Updating WRB 2022 soil type map of Europe to 30 m

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WRB Soil types in 1 km

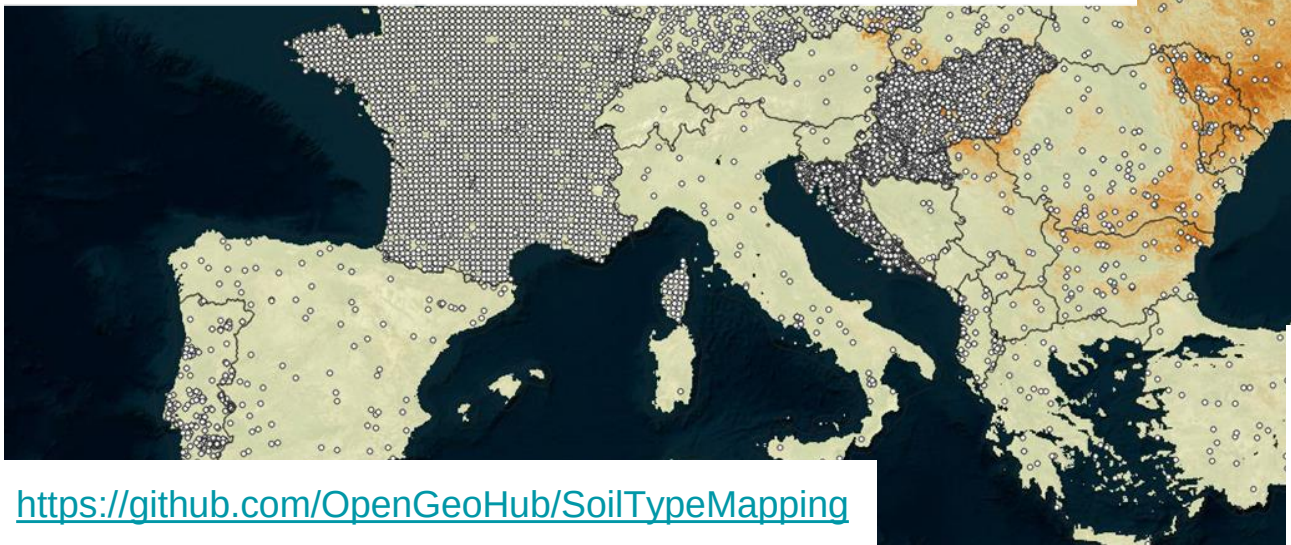
Global distribution of predicted soil types at 1 km resolution based on the WRB 2022 classification

Hengl, T.; Minarik, R.

Global maps at 1 km spatial resolution of the predicted soil types (0–100% probabilities) at 1 km resolution based on the WRB 2022 (**World Reference Base** the international standard for soil classification) classification system. The training data comes from the following 3 main sources:

1. WOSIS points available via: https://www.isric.org/explore/wosis;
2. HWSD v2 (random draw of cca 20,000 points): https://iiasa.ac.at/models-tools-data/hwsd;
3. Other national datasets / data from publications and projects.

https://zenodo.org/record/7820797



https://github.com/OpenGeoHub/SoilTypeMapping

Updates:
More high quality training data
New covariates in 30 m resolution
Testing Conformal prediction

