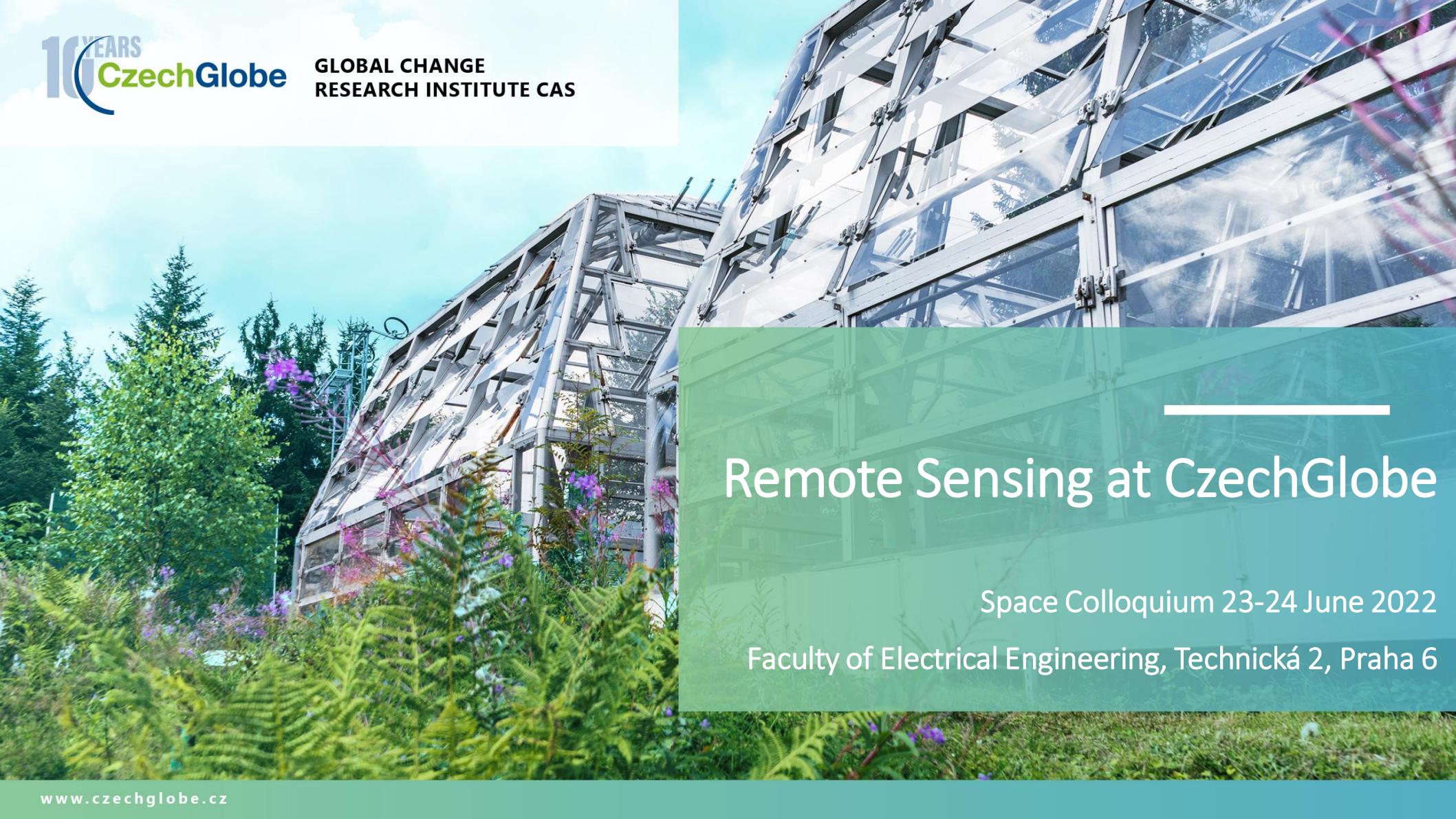




GLOBAL CHANGE
RESEARCH INSTITUTE CAS



Remote Sensing at CzechGlobe

Space Colloquium 23-24 June 2022

Faculty of Electrical Engineering, Technická 2, Praha 6

Remote Sensing Team & Team of Airborne Activities

Imaging spectroscopy



Laser scanning



Thermal scanning



Motto:

Science from above - we help to understand landscape changes using Earth observation data

NASA (Landsat, MODIS)



ESA (Sentinel-1, Sentinel-2, Sentinel-5)

JAXA (ALOS Palsar)

Private Companies (Planet, WorldView, RapidEye..)

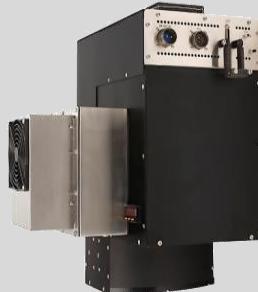
Forest
Agriculture
Urban



Flying Laboratory of Imaging Systems



Visible and near infra-red
imaging spectroscopy



CASI-1500



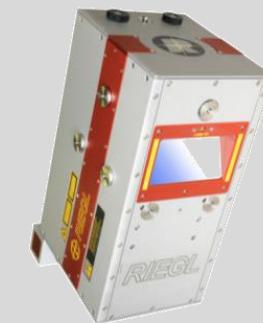
SASI-600

Thermal imaging
spectroscopy



TASI-600

Laser scanning



Riegl LMS – Q780

Basic technical specifications of FLIS scanners



	CASI - 1500	SASI - 600	TASI - 600
Sensor	CASI - 1500	SASI - 600	TASI - 600
Spectral domain	VNIR	SWIR	LWIR
Spectral range [nm]	380 - 1050	950 - 2450	8000 - 11000
Number of spatial pixels	1500	600	600
Max. spectral resolution [nm]	3.2	15	110
FOV [°]	40	40	40
Spatial resolution [m]	0.5 - 2.0	1.25 - 5.0	1.25 - 5.0

Sensor	Riegl LMS Q-780
Maximum measuring range [m]	up to 5800
Wavelength [nm]	1064
Laser pulse repetition rate [kHz]	up to 400
Laser beam Divergence [mrad]	0.25
Scan angle range[°]	60

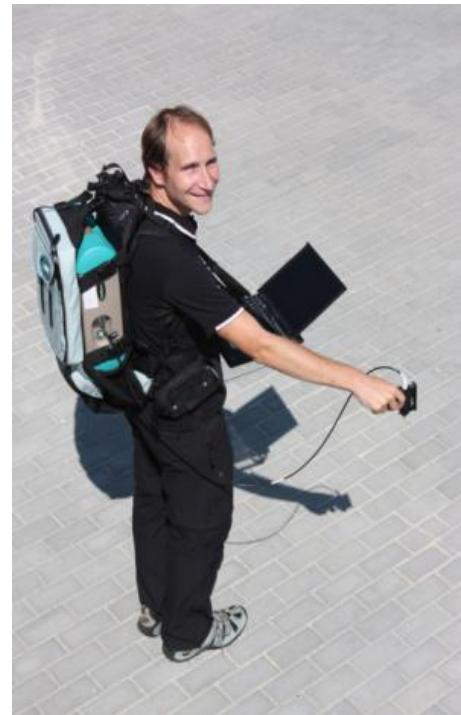
FLIS – Flying Laboratory of Imaging Systems

