Coordinating and integRating state-of-the-art Earth Observation Activities in the regions of North Africa, Middle East and Balkans and Developing Links with GEO related intiatives toward GEOSS

GEO-CRADLE Pre Kick-Off Meeting
Friday, 18th of February, 2016
EGS networking event

EuroGeoSurveys
Czech Geological Survey
Czech Republic

EuroGeoSurveys
European Geoscience for Society

The Geological Surveys of Europe

IONIC Centre, 11 Lysiou Street
Athens, Greece

HORIZON 2020

Dr. Veronika Kopačková
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PhD., Postgraduate program in Geoinformatics and Remote sensing, Faculty of Science, Charles University (2013): Thesis title „Hyperspectral remote sensing for environmental mapping and monitoring"

- *coordinating Remote Sensing Group at the Czech Geological Survey*
- *external lecturer at the Charles University in Prague*

Field of expertise
- Geological and environmental applications of Remote Sensing (e.g., mining impacts assessment, Acid Mine Drainage, forest health status)
- Optical remote sensing, Hyperspectral data analysis
- Multi-temporal data analysis

The Czech Geological Survey (CGS)

Exiting networks

International collaborations:
- Tel Aviv University (TAU)
- Helmholtz Centre Potsdam GFZ German Research Centre for Geosciences (GFZ)
- Helmholtz Institute Freiberg for Resource Technology (HIF)
- Goddard Space flight Center (NASA)
- Geological Survey of Ethiopia (GSE)

National collaborations:
- The Charles University in Prague (Department of Experimental Plant Biology)
- CzechGlobe (Academy of Science Czech Rep.)

The Czech Geological Survey (CGS)

Past projects experience:

• **HypSo:** Assessment of mining related impacts based on utilization of airborne HS sensor (Grant GAČR 205/09/1989, 2009-2012)

•**EO-MINERS:** Earth Observation for Monitoring and Observing Environmental and Societal Impacts of Mineral Resources Exploration and Exploitation, (FP7, 2010-2013)

•**PanGeo:** Enabling access to geological information in support of GMES (FP7. 2011-2014)

•**DeMinTIR:** Detection of Mineral Surface Parameter and Vegetation status from Airborne Thermal Infrared Imaginery: CGS, DLR, TAU, (AHS, INTA), (EUFAR, 2011)

•**HyperAlgo:** DEVELOPMENT OF ALGORITHMS AND COMPUTING TECHNIQUES FOR DATA MINING OF SPECTRAL-BASED INFORMATION FOR ECOLOGICAL AND SOIL MAPPING (KONTAKT II, Cz – Izrael, 2013-2015)

•**INMON:** Innovation of methods for heath status monitoring of Norway spruce stands in the Ore Mountains using hyperspectral data (KONTAKT II: Cz-USA, 2012-2015)

The Czech Geological Survey (CGS)

Projects in Ethiopia

- **Geological studies of natural hazards/hydrogeology**
- **Capacity building (remote sensing training)**
- **Identification and assessment of shallow groundwater for household irrigation (2015)**

Current relevant project involvement

- **PanAfGeo: CGS and BRGM** responsible for activity 3:
 - Geoscientific mapping: Training on remote sensing

The Czech Geological Survey (CGS)

Skills / field of expertise

- Imaging spectroscopy applications into diverse geological and environmental issues

