COUNTRY HOT TOPICS

GOFC-GOLD Network: SCERIN / MedRIN
Country: Czech Republic

Team: Jana Albrechtová[1,2], Lucie Kupková[1], Zuzana Lhotáková[1]
František Zemek[2], Petr Lukeš[2], Olga Brovkina[2], Miroslav Pikl[2]

1 – Charles University, Faculty of Science
2 – Global Change Research Institute of CAS

Joint Workshop of the GOFC-GOLD SCERIN and MedRIN Networks
CIHEAM conference center, Chania, Greece, July 16 – July 19, 2024
Land Cover Change (LCC) and Extreme Events in the Context of Climate Change

Mediterranean Agronomic Institute of Chania
Region of Crete
Eratosthenes Center of Excellence, Cyprus University of Technology
Aristotle University of Thessaloniki
NASA LCLUC Program
GOFC-GOLD and START, USA

Presented by J. Albrechtová and O. Brovkina

FACULTY OF SCIENCE
Charles University

CzechGlobe
Global Change Research Institute CAS

Remote Sensing 'hot topics':

- Commercial Smallsat data analysis for advancing the HLS products for agricultural and forest productivity (P. Campbell, J. Albrechtová, P. Lukeš et al.)
- Integration of Earth Observation, in situ Leaf Functional Traits, and Continuous Dendronetwork Measurements for Assessing Changes in Forest Stands Vitality in Czechia (J. Albrechtová, P.Lukeš, Z.Lhotáková et al.) – new proposal
- Assessment of the impact of land cover changes on local hydrology and climate in the Krkonoše Mts. National Park using remote sensing and hydrological modelling (L.Kupková, J. Albrechtová, P.Lukeš, Z.Lhotáková et al.) (***SCERIN/MedRIN* 2024 poster of L. Kupková et al.)**
  - Monitoring the spread and management of invasive and expansive species using advanced earth observation methods (Kupková et al.)
  - Earth observation technologies for the surveillance activities of the Czech Environmental Inspectorate (Kupková et al.)
  - Evaluation of evapotranspiration from alpine peat-bog by an advanced UAV technology (Kupková et al.)
- Water management analysis to support natural flooding and the transformation effect of the floodplain**(*SCERIN/MedRIN 2024* expert talk of F. Zemek, 07/19*)***
- Monitoring of natural and anthropogenic disturbances ***(SCERIN/MedRIN 2024* expert talk of O. Brovkina, 07/18)**
- Cal/Val activities for new space mission CHIME ***(SCERIN/MedRIN 2024* poster of M. Pikl, 07/16)**

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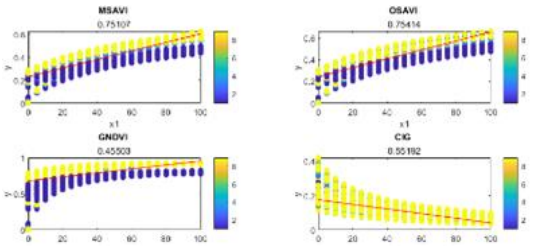
CzechGlobe: Petr Lukeš, Jan Krejza, Růžena Janoutová, Antonín Kusbach

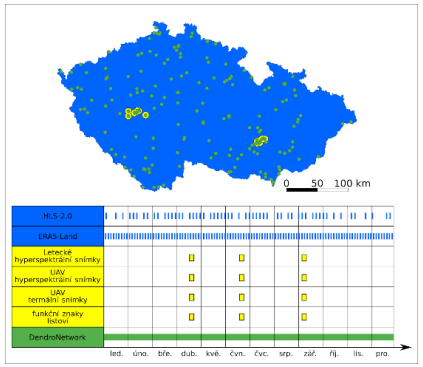
Joint SCERIN – U.S. Projects:



Simulated chlorophyll VIs with wide range of structures

1) LCLUC Program NASA CSD (2024-2025):.
"Commercial Smallsat data analysis for advancing the HLS products for agricultural and forest productivity" NASA/ROSES 2023;

- **PI –P. Campbell, International Collaborators: J. Albrechtová, P. Lukeš**



Proposed database of in-situ and RS observations for extrapolating forest vitality from plot to country scale

2) Ministry of Education, Czechia (submitted 10/07/2024, planned duration 2025-2028):
Integration of Earth Observation, in situ Leaf Functional Traits, and Continuous Dendronetwork Measurements for Assessing Changes in Forest Stands Vitality in Czechia
PI – J. Albrechtová, Co-I, P. Lukeš,
collaborators from NASA LCLUC Program:
U.S. collabortors: P. Campbell UMBC / GSFC NASA; H.Epstein, Univeristy of Virginia; J.Eitel, University of Idaho USA

