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Using Sentinel 1 data and IoT technology for analysis of soil moisture

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Challenge: 1

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**DUBROVNIK
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HACKATHON
2020**

Challenge

- 1. Using Sentinel 1 data and IoT technology for analysis of soil moisture**

A satellite in space with solar panels and a central body. The satellite is oriented horizontally, with its central body in the middle and two long solar panel arrays extending outwards. The background is a dark blue space with many small white stars. The satellite's central body is gold-colored with some white panels. The solar panels are blue with white grid lines. The satellite is mounted on a white horizontal structure.

Data

2016

- Sentinel-2
- Sentinel-1 (A,D)
- Ground data – soil moisture (vwc)

The Jupyter logo features the word "jupyter" in a lowercase, sans-serif font. It is framed by two curved, overlapping shapes: a top one in orange and a bottom one in a lighter orange. The background of the slide includes a partial view of the SNAP logo (a globe with "SNAP" text) and the QGIS logo (a green circle with a 3D cube).

jupyter

Software

- JUPYTER (python)
- SNAP
- QGIS

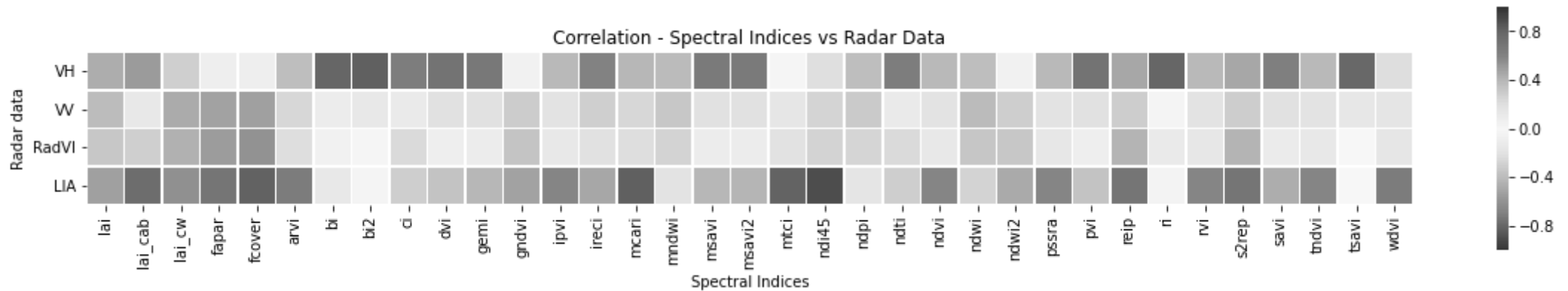
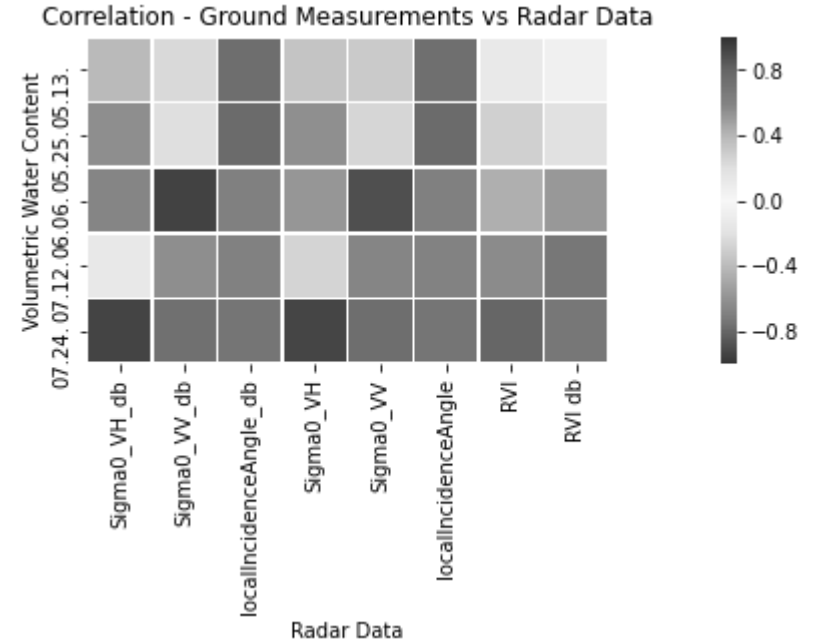
```
In [1]: import numpy as np
import geopandas as gpd
import pandas as pd
import matplotlib.pyplot as plt
import os
import rasterio
from rasterio import plot
from rasterio.plot import show
from rasterio.mask import mask
from rasterio.enums import Resampling
import seaborn as sb
import math
from math import sqrt
```


A decorative graphic consisting of several overlapping, curved bands in shades of blue and green, forming a partial circular shape on the left side of the page. The bands have a slight gradient and a soft shadow effect.

