Session 3 – SOC prediction maps; results for the Czech Republic
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ESA Symposium on Earth Observation for Soil Protection and Restoration
Work flow

Pipeline

- Compositing (PROC_SCMAP)
- Bare Prediction (PROC_BARE)
- Perm. Veg. Prediction (PROC_VEG)
- Mosaicking (PROC_MOS)
- Aggregating (PROC_AGGR)

GEO-REFERENCED SOC DATASETS

SOIL-VEGETATION MASK

SOC MAP

UNCERTAINTY MAP

MODEL ATTRIBUTION ACCURACY

SOC MAP ACCURACY

MAP RELIABILITY
Geo-referenced SOC data set

Distribution of validation points dataset across the Czech Republic

Czechia - AZZP (observed)

Geo-referenced SOC dataset in the Czech Republic (n= c. 5,000 per year)

Routine soil agrochemical testing of agricultural soils by Central Institute for Supervising and Testing in Agriculture
Model attribution accuracy

Worldsoils mask for the Czech Republic (2018-2020)
## Model attribution accuracy

### Confusion matrix of reference point data for model attribution

<table>
<thead>
<tr>
<th>2018-2020</th>
<th>Point data (validation set)</th>
<th></th>
<th></th>
<th></th>
<th>Accuracy</th>
<th>Kappa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prediction</td>
<td>Arable land</td>
<td>Grasslands</td>
<td>Orchards</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bare soil</td>
<td>12,019</td>
<td>104</td>
<td>58</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permanently</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vegetated</td>
<td>322</td>
<td>1,245</td>
<td>149</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Accuracy: 0.95
Kappa: 0.79
SOC map accuracy

Validation of 2018-2020 pixel values against corresponding reference data

<table>
<thead>
<tr>
<th>RMSE</th>
<th>$R^2$</th>
<th>RPD</th>
<th>RPIQ</th>
<th>CCC</th>
<th>Bias</th>
<th>NSE</th>
<th>NRMSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.69</td>
<td>0.11</td>
<td>0.91</td>
<td>1.07</td>
<td>0.32</td>
<td>-0.28</td>
<td>-0.21</td>
<td>0.31</td>
</tr>
</tbody>
</table>
SOC map accuracy

National SOC map 2020

Worldsoils SOC map 2018-2020
Model uncertainty pattern mostly followed by the bare soil/vegetated area prediction.

For 2018-2020, 31% of the reference SOC data fell within the predicted confidence interval.
Thank you!

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