UMBC
University of Virginia
University of Idaho
NASA LCLUC Land-Cover / Land-Use Change Program
Faculty of Science Charles University
CzechGlobe Global Change Research Institute CAS

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Team: Lucie Kupková, Lucie Červená, Jakub Lysák, Markéta Potůčková, Záboj Hrázský, Jana Albrechtová, Zuzana Lhotáková, Eva Neuwirthová Adam Kulich, Mojmír Polák, Daniela Dančejová, Alex Šrollerů

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Charles University Prague - Team of Image and Laboratory Spectroscopy – EO projects; www.tilspec.cz

Project: „Assessment of the impact of land cover changes on local hydrology and climate in the Krkonoše Mts. National Park using remote sensing and hydrological modelling“

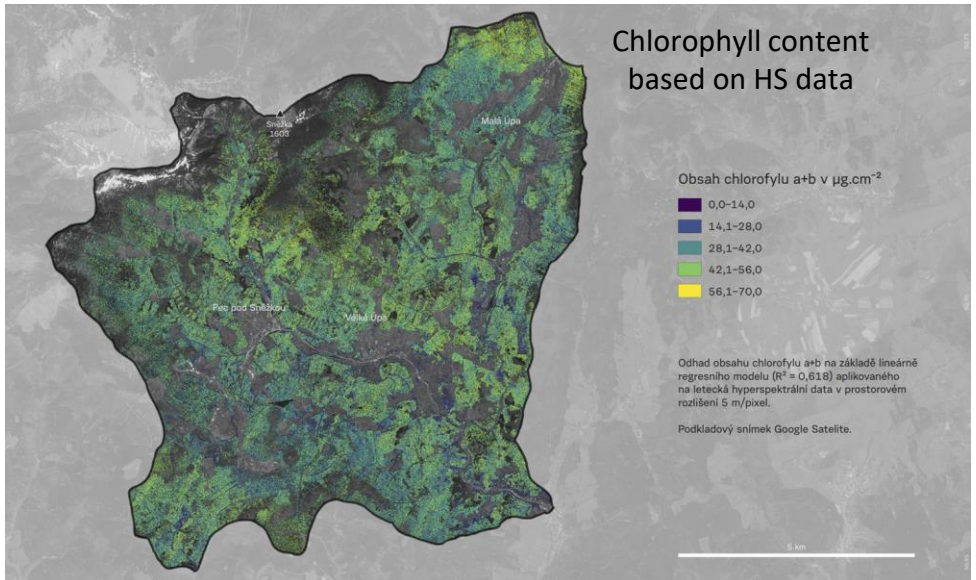
Collaboration with CzechGlobe (Lucie Homolová, Petr Lukeš, Václav Bárta and Institute of Hydrodynamics CAS – Václav Šípek, Lukáš Vlček)

