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Hyperspectral Unmixing

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Overview

1. Research goal
2. Methods
    - Study Area
    - Workflow
3. Results
    - Non-vegetation vs. vegetation fraction
    - Non-woody vegetation fraction
    - Woody vegetation class fraction
4. Discussion

Literature

1. Research goal

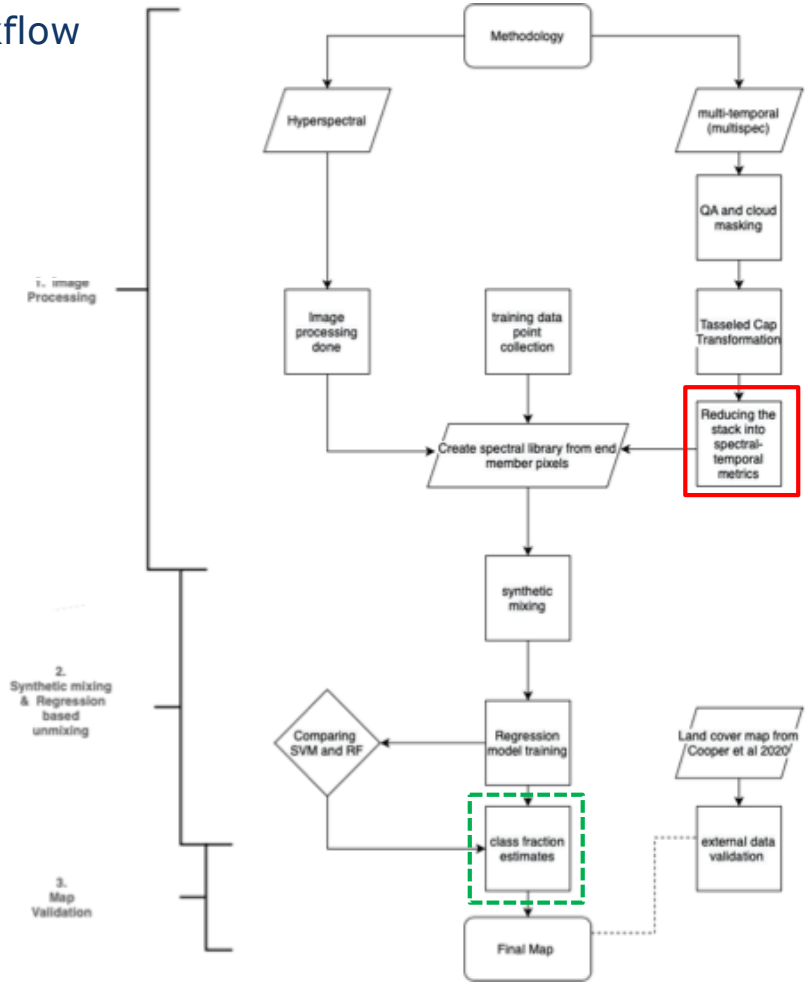
Comparison of vegetation class fraction maps based on hyperspectral and multi-temporal multi-spectral imagery

2. Methods Study Area

- North of Santa Rosa, California (USA)
- Extend: approx. 72 km x 15 km
- Time frame hyperspectral (EnMAP): 07.06.2013
- Time frame Landsat: 02.01.2013 – 28.12.2013

Fig. 1: Overview of the study area
(Data provided by HU Berlin Earth Observation department, 2021 and Open Street Map, 2021)

2. Methods Workflow



Calculation (RAM?) issue for STMs

with Python script by Leon Nill
(otherwise R and QGIS were applied)

Current step (first results on next slide)

Fig. 2: Workflow *V.5*

3. Results Non-Vegetation vs. Vegetation fraction

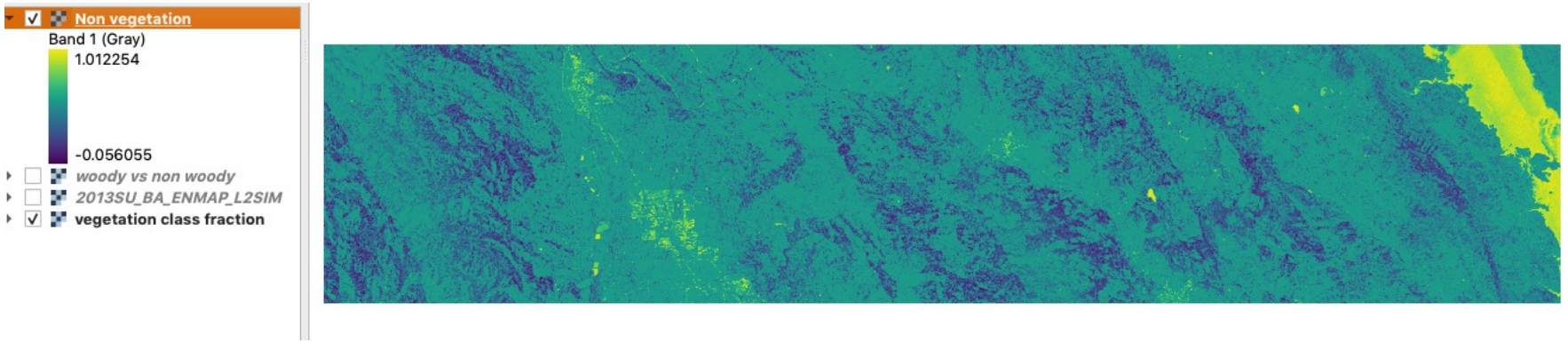


Fig. 3: Map 1 (Non-Vegetation vs. Vegetation)