<https://olc.czechglobe.cz/>

www.czechglobe.cz

Complementary field/lab infrastructure

VNIR
spectroscopy



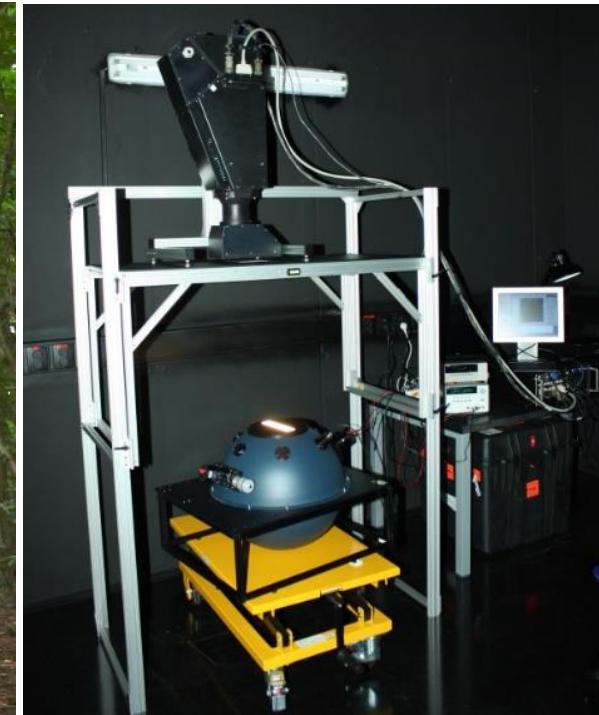
Thermal
spectroscopy



Terrestrial
laser scanning



Calibration facility

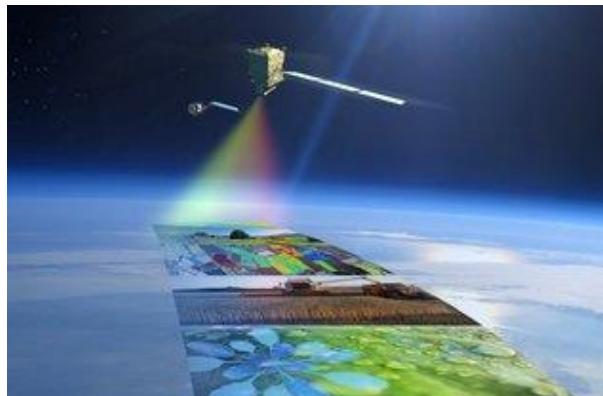


ASD FieldSpec

FT-IR Spectrometer

Riegl VZ-400

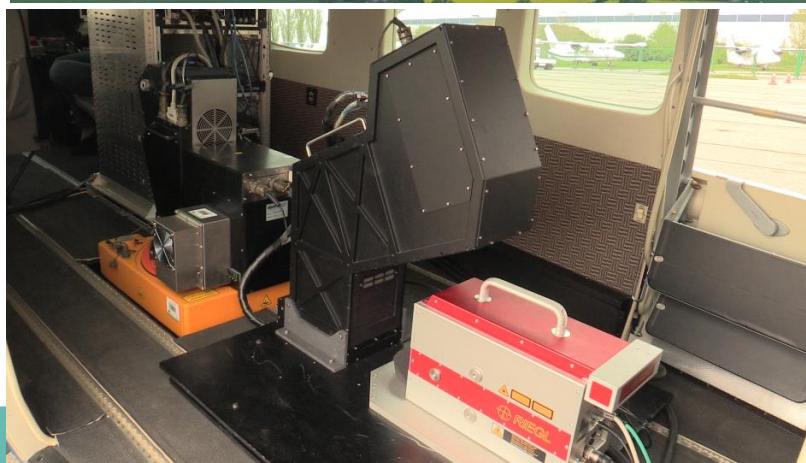
FLIS international operations



Support of ESA FLEX and
Italian PRISMA mission



FLIS – Flying Laboratory of Imaging Systems



MapServer

<http://mapserver.czechglobe.cz/>

Mapserver

CzechGlobe

Filters
Data type
Ecosystem type

Place
Places overview

Background Layer
OpenStreetMap

Coordinates
UTM-33N: 622935, 5455375
WGS-84: 16.68889, 49.23880

Callout Box Content:

- Brno
- Brno - Kraví hora
- Brno přehrada
- Jinačovice
- Kotvrdovice
- Iletiště - Brno
- Otnice
- Otnice 2
- Žabčice

