



národní
úložiště
šedé
literatury

Využití metod dálkového průzkumu země pro stanovení závadných látek v obálkách stavebních objektů

Polák, Mojmír
2022

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Centre of Environmental Research

Waste Management,
Circular Economy and
Environmental Security

WP 1.A4 The application of remote sensing methods for the determination of pollutants in building envelopes

Environment - Environment for Life
12. – 14. 9. 2022



T A
C R

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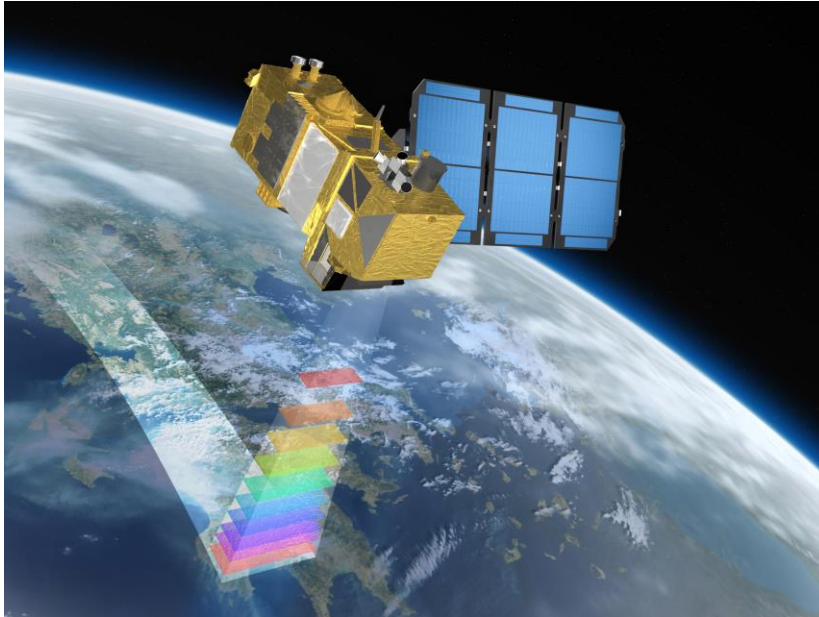
The application of remote sensing methods for the determination of pollutants in building envelopes

Bc. Mojmír Polák

Czech Environmental Information Agency

Remote sensing

- Remote sensing is the process of detecting and monitoring the physical characteristics of an area by measuring its reflected and emitted radiation at a distance (typically from satellite, aircraft or UAV)



ESA (2012)



DLR (2022)

