


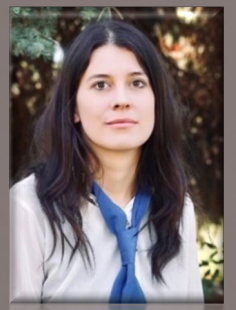
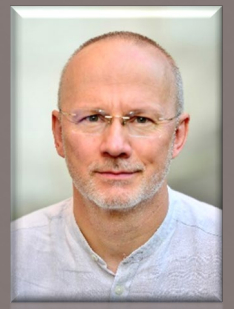

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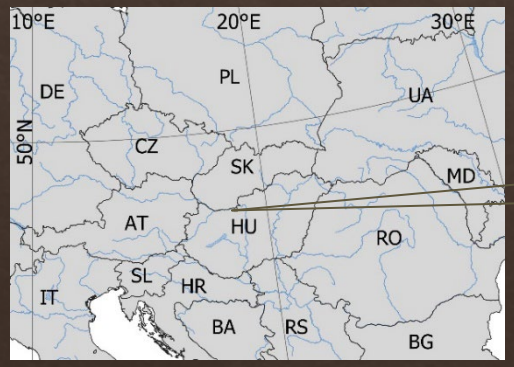
Evaluation and improvement of the predictivity of a digital parent material map

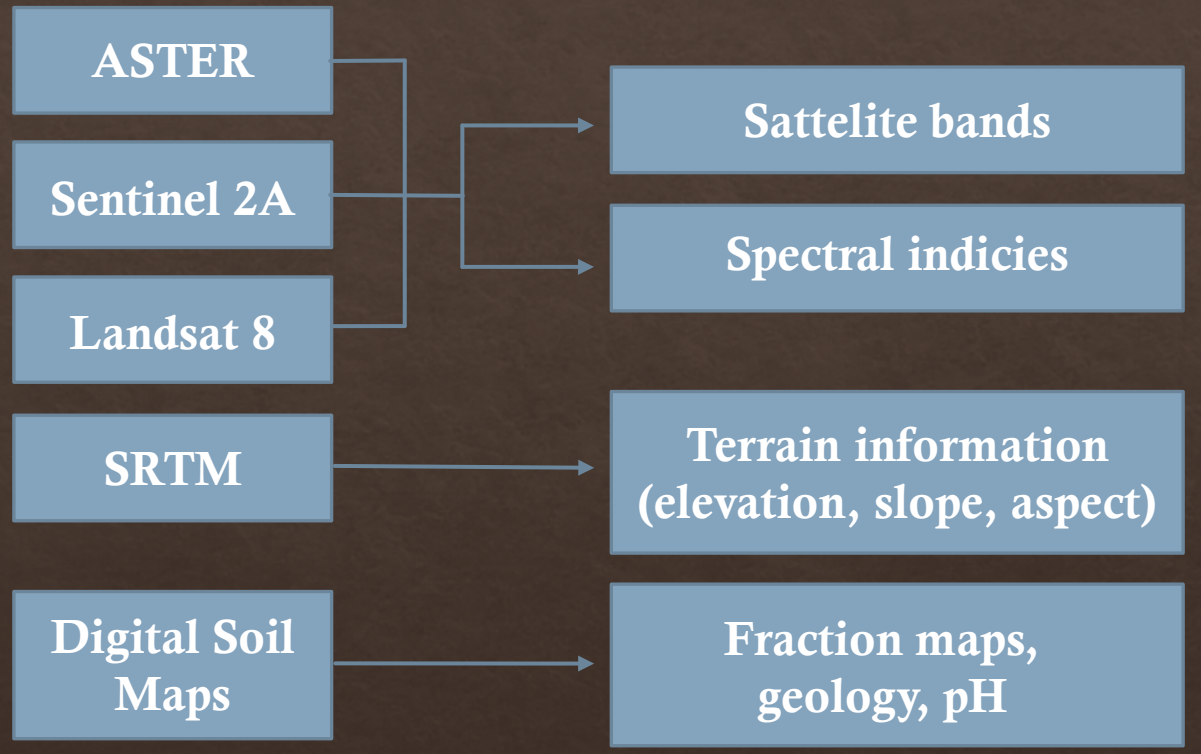
Study area and data

Dorogi Basin

- Northern central Hungary
- It is known for coal mining, which ended in 2003, after two centuries



