

How to estimate SOC from satellite images in the upcoming no-tillage era?

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Background

At least a revisit time of 5-7 days for soil properties mapping (Mzid et al. 2021)

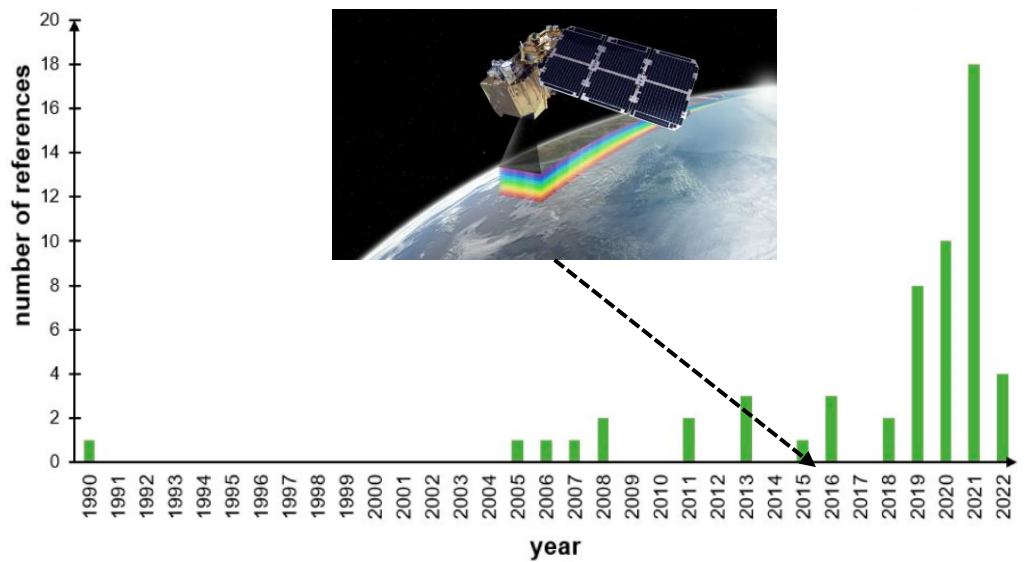
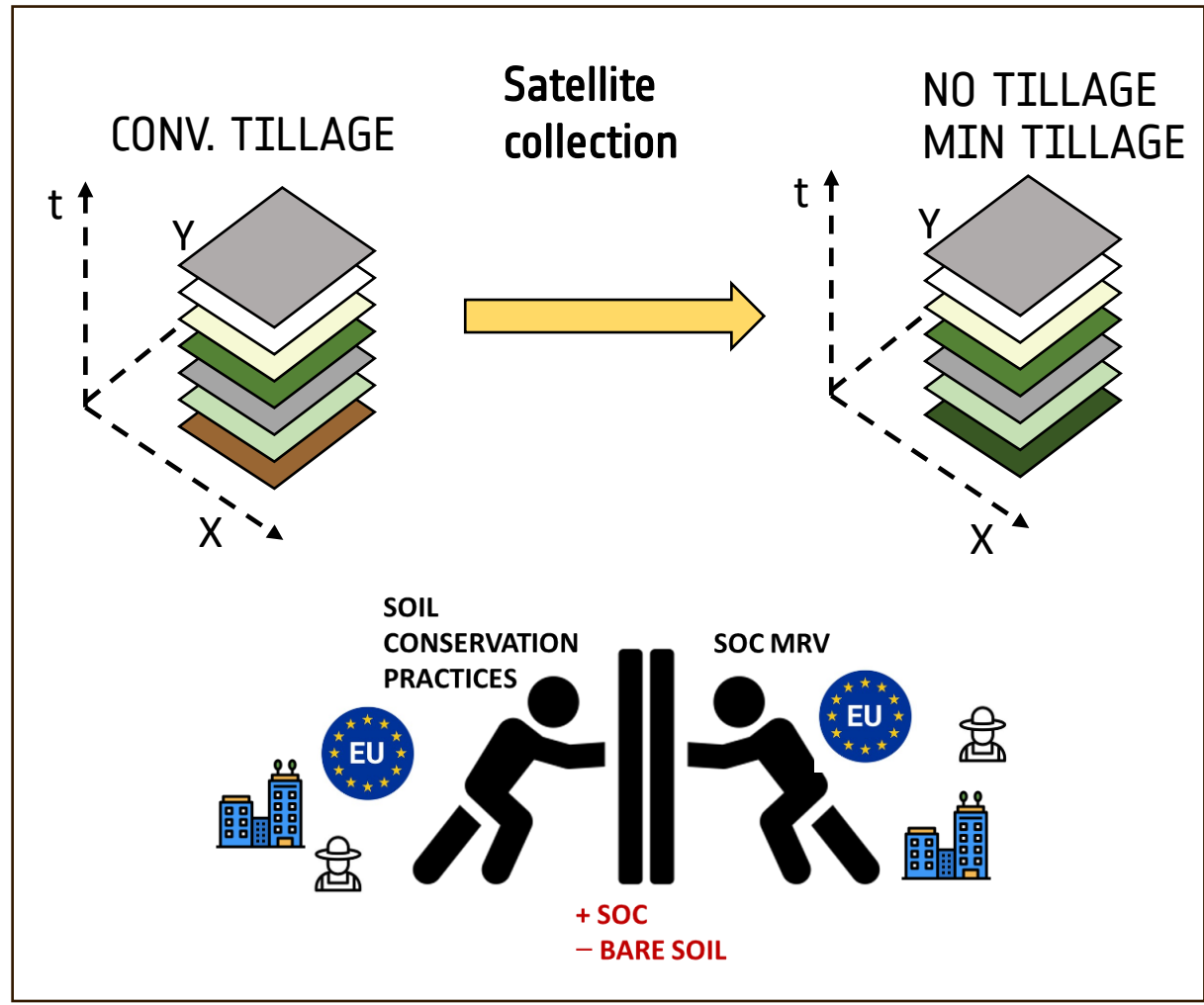


