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Assessment of soil management practices in Vineyards using Sentinel-2: Challenges in enhancing soil organic carbon content prediction

Hayfa Zayani^{1,2}, Youssef Fouad², Nicolas Baghdadi³, Didier Michot², Emmanuelle Vaudour¹, Maria José Marques Perez⁴

¹ Université Paris-Saclay, INRAE, AgroParisTech, UMR EcoSys, 91120 Palaiseau, France ; hayfa.zayani@inrae.fr, emmanuelle.vaudour@inrae.fr

² SAS, Institut Agro, INRAE, 65 Rue de St Briec, 35000 Rennes, France ; youssef.fouad@agrocampus-ouest.fr, didier.michot@agrocampus-ouest.fr

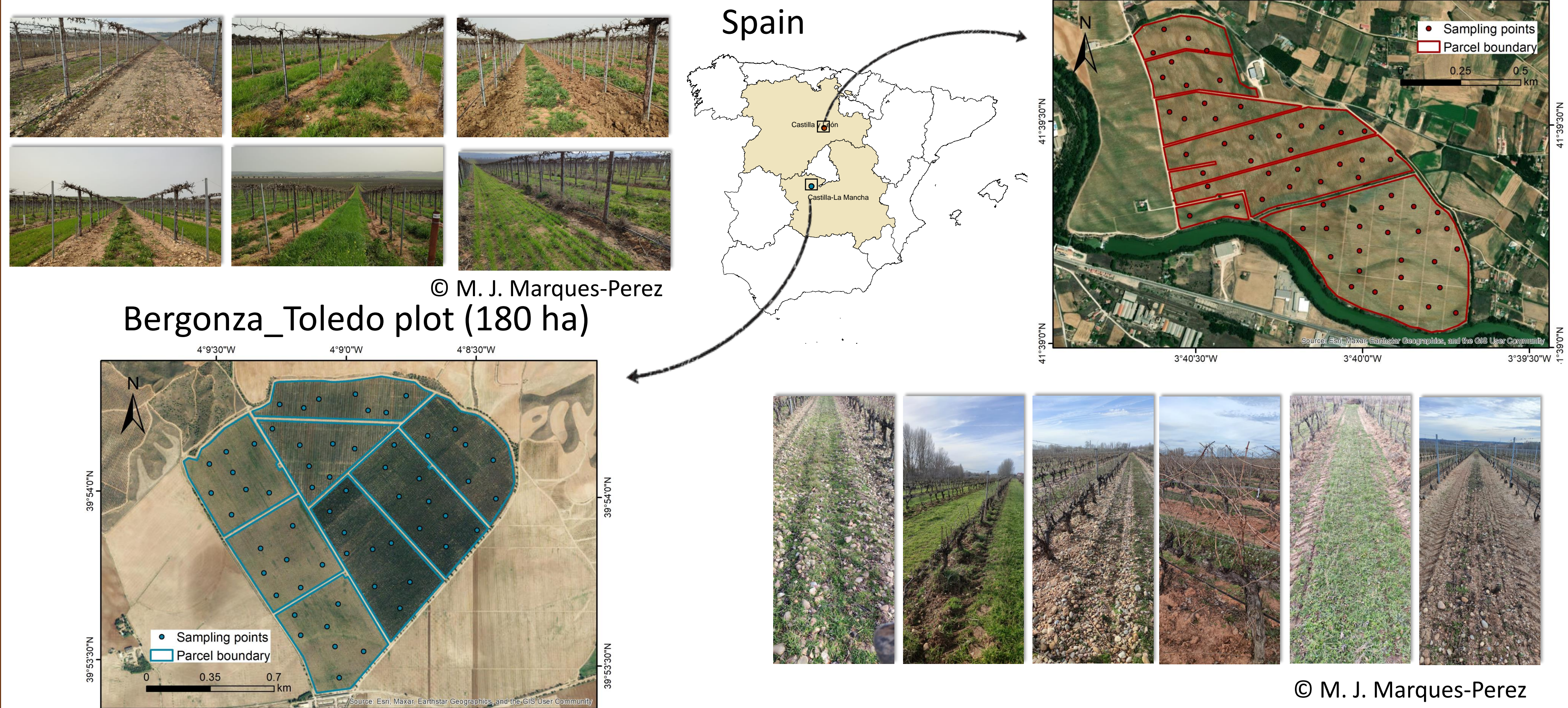
³ CIRAD, CNRS, INRAE, TETIS, Université de Montpellier, AgroParisTech, CEDEX 5, 34093 Montpellier, France ; nicolas.baghdadi@teledetection.fr

⁴ Department of Geology and Geochemistry, Universidad Autónoma de Madrid (UAM), 28049 Madrid, Spain ; mariajose.marques@uam.es