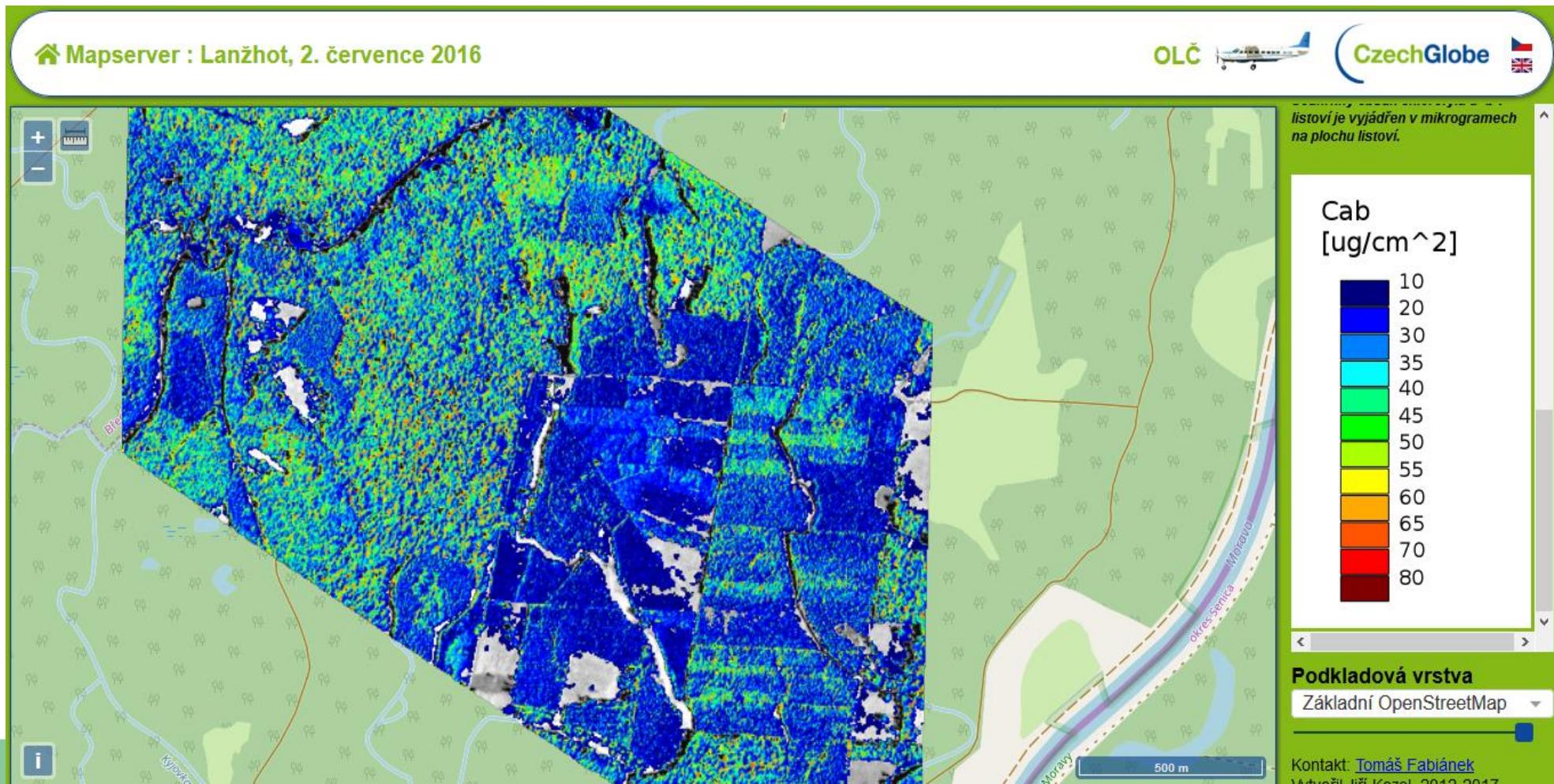
MapServer

<http://mapserver.czechglobe.cz/>



MapServer

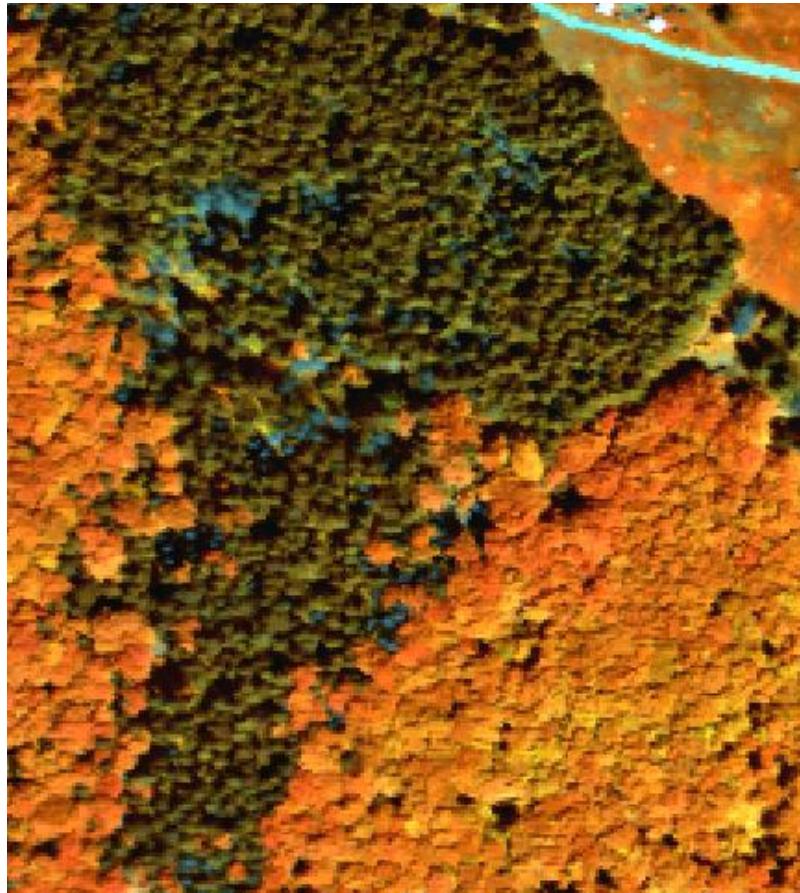
<http://mapserver.czechglobe.cz/>



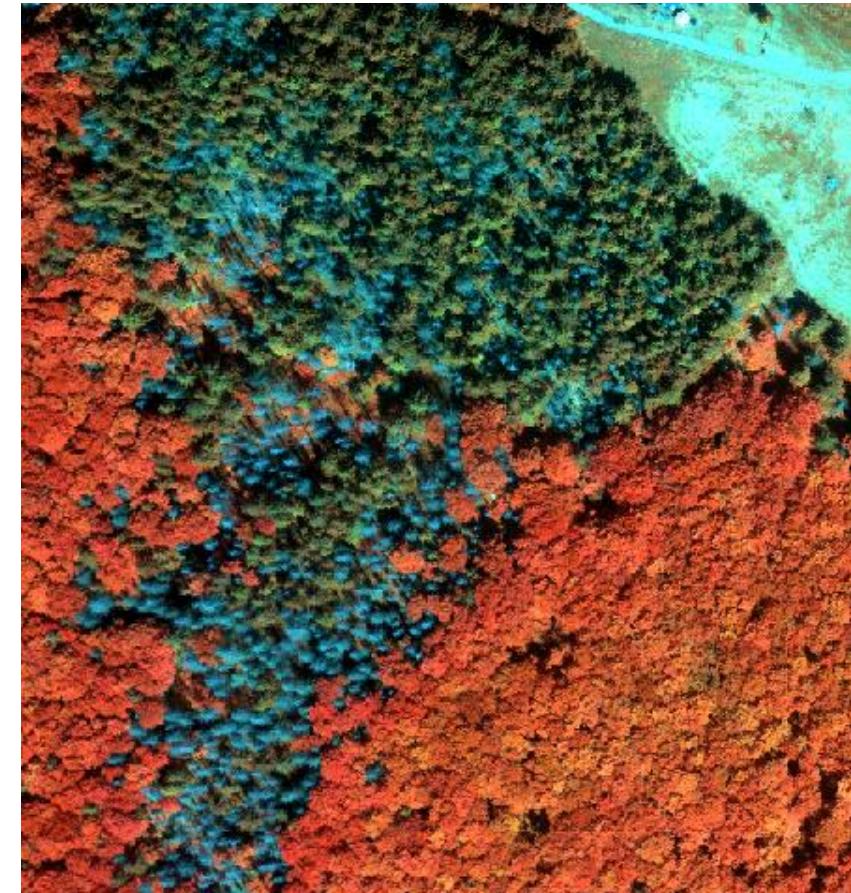
Forest Agriculture Urban



Tracking changes in spruce forest decline



2015