Data sources and form of use



Digital Soil Maps

Sattelite images

Radar

Geological map of the study area (14 groups of parent material)

Bands

Spectral indices

Terrain information

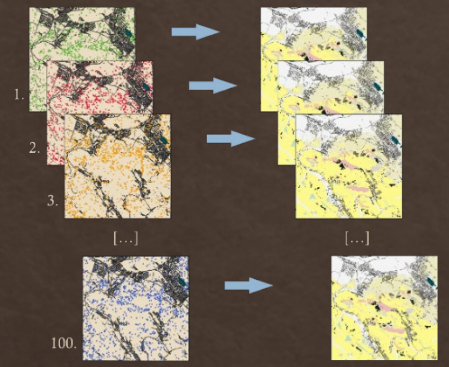
100 set of random points (each contains ca. 1000 points)

63 predictors

Classification models (RF, DL, GB, GL, NB)

80% training

20% testing



1 2 3 [...] 100

Classified maps

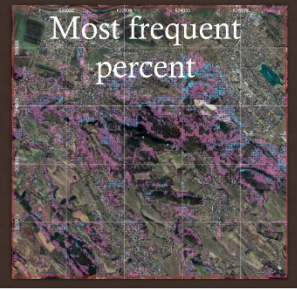
Mode of each pixels

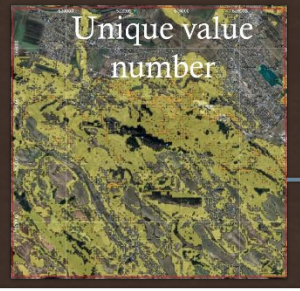
Parent material map

Only after first run

Collect ground truth points

Study the uncertain areas





Collecting and evaluating the use of ground truth points (GTP) in mapping of parent material

dorog_terepipontok_ALL — Features Total: 200, Filtered: 200, Selected: 0

123 id = ε 123 Update All Update Selected

	id	id_FAO_M	id_FAO_G	id_FAO_T	x	y
1	2002	2	21	213	623610,0090465...	264149,8482253...
2	2003	2	21	213	623339,8249635...	264027,5763347...
3	2004	2	21	213	623216,7441693...	264042,2140585...
4	2005	2	21	212	623287,8520874...	264018,6812980...
5	2006	2	21	213	623297,7128105...	263925,2989262...
6	2007	1	12	121	623271,4672865...	263965,9699966...
7	2008	1	12	121	623237,1467444...	263982,5691410...
8	2009	2	21	212	623301,8128560...	264031,9081730...
9	2010	2	21	213	623562,6249159...	264192,5563929...
10	2011	1	11	113	621226,0619278...	263599,5509154...
11	2012	1	13	131	621265,7451364...	263611,0265325...
12	2013	1	12	121	621232,5978364...	263484,1383333...
13	2014	2	21	213	621296,8061934...	263404,6234503...
14	2015	2	22	222	621351,7419768...	263351,2329504...
15	2016	2	21	213	621360,4459537...	263288,6022774...
16	2017	1	11	113	621382,4867943...	263178,7329073...

