

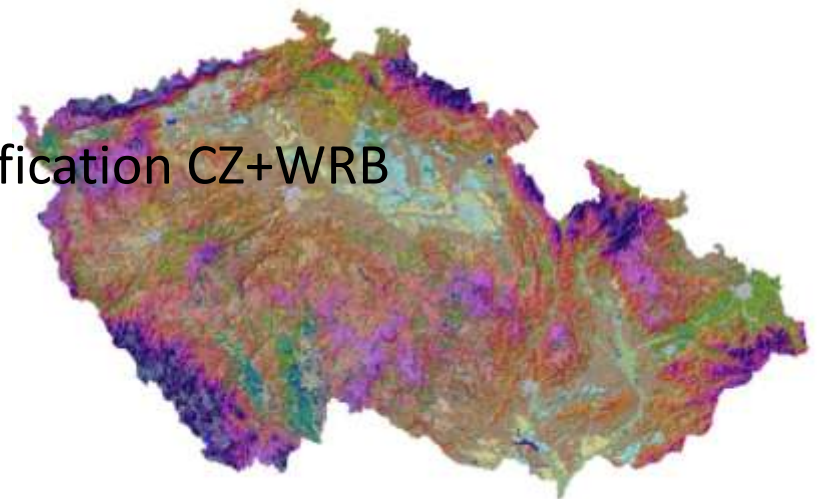
Overview of the Czech national datasets for new database



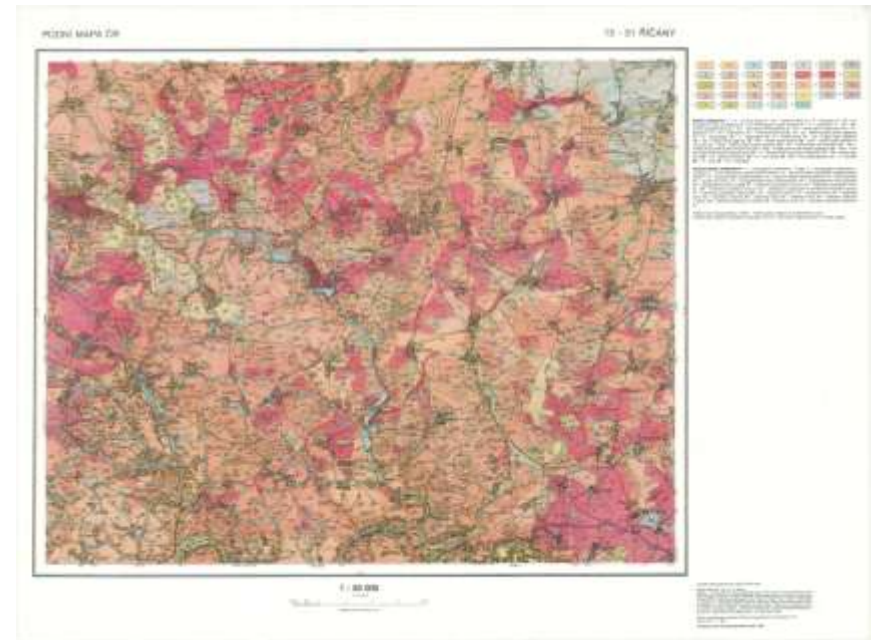
J.Kozák, V. Penížek, T. Zádorová R. Vašát, A. Rubešová
Czech University of Life Sciences Prague

Soil information resources

- Soil geodatabase 1:1M
 - Full cover
 - Digital (vector)
 - Spatial+attribute database, classification CZ+WRB
- Soil geodatabase 1:250 000
 - Full cover
 - Digital (vector)
 - Spatial+attribute database, classification CZ+WRB
- CZ SOTER 1:250 000
 - Full cover
 - Digital (vector)+raster
 - Modified SOTER methodology (Němeček et al.)