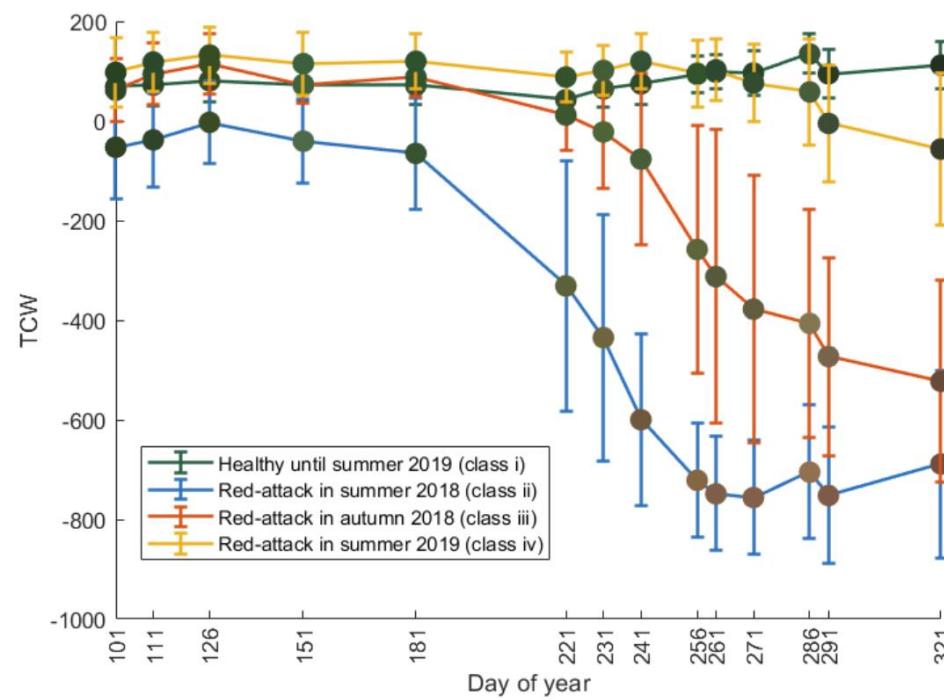
2019

www.czechglobe.cz

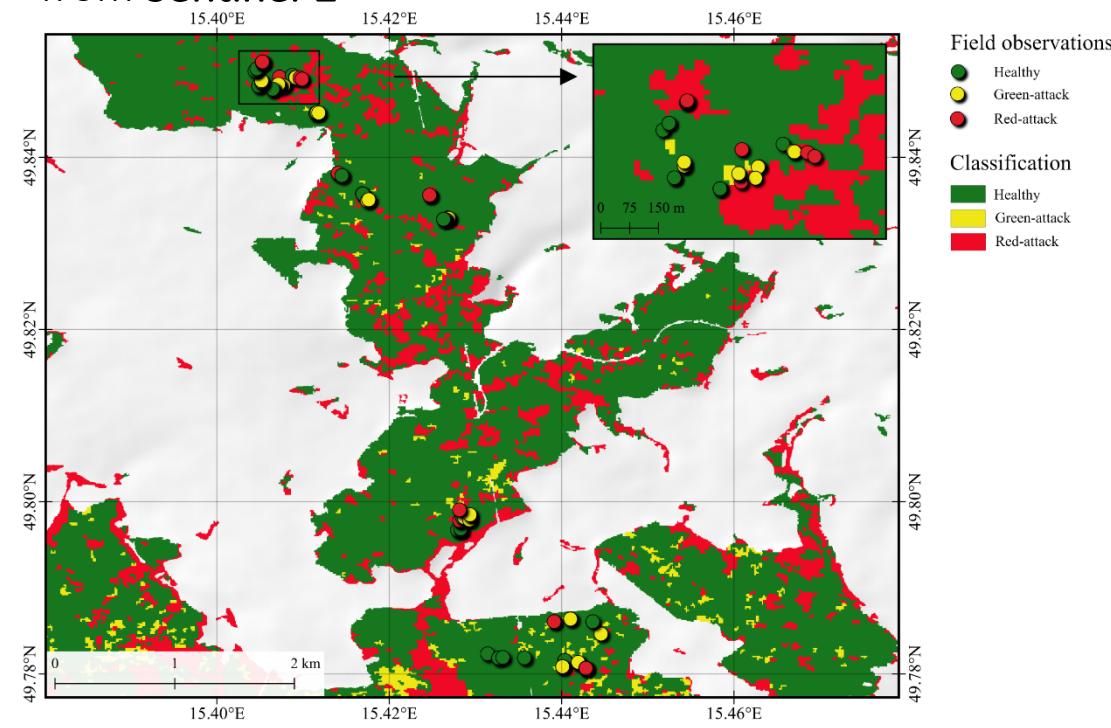
Bark beetle infestation mapping



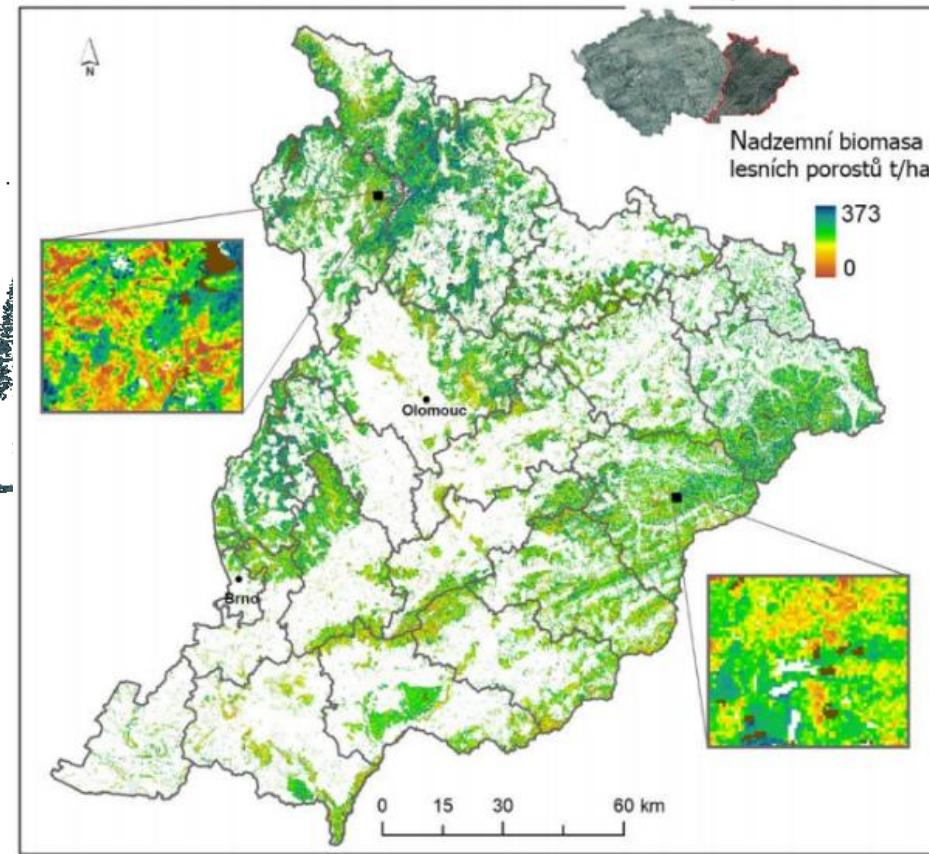
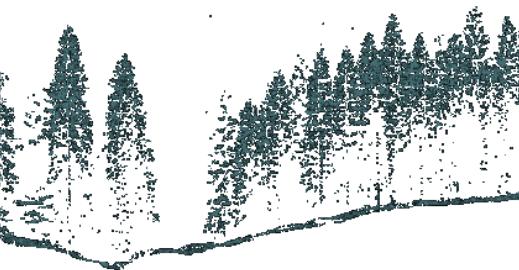
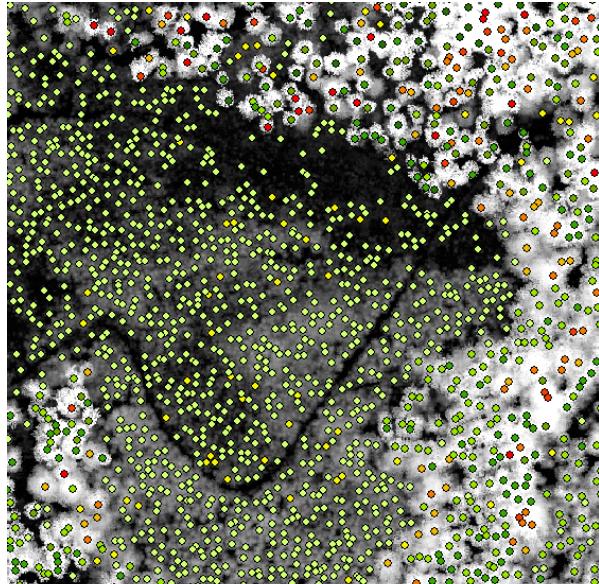
Seasonal trajectory of wetness vegetation