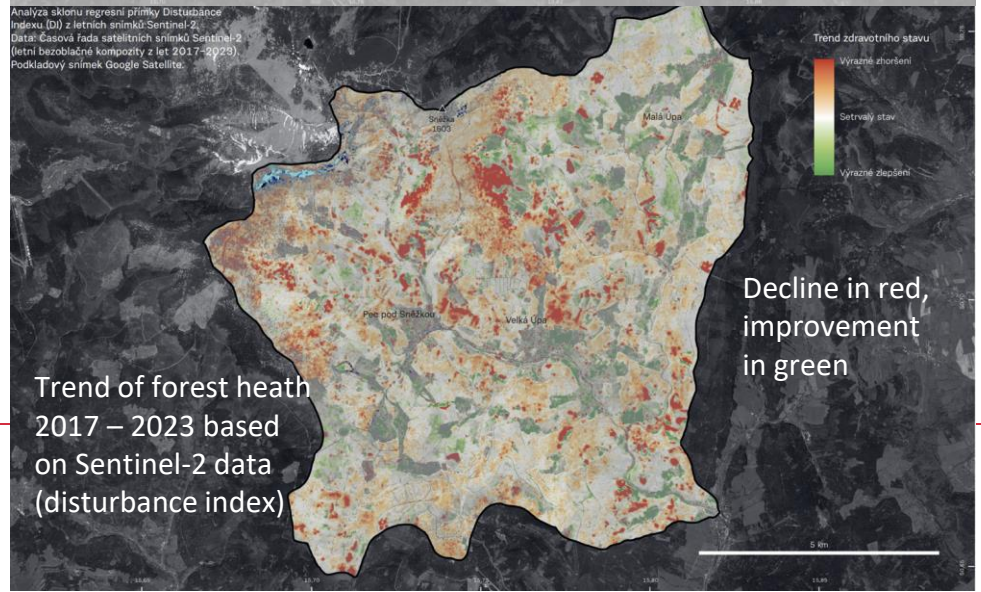
poster

- Used multispectral data: Sentinel-2A, Landsat series
- Used hyperspectral data: CASI + SASI + TASI sensors
- **Evaluation of forest cover change from 1985 till 2023**
- **Forest health evaluation**

→ inputs for hydrological modelling (influence of forest cover change on local hydrology)

- **Outputs:**
  - **Map of potential forest threats**
  - **Methodology for monitoring the impact of land cover change on local hydrology using RS and hydrological modeling.**





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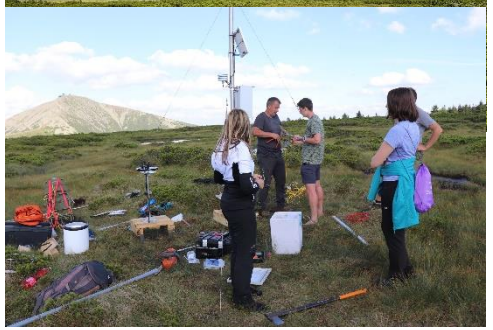
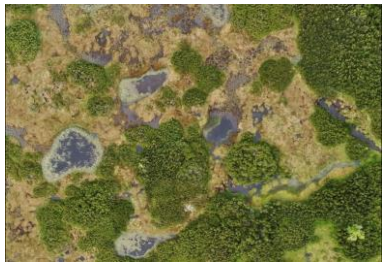
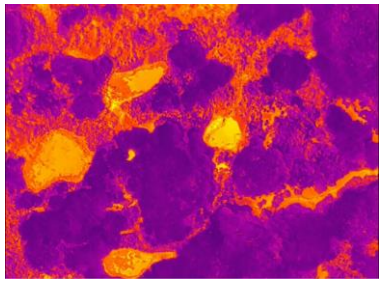
New EO projects:

- **1. Monitoring the spread and management of invasive and expansive species using advanced earth observation methods**
  - 2 mountains ranges (the Krkonoše Mts., the Orlické hory Mts.
  - 6 species
  - UAV and Planet data

- **2. Earth observation technologies for the surveillance activities of the Czech Environmental Inspectorate**
  - Asbestos monitoring
  - Rare flower species identification
  - Volumes of landfills
  - UAV data, satellite data time series, new HS satellite TROLL (TRL Space Company)



- **3. Evaluation of evapotranspiration from alpine peat-bog by an advanced UAV technology** – main goals:
  - 1) to estimate evapotranspiration (ET) its components over Úpské peat-bog patches (the Krkonoše Mts.) based on UAV-based TIR images with a high spatial and temporal resolution
  - 2) to reveal the spatial variability of peat-bog ET with respect to surface vegetation characteristics and meteorological conditions

