800-12 in combination with field spectrometer ASD FieldSpec Pro.







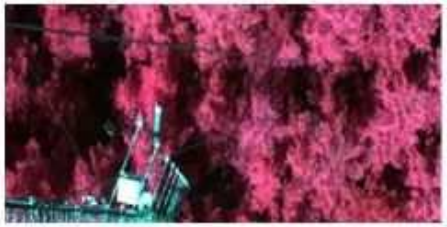
Ground based imaging spectrometry

Ground based imaging spectroscopy

- Spatial resolution up to 2 mm, spectral resolution up to 2,5 nm

Imaging spectroscopy of forest canopy

Imaging spectroscopy of meadow canopy



Airborne imaging spectrometry

- AISA Eagle VNIR imaging system (Specim Ltd., Finland)
- FOV 58.4°, 39.7°, 29.9°
- Spectral Range 400-1000 nm
- Spectral Samples/pixels 260
- Max. spectral Resolution 3.2 nm
- Spatial Resolution 0.4-6.0 m

Satellite image data

CHRIS ESA

Aster NASA

Landsat NASA

Ground support segment

Spectral measurement of ground reference targets by FieldSpec-3 spectroradiometer

Artificial reference targets painted by Nextel Suede Coating

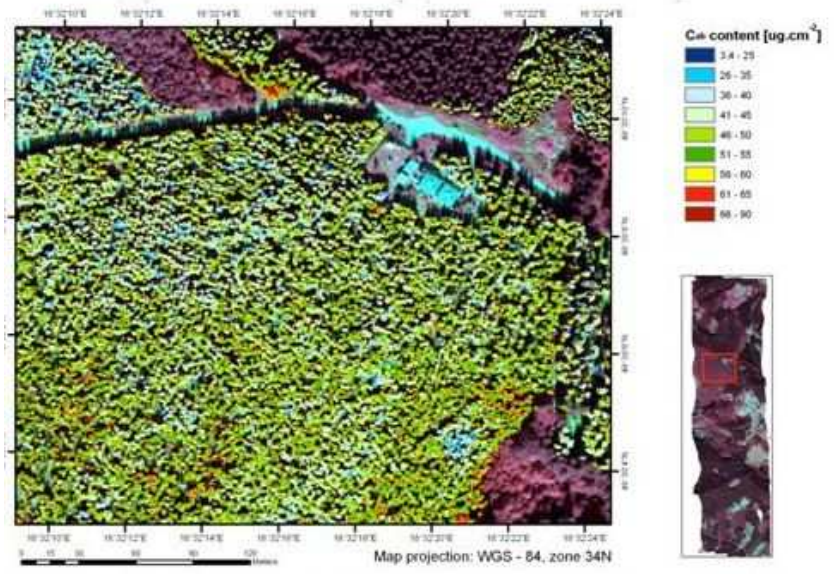
Actual state of atmosphere is estimated from Microtops II measurements

GPS surveying

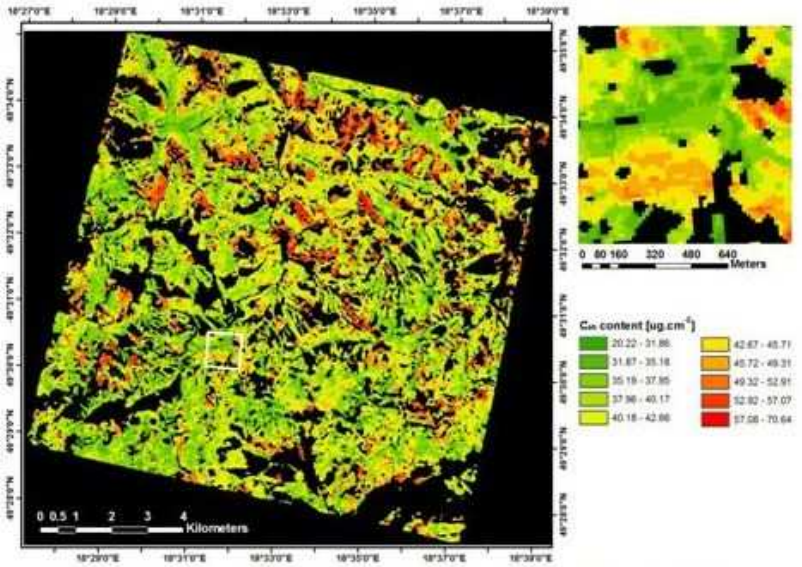
Outputs

Quantitative remote sensing

- physical models of vegetation radiative transfer e.g. coupled PROSPECT and DART model
- Estimation of biophysical and biochemical parameters of vegetation

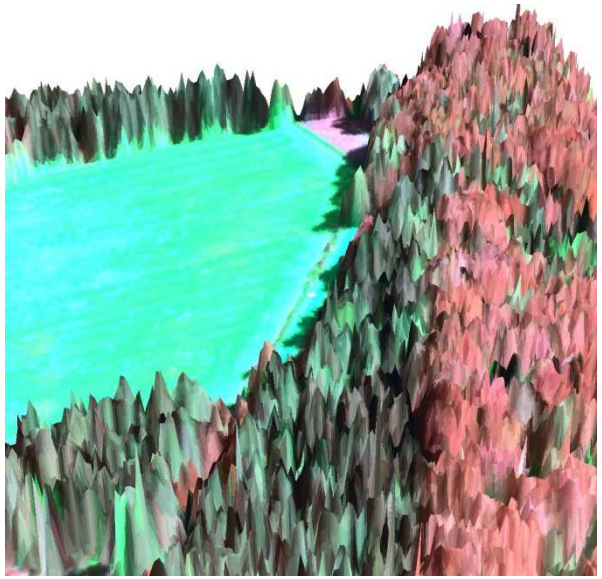


The example of leaf chlorophyll content (Cab) map retrieved by neural network from sunlit pixels of both immature and mature Norway spruce crowns acquired on airborne AISA Eagle hyperspectral images during the flight/ground campaign HYPERTREES 2006.