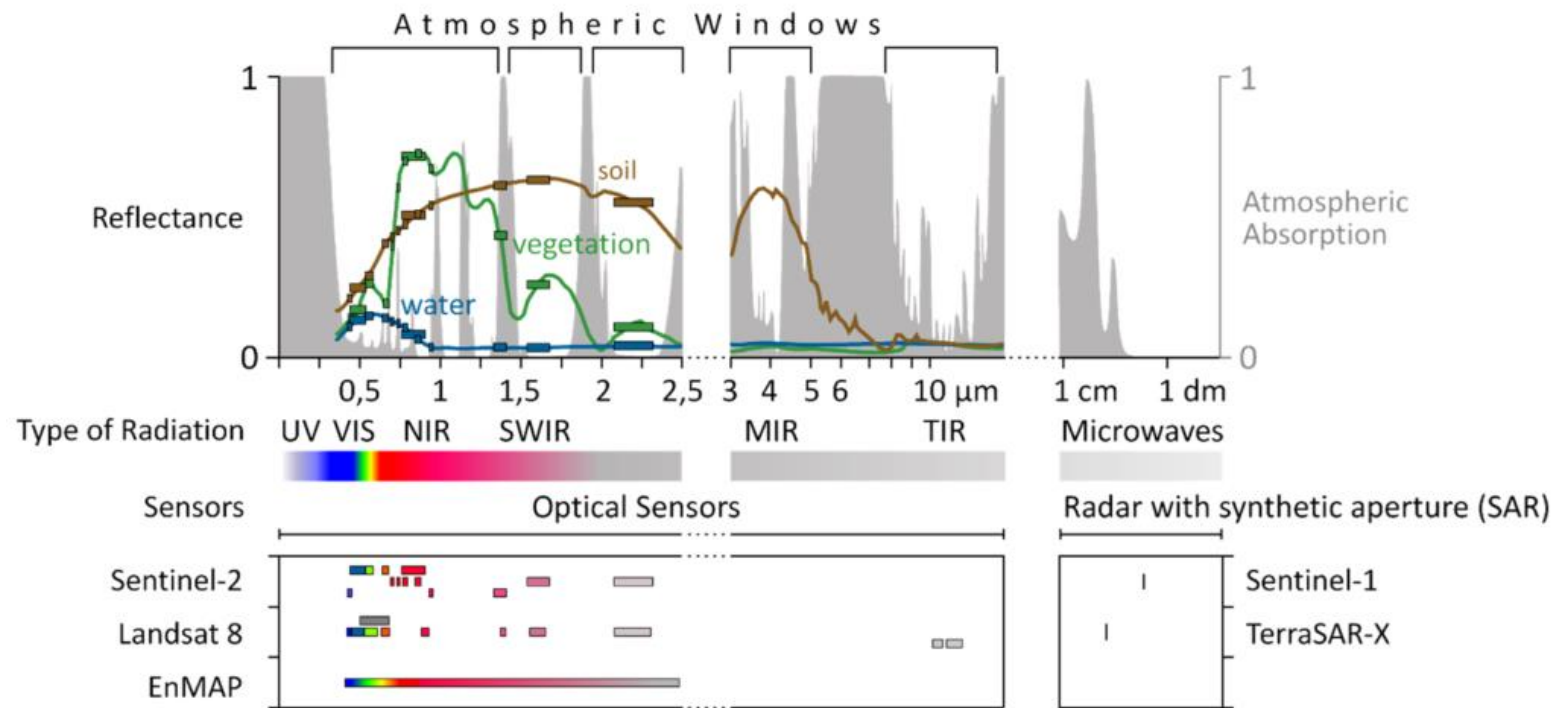


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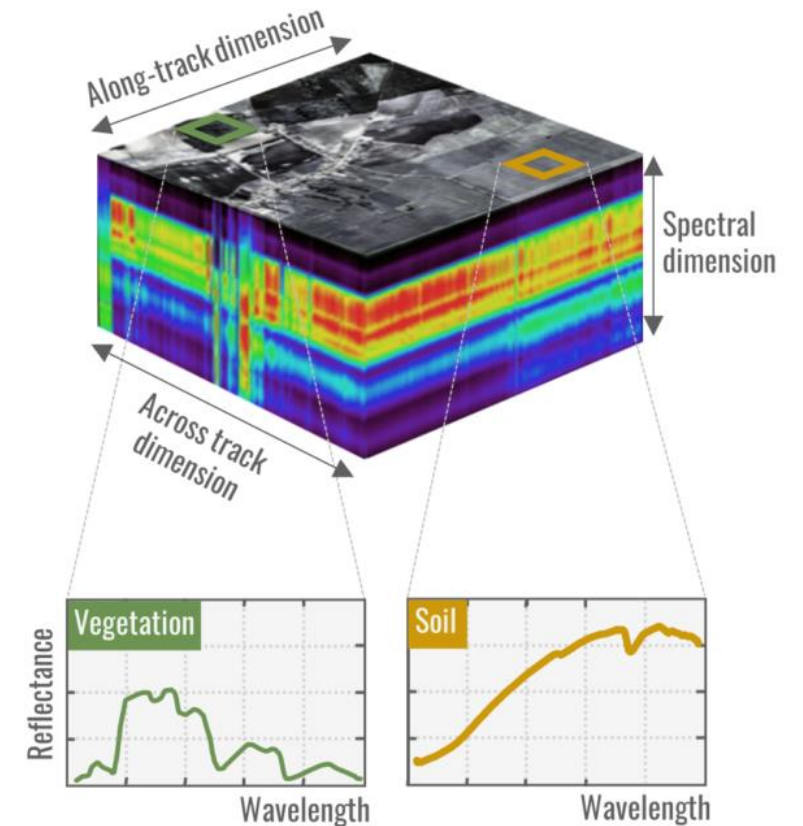
Aims of study

- **Detection of asbestos-containing or eternit materials in the outer envelope buildings**
 - **2021**
 - Literature research on the topic detection of asbestos-containing materials using panchromatic, multispectral and hyperspectral data
 - Validation of selected data processing methods at test sited – eventually, design of own detection method (or processing process)
 - **2022**
 - Application of selected remote sensing data analysis to the detection of asbestos-containing materials within a larger area (e.g. municipality)
 - Creation of a specialised map of asbestos roofs (coverings) in a selected area (input classes municipality)

Hyperspectral data



EO College (2022)



EO College (2022)

