



národní
úložiště
šedé
literatury

Correlation between Sentinel-1 radar data, Sentinel-2 multispectral data and ground measurement reference data for soil moisture monitoring

Batrlová, Iva; Seidlová, Jana
2020

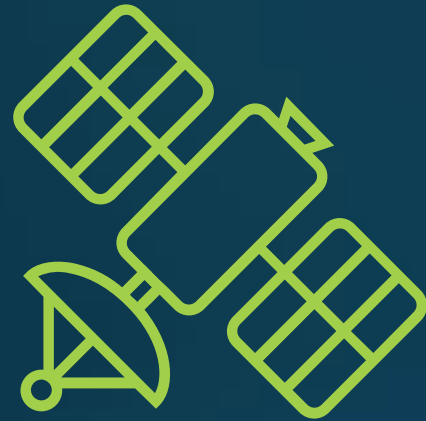
Dostupný z <http://www.nusl.cz/ntk/nusl-432122>

Dílo je chráněno podle autorského zákona č. 121/2000 Sb.

Tento dokument byl stažen z Národního úložiště šedé literatury (NUŠL).

Datum stažení: 19.04.2024

Další dokumenty můžete najít prostřednictvím vyhledávacího rozhraní nusl.cz .



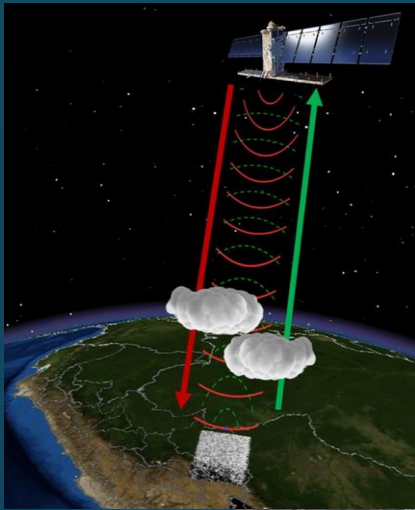
Correlation between Sentinel-1 radar data, Sentinel-2 multispectral data and ground measurement reference data for soil moisture monitoring