Results

Correlation

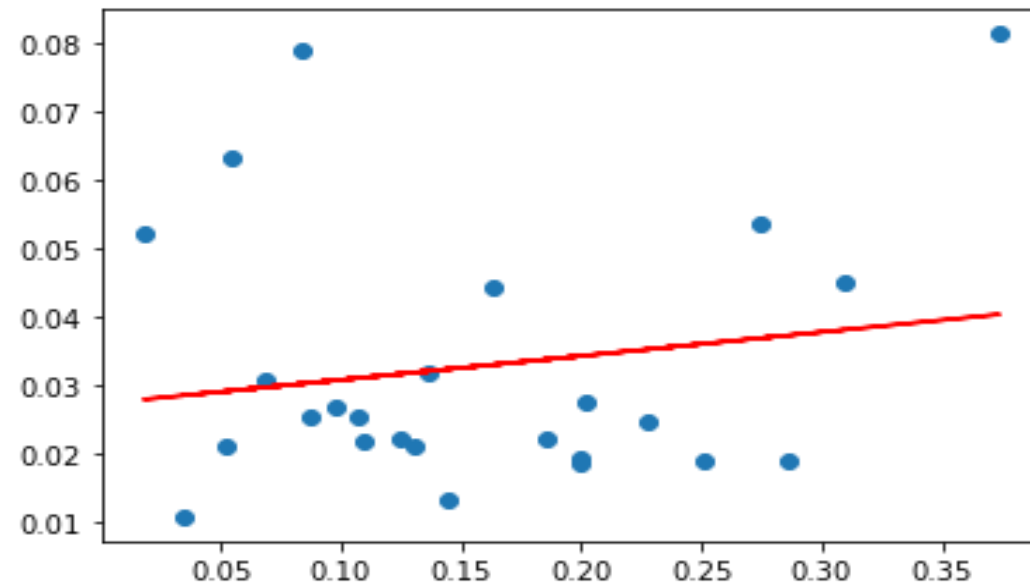
- Finding correlation between Sentinel-1 data and ground measurements
- Finding correlation between Sentinel-2 and Sentinel-1 data



#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

Linear regression

- Finding linear regression between Sentinel-1 data and ground measurements

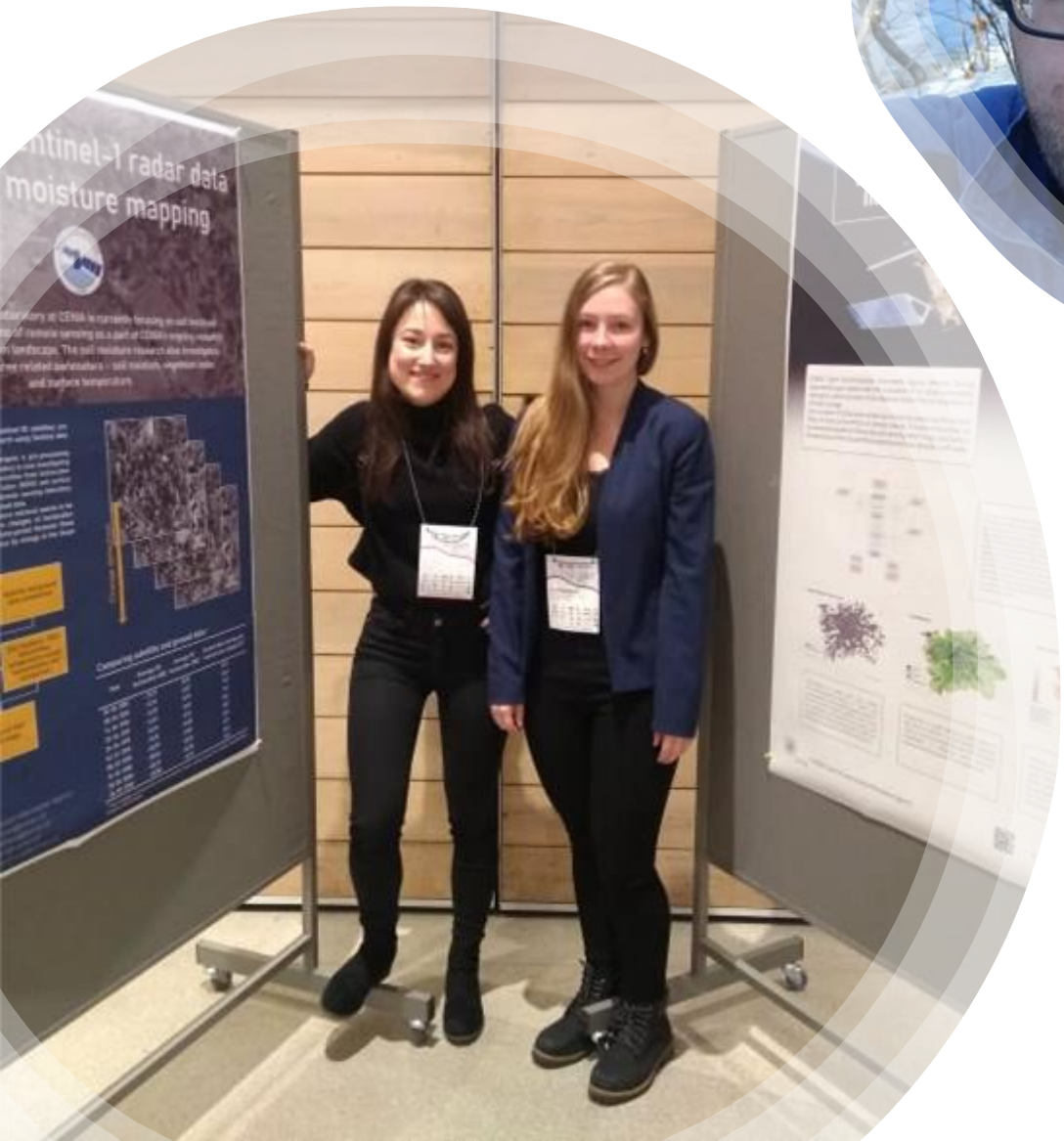


Linear regression between radar VH polarization (y axis) and volumetric water content (vwc) (x axis)

Conclusion

- Overall results
- Future research





Thank you!