Show All Features

Testing the use of increasing number of GTPs

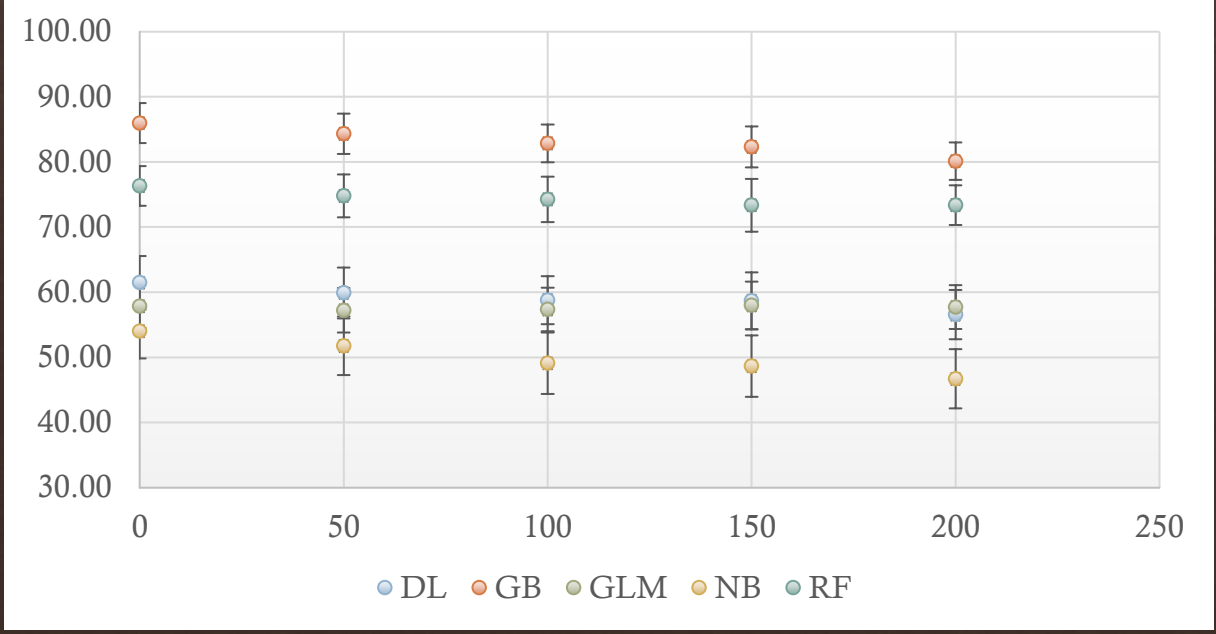
- Estimations made by:
  - Deep Learning (DL)
  - Gradient Boosting (GB)
  - Generalized Lineaar Model (GLM)
  - Naive Bayes (NB)
  - Random Forest (RF)

- Change GTPs to random points
- Add GTPs to random point sets

Validating accuracy of the classifications

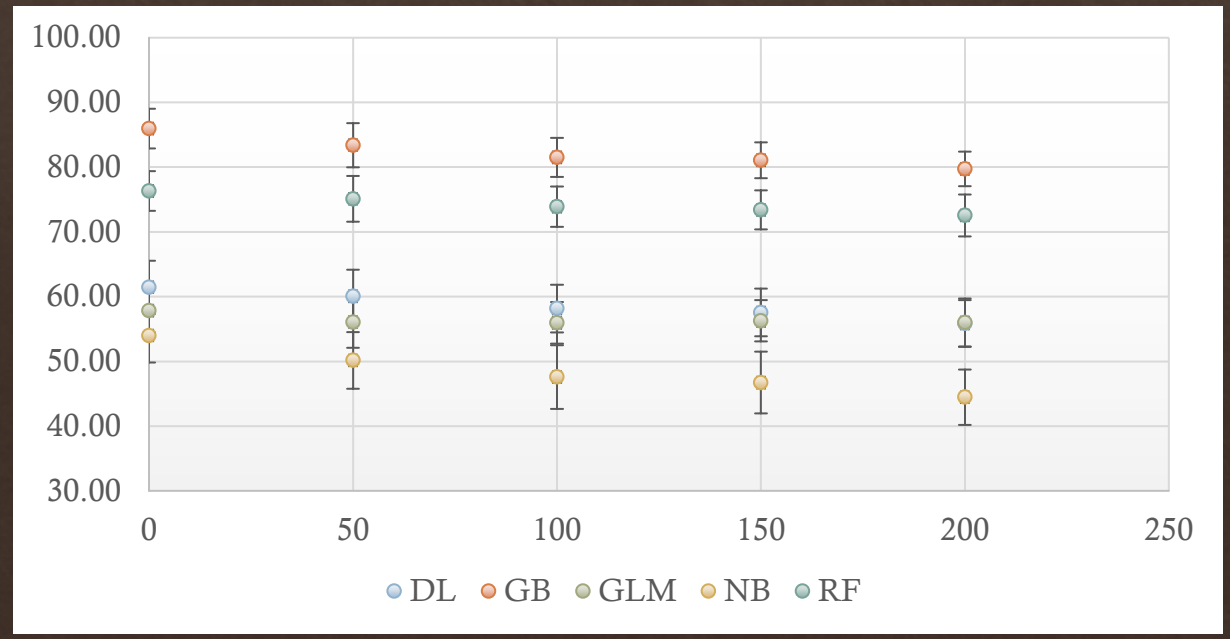
- Change GTPs to random points

	0	50	100	150	200
DL	61.46	59.88	58.77	58.66	56.55
GB	85.95	84.31	82.85	82.31	80.11
GLM	57.83	57.21	57.35	57.96	57.71
NB	54.00	51.76	49.08	48.63	46.69
RF	76.32	74.78	74.25	73.34	73.36