Kostecké inspirování 2020



Introduction

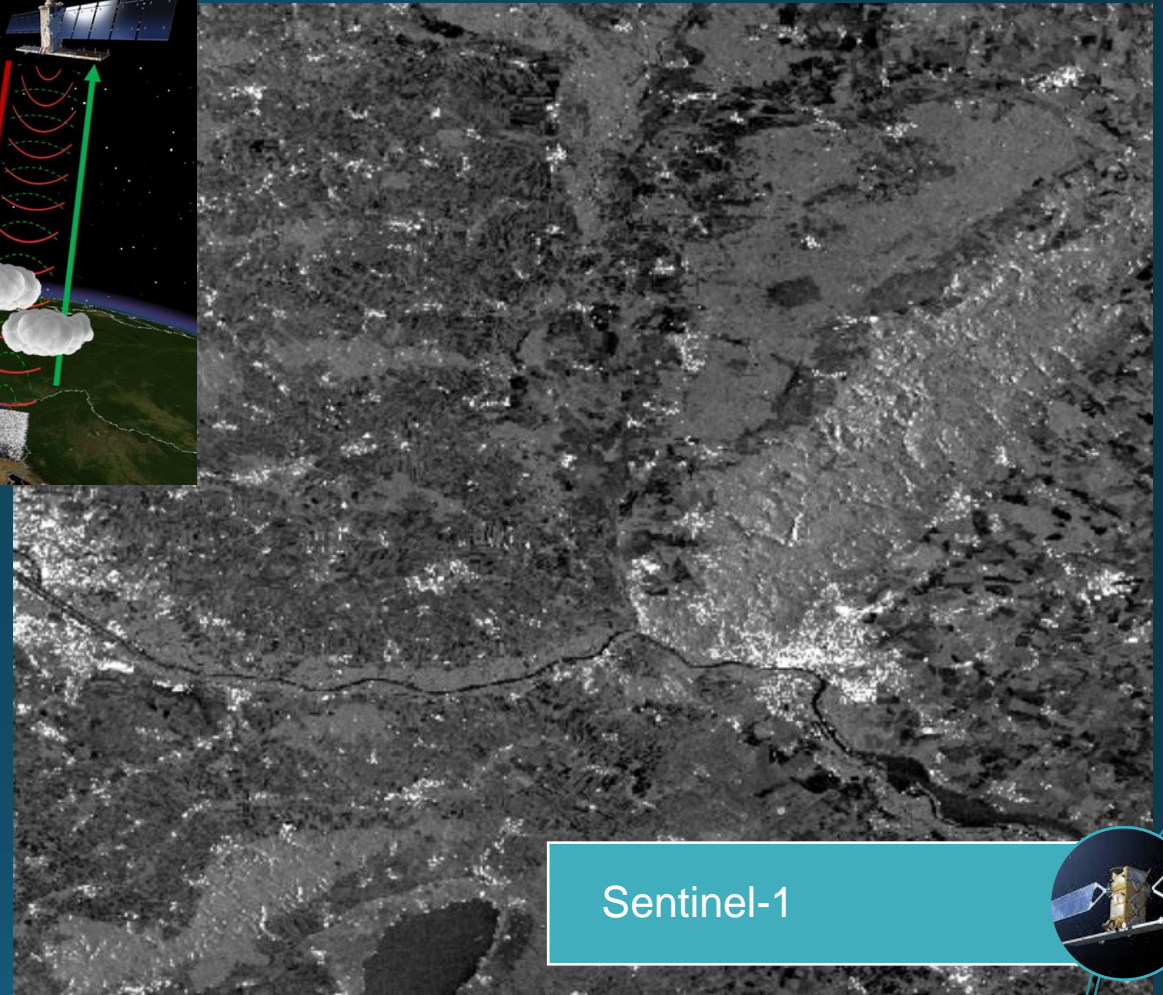


Why satellite data?

What's the advantage of radar data?

Combining data sources

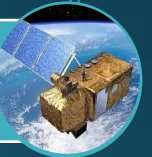
What does the project deal with and what is the goal?



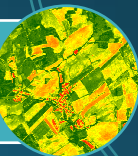
Sentinel-1



Sentinel-2



Spectral indices



Sentinel-1

- C-SAR radar instrument
- Constellation of Sentinel-1A and Sentinel-1B satellites
- Spatial resolution: 5x20m
- Temporal resolution: 6 days
- Utilization: ocean and Arctic region mapping, agriculture, forestry, Earth surface classification, ...
- Usable at any weather conditions and any time of day

Where to download:

- <https://scihub.copernicus.eu>
- <https://asf.alaska.edu>

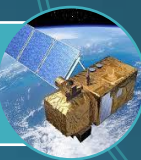
Introduction



Sentinel-1



Sentinel-2



Sentinel-2

- MSI Multispectral Instrument
- Constellation of Sentinel-2A and Sentinel-2B satellites
- 13 spectral bands
- Spatial resolution: 10; 20; 60 m
- Temporal resolution 5 days

- Utilization: agriculture, forestry, security applications, land management, ...
- Limited by cloud cover and time of day

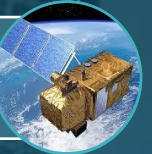
Where to download:

- <http://collgs.czechspaceportal.cz>
- <https://scihub.copernicus.eu>
- <https://dpz.cenia.cz/archiv>

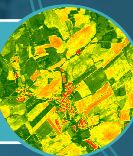
Sentinel-1



Sentinel-2



Spectral indices



Spectral indices

Vegetation indices:

NDVI, RVI, PVI, IPVI, WDV, TNDVI, GNDVI, GEMI,
ARVI, NDI₄₅, MTCI, MCARI, REIP, S₂REP, IRECI, PSSRa

Soil indices:

SAVI, TSAVI, MSAVI, MSAVI₂, BI, BI₂, RI, CI

Water indices:

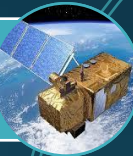
NDWI, NDWI₂, MNDWI, NDPI, NDTI

Radar indices:

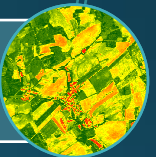
RVI, LIA



Sentinel-2



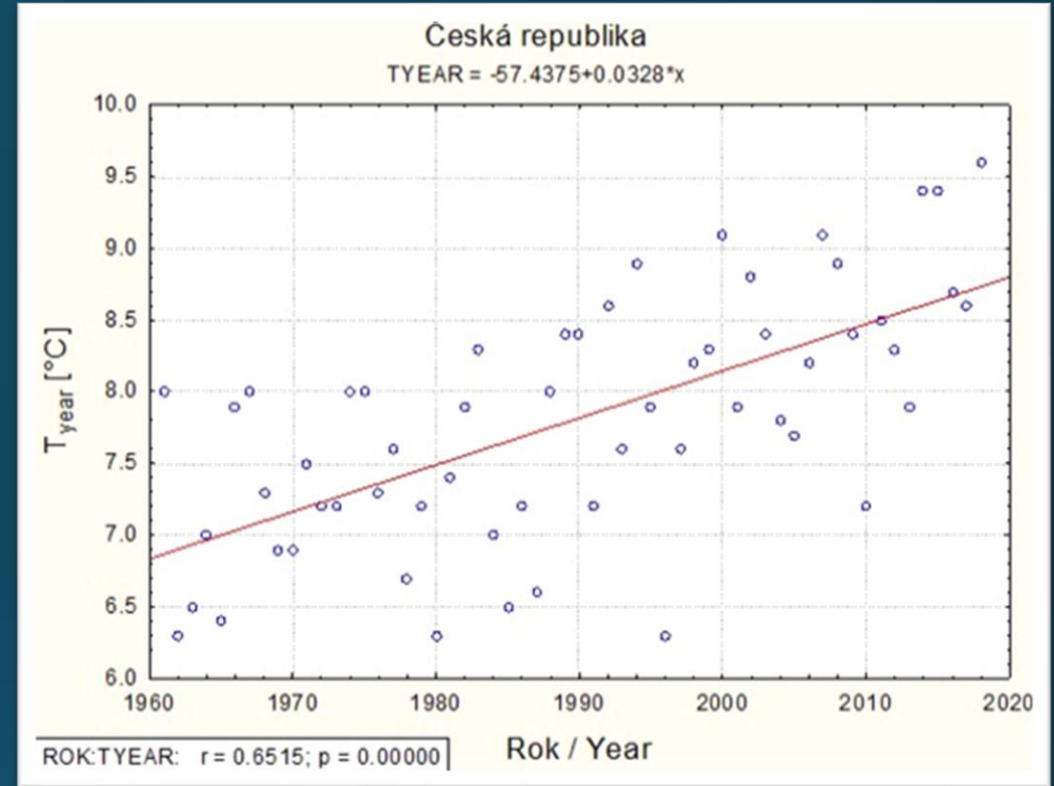
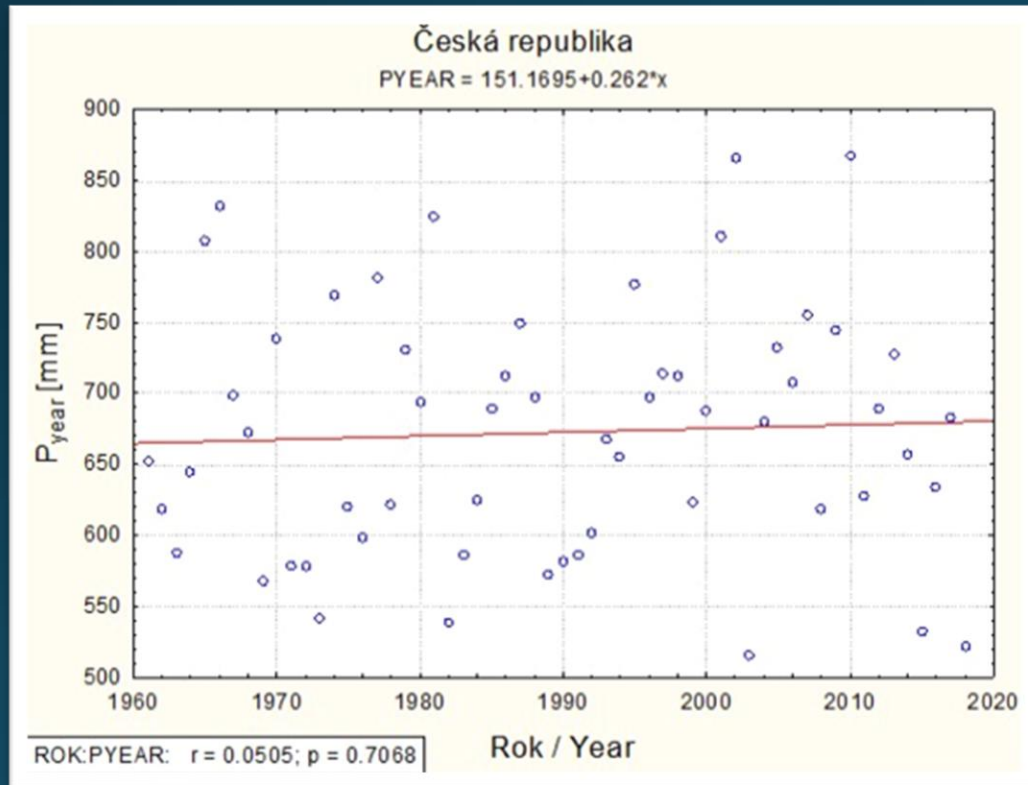
Spectral indices



