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Testing PRISMA hyperspectral satellite imagery in predicting soil carbon content based on synthetized LUCAS spectral data

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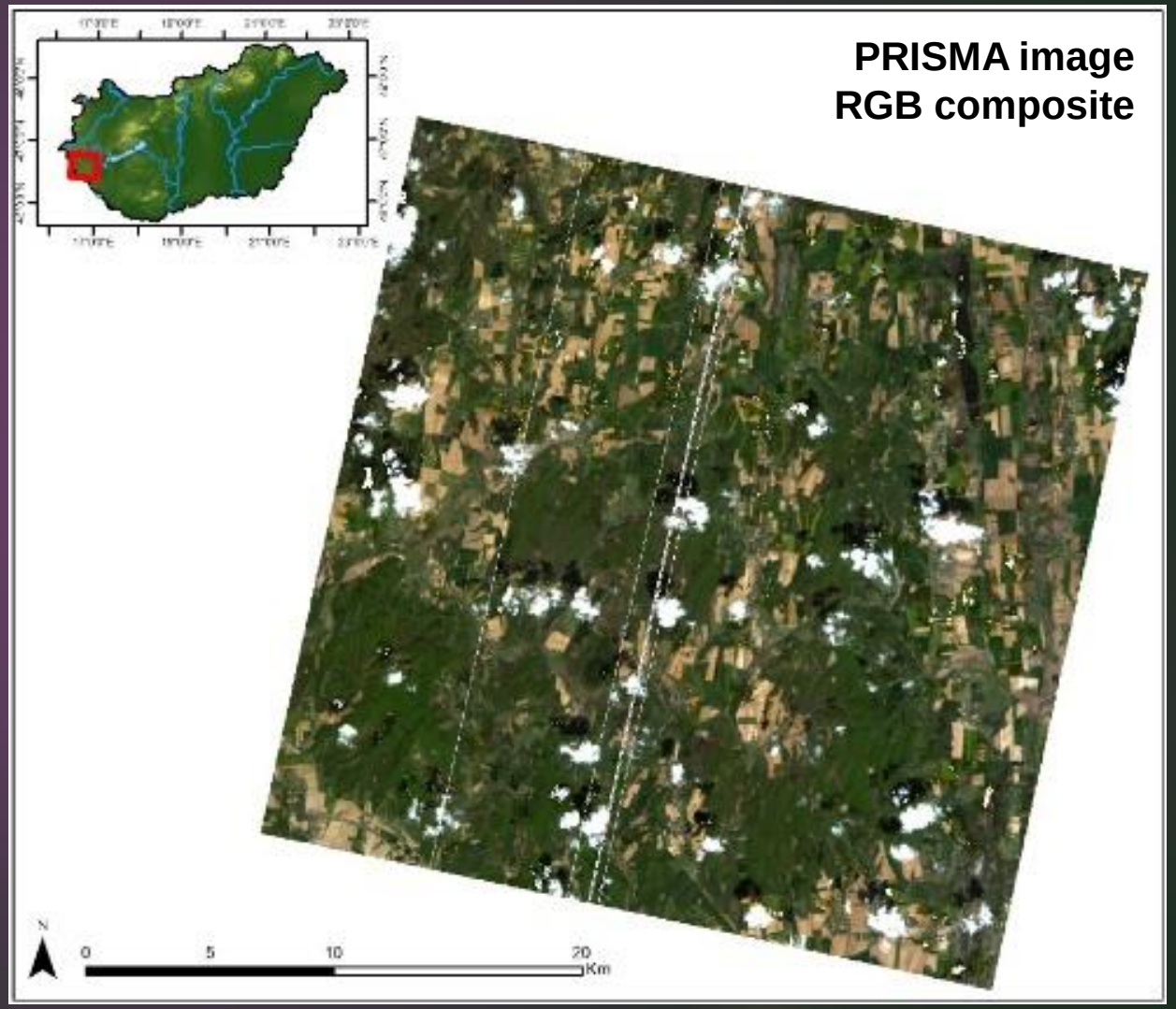
Goals

- the prediction accuracy of PRISMA (PRecursore IperSpettrale della Missione Applicativa - Hyperspectral Precursor of the Application Mission) satellite hyperspectral imagery data supplemented by various environmental datasets as additional predictor variables in four scenarios:
- using solely hyperspectral imagery data
- spectral imagery data, elevation and its derived parameters (e.g. slope, aspect, topographic wetness index etc.)
- spectral imagery data and land-use information and
- all aforementioned data in fusion.