Figure 1. Histogram of publications of satellite-derived SOC studies according to year.

Vaudour et al. 2021

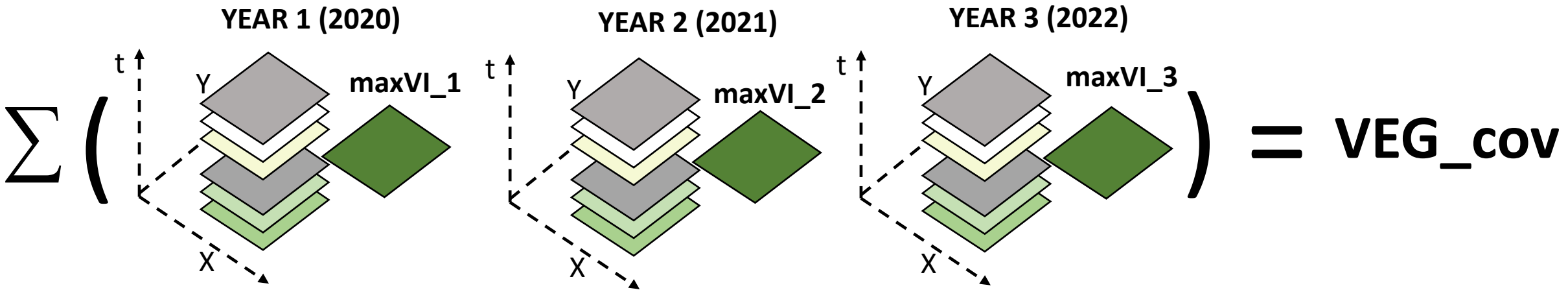




Proposed solution



“To destroy an enemy make him your friend.”