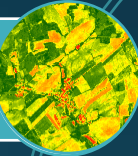
Reference data



Reference data



Spectral indices



Reference data



Software



Software



Reference data



Software



Methodology



Methodology

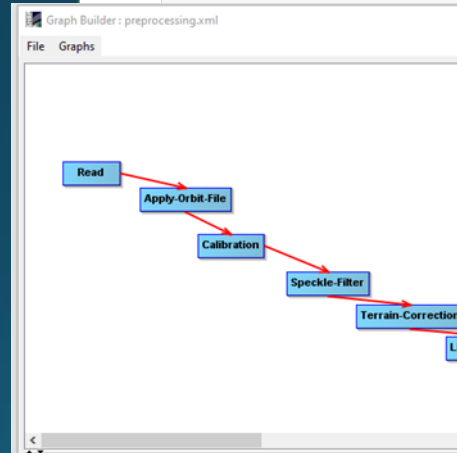
- Data download and processing
- Calculation of 61 spectral indices
- Comparison of Sentinel-2 spectral indices with and Sentinel-1 indices and backscatter
- Comparison with ground measurement data

```
## Resampling
upscale_factor_2 = 2
upscale_factor_6 = 6

# swir1
with rasterio.open(B11_2) as swir1_20:
    swir1 = swir1_20.read(
        out_shape = (
            swir1_20.count,
            int(swir1_20.height * upscale_factor_2),
            int(swir1_20.width * upscale_factor_2)
        ),
        resampling = Resampling.nearest
    )

# swir2
with rasterio.open(B12_2) as swir2_20:
    swir2 = swir2_20.read(
        out_shape = (
            swir2_20.count,
            int(swir2_20.height * upscale_factor_2),
            int(swir2_20.width * upscale_factor_2)
        ),
        resampling = Resampling.nearest
    )

# b05
with rasterio.open(B05_2) as b05_20:
    b05 = b05_20.read(
        out_shape = (
            b05_20.count,
            int(b05_20.height * upscale_factor_2),
            int(b05_20.width * upscale_factor_2)
        ),
        resampling = Resampling.nearest
    )
```



```
# NDVI
ndvi = (nir - red) / (nir + red)

with rasterio.open(out_ndvi, "w", **out_meta) as dest:
    dest.write(ndvi)

# MCARI2
mcari2 = (1.5 * ((2.5 * (nir - red) - 1.3 * (nir -
(np.sqrt(red)) - 0.5)))

with rasterio.open(out_mcari2, "w", **out_meta) as dest:
    dest.write(mcari2)

# GEMI
gemi = 2 * ((nir ** 2) - (red ** 2)) + 1.5 * nir
- (red ** 2) + 1.5 * nir + 0.5 * red) / (nir + red + 0.5) - ((red - 0.125) / (1 - red))

with rasterio.open(out_gemi, "w", **out_meta) as dest:
    dest.write(gemi)
```