Study area

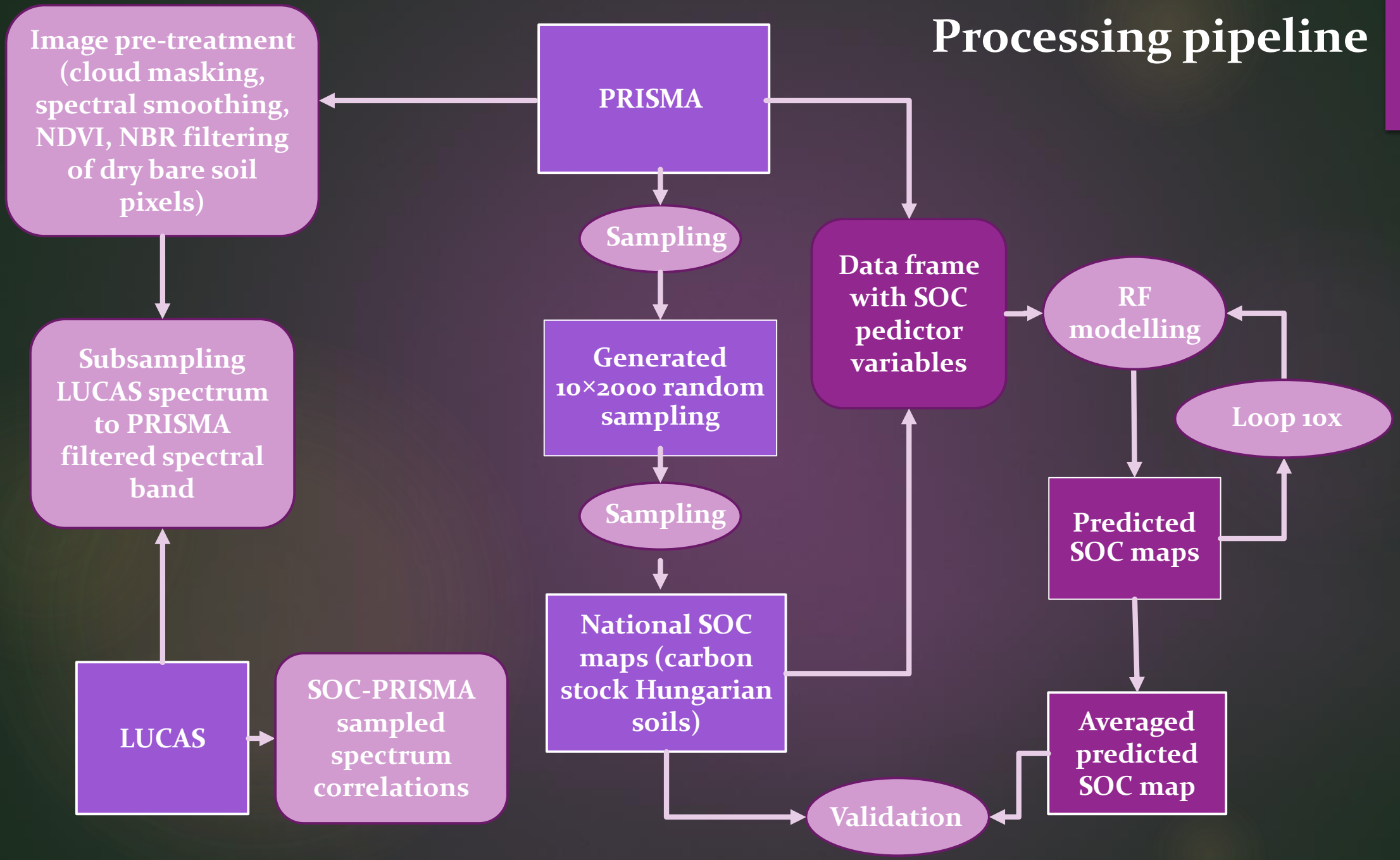
- Image acquisition: 23-04-2021
- Spectral bands (VNIR 400-1010 nm; SWIR 920-2505 nm) filtered leaving out atmospheric absorption wavelengths or bands with too much striping error:
  - 400-475 nm
  - 905-1010 nm
  - 1095-1160 nm
  - 1320-1490 nm
  - 1780-2030 nm
  - 2300-2505 nm
- Spatial resolution: 30 m



LUCAS spectral data resampled for PRISMA spectral bands (without atmospheric absorption bands)