- Vegetation stress detection

- Image processing for soil/geology

- Developing new processing techniques

- Field spectroscopy and ground truth data collecting

# Acid Mine Drainage/pH mapping in open-pit mines using image spectroscopy
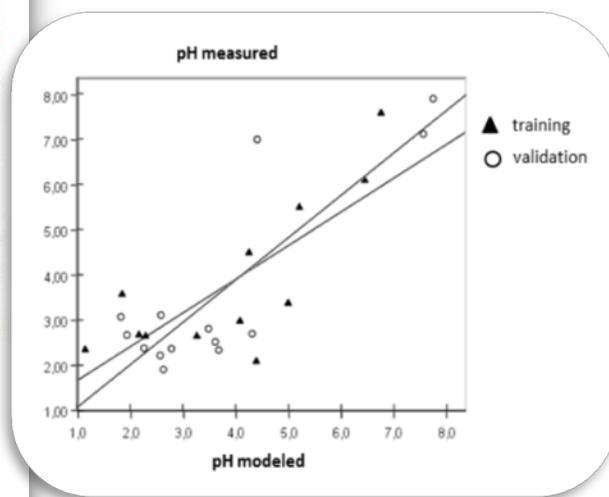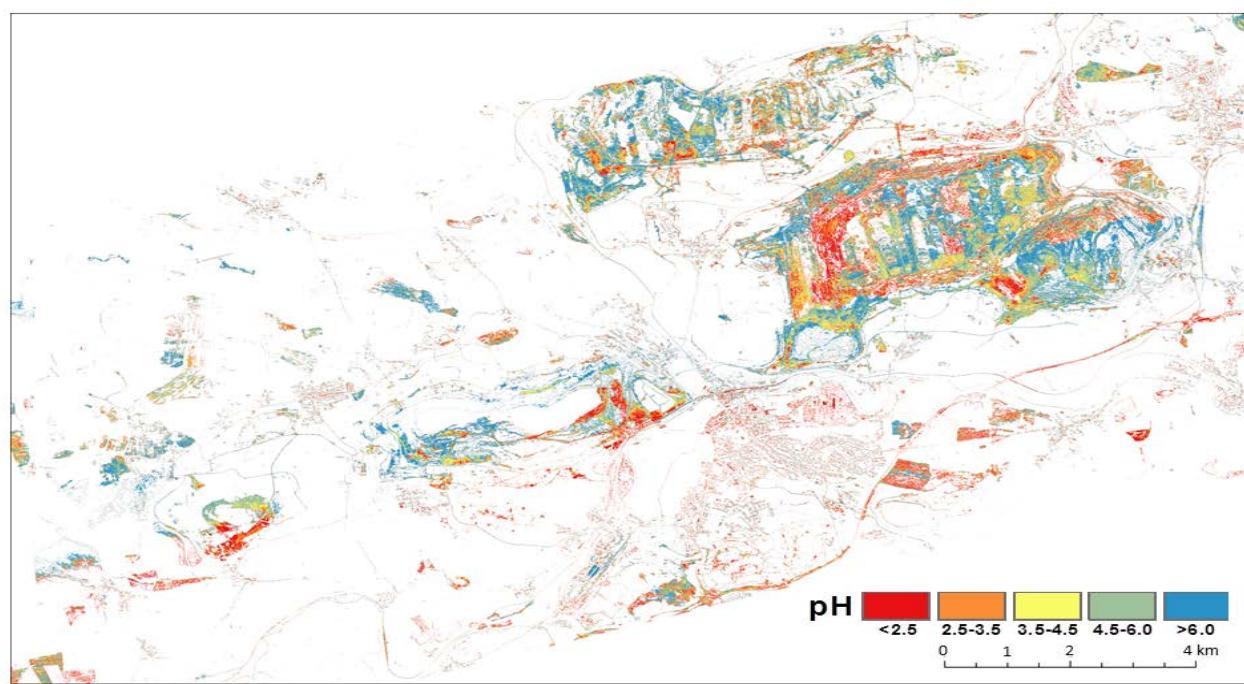
R	R^2	Adjusted R^2	Std. Error of the Estimate	Sig.
Training				
,779	,606	,567	1,140	,003
Validation				
,873	,763	,744	1,138	,000

Kopačková, V. (2014). *Using multiple spectral feature analysis for quantitative pH mapping in a mining environment*. International Journal of Applied Earth Observation and Geoinformation, 28, 28-42. http://dx.doi.org/10.1016/j.jag.2013.10.008,

Mining waters: semi-quantitative maps
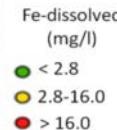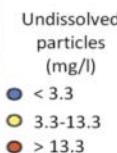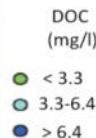
Hyperspectral data (HyMap) simulated
WorldView2 (WV2) data processing
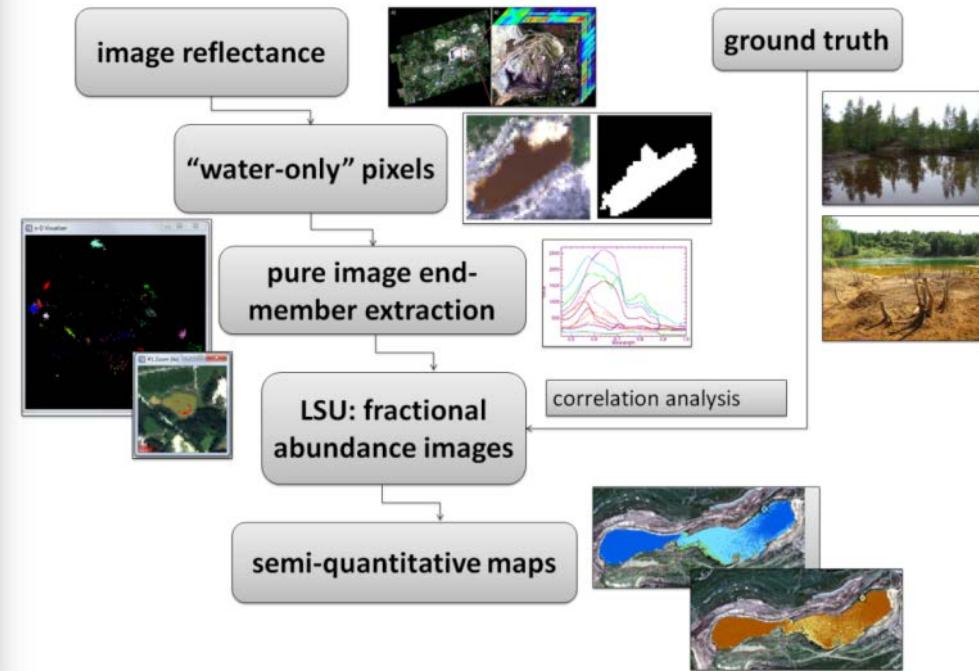
Kopačková, V., Mišurec, J., Lhotáková, Z., Oulehle, F., & Albrechtová, J. (2014). *Using multi-date high spectral resolution data to assess the physiological status of macroscopically undamaged foliage on a regional scale*. International Journal of Applied Earth Observation and Geoinformation, 27, 169-186. http://dx.doi.org/10.1016/j.jag.2013.09.009,