- Soil map 1:50 000
 - Most of the country
 - Analog/Digital (vector)
 - classification CZ
- Soil map 1:10 000
 - Full cover (agriculture land only)
 - Analog
 - Extensive set of soil profiles (tens of thousands), classification CZ



Update of 1:250k soil geodatabase

- Updated geodatabase 1:250k

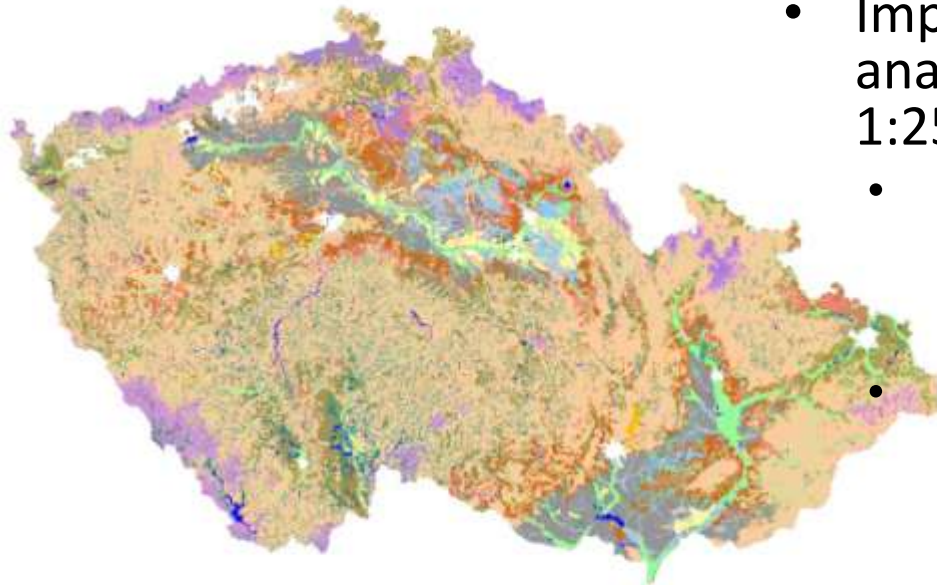
Aim:

- Connection of extended point analytical database to the existing 1:250k map
- Database update (time scale)
- Landuse incorporation
- Development of grid form with quantitative data (development towards GSM)

Effort:

- statistical processing of attribute data
- Testing of different approaches of the attribute database and spatial data
- Collation data for forest landuse

1:250k update/new form



- Improved connection of extended point analytical database to the existing 1:250k map
 - Testing of connection between attribute and spatial database based on:
 - Regional stratification, attribute stratification, combined method
 - Incorporation of differences given by prevailing landuse (agriculture land x forest)
- Dissagregation of mapping units / Development of grid form with quantitative data



Testing the multiscale data

- Comparison of soil geodatabases at different scale level: 1:1M, 1:250k, 1:50k and 1:10k at pilot area(s)