Map of bark beetle infestation stages in Autumn 2019 from Sentinel-2



Forest aboveground biomass mapping

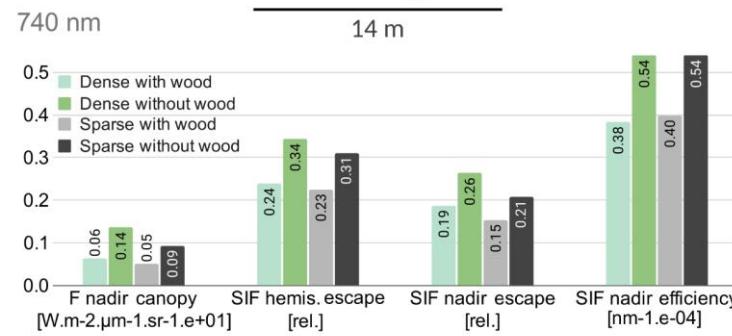
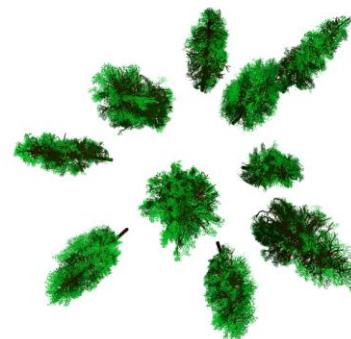


3D modelling of forest sun-induced fluorescence

Terrestrial laser scanning
for 3D tree species models

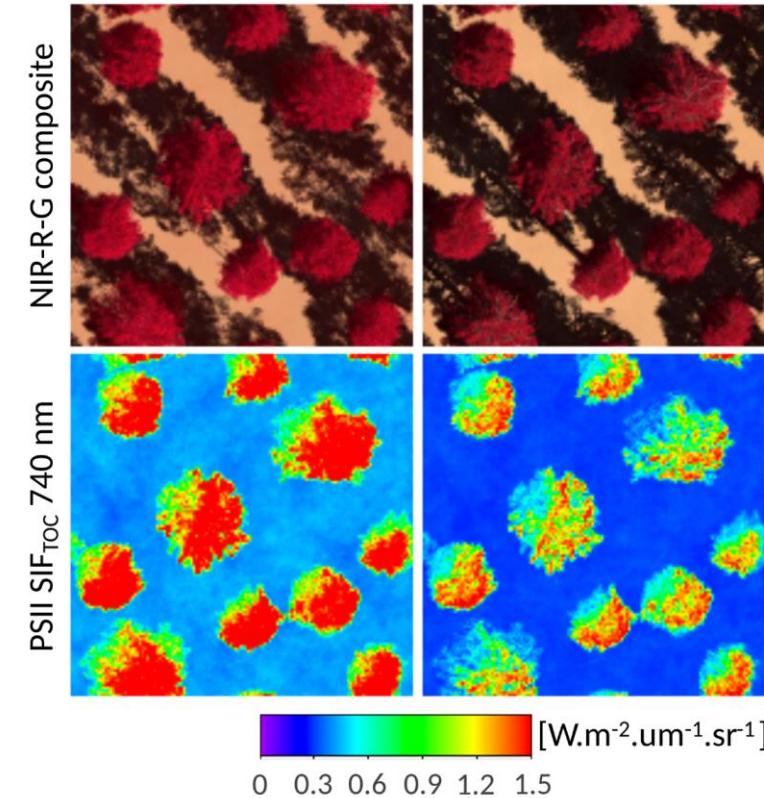


Radiative transfer
modelling (DART)