Introduction

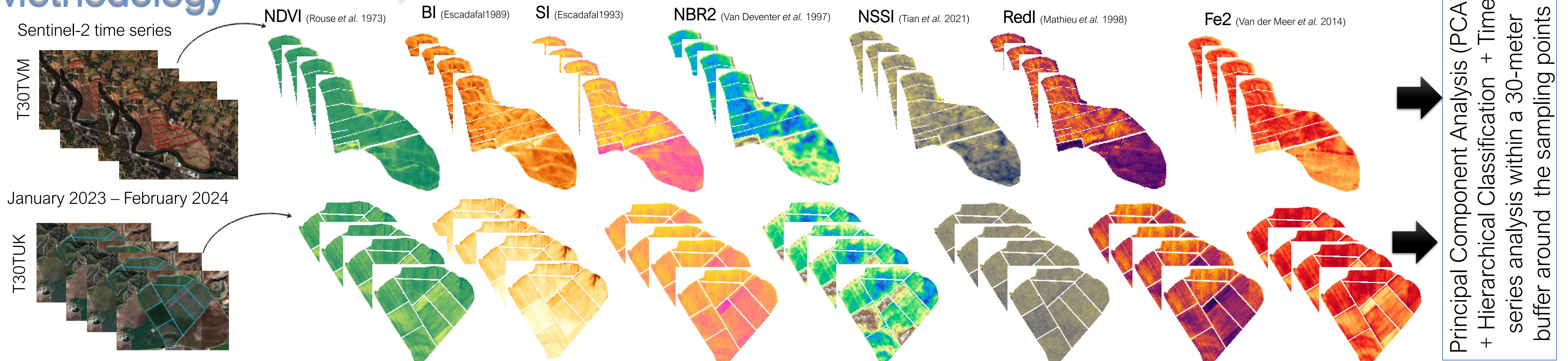
- Soil organic carbon (SOC) is a key indicator of soil fertility. In the context of climate change, it is crucial to monitor its spatial and temporal evolution in relation to agricultural practices.
- Vineyard management practices influence soil surface characteristics, which in turn affect the accuracy of models used to predict SOC content via satellite remote sensing (Marques et al., 2010; Vaudour et al., 2022).
- It is crucial to identify viticultural management practices to further assess their impact on carbon storage in viticultural soils.
- This work was carried out within the framework of the SANCHOSTHIRST project, which began in November 2023. This project aims to identify soil restoration practices and management.
- Objective:** Evaluate the ability of Sentinel-2 data time series to detect soil surface conditions associated with cover crop and tillage.

Study areas

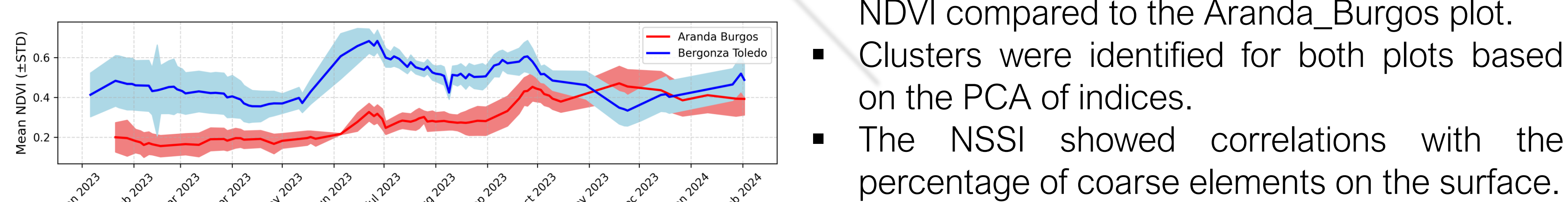


- Two Spanish vineyard plots with 60 points sampled on each in October 2023 and January 2024.
- For both plots vineyards are trellis-trained with an inter-row spacing around 3 m.
- Two soil management practices were conducted; cover crop (CC) and tillage (Till)

Methodology



Preliminary results



- Toledo_Bergonza plot has greater variability in NDVI compared to the Aranda_Burgos plot.
- Clusters were identified for both plots based on the PCA of indices.
- The NSSI showed correlations with the percentage of coarse elements on the surface.

Conclusion

- These preliminary results highlight the significant variability in soil surface condition, raising additional challenges, in addition to the presence of grapevines, for the prediction of SOC content using satellite remote sensing.

Next steps

- Multivariable analysis for the 7 indices.
- Analyzing indices of only bare soil periods
- Relation analysis of NSSI and coarse elements
- Conduct a deeper investigation of agricultural practices with farmers.

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