1st area of interest: Šošůvka



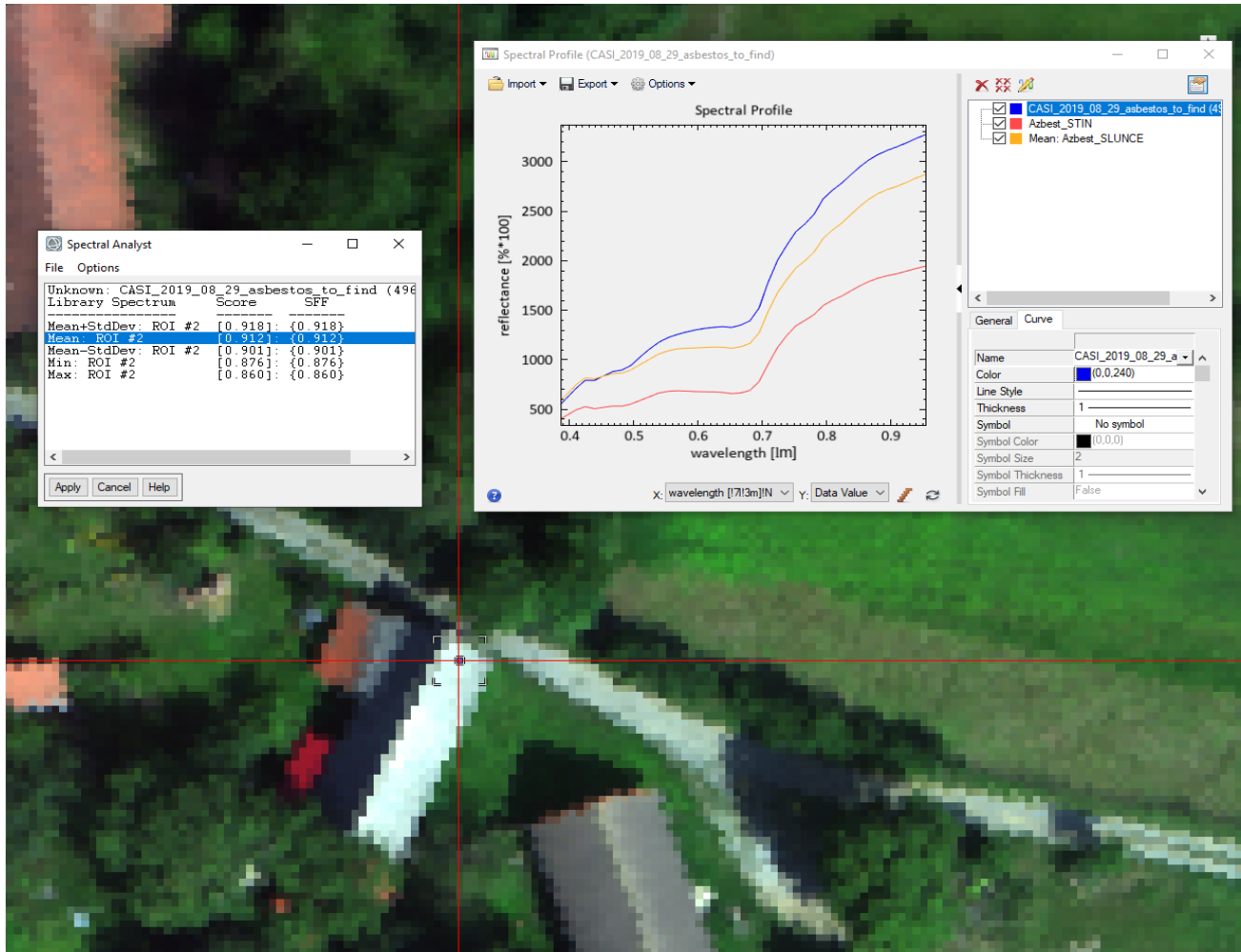
2nd area of interest: Vysoké Popovice



Data and methods

- Cooperation with CzechGlobe - Institute of Global Change Research, The Czech Academy of Sciences (CAS)
- Aerial hyperspectral data
 - CASI (400-1000 nm)
 - SASI (1000-2500 nm)
- Spectral Analyst
- Minimum Noise Fraction (MNF) Transform
- Classification of hyperspectral data using SAM algorithm

Spectral Analyst



Blue curve: unknown material

Orange curve: Average curve of the AZBEST roof from 1000 pixels on the sunlit side

