

Uporaba nevronske mreže pri obdelavi geokemičnih podatkov

Use of neural networks for the interpretation of geochemical data

Gorazd Žibret



**Geološki
zavod
Slovenije**



3. SGK, Bovec, 16. – 18. 09. 2010

Uporaba nevronske mreže za obdelavo podatkov v geologiji

Use of neural networks for the interpretation of geological data

Gorazd Žibret, Barbara Čenčur-Curk, Blaž Milanič, Branka Trček, Janko Urbanc, Marko Komac, Miloš Bavec, Robert Šajn, Sonja Cerar, Tanja Prebil & Trajče Stafilov



**Geološki
zavod
Slovenije**



4. Slovenski
geološki
kongres
Ankaran, 8.–10. oktober 2014

4. SGK, Ankaran, 8. – 10.10.2014

Do we have
INNOVATION
component in
our proposal?

Neural Networks

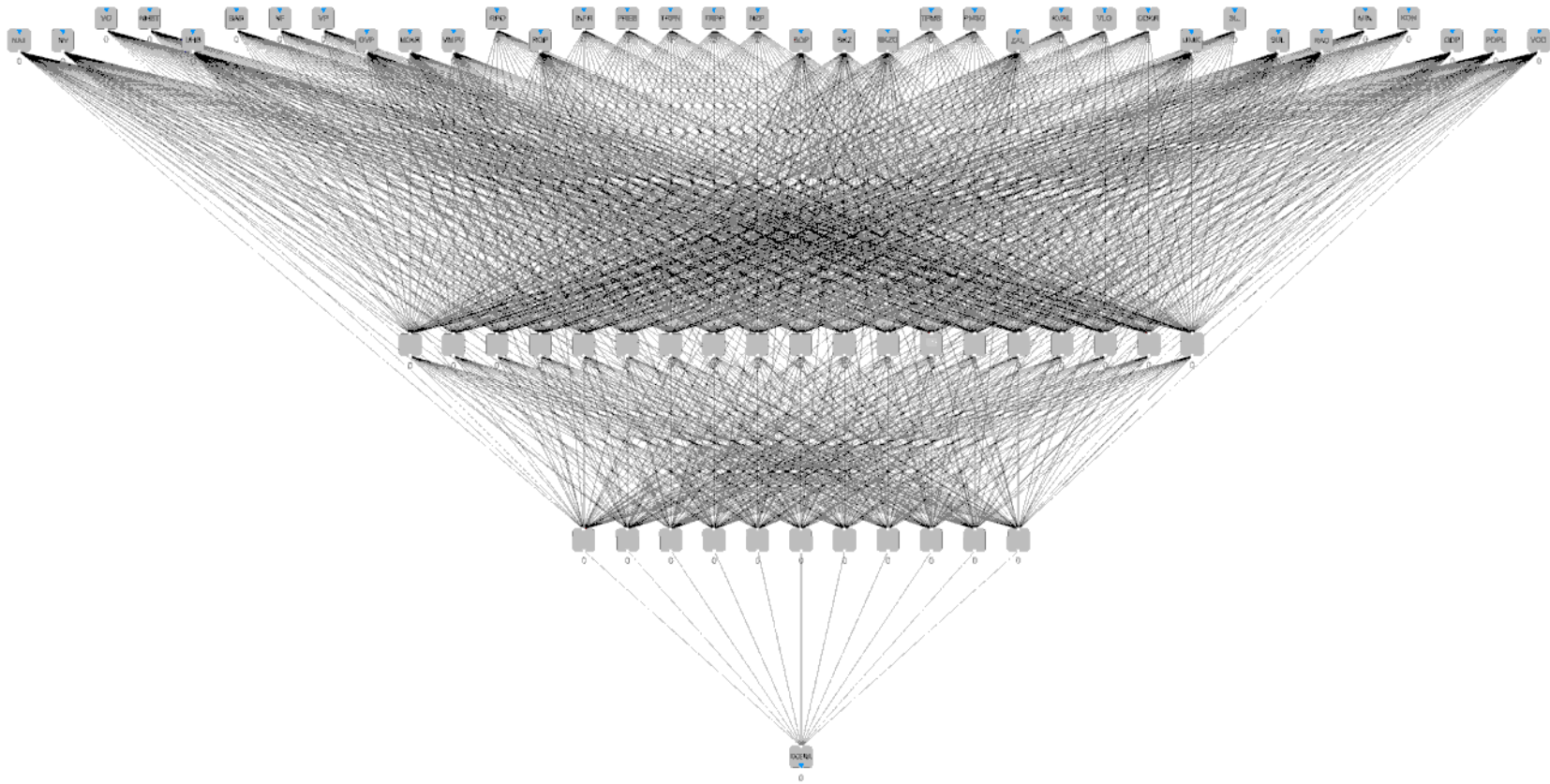


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- making a decision support models (for mineral resources)



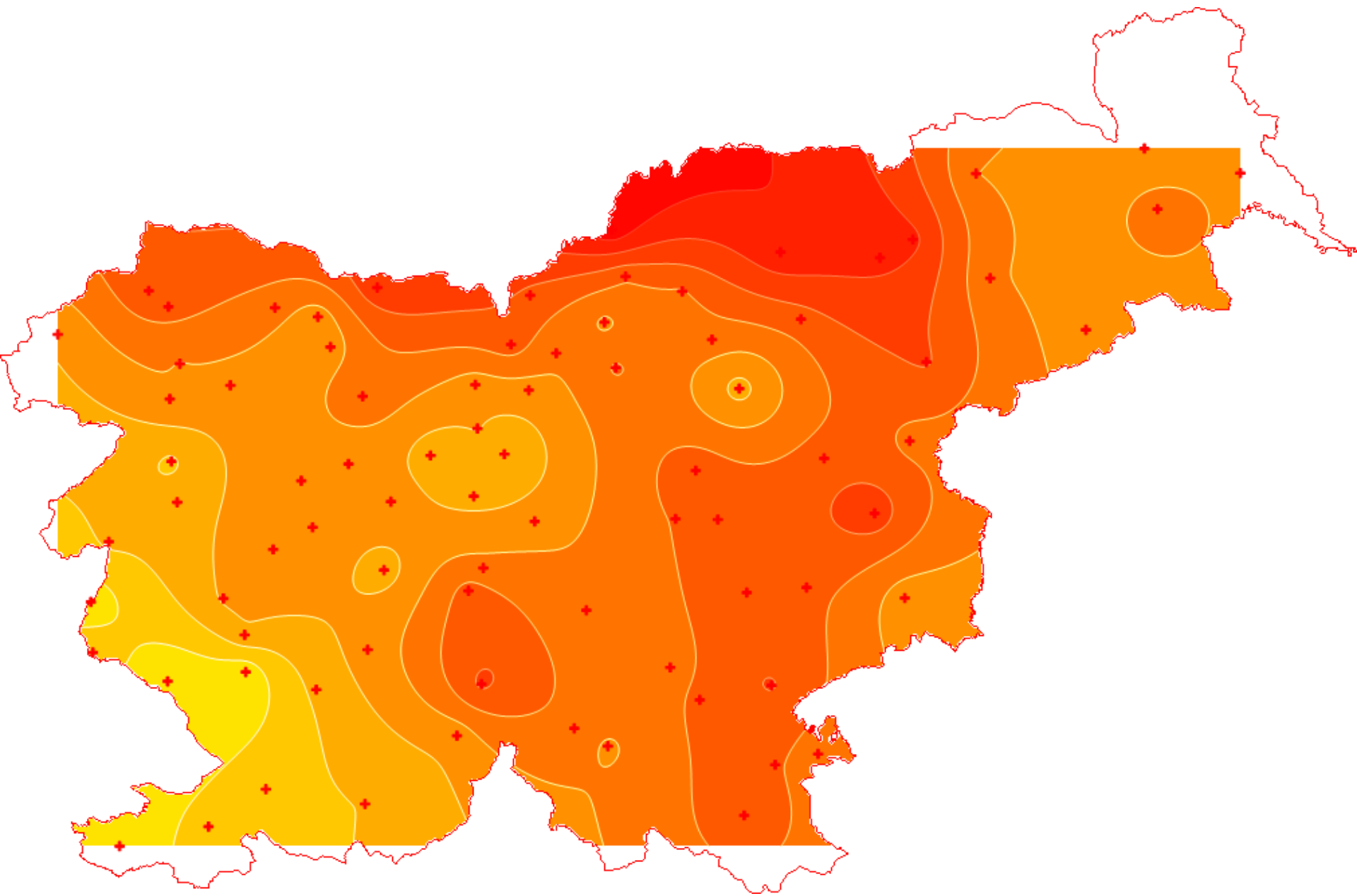
isotopes in uderground waters

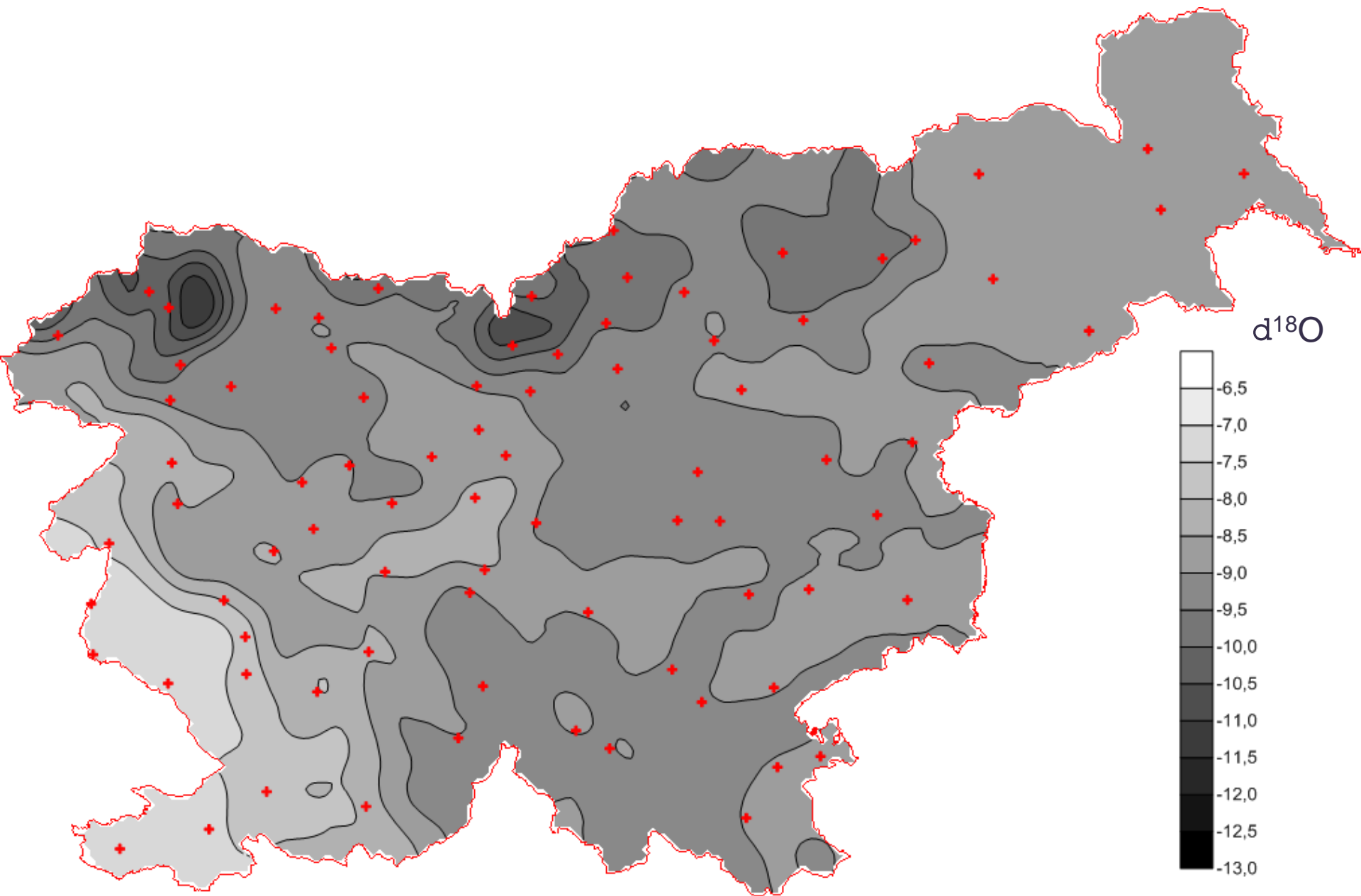
- INPUTS:

elevation, exposition, distance from the sea, slope angle, land use, average annual temperature, average annual precipitation rate, season (spring - autumn)