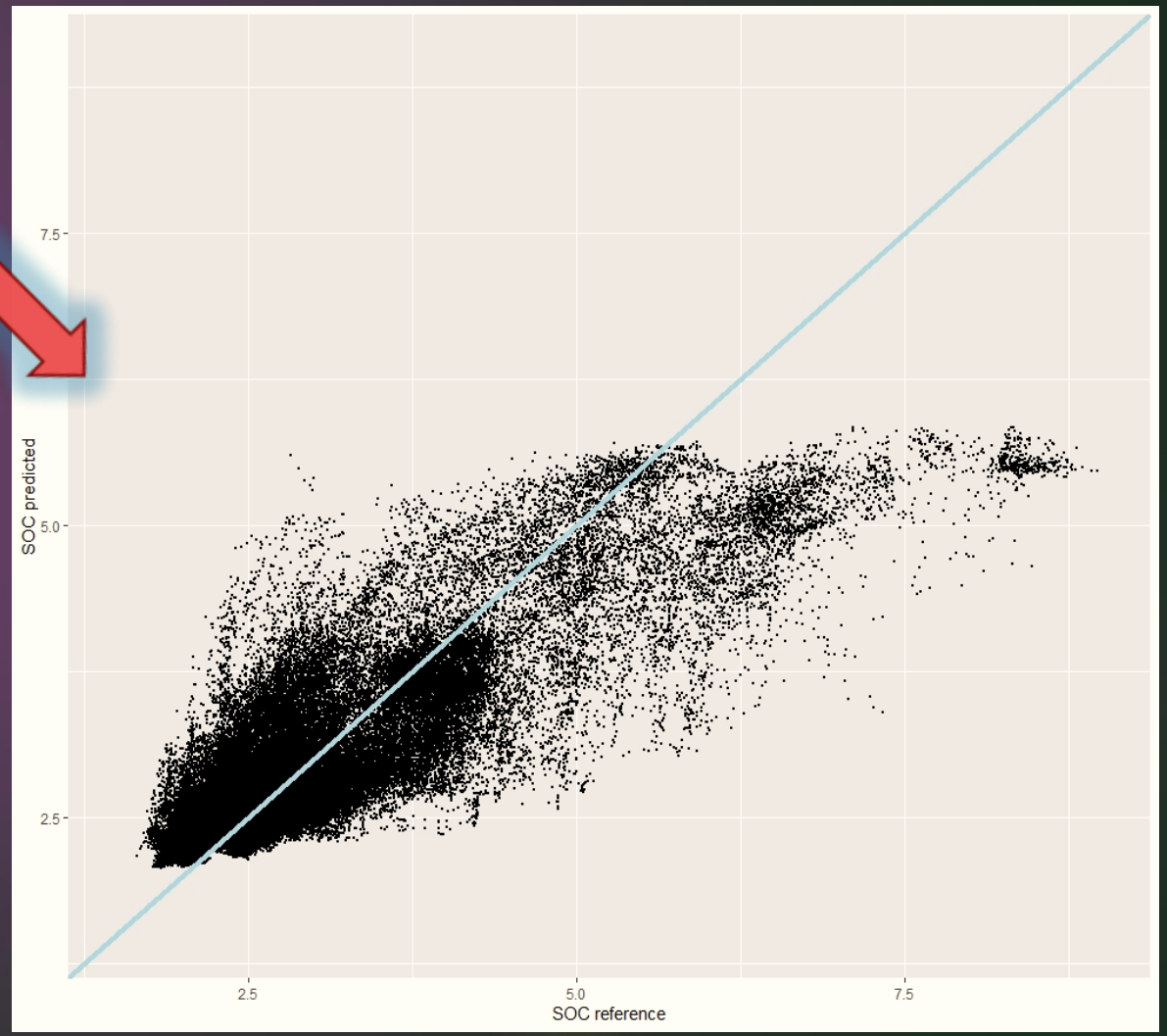
Pearson correlation	Wavelenght range (nm)	References
-0,81	590-664 nm	Ben-dor et al. 1997.; Castaldi et al. 2019; Rossel et al. 2010
-0,88	900-1200 nm	Rossel et al. 2010
-0,85	2100-2300 nm	Ben-dor et al. 1997,2009; Biney et al. 2020

Processing pipeline



Results

Datatype	MEAN	MIN	MAX	SD	R^2
Spectrum	-0,006	-2,866	5,549	0,785	0,588
Spectrum+ Indices	-0,028	-2,990	5,448	0,783	0,586
Spectrum+ Indices + DEM	-0,011	-2,783	3,937	0,495	0,869



Thank you for your kind attention

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