Without wood:
 $fAPAR_{green} = 0.76$

With wood:
 $fAPAR_{green} = 0.58$

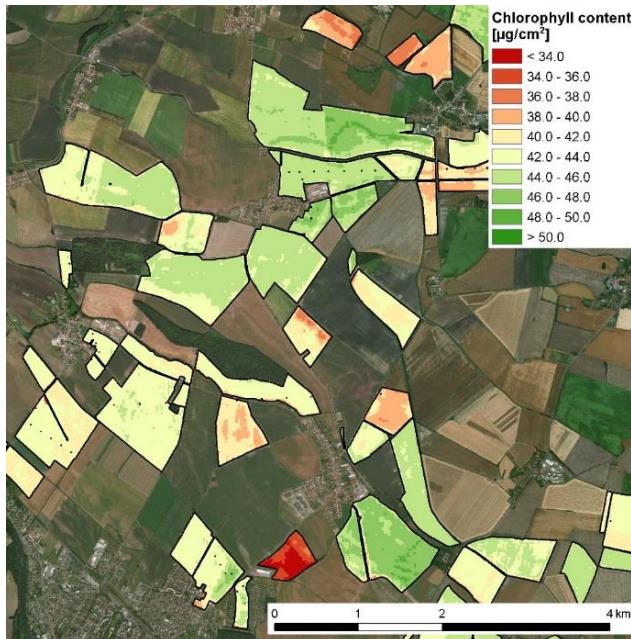


Forest Agriculture Urban



Mapping crop properties from Sentinel-2

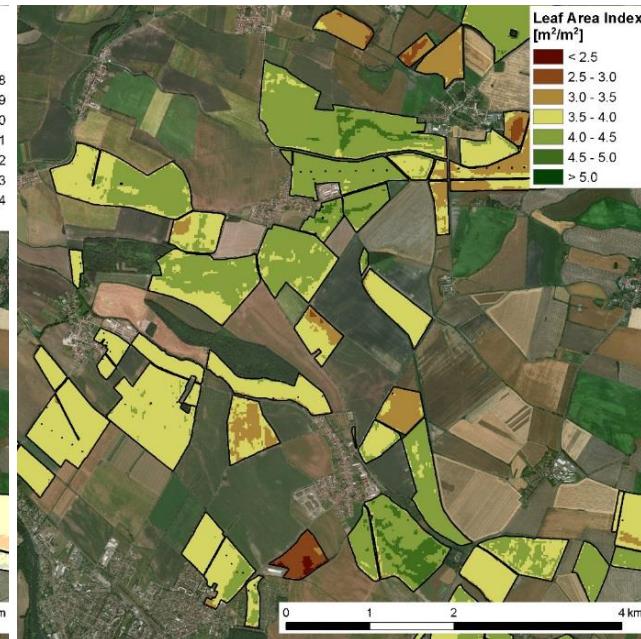
Leaf chlorophyll content



Leaf water content



Leaf area index

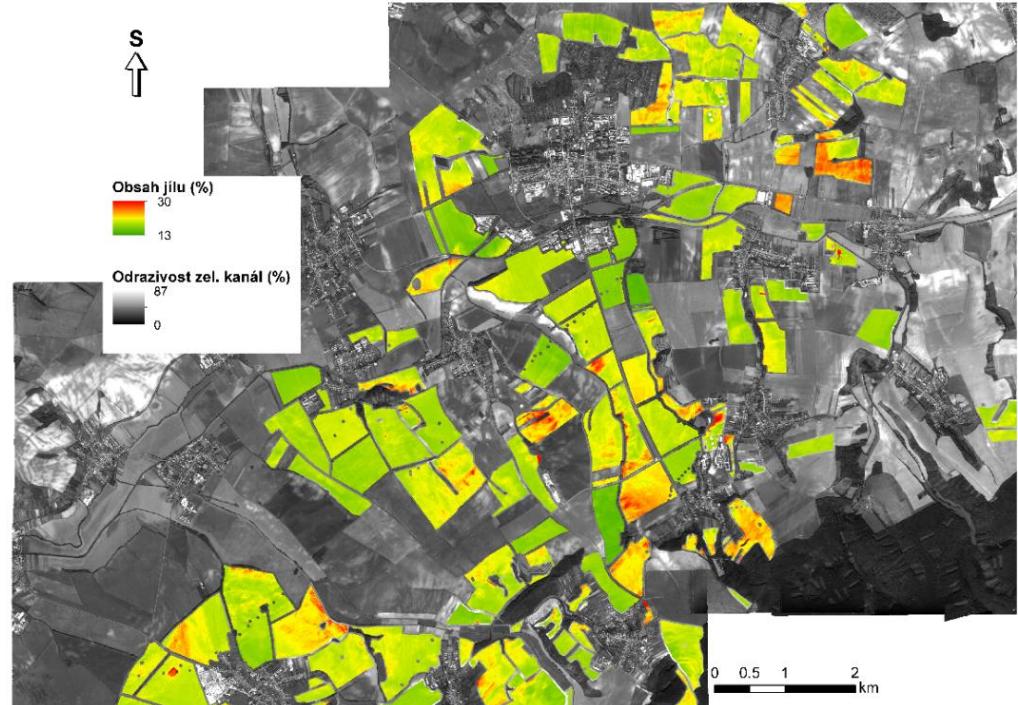


Bare soil properties from imaging spectroscopy

Soil carbon content (%)



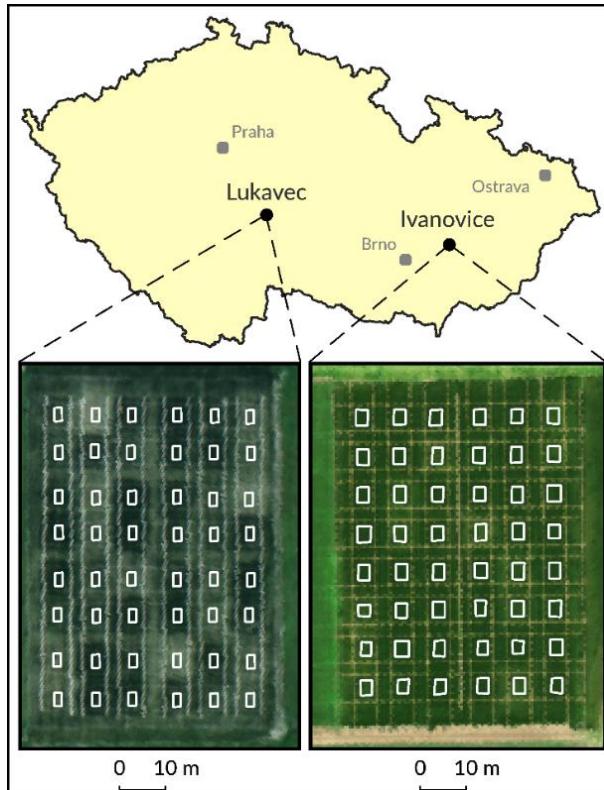
Soil clay content (%)