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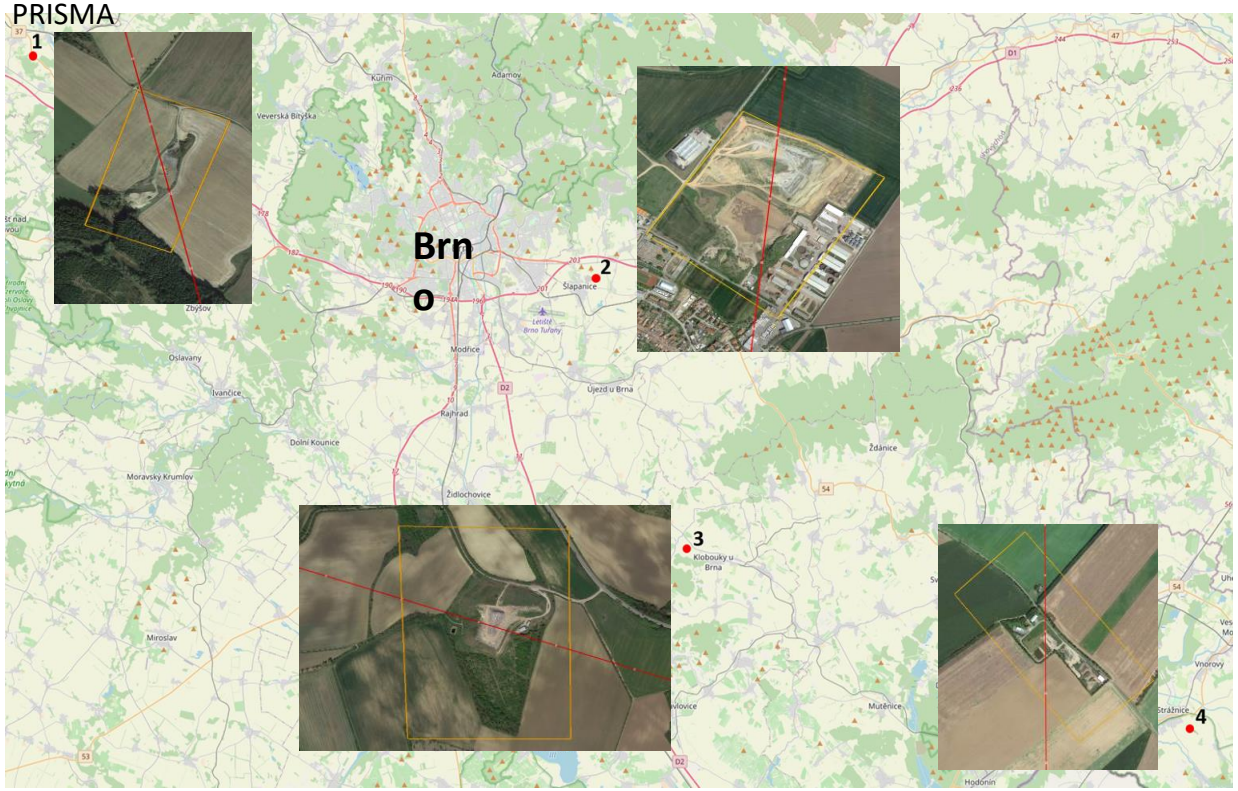
CzechGlobe
Global Change Research Institute CAS

Remote sensing monitoring of anthropogenic disturbances

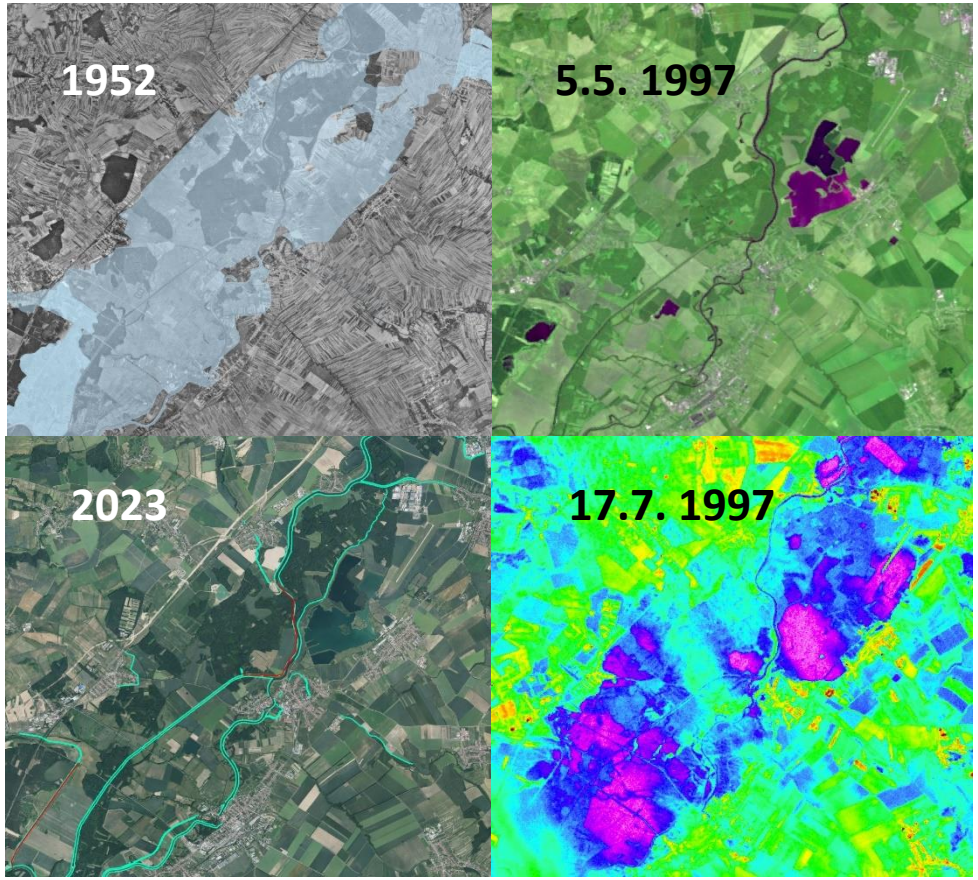
Airborne data VNIR, SWIR, TIR https://olc.czechglobe.cz/en/home-en/