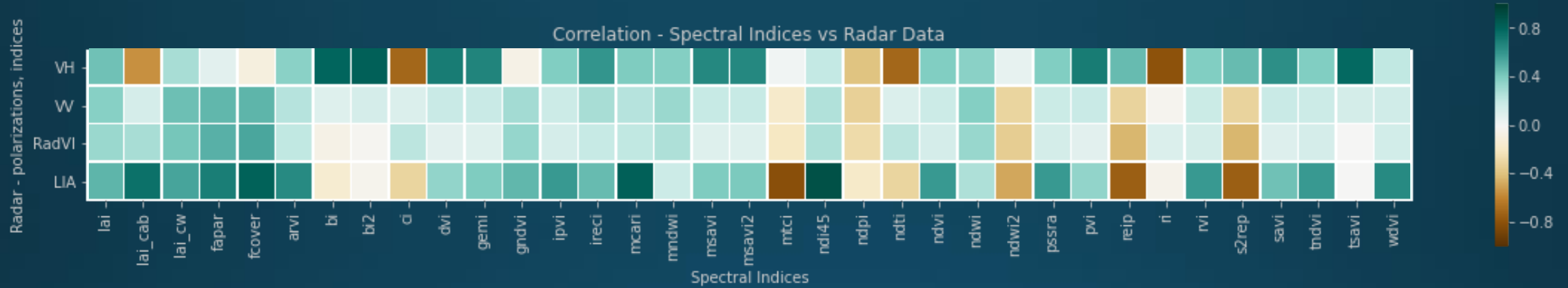
Software

Methodology

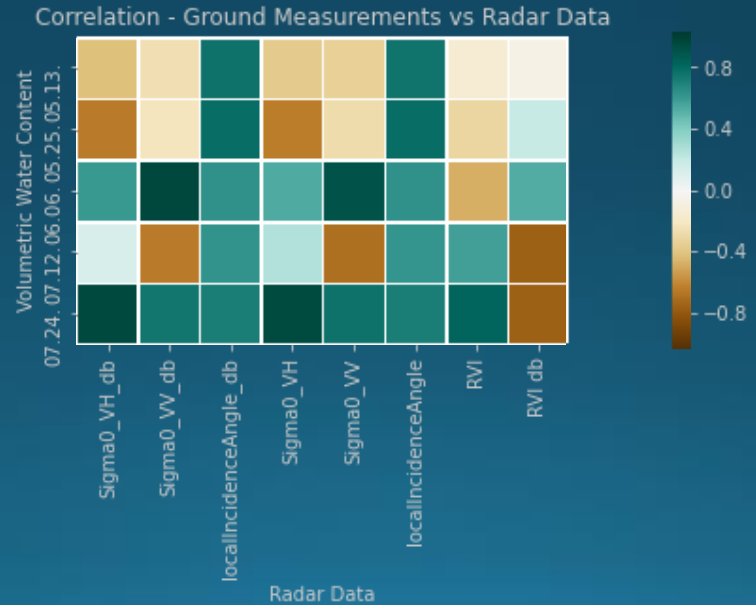
Results

The graphic consists of three circular icons arranged vertically. The top icon shows a snippet of code with various variables and functions. The middle icon is a tree diagram with a root node and several child nodes. The bottom icon is a bar chart with four bars of increasing height and an upward-pointing arrow.