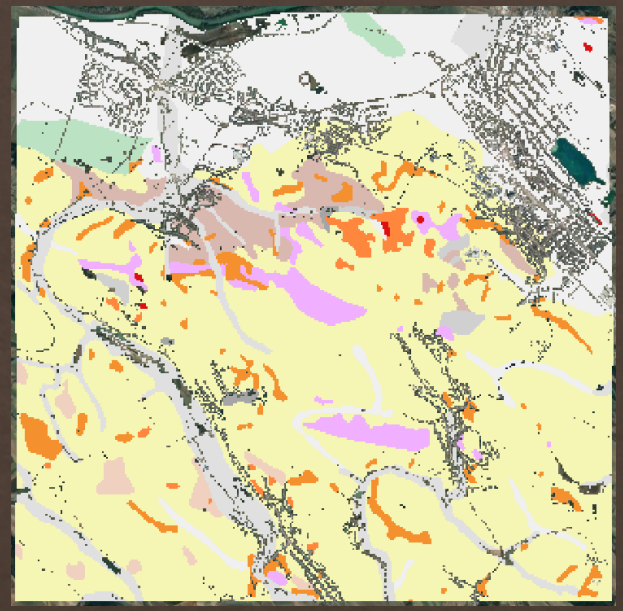
- Add GTPs to random point sets

	0	50	100	150	200
DL	61.46	60.06	58.16	57.56	55.82
GB	85.95	83.40	81.51	81.07	79.72
GLM	57.83	56.08	55.95	56.26	56.01
NB	54.00	50.15	47.59	46.73	44.47
RF	76.32	75.11	73.88	73.39	72.54