Forest health status assessment using hyperspectral data
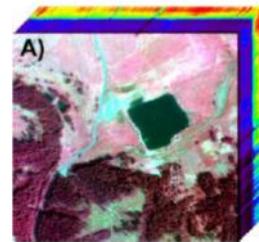
ASAS
(1998)
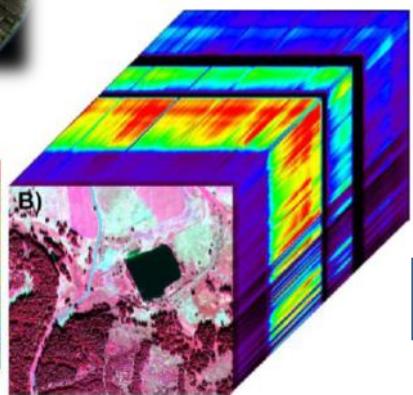
APEX
(2013)
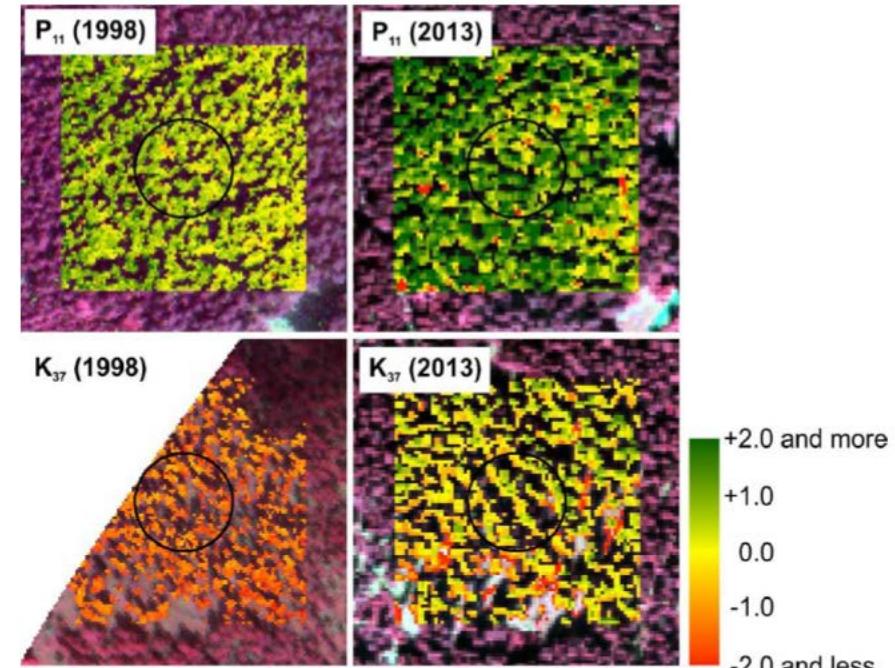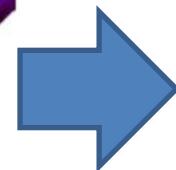
Relativized values of the VOG1
vegetation index calculated from the
ASAS (1998) and APEX (2013)

Mišurec, J.; Kopačková, V.; Lhotáková, Z.; Albrechtová, J. Detection of Spatio-Temporal Changes of Norway Spruce Forest Stands in Ore Mountains Using Airborne Hyperspectral Imagery. In Proceedings of the 1st Int. Electron. Conf. Remote Sens., 22 June–5 July 2015; Sciforum Electronic Conference Series, Vol. 1, 2015 , d006; doi:10.3390/ecrs-1-d006

Hyperspectral monitoring and modeling the spatial-temporal dynamics of mine tailings using UAV

Sokolov mining site:
To optimize image calibration and validation techniques and the entire pre-processing chain from raw images up to georeferenced reflectance (RICOLA image data)