Results



- Finding correlation between Sentinel-1 data and ground measurement data
- Finding correlation between Sentinel-2 and Sentinel-1 data



#Vegetation indices: DVI, RVI, PVI, IPVI, WdVI, TNDVI, GNDVI, GEMI, ARVI, NDI45, MTCI, MCARI, REIP, S2REP, IRECI, PSSRa
 #Soil indices: SAVI, TSAVI, MSAVI, MSAVI2, BI, BI2, RI, CI
 #Water indices : NDWI, NDWI2, MNDWI, NDPI, NDTI

Conclusion

- Overall results
- Future research

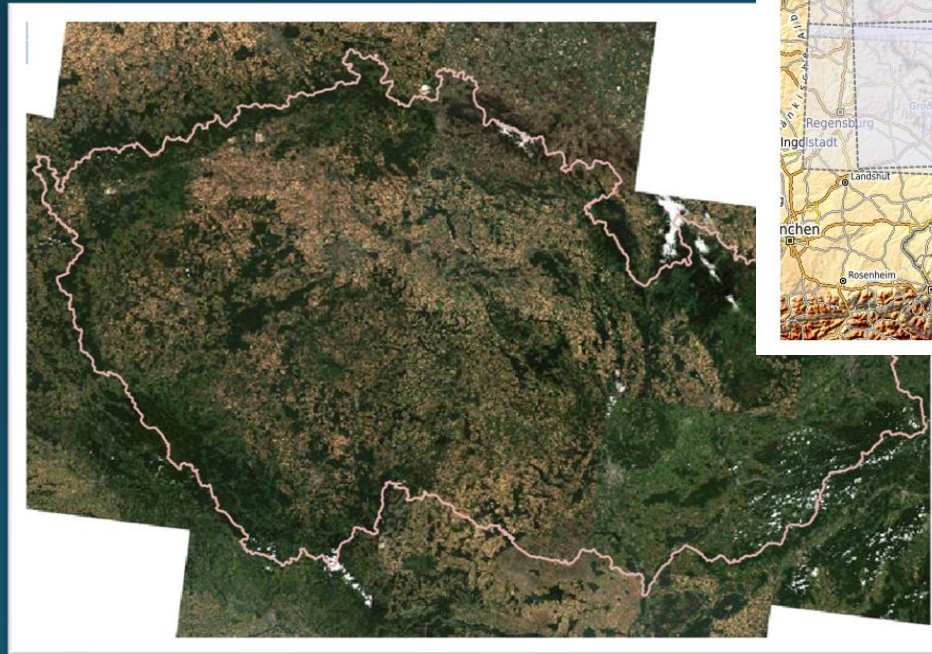


Remote Sensing Laboratory

CENIA, Czech Environmental Information Agency

New products:

- Satellite data archive
- Sentinel-2 mosaic in true colours



Zadání vyhledávacích parametrů

Sezóna
2020

Datum
8.9.2020 - 18.10.2020

List
33UVR

Maximální oblačnost [%]
50


Vyhledat

Methodology

Our Laboratory

Conclusion



A photograph of two women standing in a hallway with informational panels. The woman on the left has long dark hair and is wearing a black top and pants. The woman on the right has long blonde hair and is wearing a blue blazer over a black top and pants. Both are wearing lanyards with identification badges. The hallway has wooden paneling on the walls and informational panels on either side.

Thank you for your attention!

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