- OUTPUTS

$d^{18}O$







extrapolation of pedological maps

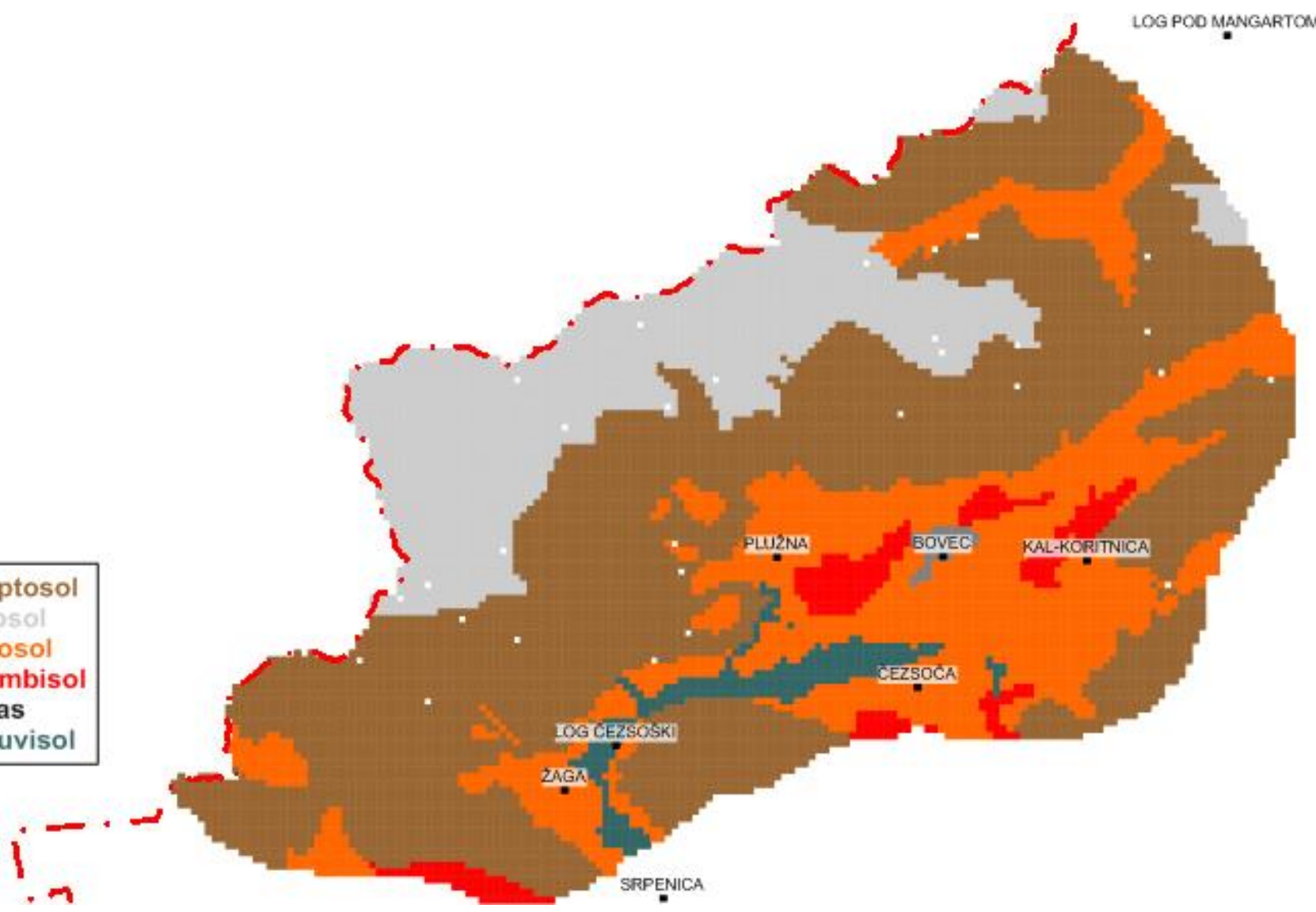
- **INPUTS:**

elevation, slope angle, lithology, land use, average annual precipitation

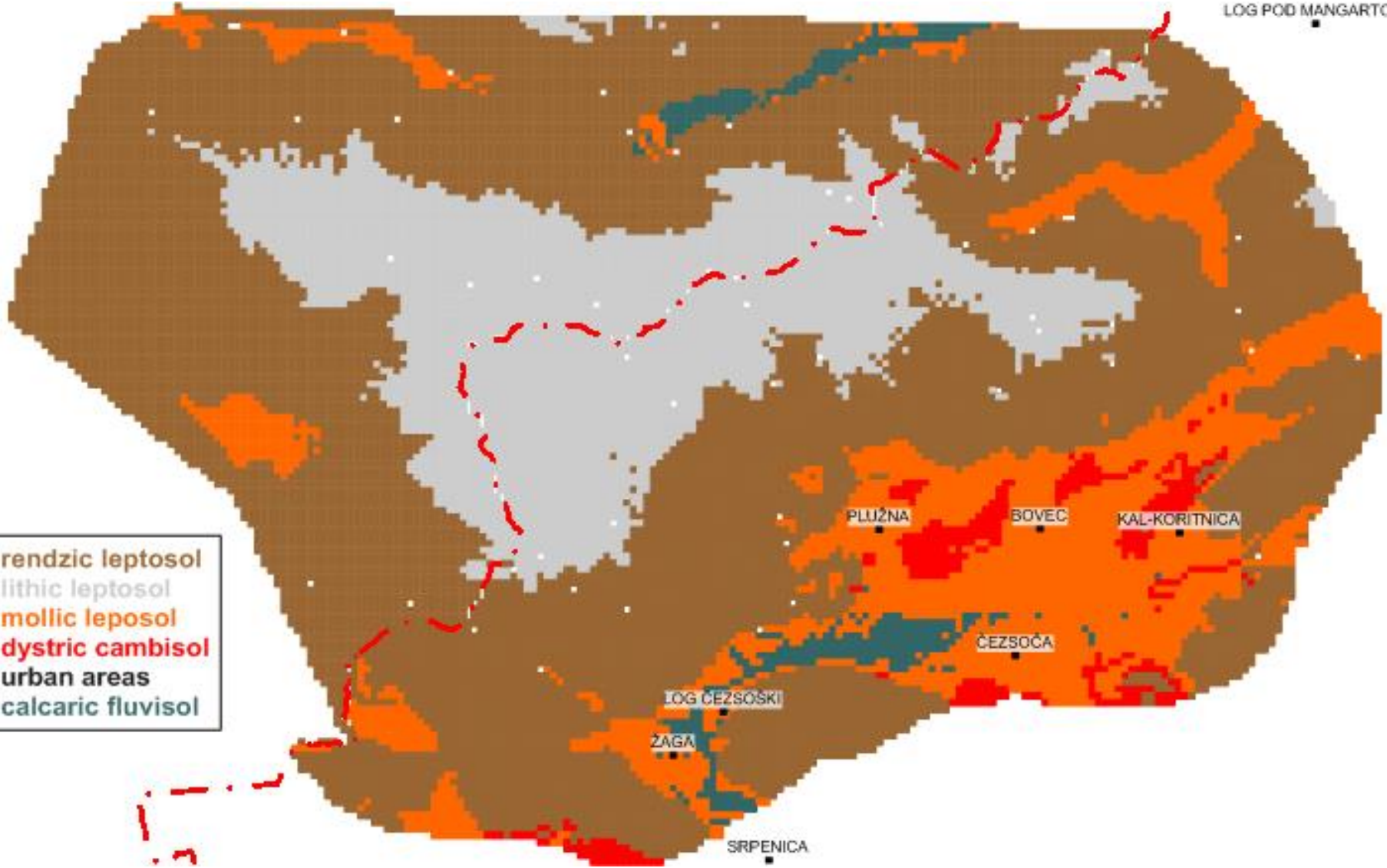
- **OUTPUTS:**

soil type, soil depth

- P1 - rendzic leptosol
- P2 - lithic leptosol
- P3 - mollic leposol
- P4 - dystric cambisol
- P5 - urban areas
- P6 - calcareic fluvisol



LOG POD MANGARTOM



- P1 - rendzic leptosol
- P2 - lithic leptosol
- P3 - mollic leposol
- P4 - dystric cambisol
- P5 - urban areas
- P6 - calcaric fluvisol

PLUŽNA

BOVEC

KAL-KORITNICA

ČEZSOČA

LOG ČEZSOŠKI

ŽAGA

SRPENICA



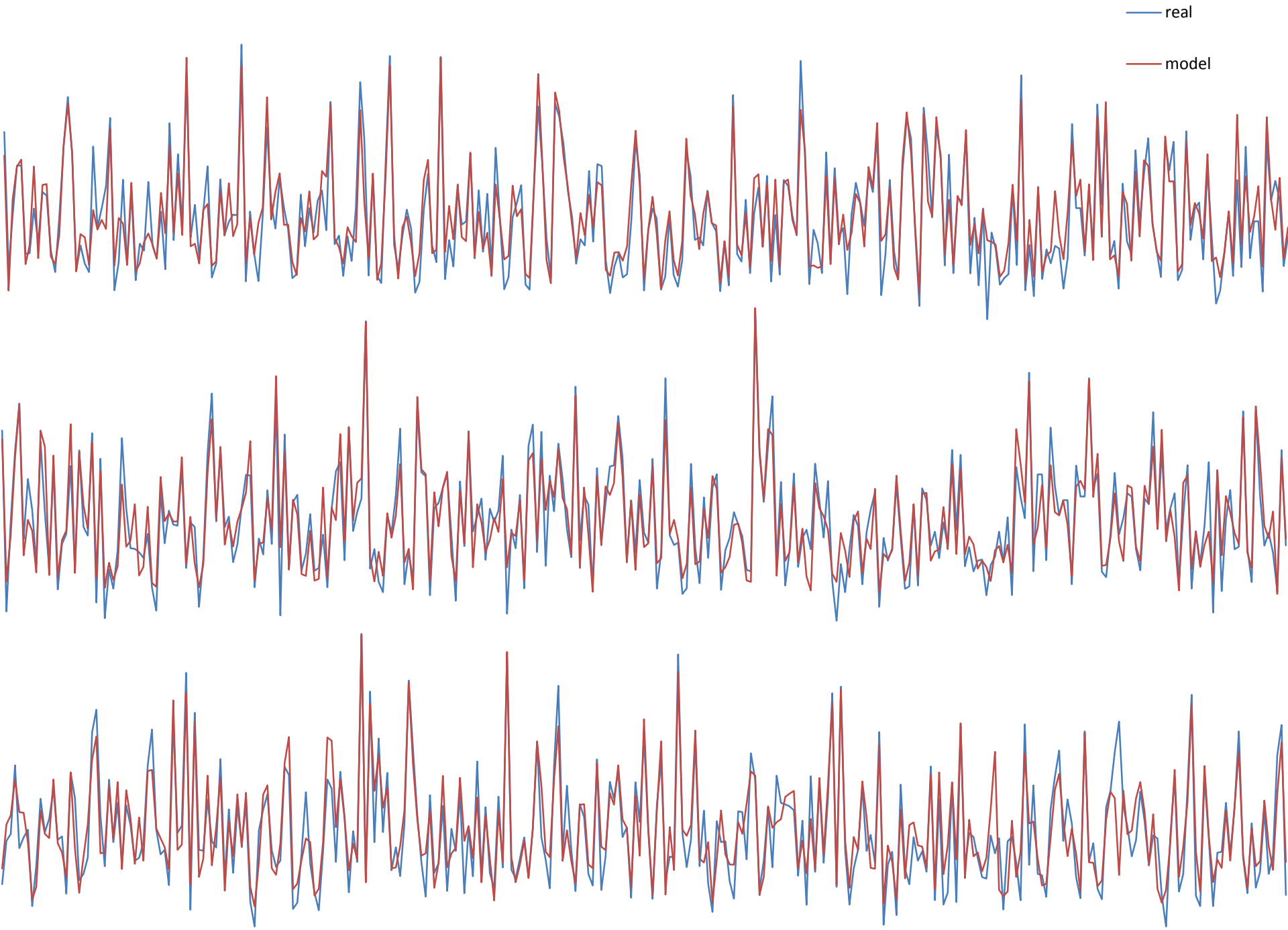
modelling of river discharge

- **INPUTS:**

precipitation (Kobarid, Trenta and Cerklno),
air temperature, season (winter, spring,
summer, autumn)