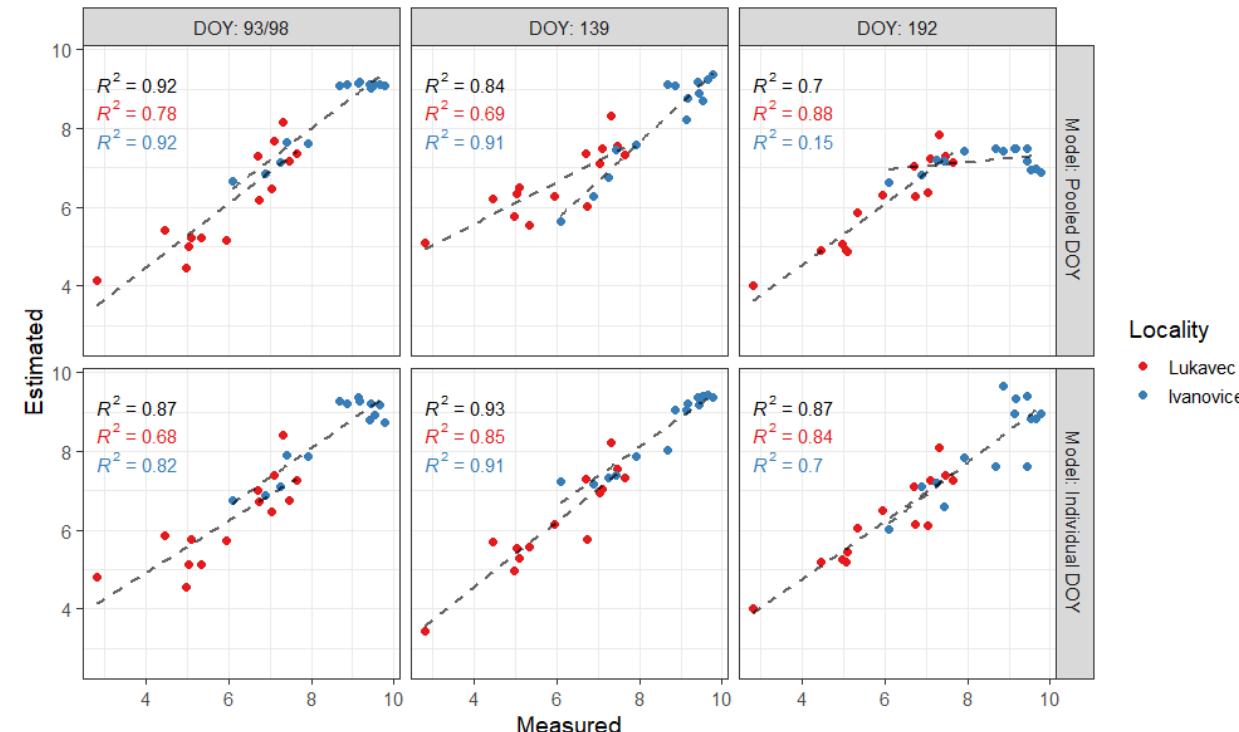
Crop yield prediction modeling



Time series of airborne hyperspectral data



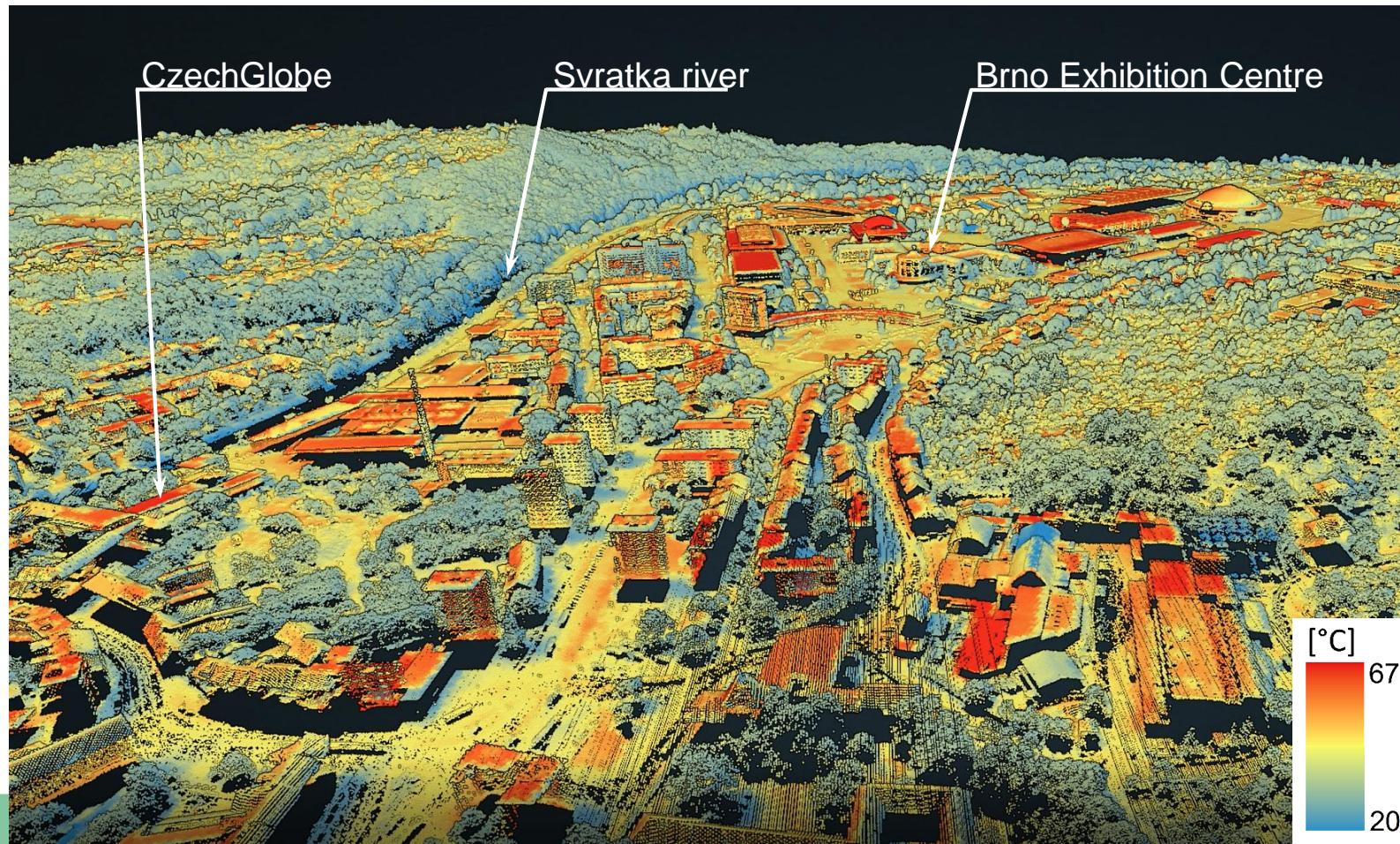
Models for prediction of wheat yields [t/ha]
Testing machine learning methods (Gaussian processes)