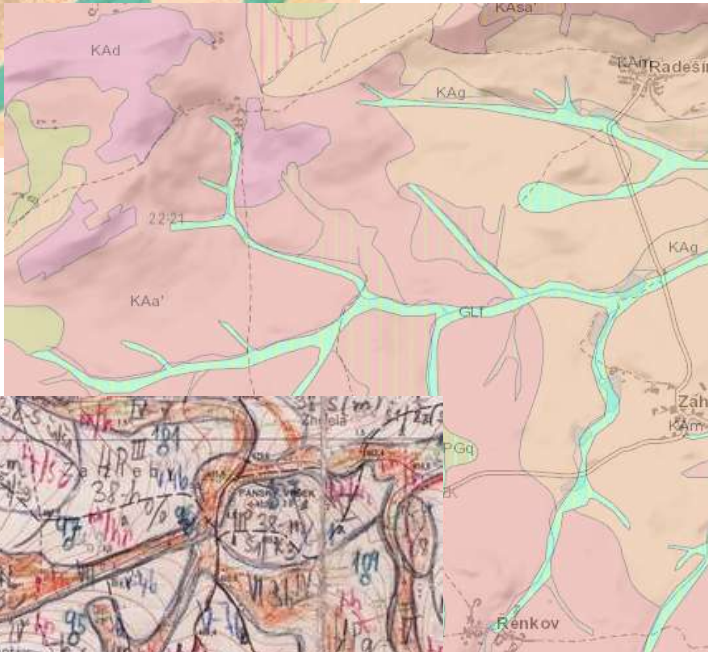
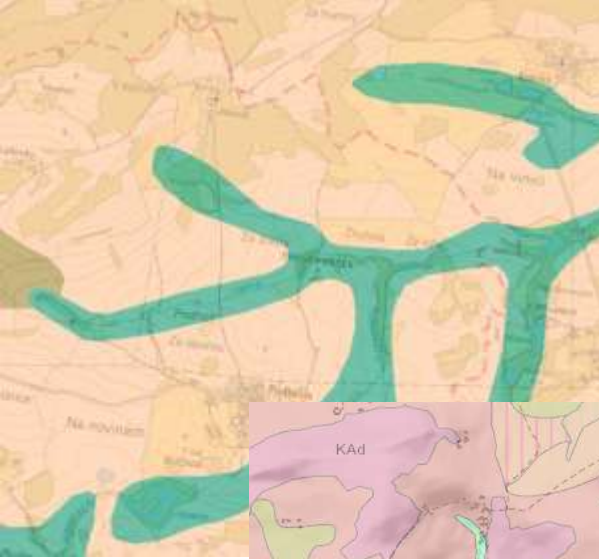
Aim:

- To test the comparison of soil geodatabases at different scale levels
- Map resolution can have crucial impact on analysis/applications quality

Effort:

- Data collation, data vectorisation
- Database processing and analysis
- Run applications

Testing the multiscale data



Soil map	Digital form	Attribute database	Actual	Availability
1:M	x	x	?	x
1:250k	x	x	?	x
1:50k	x	o	o	€
1:10k	o	o	o	€

Possible harmonization of the maps at different scales

Comparison and harmonization of national data on trans-boundary pilot area (CZ-SK,CZ-DE, CZ-AT)

Proposed new structure of PUGIS

Land Use

Physical properties
Hydrolimits

Localization
Identification

Organic matter

Forest soil characteristic and
properties



Map layout

Taxonomic classification

Soil layers Horizons
properties

Climate, Relief

Substrate

Application of GIS on study Czech Republic soil cover

1 : 1,000,000

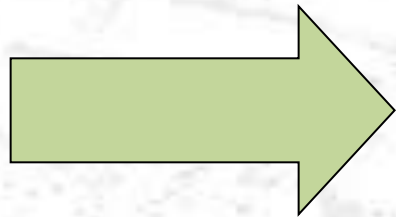
1 : 500,000

1 : 250,000

1 : 50,000

1 : 10,000

1 : 5,000



whole territory of the Czech Republic



in digitized form only a part of the territory



whole territory of the Czech Republic (taxation maps)

Basic Information

- Implementation as relational database management system (RDBMS)
- Open source database MySQL
- 66 tables, 28.083 records
- Accessible on the Internet via common web browser (phpMyAdmin GUI), protected with username and password
- SQL (Structured Query Language) querying

Contents of Database

- **Data of comprehensive soil survey of Czech Republic**

Locality, soil unit (MKSP, TKSP, WRB), soil horizons, thickness, texture (sand, silt, clay, + other fractions), humus, active and exchangeable soil pH, carbonates, CEC, etc.