- **OUTPUTS:**

discharge



Pretok Soče v Solkanu - Neurokalkulator

About

Padavine - merilna postaja

	Kobarid (mm)	Trenta (mm)	Cerkno (mm)	Temperatura vode (C)	
napoved-jutri	29	25	21	5.8	Dan
danes	0	0	0	5.5	1
včeraj	0	0	0	5.7	Mesec
predvčerajšnjim	0	0	0	6.2	1
D-3	0	0	0	6.7	
D-4	2	7	5	7.3	
D-5	2	3	10	7.4	
D-6	88	70	42	7.5	
D-7	2	2	0	7.8	
D-8	0	0	0	8.1	
D-9	18	21	19	8.2	

Napoved pretoka Soče na merski postaji Solkan: m³

19

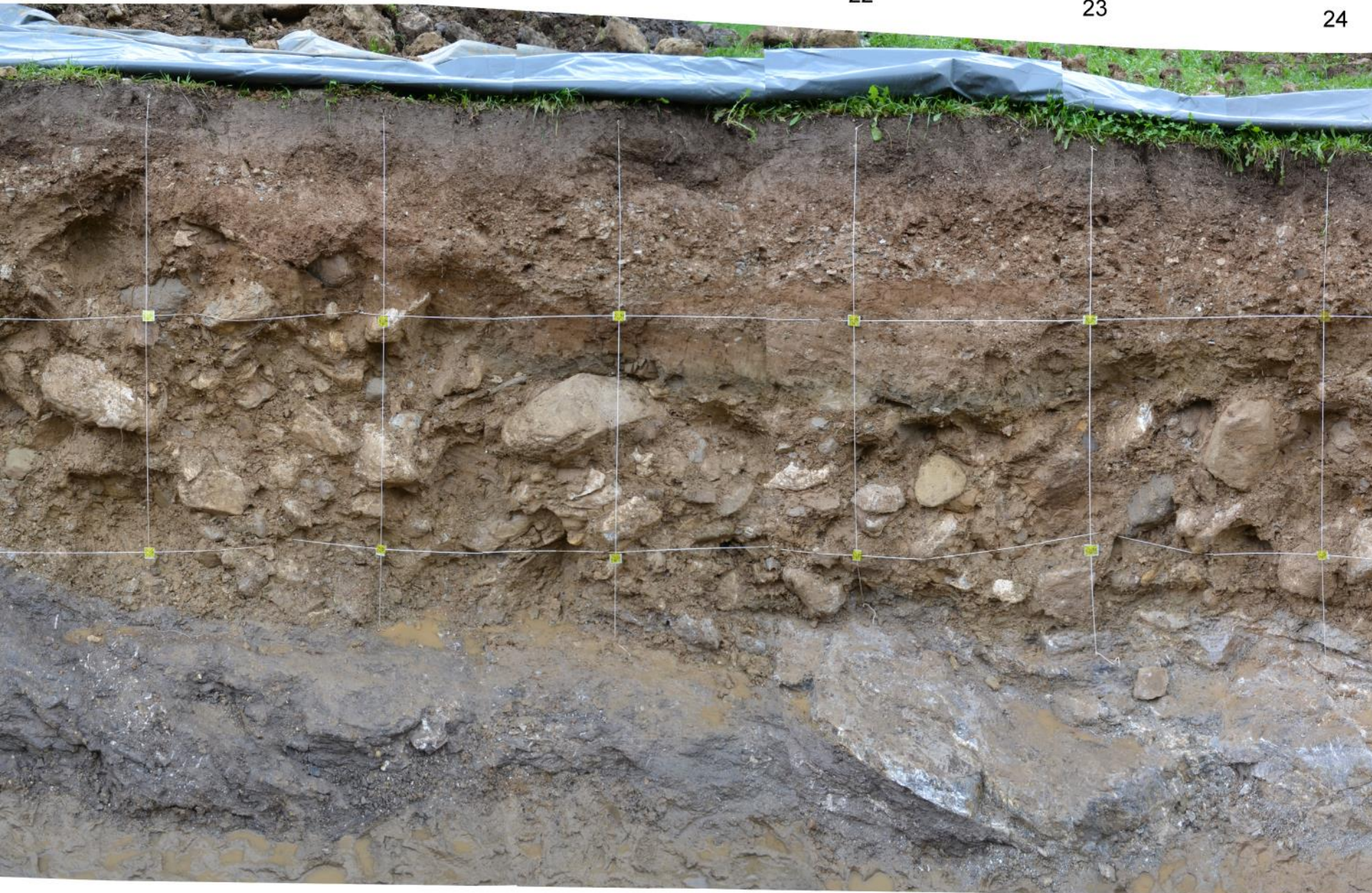
20

21

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23

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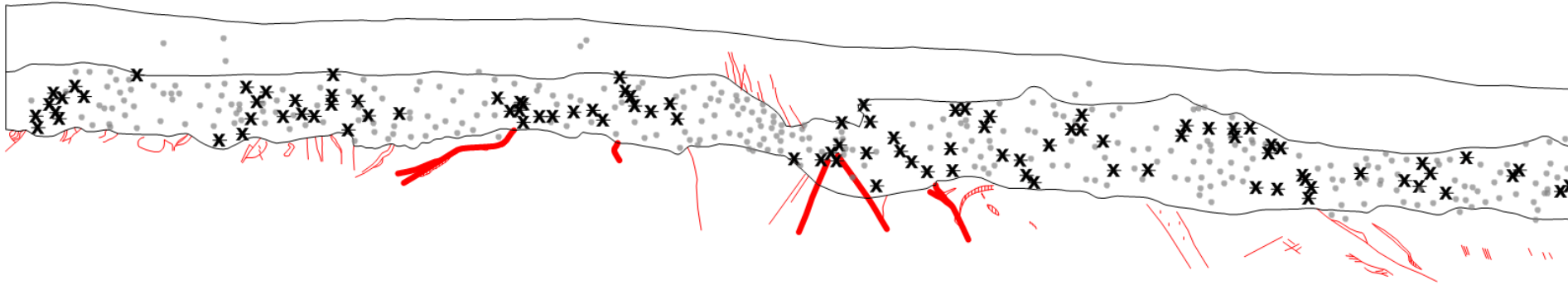
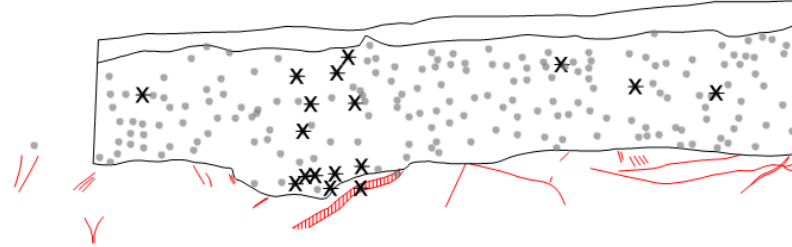
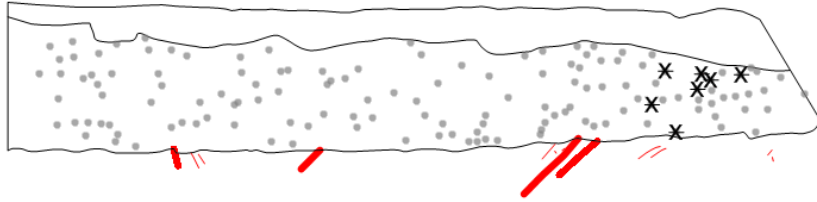
determining of neotectonic movement

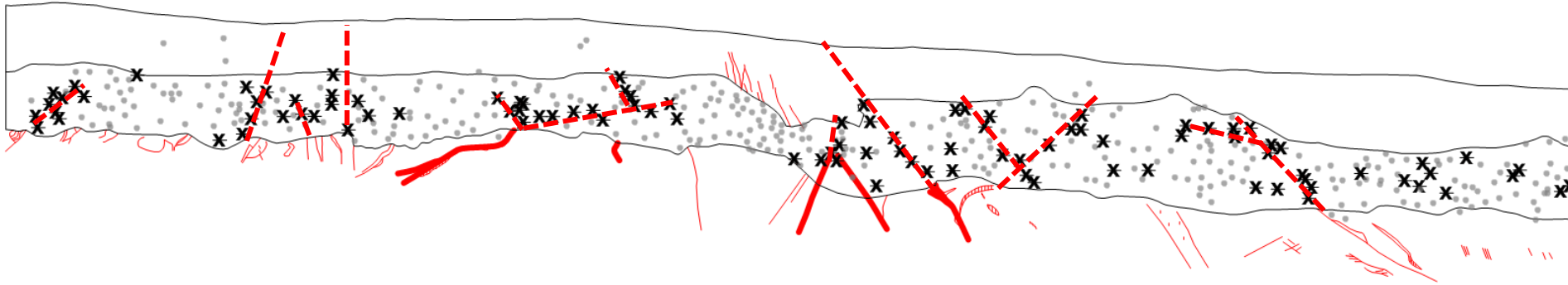
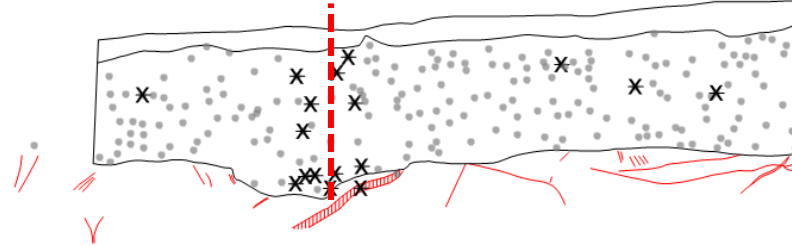
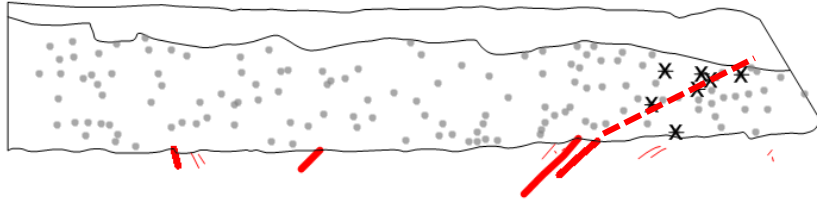
- INPUTS:

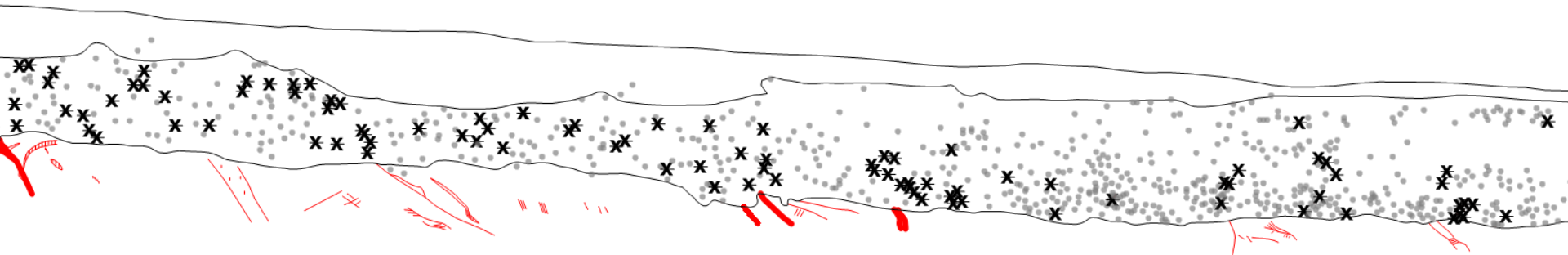
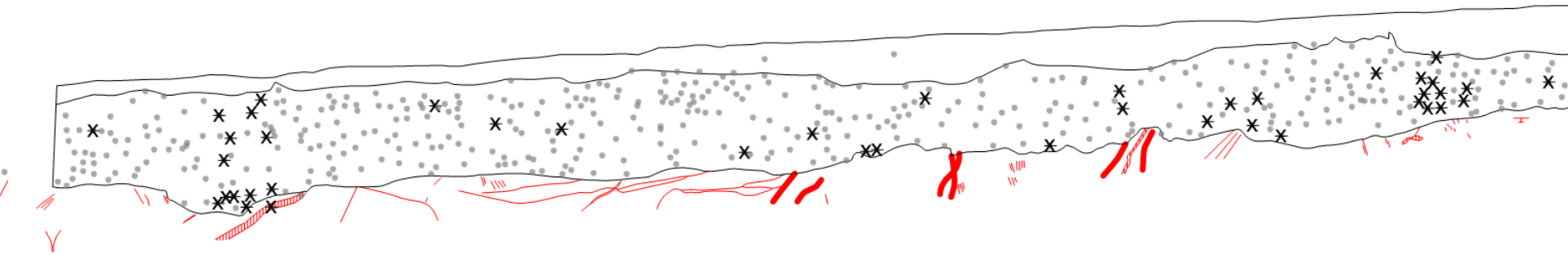
height of pebble in the profile, pebble density, angle of long axis (4 parameters), length of longer axis, area of pebble in cross section

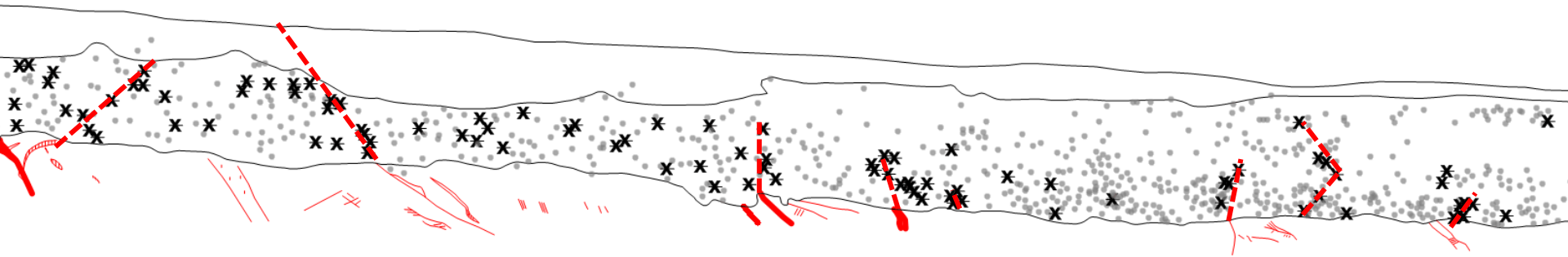
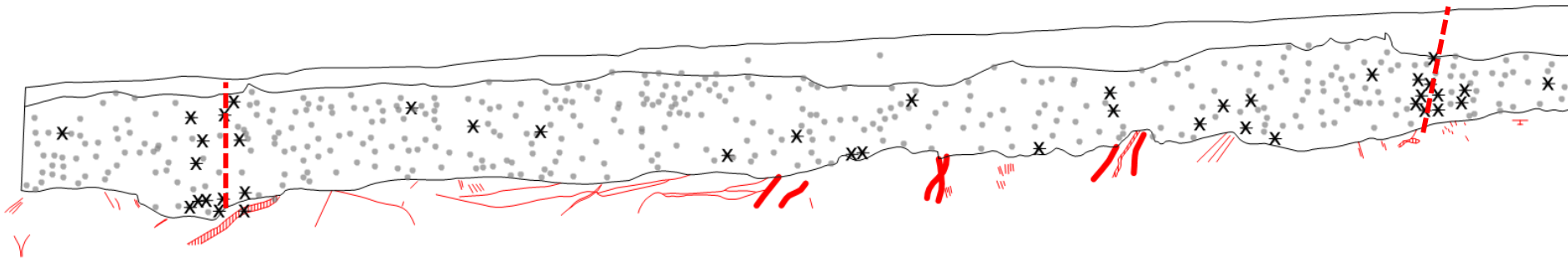
- OUTPUTS:

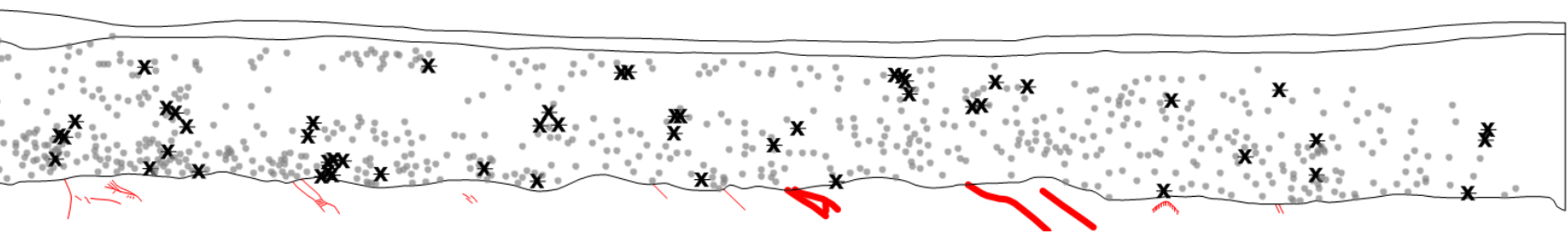
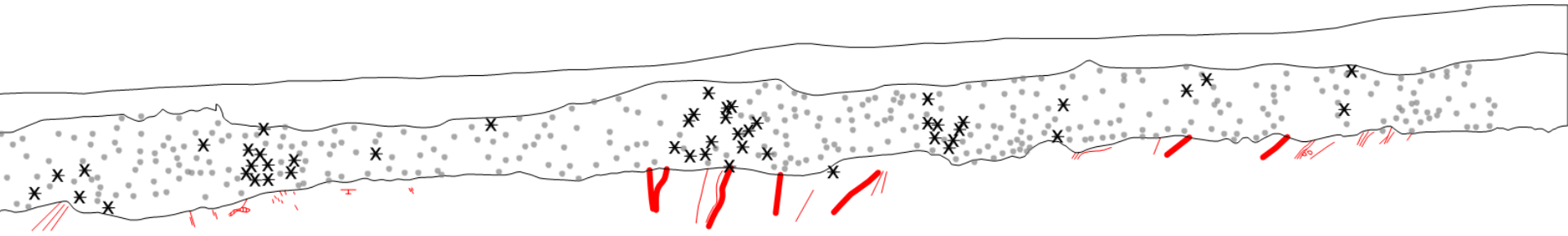
SOM matrix

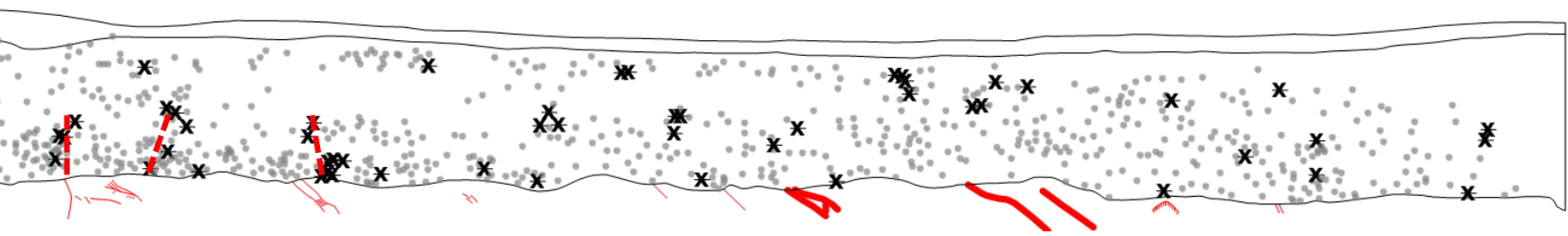
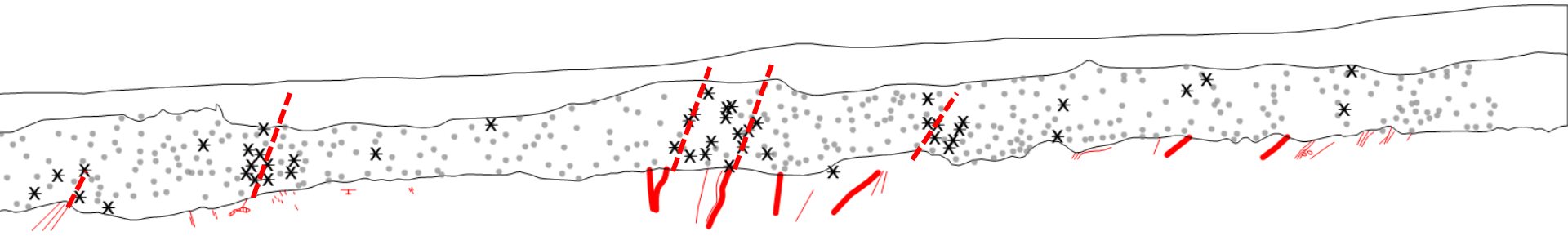














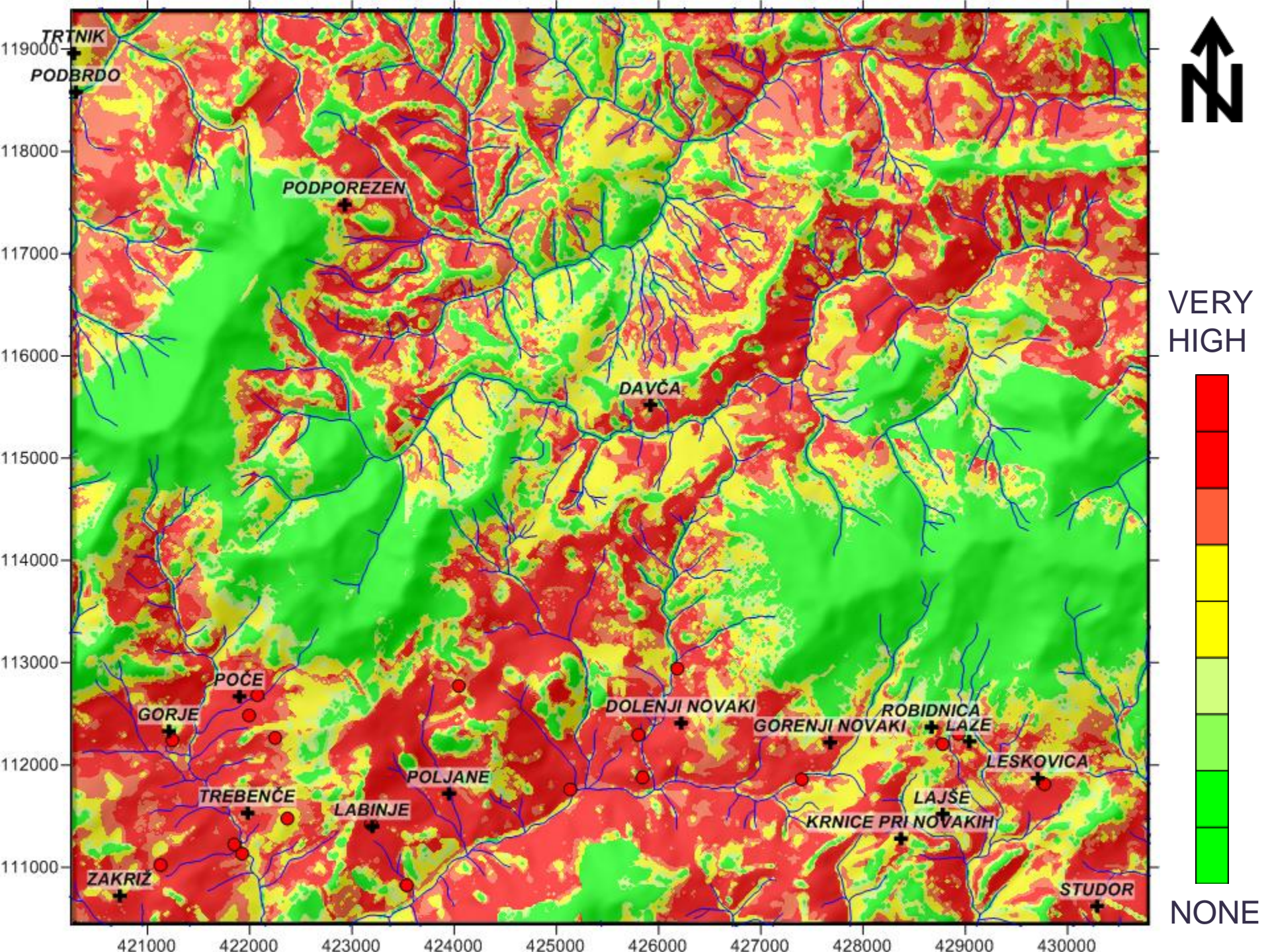
making of geochemical maps

- **INPUTS:**

altitude, land use, terrain curvature, aspect, terrain inclination, distance from nearest river, distance from nearest geological boundary (lithological), distance from nearest structural element (fault, overtrust...), engineering-geology classification