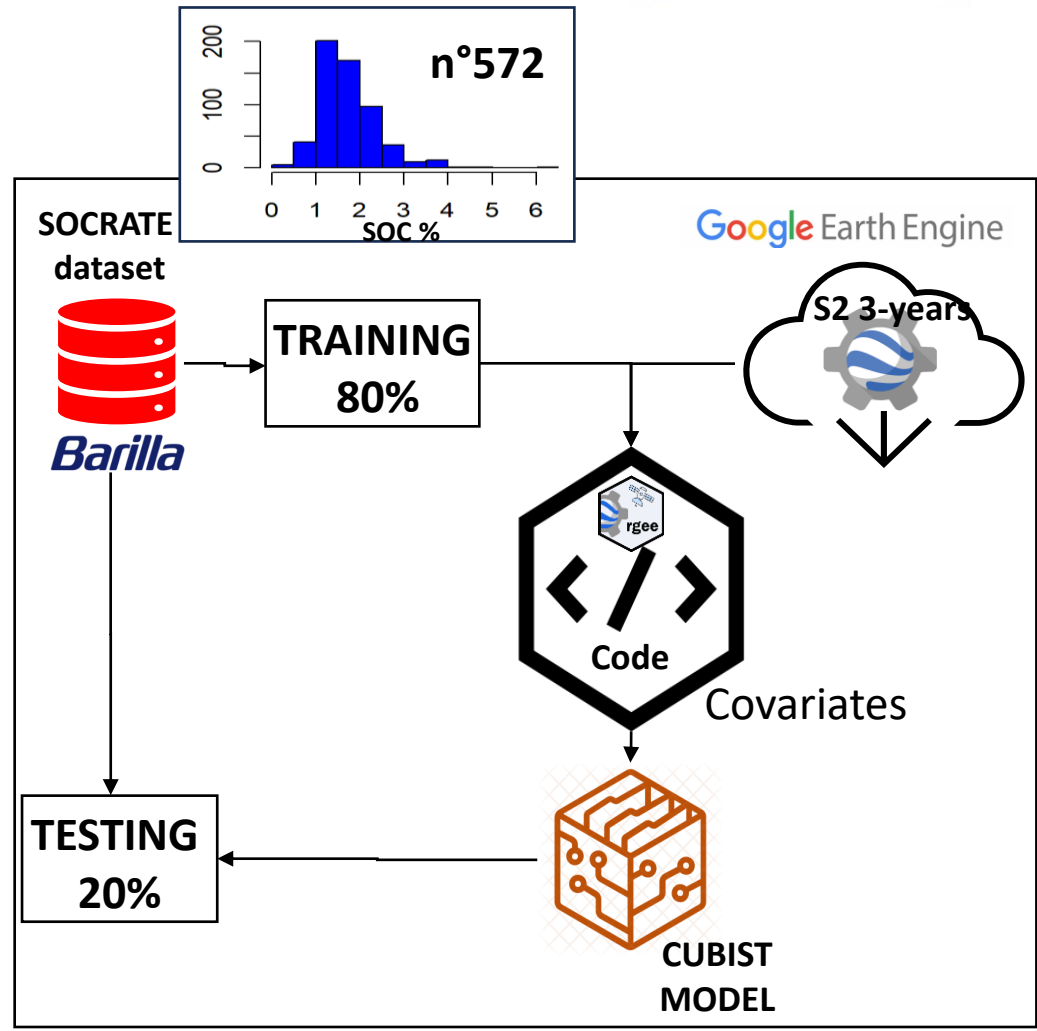
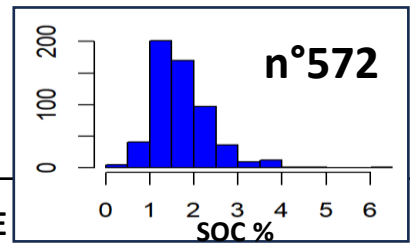
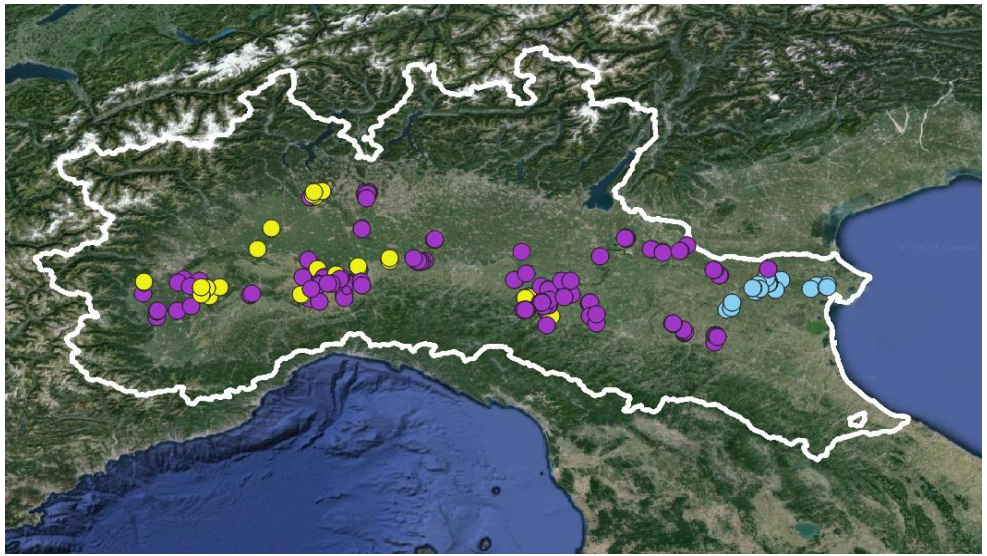
- VEGETATION vs SOC -> indirect
- Crop, Weather condition, diseases, growing stage...
- Looking for VIs correlated to SOC - > NDVI, GNDVI, SATVI, EVI
- Sum of the yearly maximum values for each VI -> covariates