More high quality training data

OpenGeoHUB
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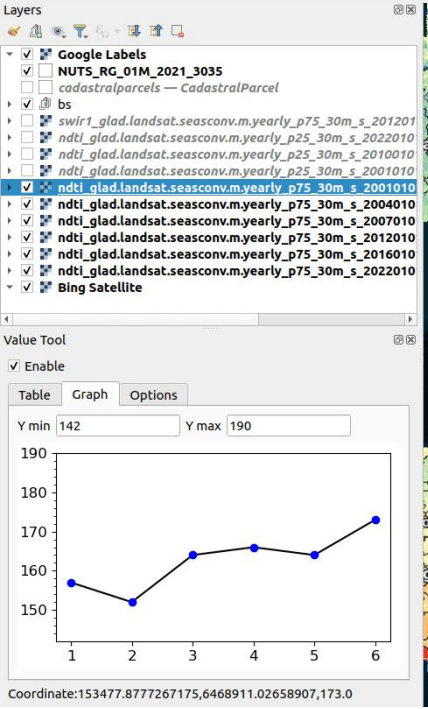
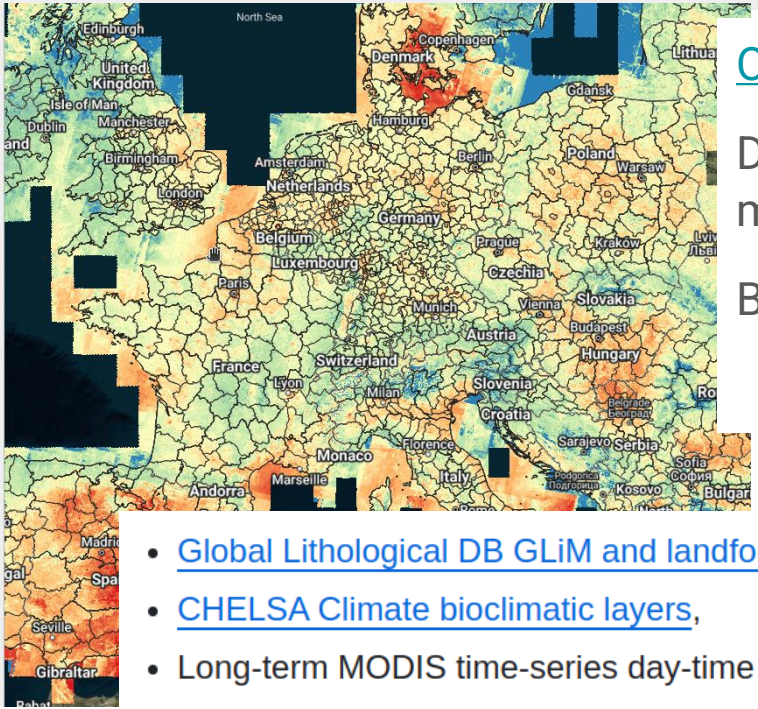
	A	B	C	D	E	F
1	**Country**	**Original Soil Clasiification**	**Num of points**	**Positioning accurac**	**Basic correlations to WRB2022**	**Refinement by experts**
2	Denmark	FAO1974	1263	< 100 m	FAO74 > FAO90 > WRB2022	Aarhus University
3	Germany (agrisoils)	Bodenkundliche Kartieranleitung	1478 (3104)	< 10 m	Bodenkundliche; https://doi.org/10.4324/9781849774352	
4	Belgium (Vlaanderen)	Belgic system	628	< 100 m	10.13140/2.1.4381.4089	
5	Netherlands	Dutch system	10 000 (~ 300 000)	< 10 m	https://doi.org/10.4324/9781849774352	WUR
6	Switzerland	Swiss system	~70 000	< 10 m	https://doi.org/10.4324/9781849774352	Madlene Nussbaum et al.
7	Slovenia	Slovenian system	1826	< 10 m	https://doi.org/10.1007/978-94-017-8585-3	?Uni v Ljubljani?
8	Croatia	Croatian system	2200	< 10 m	https://doi.org/10.1007/978-94-007-5815-5	Uni Zagreb, Faculty of Agriculture
9	Portugal	WRB	~ 3000	< 10 m		
10	Italy	WRB	2583	< 10 m		Pasquale Borreli et al.
11	Bulgaria (GeoCradle)	WRB	100	< 10 m		
12	Geo-cradle (Balkan Countries)	WRB RSG	1700	< 10 m	assigning principal qualifiers when possible	
13	Estonia	WRB	?	< 10 m		
14	United Kingdom	WRB	?	< 10 m		
15	France	French system	2100	no coords, overlay	https://doi.org/10.4324/9781849774352	
16	Czechia	WRB RSG	~ 300 000	< 100 m		

Inviting national authorities to participate in correlating national classifications. (WRB RSG always possible, trying to add principal qualifiers)

Modelling approach needs to deal with the different levels of WRB classification.

New Scorpan Covariates in 30 m resolution





[OpenLandMap ensemble DTM]

Derivatives, gaussian pyramids in 30 m under construction

Biophysical indices Landsat ARD v.2

- Global Lithological DB GLiM and landform units,
- CHELSA Climate bioclimatic layers,
- Long-term MODIS time-series day-time and night-time Land Surface Temperature (LST),
- Long-term MODIS monthly EVI,
- Long-term monthly snow probability images,
- Long-term NASA's NEO Water vapor images,
- Long-term Cloud fraction images from EarthEnv,

Modelling approach

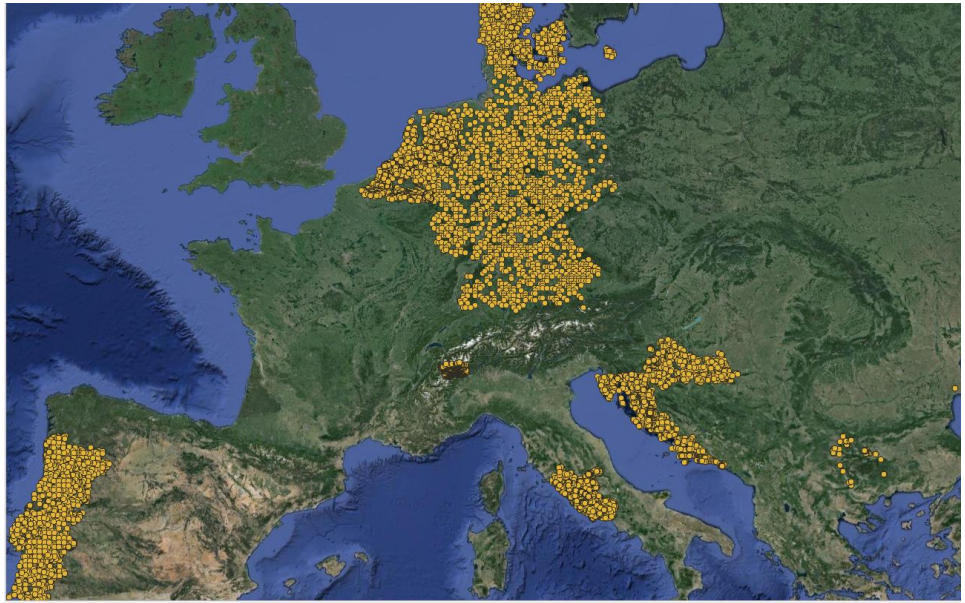
Previously: Probability maps

Now: multi-label classification following WRB 2022 system

Outputs: Probabilities of RSGs and principal qualifiers for every pixel.

Matching RSGs and relevant qualifiers in post-processing using conformal prediction.

Dynamic legend reflecting the uncertainty and the quality of the national training datasets



When RSG correlation only is possible (e. g. Germany), ML algorithm estimates the princ. quali. Needs to be verified in the field.

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