- **OUTPUTS:**

landslide probability





making of geochemical maps

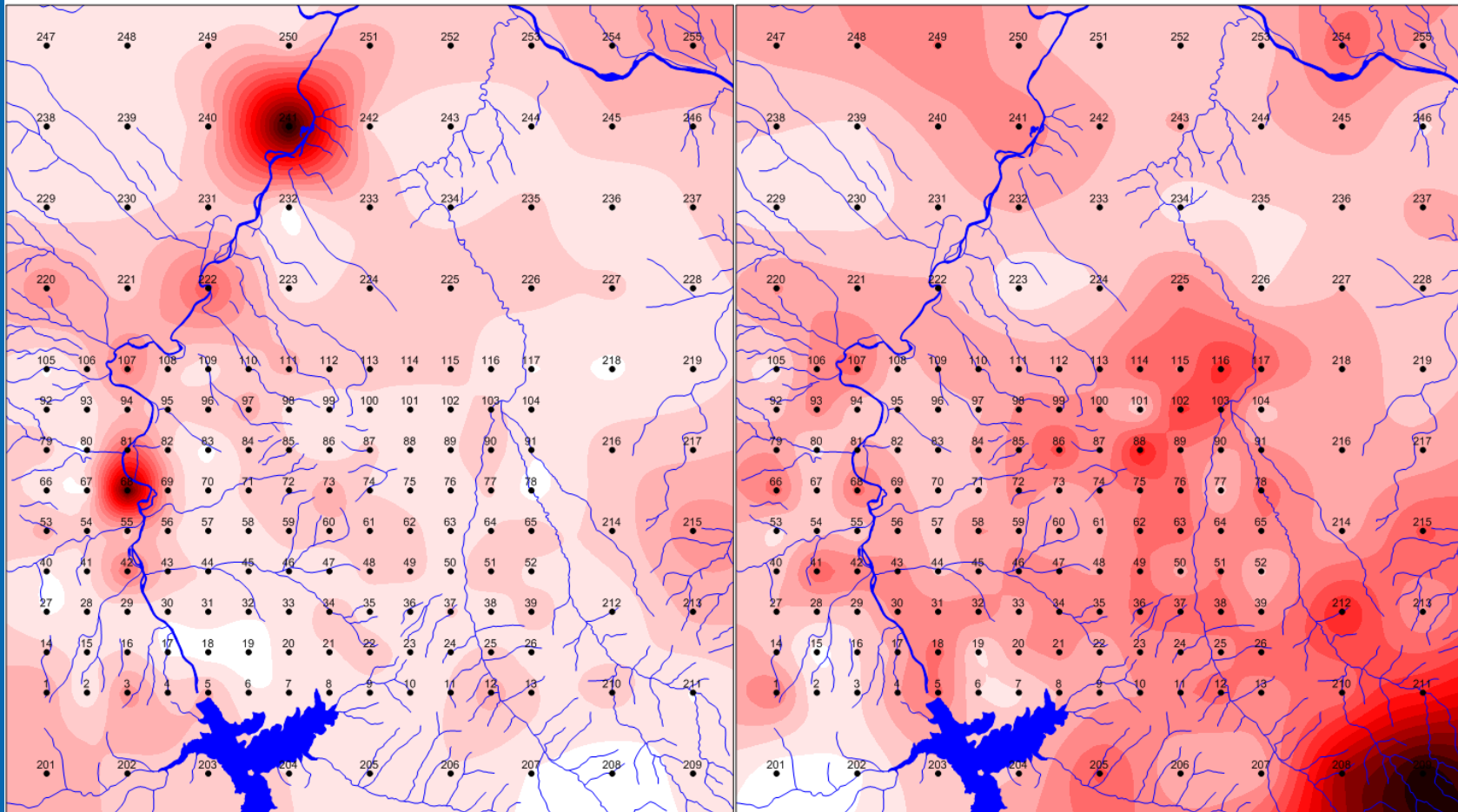
- **INPUTS:**

position, elevation, slope, aspect, land use, geology

- **OUTPUTS:**

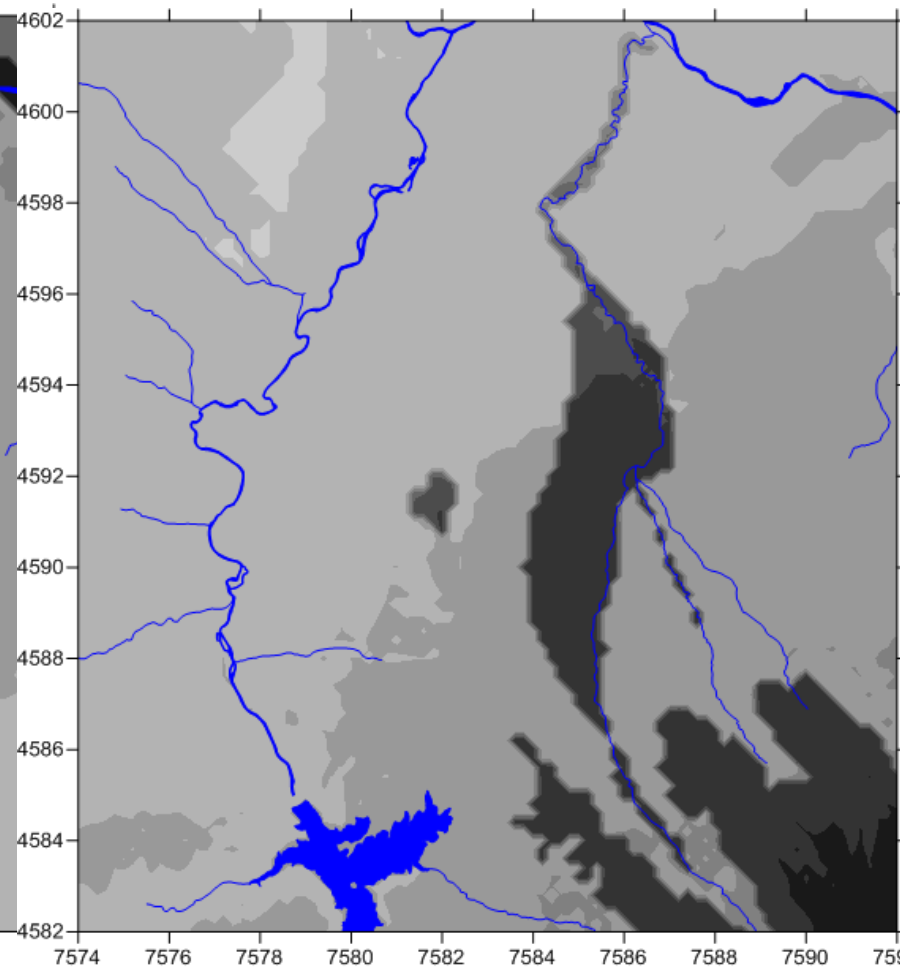
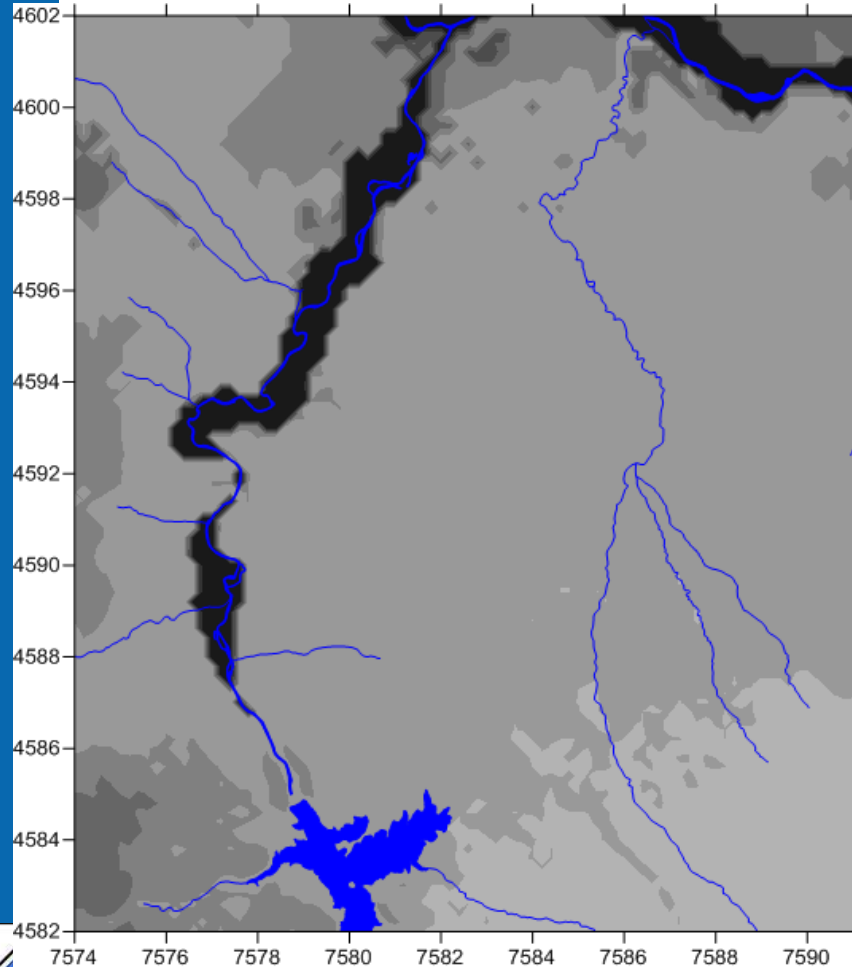
element concent in top/bottom soil