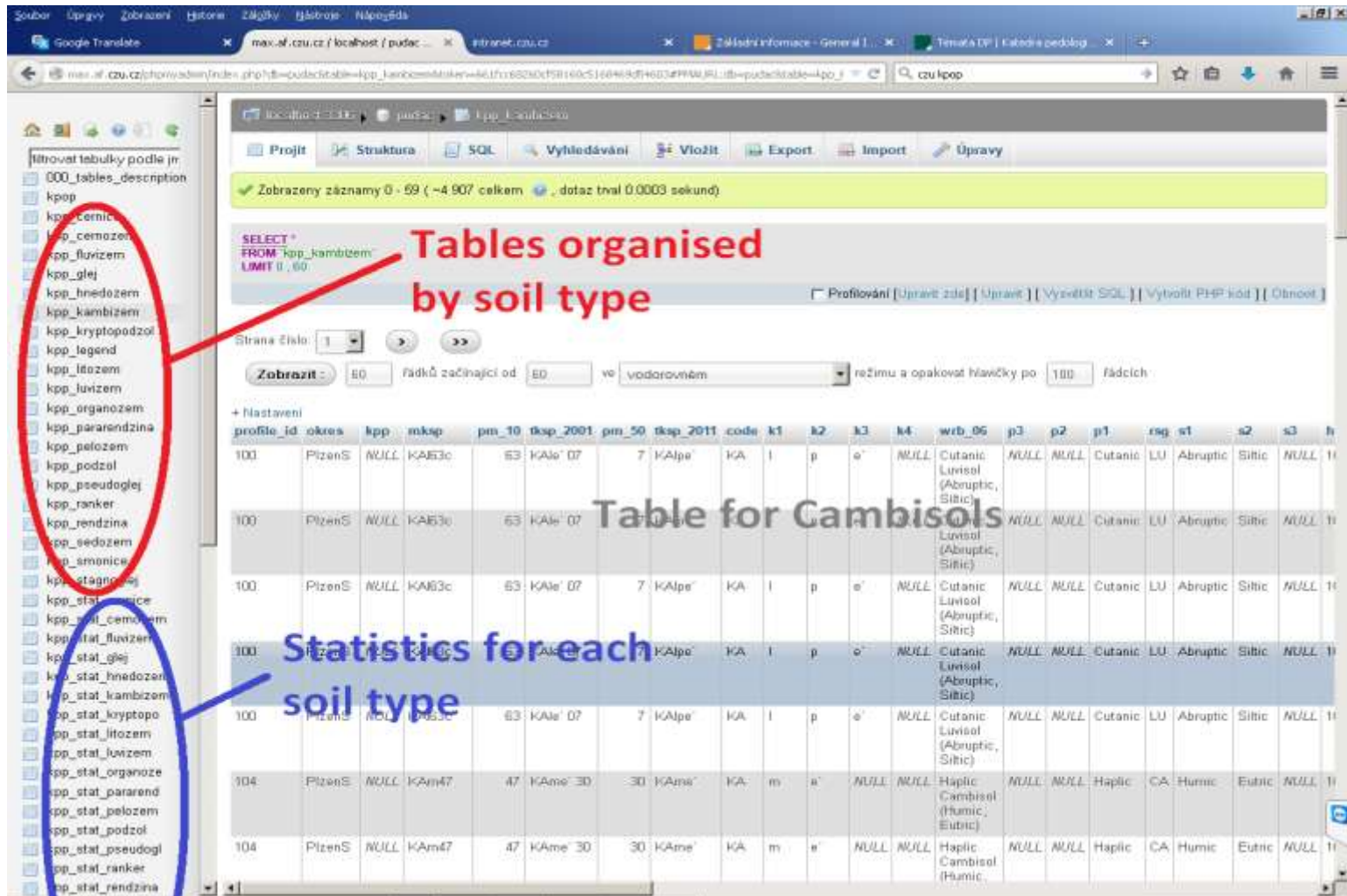
- **Descriptive statistics for each soil type by soil horizons**

Mean, standard deviation, max, min

- **Soil data of the department**

Research projects, bachelor, diploma and doctoral thesis

Outlook of the database



The screenshot shows a web-based database interface with a table of soil data. The table has columns for profile ID, district, soil type, and various soil properties. Annotations highlight specific parts of the interface:

- Tables organised by soil type:** A red arrow points to the table name 'kpp_kambizem' in the SQL query editor.
- Table for Cambisols:** A grey arrow points to the row for profile 104, which is a Cambisol.
- Statistics for each soil type:** A blue arrow points to the 'kpp_stat_kambizem' table in the left sidebar.