Forest Agriculture Urban



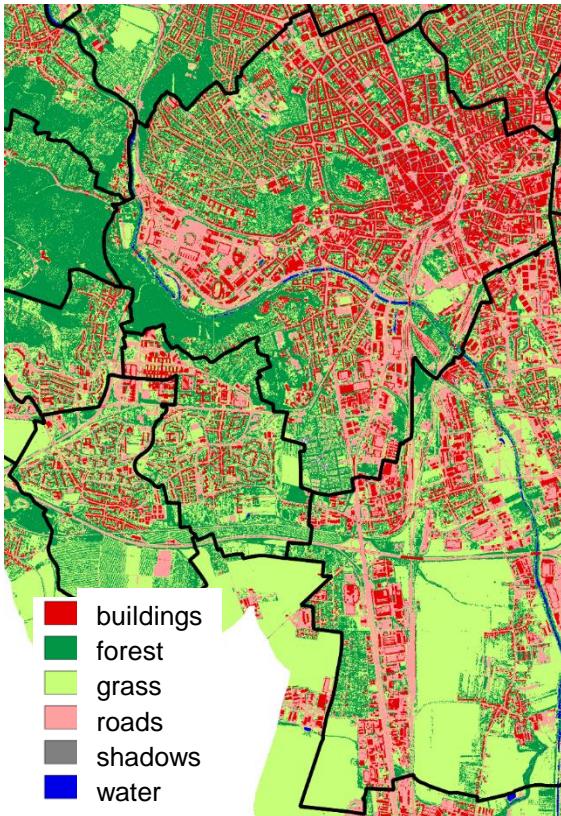
Surface temperature of urban areas



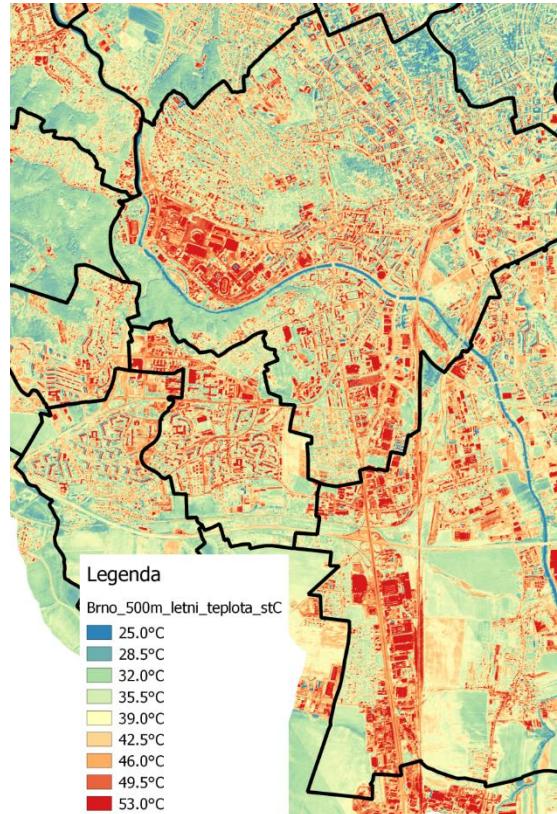
Surface temperature of urban areas



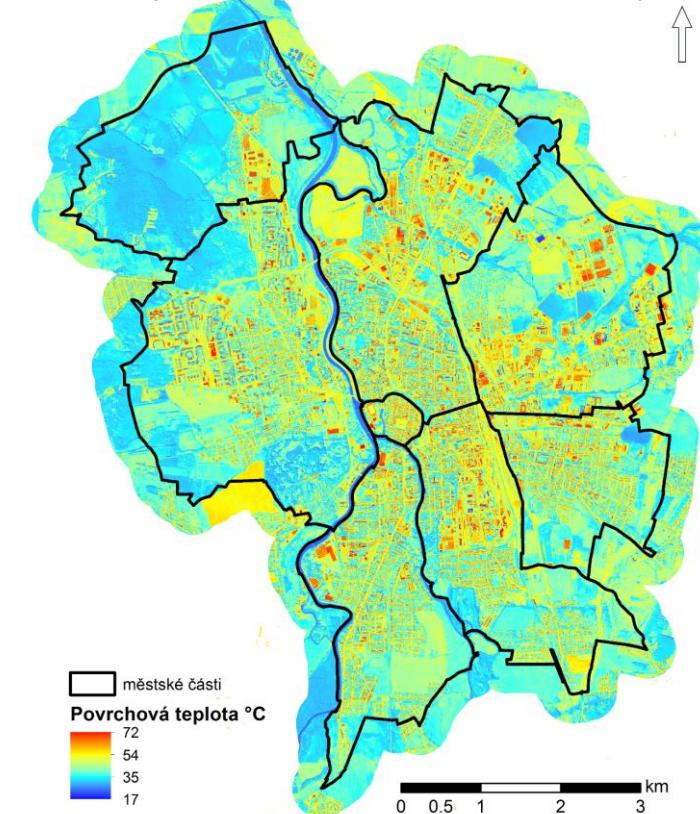
Brno: land cover classes



Brno: Summer surf. temp.



České Budějovice: Summer surf. temp.



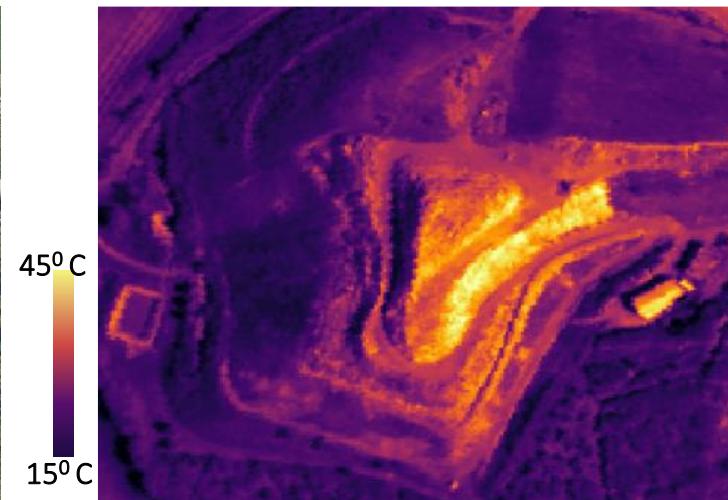
Monitoring of municipal solid waste landfills



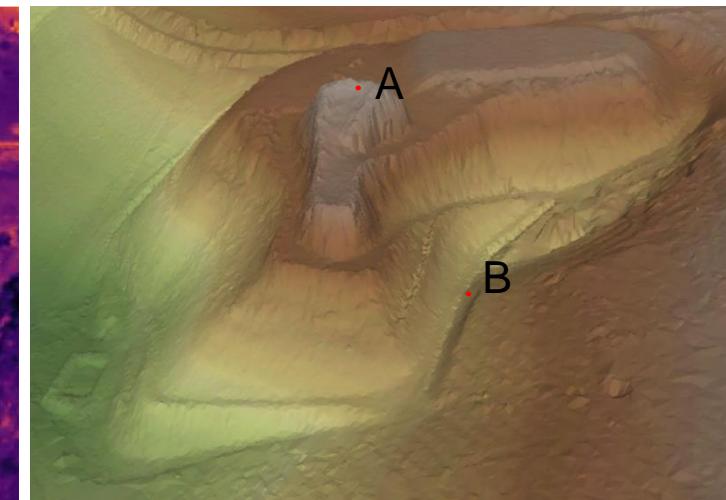
RGB



Thermal IR

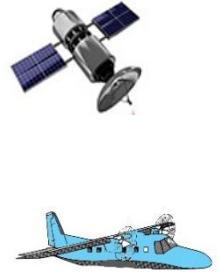


Laser scanning



Height_{AB} = 41 m

Disaster mapping – tornado at South Moravia



Thank you for your attention!



<https://www.czechglobe.cz/> →
Domain-Ecosystems-Analysis → Department-of-Remote-Sensing

<https://olc.czechglobe.cz/> → Department of Airborne Activities

<http://mapserver.czechglobe.cz/> → MapServer



19th–21st September 2022

www.czechglobe.cz