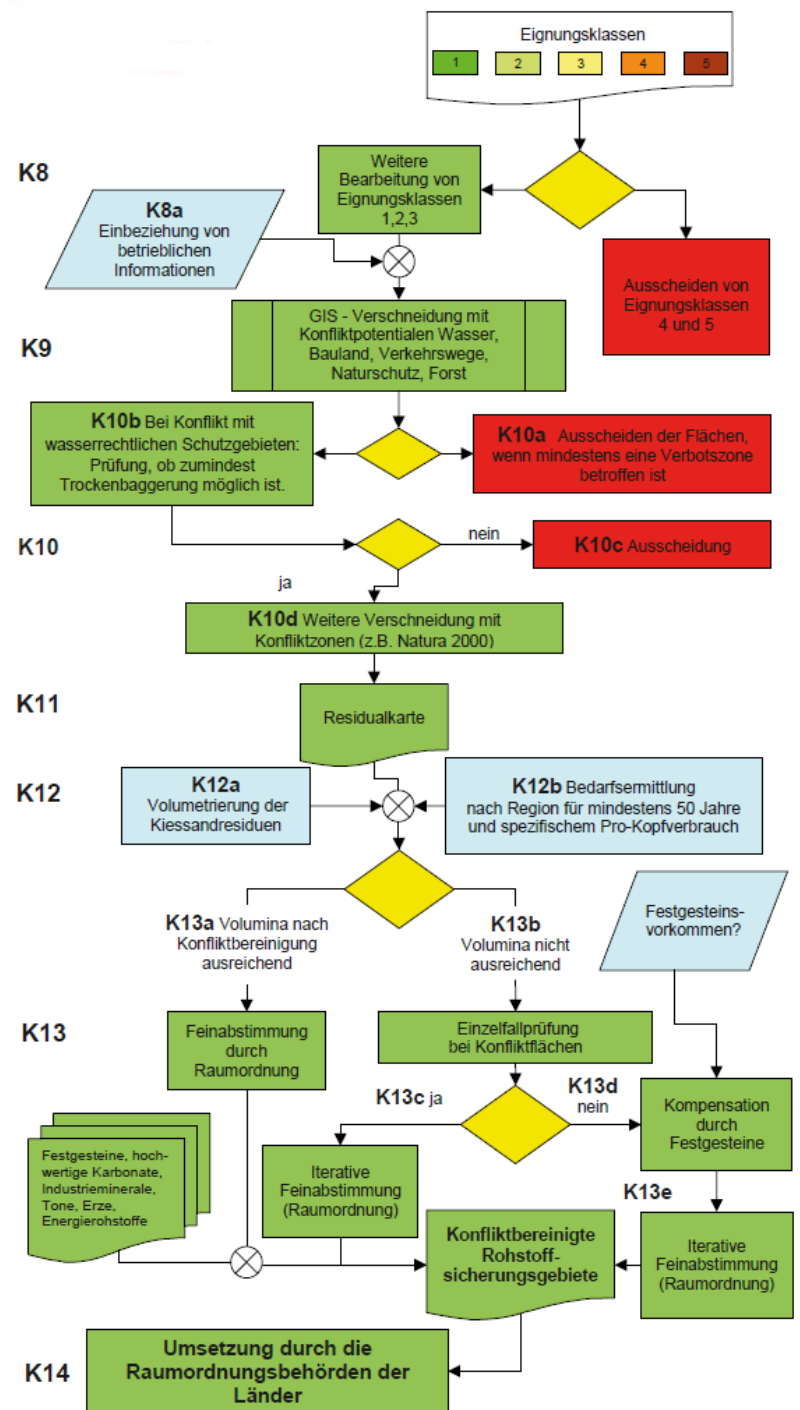
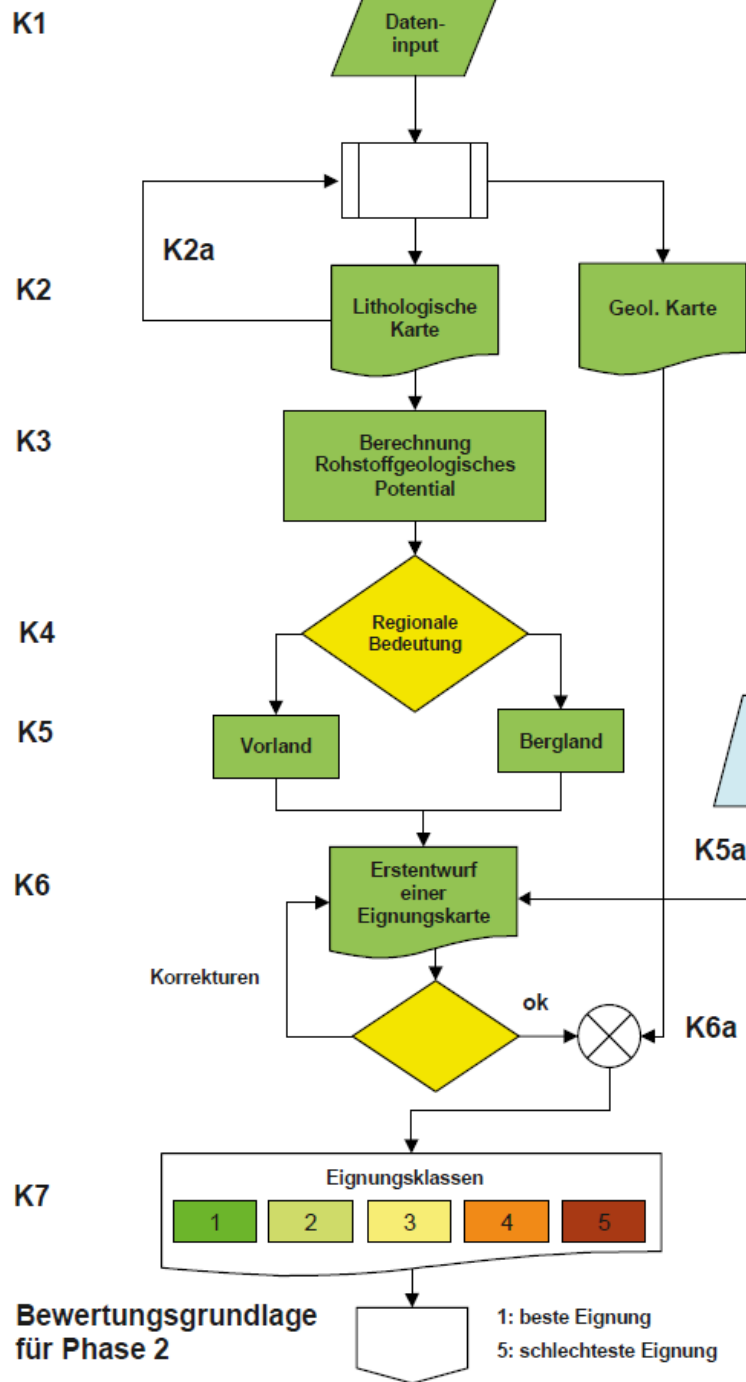
making of geochemical maps



making of geochemical maps

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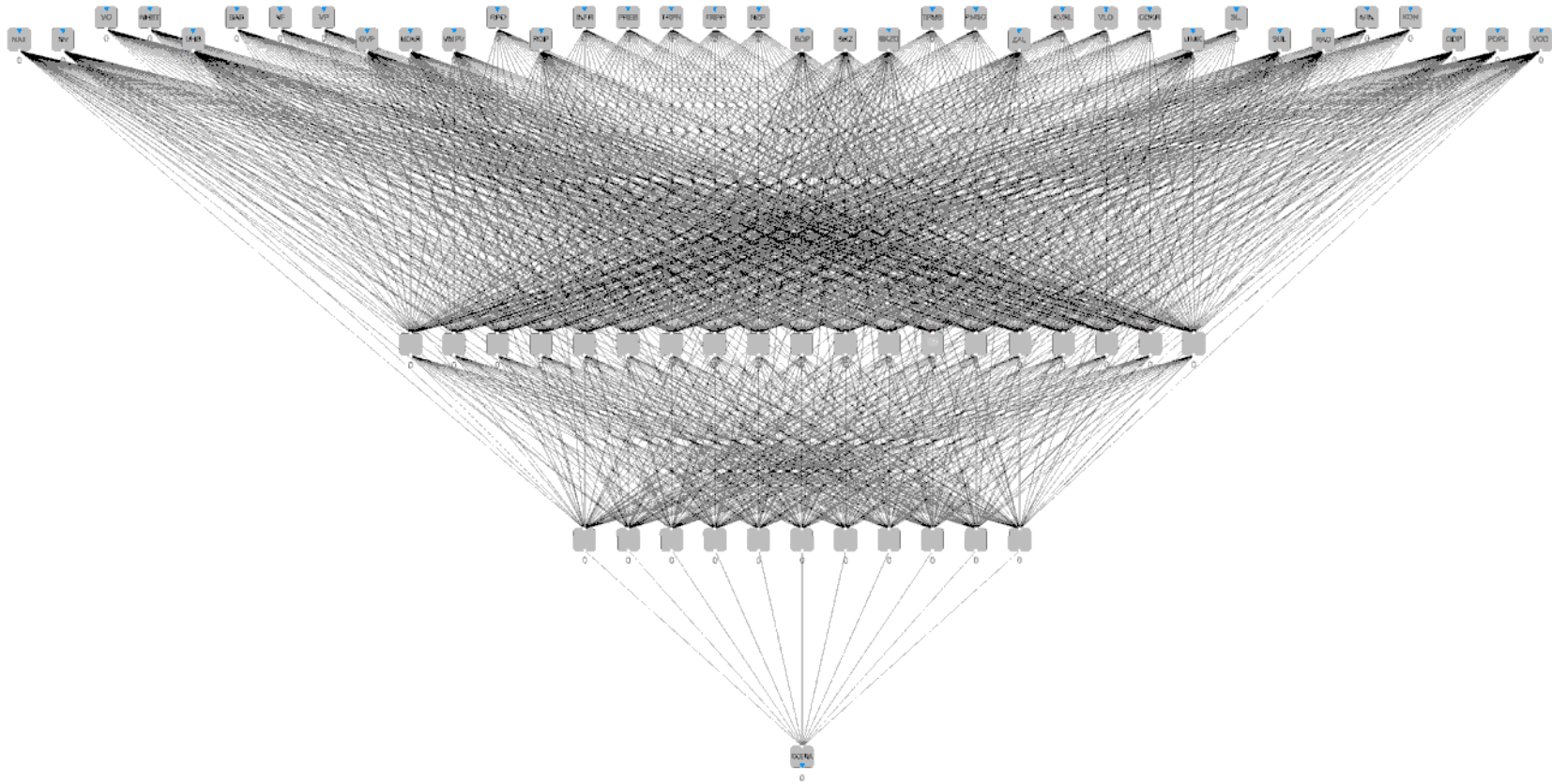




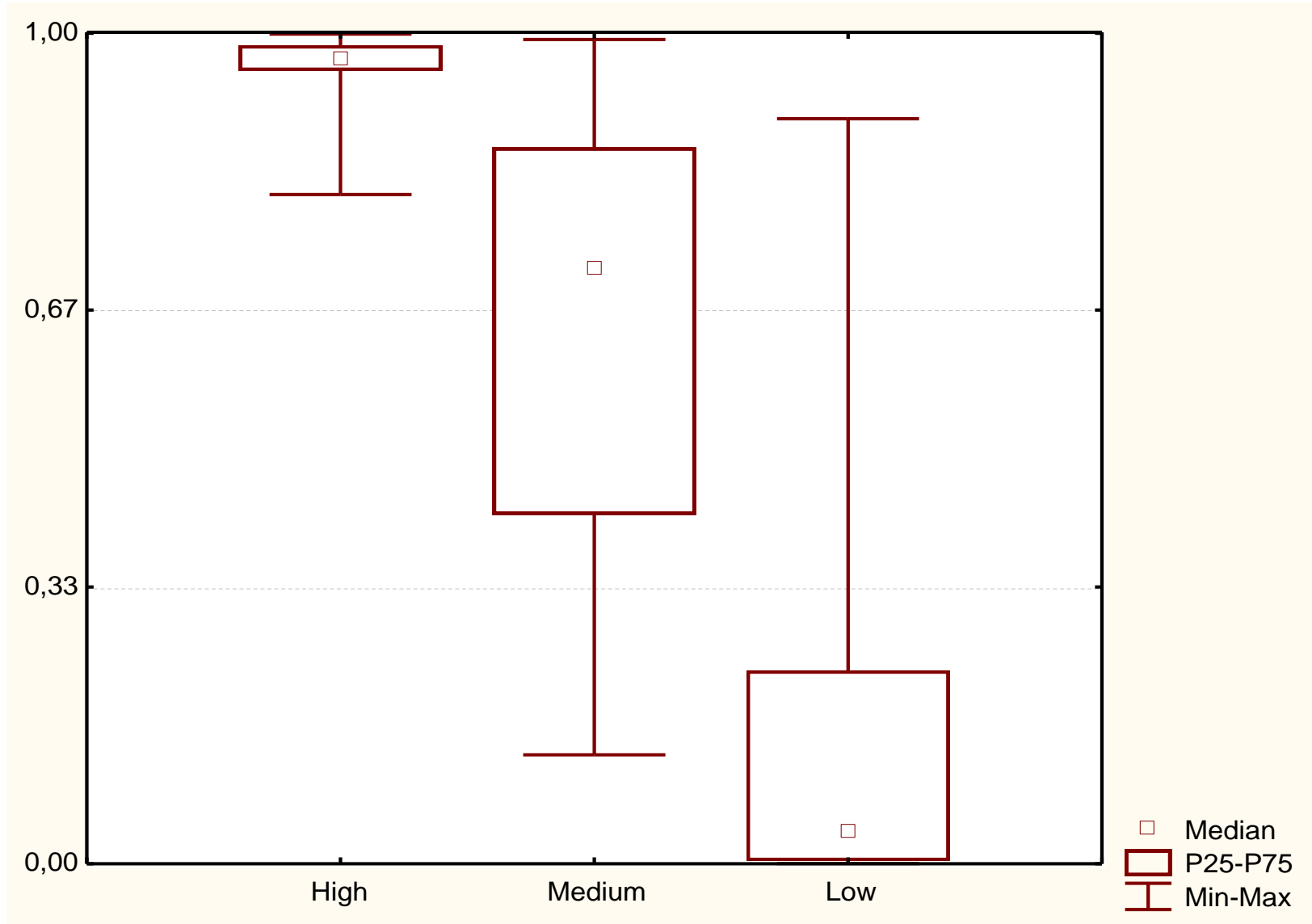
making a decision support models (for mineral resources)