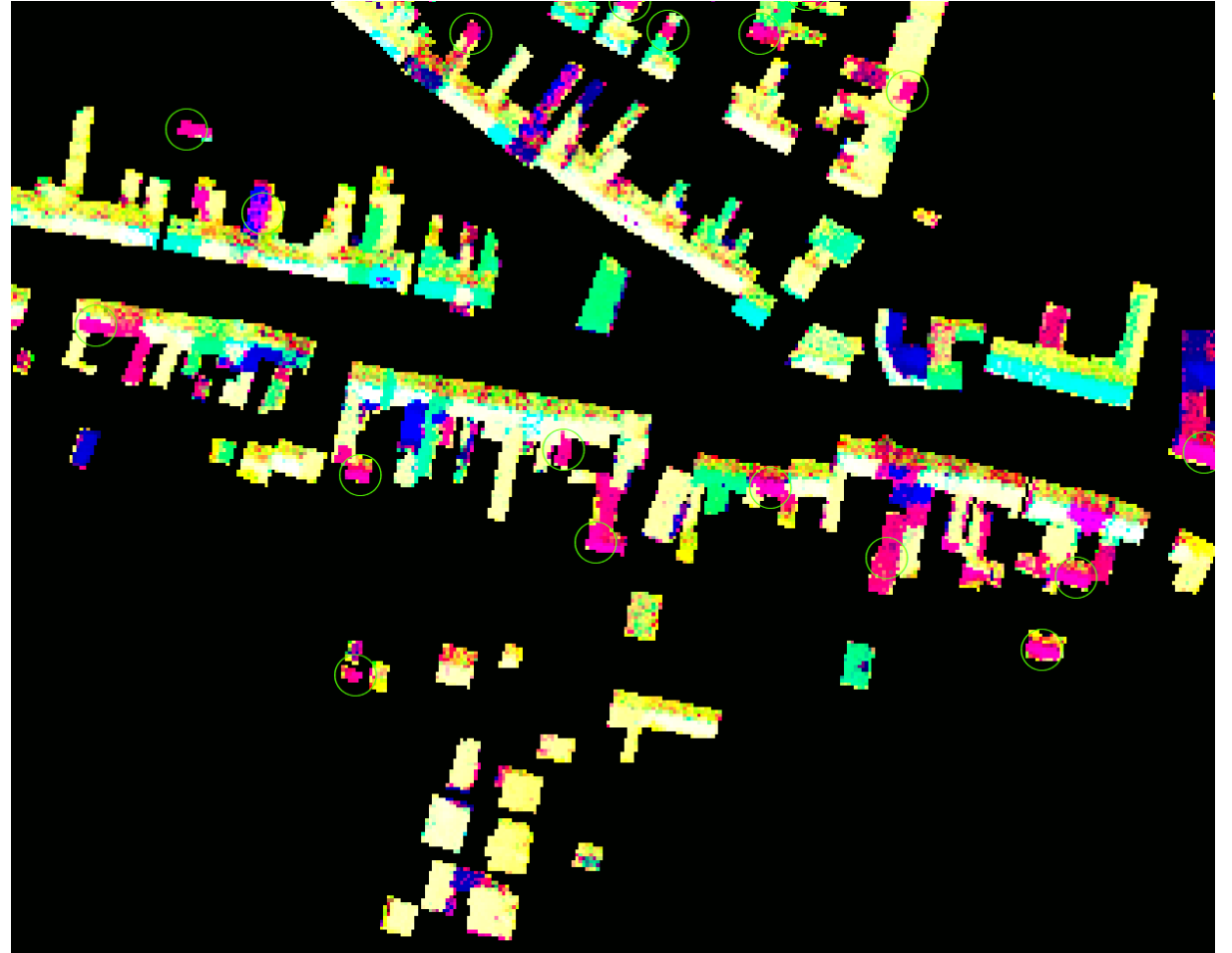
Red curve: Average curve of the AZBEST roof from 1000 pixels on the shadow side



- 91% asbestos in the tested pixel in Šošůvka

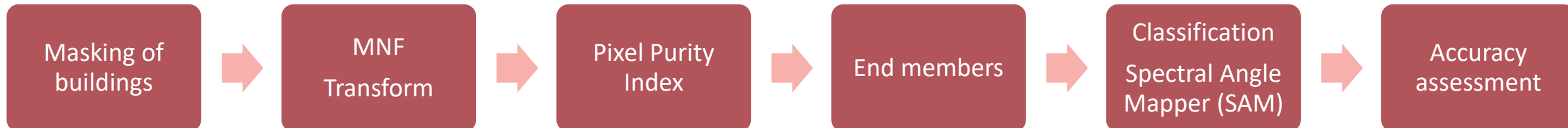
Minimum Noise Fraction Transform

- Vysoké Popovice
- Roofs with potential asbestos content can be visually interpreted after transformation



Classification of hyperspectral data

- More complex process than for multispectral data (Landsat , Sentinel-2)
- Results affected by the quality of the training sample (shadows, mixing of materials)
- Input classes:
 - Asbestos medium roofing
 - Ceramic roofing (red, black)
 - Roof made of asphalt strips
 - Sheet metal roofing
- The accuracy of asbestos-cement roofs identification in Popovice was 68 %



Sources

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Thank you for your attention!