The example of leaf chlorophyll content (Cab) map retrieved by neural of both immature and mature Norway spruce stands acquired from CHRIS/PROBA satellite image data.

Hyperspectral + LiDAR



http://hydap.czechglobe.cz/

Building RS infrastructure

Key components of RS infrastructure

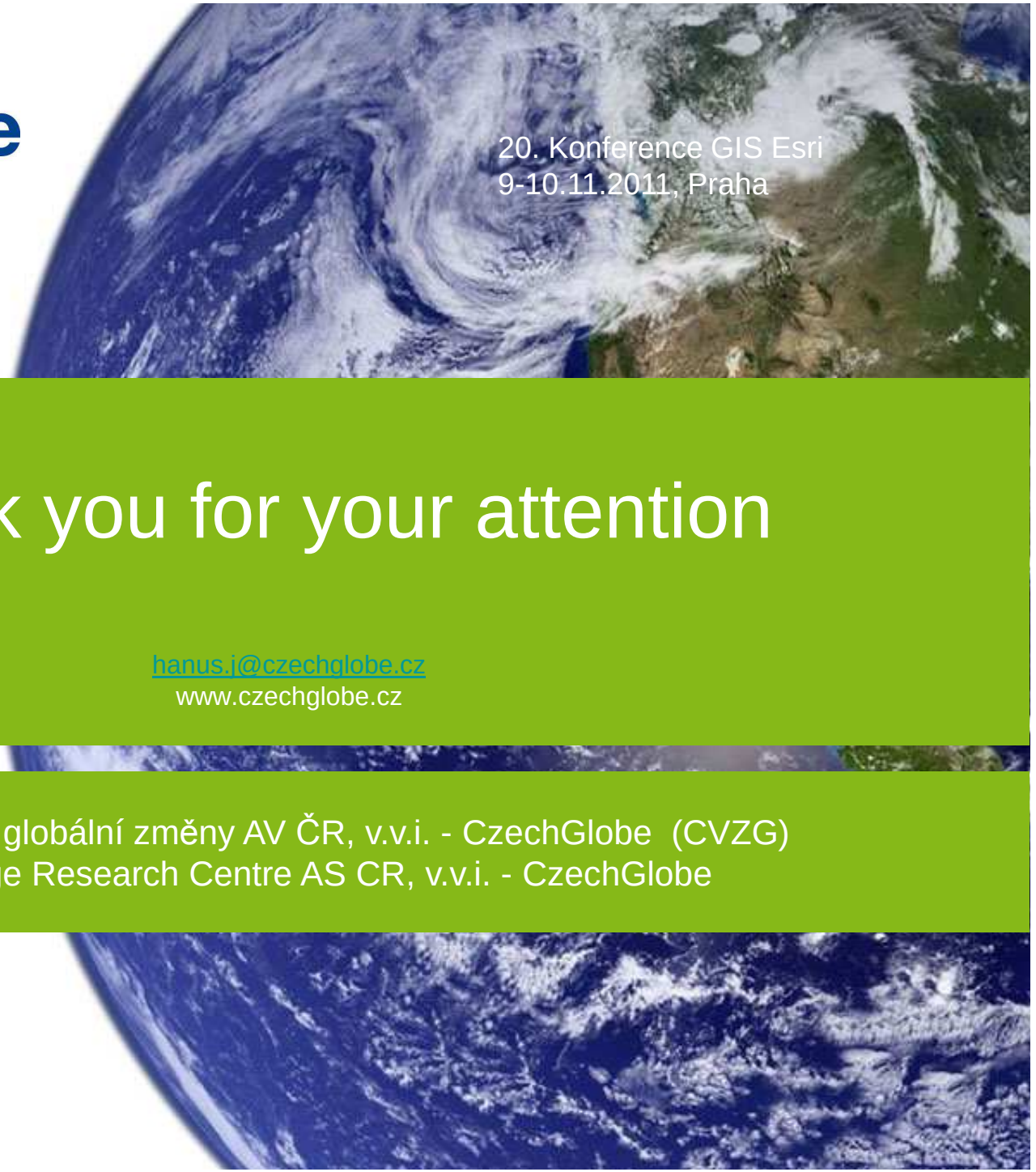
Flying Laboratory of Imaging Systems (FLIS) + field campaign instrumentation + highly educated staff

FLIS

• Photogrammetric **aircraft** with two acquisition open slits for imaging RS instruments

• Airborne imaging **spectroradiometer** with sensors
  - visible and near infrared (**VNIR**)
  - short wavelength infrared (**SWIR**)
  - thermal infrared (**TIR**) of EM spectral regions
  - **IMU/GPS** units

• Full-waveform Light Detection And Ranging (**LiDAR**) airborne laser scanner for mapping the geometrical characteristics of the Earth surface objects (AdMaS)



20. Konference GIS Esri
9-10.11.2011, Praha

Thank you for your attention

hanus.j@czechglobe.cz
www.czechglobe.cz

Centrum výzkumu globální změny AV ČR, v.v.i. - CzechGlobe (CVZG)
Global Change Research Centre AS CR, v.v.i. - CzechGlobe