Test



SCENARIO	COVARIATES	Models
 Conventional tillage	BS (S2 bands), VEG (4 VIs), GP	4
 No or Minimum tillage	VEG, GP	3



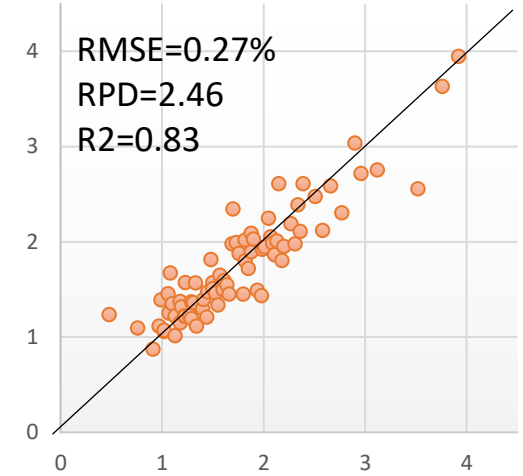


Results



RPIQ

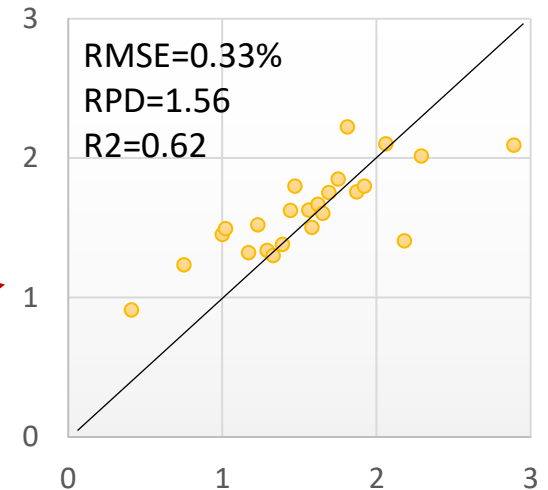
COVARIATES	GLOBAL	CAMBISOLS	LUVISOLS	FLUVISOLS
BS	1.63	1.87	0.8	2.50
BS+VEG	1.61	2.14	1.26	2.19
BS+GP	1.73	2.76	1.26	3.1
BS+GP+VEG	1.82	3.06	1.27	2.19

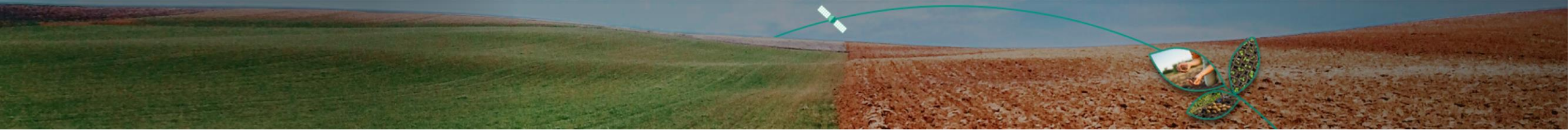


RPIQ



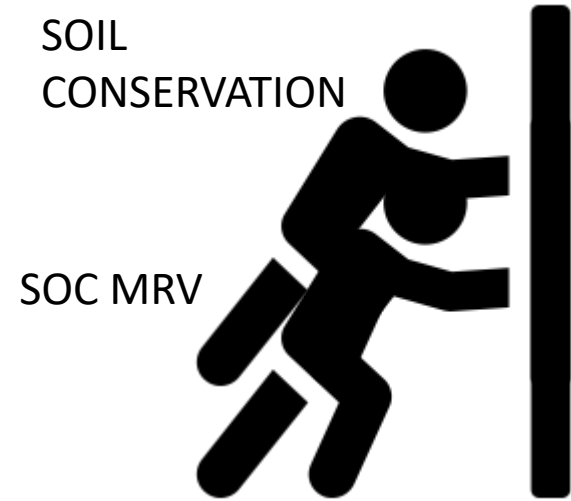
COVARIATES	GLOBAL	CAMBISOLS	LUVISOLS	FLUVISOLS
VEG	1.18	1.10	1.35	1.03
GP	1.63	2.13	1.44	1.89
VEG+GP	☹️ 1.63	☹️ 2.08	😊 1.63	😊 2.38





Conclusions

- Stratified models > Global models
- Better accuracy for conv. tillage scenario except for LUVISOLS
- For no tillage scenario VEG covariates can allow to increase accuracy in LUVISOLS and FLUVISOLS



Next steps

- More indices or new approaches
- Add other covariates
- More years
- 'Local' models
- Collect suggestions



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Thank you for your
attention

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