3. Results Non-Woody vegetation fraction

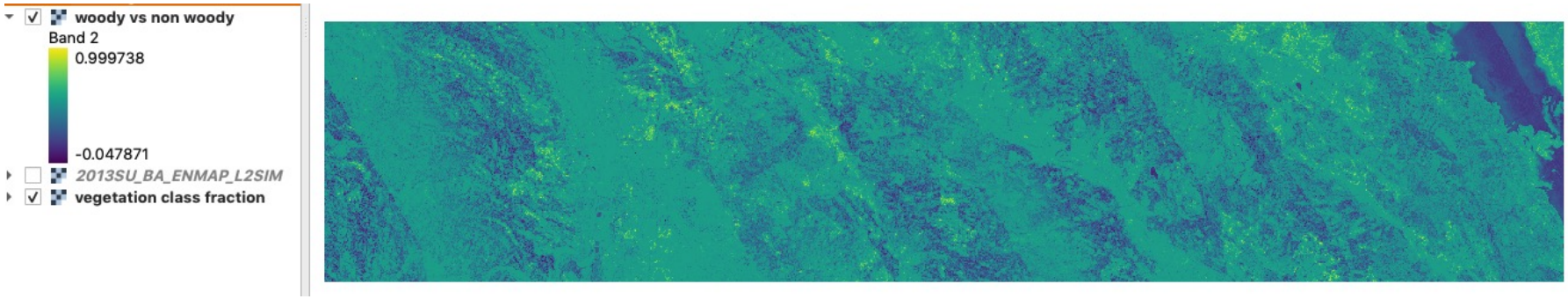
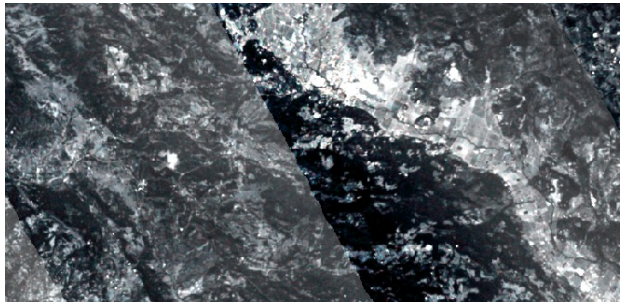


Fig. 4: Map 2 (Non-Woody)

3. Results Woody vegetation class fraction



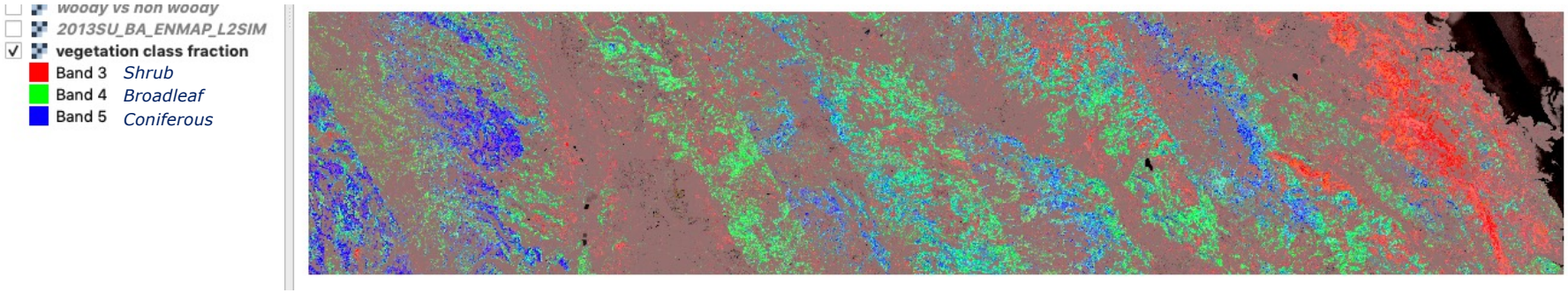


Fig. 5 **top:** Hyperspectral image
bottom: Map 1 (Woody vegetation class fraction)

4. Discussion

1. Use of hyperspectral imagery led to *seemingly* adequate fractional cover estimations across the study area

2. Endmembers affected by data artefacts from flight paths

3. Hyperspectral and multi-temporal multi-spectral imagery requires extensive computational resources…

Thank you for you_R attention!

Literature

- Cooper et al. (2020): Disentangling fractional vegetation cover: Regression-based unmixing of simulated spaceborne imaging spectroscopy data. Remote Sensing of Environment, 246. DOI: 10.1016/j.rse.2020.111856
- Jänicke, C., Okujeni, A., Cooper, S., Clark, M., Hostert, P. and van der Linden, S., 2020. Brightness gradient-corrected hyperspectral image mosaics for fractional vegetation cover mapping in northern California. Remote Sensing Letters, 11(1), pp.1-10.
- Okujeni, A., van der Linden, S., Suess, S., Hostert, P., 2017. Ensemble learning from synthetically mixed training data for quantifying urban land cover with support vector regression. IEEE J. Sel. Top. Appl. Earth Observ. Remote Sens. 10, 1640–1650.
- QGIS (2021): QGIS Geographic Information System. QGIS Association. URL: http://www.qgis.org [2021-07-11]
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- Roberts et al. (2018): Hyperspectral vegetation indices. In: Hyperspectral indices and image classifications for agriculture and vegetation.

- *Referring as well to* California natural resources agency (2021) *for Cropping* (*e.g. vineyards, apple plantations, wheat etc.*). URL: https://data.cnra.ca.gov/dataset/crop-mapping-2014 [2021-06-19]