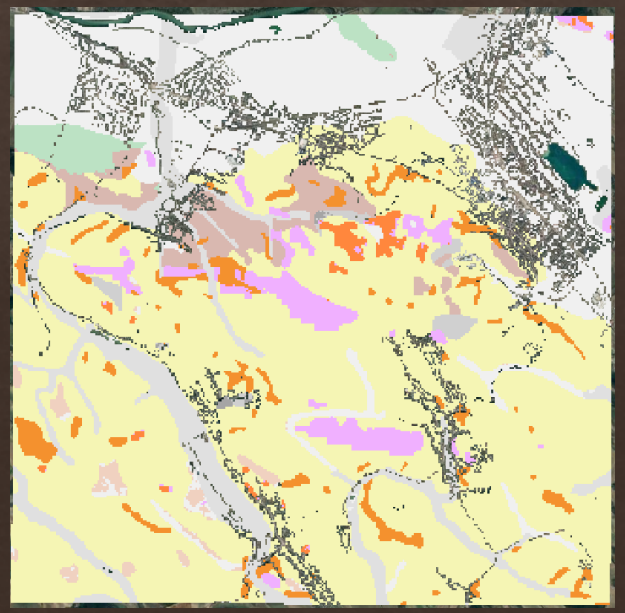


FAO based parent materials

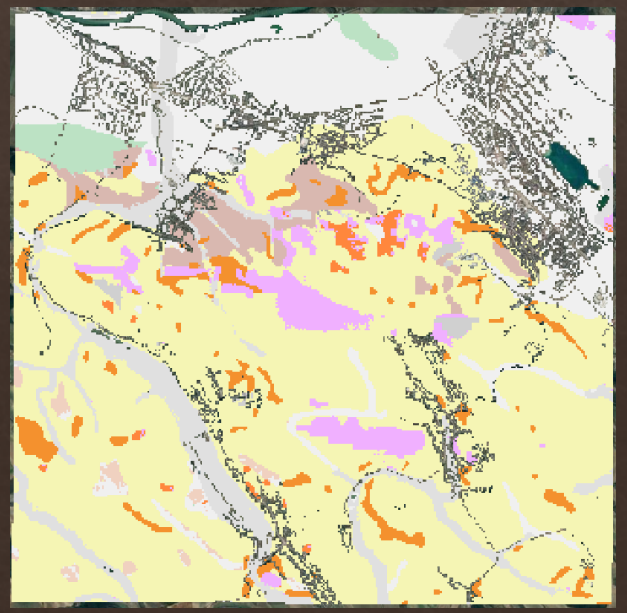
- No data
- Clay, aleurite (alluvial, deluvial)
- Pebble, sand (alluvial, proluvial)
- Clay, aleurite, sand (alluvial)
- Loess (eolian)
- Clay, aleurite (colluvium)
- Pebble, sand (colluvium)
- Anthropogeneous sediment (industrial)
- Dumps
- Marl and marl mixed sediments
- Limestone, dolomite
- Alteration of clay, aleurolite, sandstone



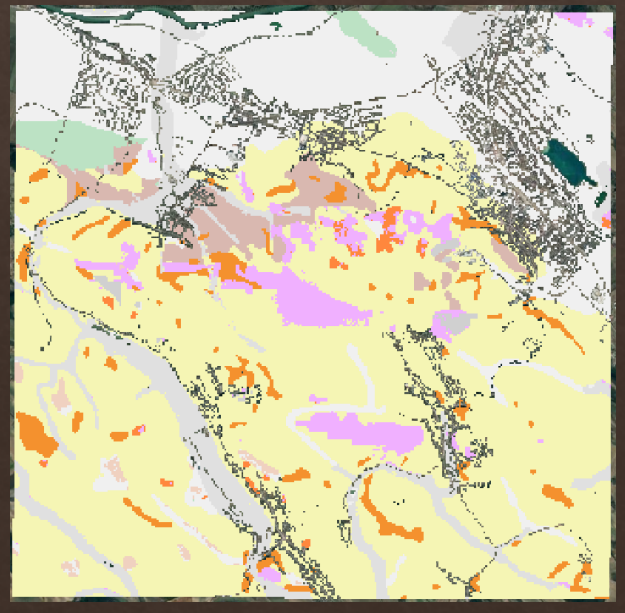
Original



Without GTP



200 GTPs changed



200 GTPs added

Analysis of uncertain areas

Without GTP

200 GTPs changed

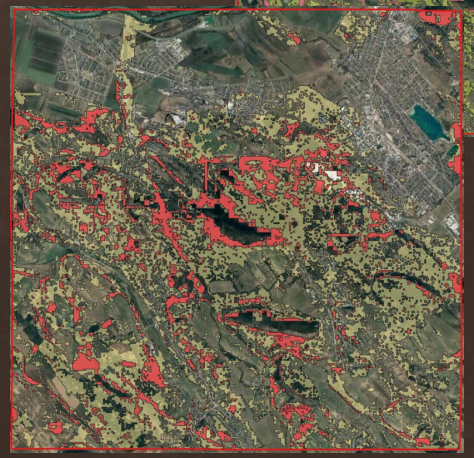
200 GTPs added

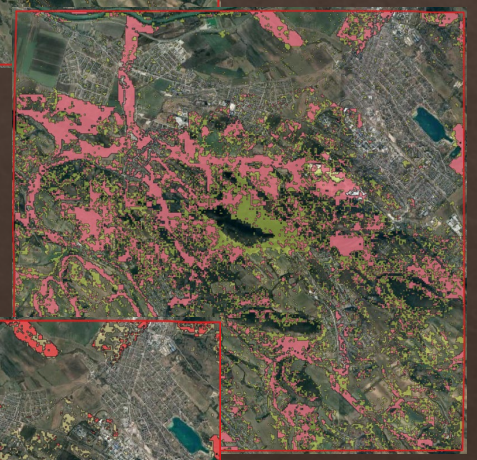
Difference map

Unique value number

Most frequen percent









Conclusion

- We tested various models to predict parent material
- We evaluated the use of increasing number of ground truth points
- We are working on the interpretation of the decreasing tendency of the global mean accuracy of the models
- The improving tendency in the decrease of the uncertain areas suggests good direction
- We are going on with testing the accuracy by considering varying parent material categories

Thank you for your kind attention!