- **INPUTS:** natura2000 areas, natural protected areas, water protected areas, biological diversity (2), quarry visibility, material quality, influence to surface & underground waters (5), transportation & impacts (4), infrastructure (1), society (4), current land use (incl. farming, 2), cultural heritage, geological parameters (8), extraction methods, dust, wastes
- **OUTPUTS:**
suitability to open extraction site

making a decision support models (for mineral resources)



making a decision support models (for mineral resources)





determining the sources of elements in the environment

- **INPUTS:**

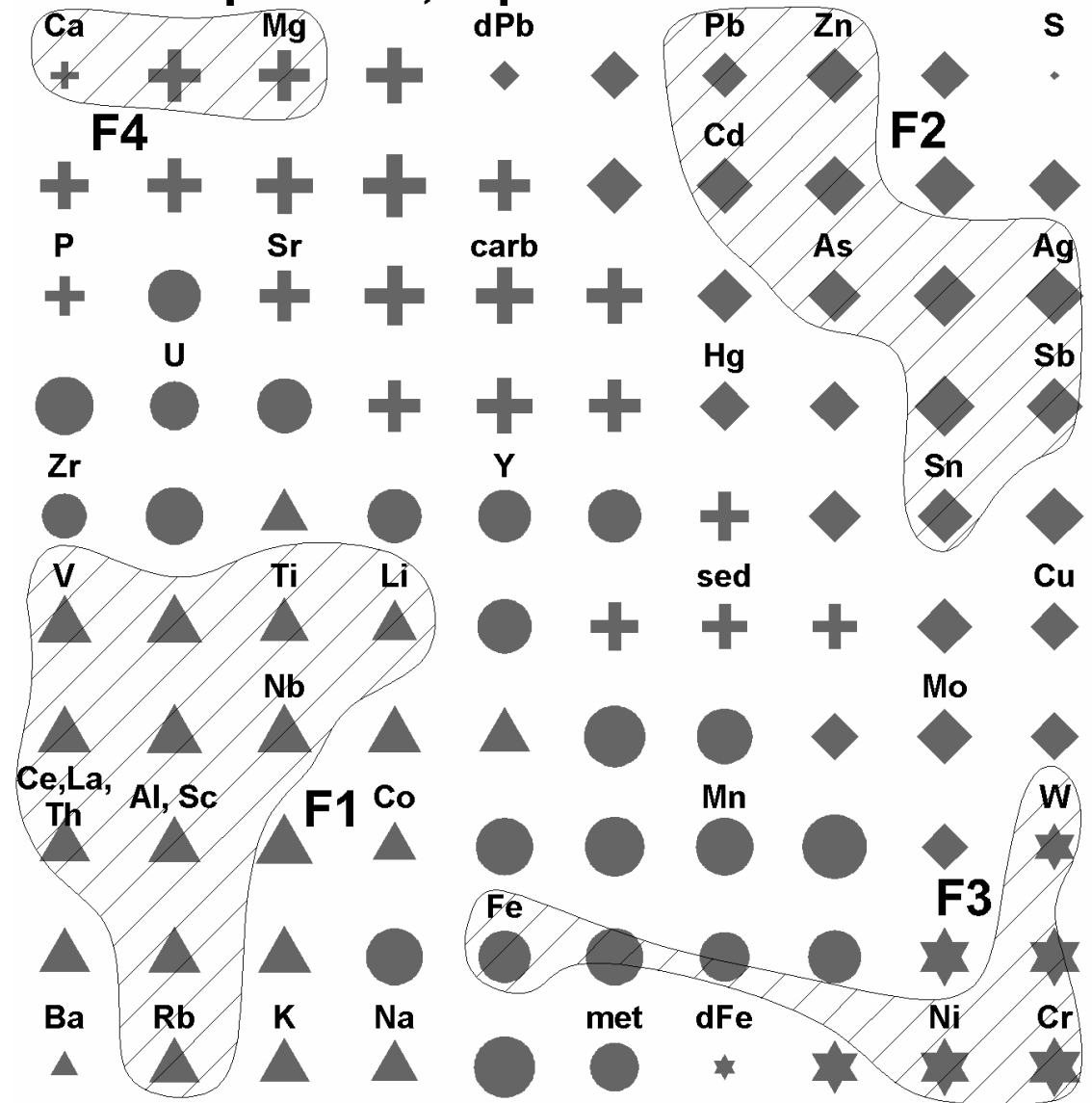
chemical composition (soil, attic dust), geological composition, distance from the dominant sources of pollution (ironworks, Pb-Zn smelter)

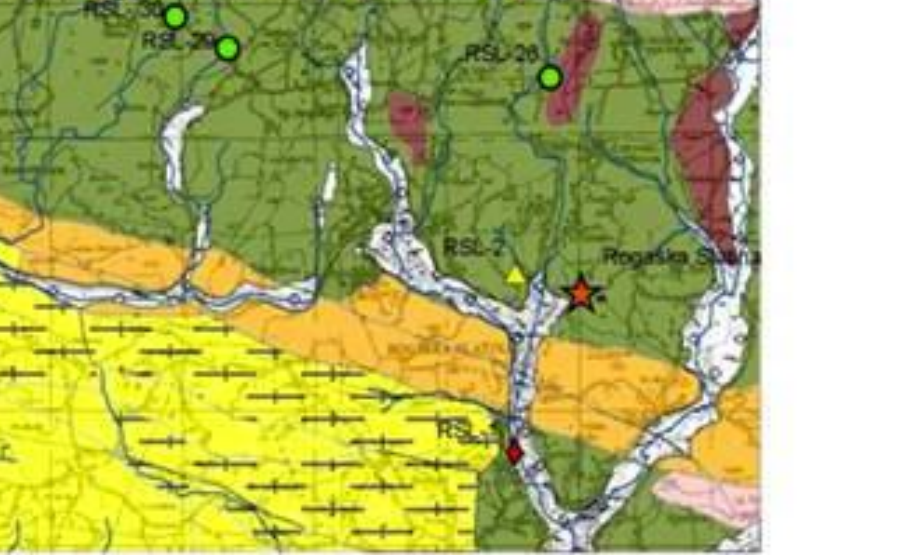
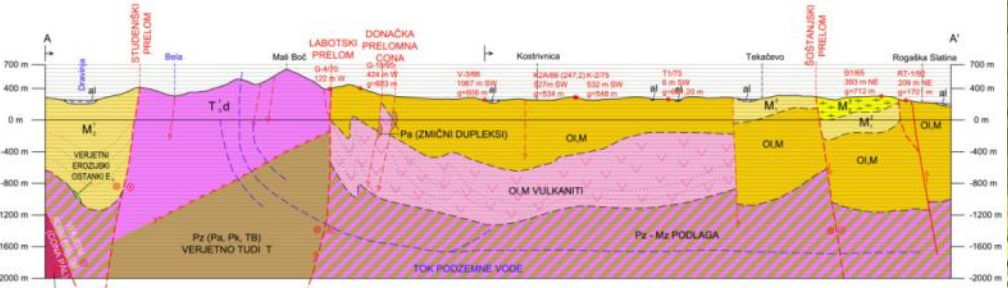
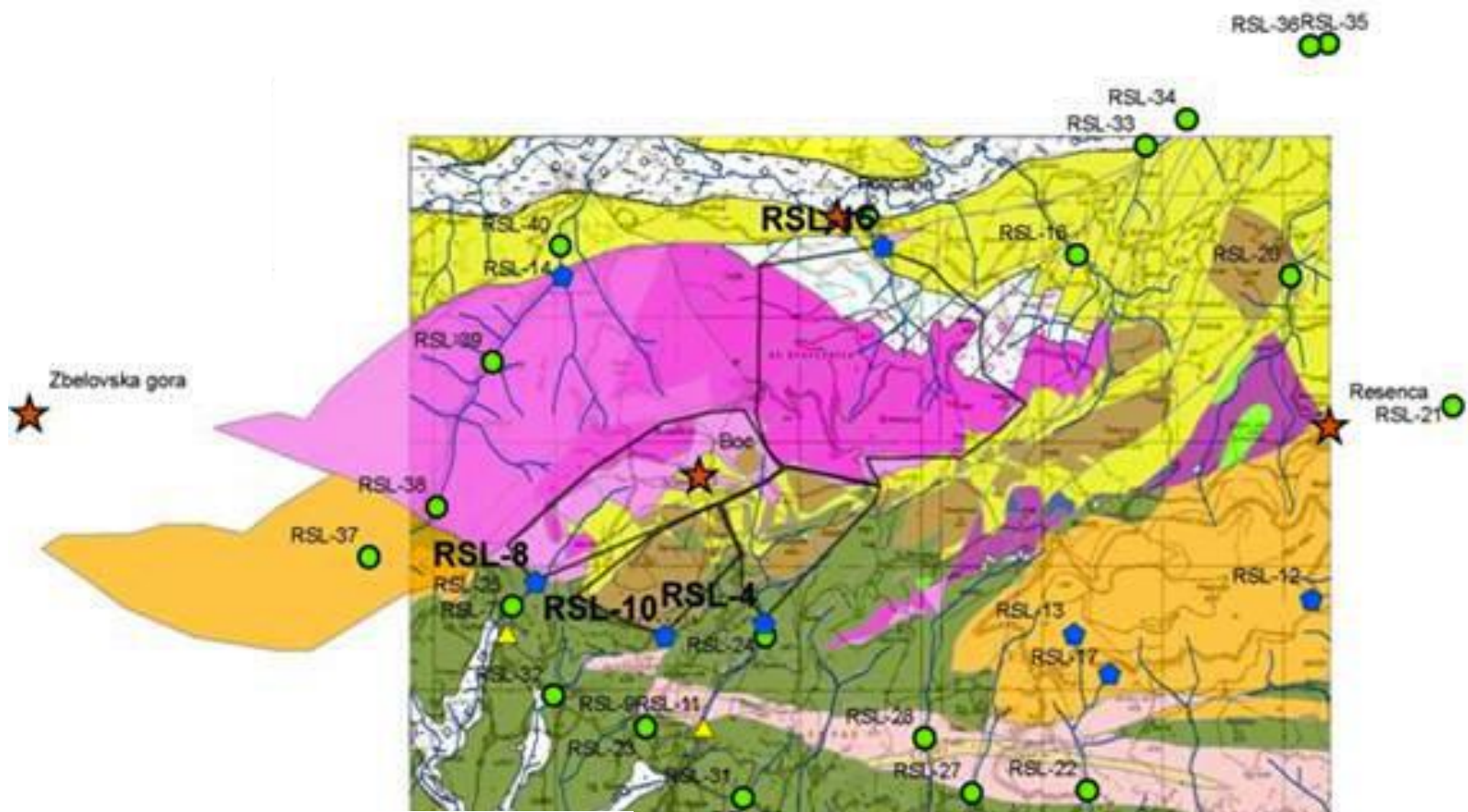
- **OUTPUTS:**