Satellite data Landsat, CORONA, GHGSat, EMIT, EnMAP, PRISMA



Projects: Technology Agency of the Czech Republic grant number SS06020164, 2023-2025
GHGSat/ESA Earthnet - Project 96477, 2024

NIVALIS – multisource RS archive data for water management analysis to support natural flooding



Projects: Technology Agency of the Czech Republic, No SS07010401; 2024-26

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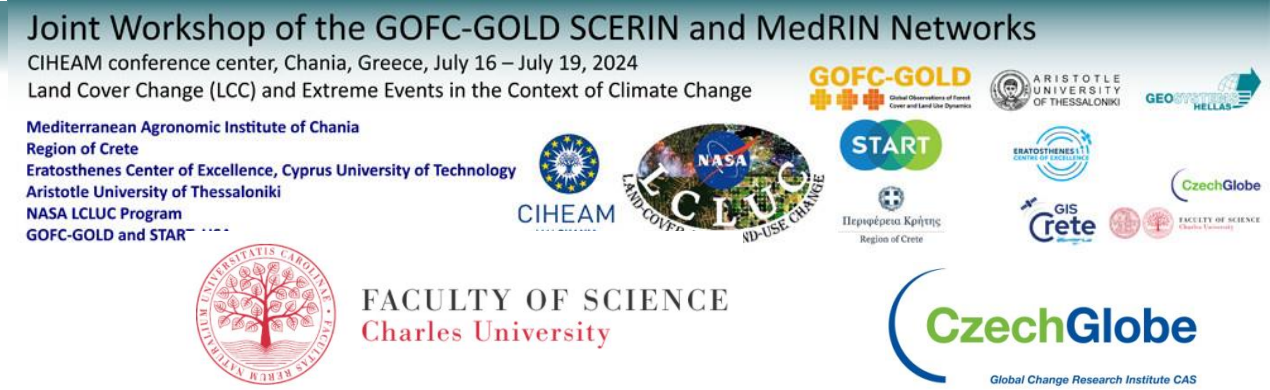

Projects/ Success stories / Good practices

Achieved

- *Geographical dimension: Czechia, Europe, USA;*
- *National and European infrastructure, integration into international research structures;*
- *NETWORKING OPPORTUNITIES (within a GOFC-GOLD SCERIN): joint R&D projects (USA-Czechia: NASA-LCLUC Program, INTER-EXCELLENCE by Ministry of Education of CZ); Slovenia–Czechia), EURIZON project (Ukraine with Czechia as coordinator), scientific publications, participation at the international conferences.*

Future plans

- *Main objective: to maintain our research goal to develop innovative RS based solutions allowing to study spatio-temporal changes of ecosystems under various environmental and anthropogenic pressure.*
- *NETWORKING OPPORTUNITIES (within a GOFC-GOLD SCERIN): scientific publications, participation at the international conferences, joined R&D project, joined scientific experiments*

1. Pikl, M., Brovkina, O., Zemek, F., Ladyka, M., Starodubtsev, V. **2024**. Effects of urbanization and Kaniv Reservoir on the thermal characteristics in the region. EUROPEAN JOURNAL OF ENVIRONMENTAL SCIENCES. 14. 33-42.
2. Neuwirthová, E., Lhotáková, Z., Červená, L., Lukeš, P., Campbell, P. and Albrechtová, J., **2024**. Asymmetry of leaf internal structure affects PLSR modelling of anatomical traits using VIS-NIR leaf level spectra. *European Journal of Remote Sensing*, *57*(1), p.2292154.
3. Stejskal, J., Čepl, J., Neuwirthová, E., Akinyemi, O.O., Chuchlík, J., Provazník, D., Keinänen, M., Campbell, P., Albrechtová, J., Lstibůrek, M. and Lhotáková, Z., **2023, Nov.** Making the genotypic variation visible: hyperspectral phenotyping in Scots pine seedlings. *Plant Phenomics*, *5*, p.0111.