profile_id	okres	kpp	mkap	pm_10	tkap_2001	pm_50	tkap_2011	code	k1	k2	k3	k4	wrb_06	p3	p2	p1	rsg	st	s2	s3	h
100	PízenS	NULL	KA63c	63	KA6e' 07	7	KA6e'	KA	l	p	e'	NULL	Cutanic Luvisol (Abruptic, Siltic)	NULL	NULL	Cutanic	LU	Abruptic	Siltic	NULL	11
100	PízenS	NULL	KA63c	63	KA6e' 07	7	KA6e'	KA	l	p	e'	NULL	Cutanic Luvisol (Abruptic, Siltic)	NULL	NULL	Cutanic	LU	Abruptic	Siltic	NULL	11
100	PízenS	NULL	KA63c	63	KA6e' 07	7	KA6e'	KA	l	p	e'	NULL	Cutanic Luvisol (Abruptic, Siltic)	NULL	NULL	Cutanic	LU	Abruptic	Siltic	NULL	11
100	PízenS	NULL	KA63c	63	KA6e' 07	7	KA6e'	KA	l	p	e'	NULL	Cutanic Luvisol (Abruptic, Siltic)	NULL	NULL	Cutanic	LU	Abruptic	Siltic	NULL	11
104	PízenS	NULL	KAm47	47	KAm6e' 30	30	KAm6e'	KA	m	a'	NULL	NULL	Haplic Cambisol (Humic, Eutric)	NULL	NULL	Haplic	CA	Humic	Eutric	NULL	11
104	PízenS	NULL	KAm47	47	KAm6e' 30	30	KAm6e'	KA	m	a'	NULL	NULL	Haplic Cambisol (Humic)	NULL	NULL	Haplic	CA	Humic	Eutric	NULL	11

Descriptive statistics

Google Translate max.af.czu.cz / localhost / pudac ... kvranet.czu.cz Zřídání informací - General I ... Tisková DFT Fábeka pedolog ... czu.lfp

Projít Struktura SQL Vyhledávání Vložit Export Import Úpravy

✓ Zobrazeny záznamy 0 - 47 (~40 celkem), dotaz trval 0.0002 sekund

SELECT * FROM kpp_stat_kambizem LIMIT 0, 50

Zobrazit: 60 řádků začínající od 0 ve vodorovném režimu a opakovat hlavičky po 100 řádků

Soil horizons

Statistics

Table for Cambišols

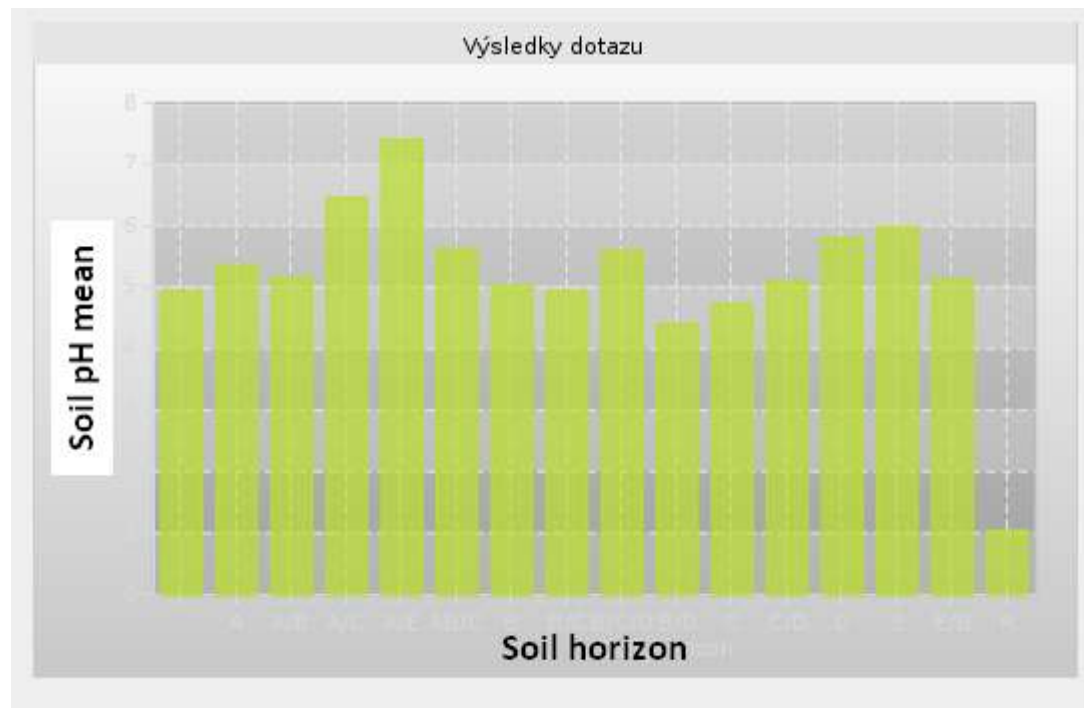
rowsnames	a	ab	b	bc	c	abc	e	eb	bd	r	bc	ac	c/d	bc/d
kpp_group	A/B	B	B/C	D	C	AB/C	E	E/B	B/D	R	A/C	A/E	C/D	B/C/D
hl_no	1247	427	1024	1222	27	710	40	6	7	7	26	2	1	2
mean_thick_cm	20.653	21.810	28.720	33.775	36.071	39.396	21.737	20.833	13.714	25.000	20.000	16.000	12.000	41.000
hl_mean	11.672	13.639	15.606	17.573	19.540	21.507	12.783	14.357	21.536	27.440	14.220	17.610	12.030	21.460
hl_sd	5.672	6.018	6.910	9.607	20.260	9.520	6.699	2.931	6.974	NULL	NULL	8.047	NULL	0.651
hl_min	3.83	3.17	2.37	2.48	3.52	2.48	5.47	11.45	13.72	27.44	14.22	11.92	12.03	21.46
hl_max	44.47	46.42	56.08	68.85	78.40	66.4	10.0	10.0	27.44	14.22	23.30	12.03	21.46	28.31
prach_no	1241	422	1024	1197	22	610	40	6	7	7	1	2	1	2
prach_mean	39.963	38.941	35.087	30.151	28.142	27.872	38.602	48.163	61.383	50.960	20.880	43.340	57.070	14.040
prach_sd	14.080	13.912	15.601	16.262	16.593	16.338	19.732	18.625	11.285	NULL	NULL	22.684	NULL	14.156
prach_min	0.53	5.78	-0.30	-2.08	5.83	-1.48	3.73	12.00	35.44	60.96	20.88	27.30	57.07	14.04
prach_max	78.92	85.90	80.36	75.27	70.11	84.51	79.75	61.90	65.83	60.96	20.88	59.38	57.07	14.04

SQL querying

- Example 1: Average soil pH for Cambisols by soil horizons

```
SELECT ROUND(avg(ex_ph),2) as Soil_pH_mean, tksp_group as
Soil_horizon FROM kpp_kambizem GROUP BY tksp_group
```

Soil_pH_mean	Soil_horizon
4.94	NULL
5.36	A
5.16	A/B
6.45	A/C
7.40	A/E
5.62	AB/C
5.03	B
4.94	B/C
5.60	B/C/D
4.40	B/D
4.73	C
5.10	C/D
5.80	D
5.98	E
5.13	E/B
1.03	R



SQL querying

- Example 2: Average contents of clay, silt and sand for A horizon in Cambisols

```
SELECT ROUND(avg(jil),2) as Percentage, 'Clay' as Texture FROM kpp_kambizem  
WHERE tksp_group='A'
```

```
UNION SELECT ROUND(avg(prach),2), 'Silt' FROM kpp_kambizem WHERE  
tksp_group='A'
```

```
UNION SELECT ROUND(avg(pisek),2), 'Sand' FROM kpp_kambizem WHERE  
tksp_group='A'
```

Percentage	Texture
11.67	Clay
39.96	Silt
48.36	Sand