SOM matrix

Case study - Mežica

MEŽICA polluted, topsoil + attic dust





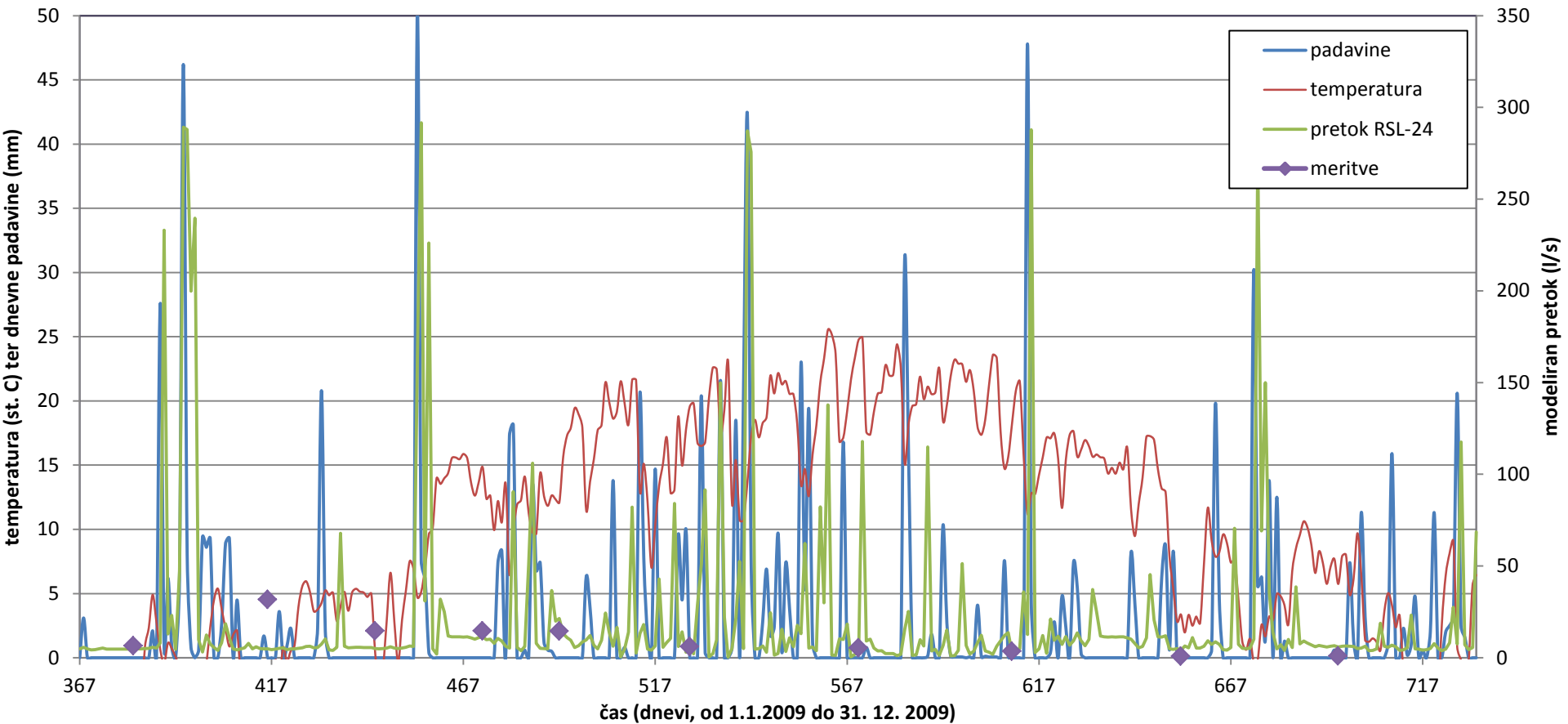
calculation of surface discharge

- INPUTS:

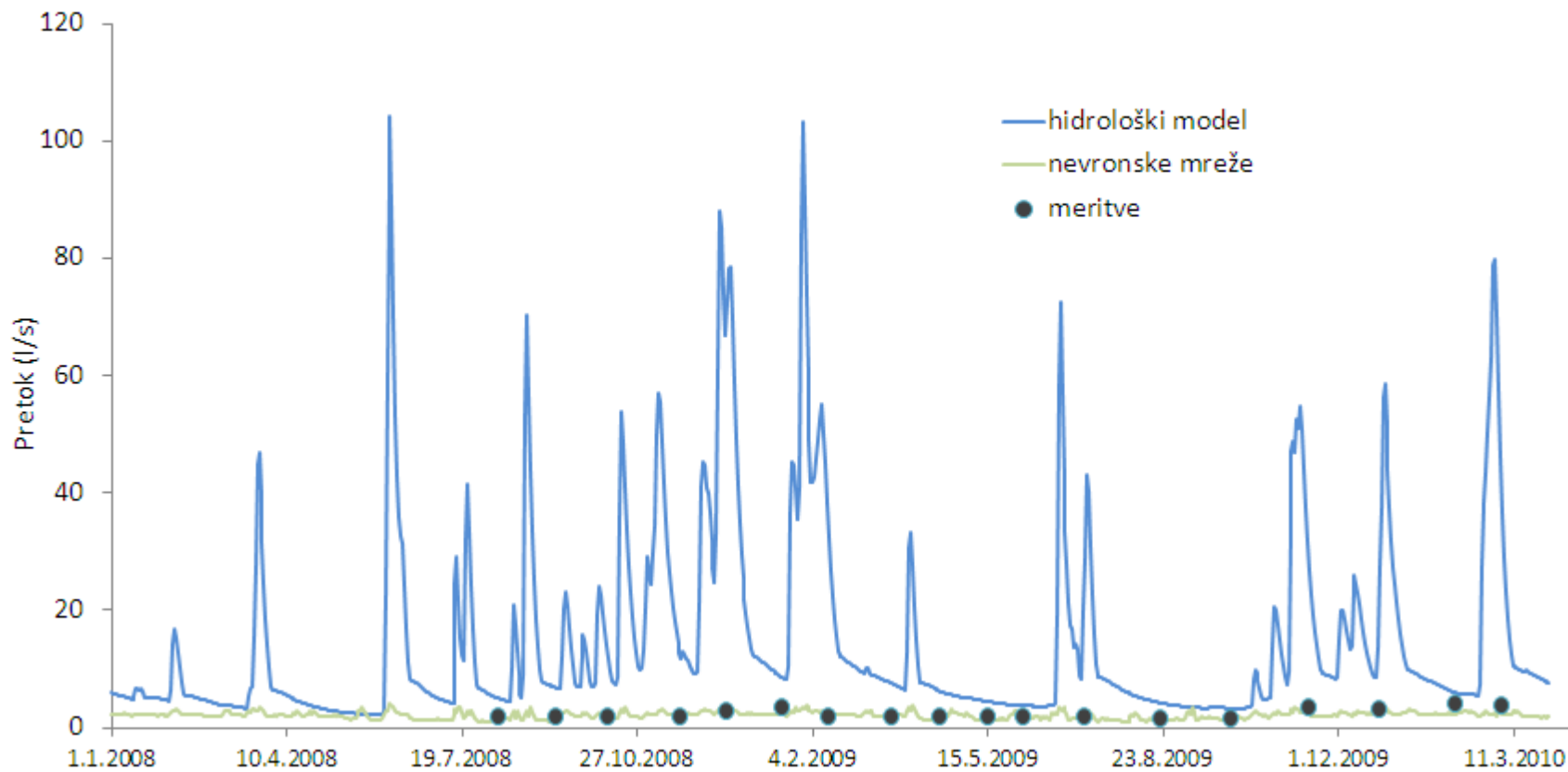
precipitation (4 parameters), air temperature (2 parameters)

- OUTPUTS:

discharge

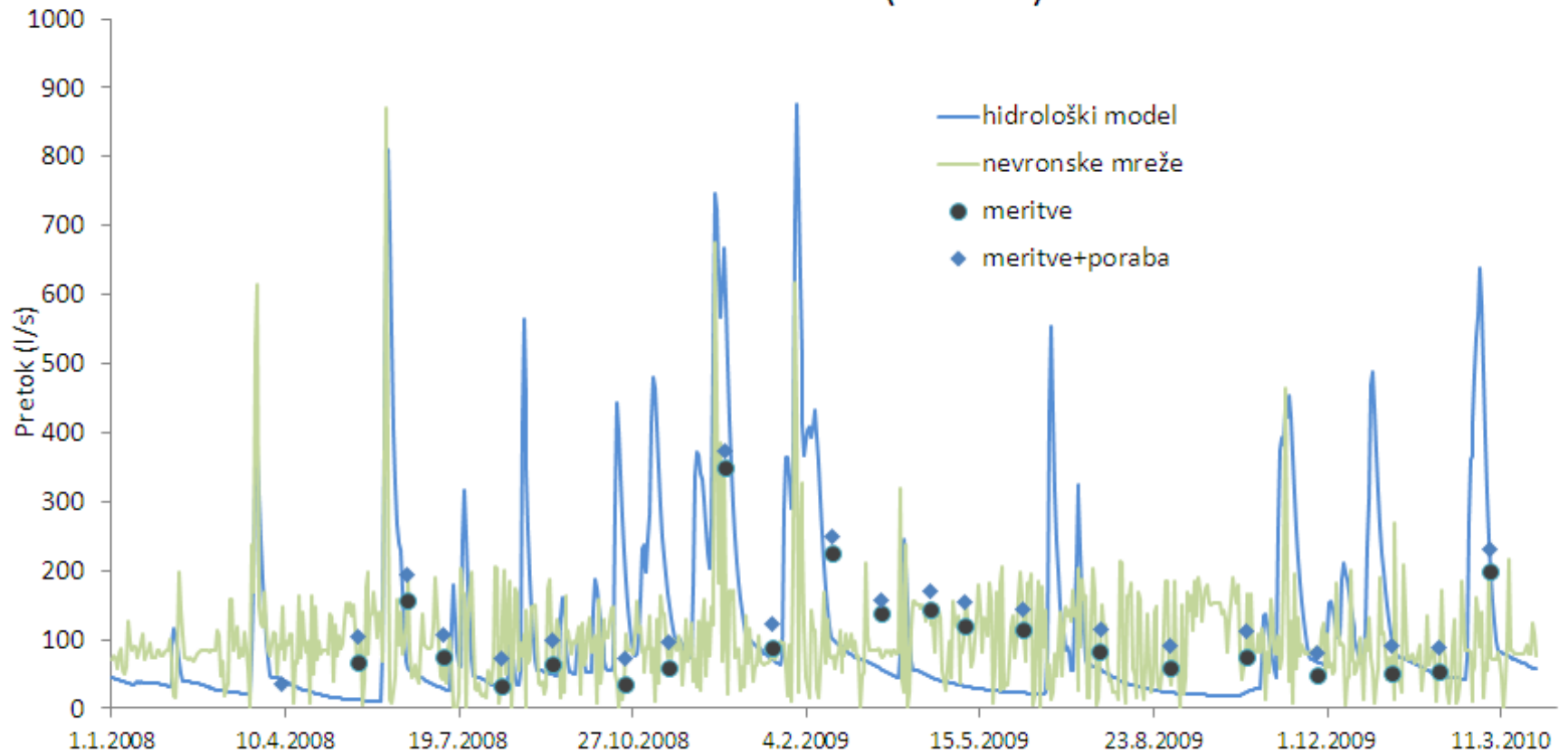


RSL-4



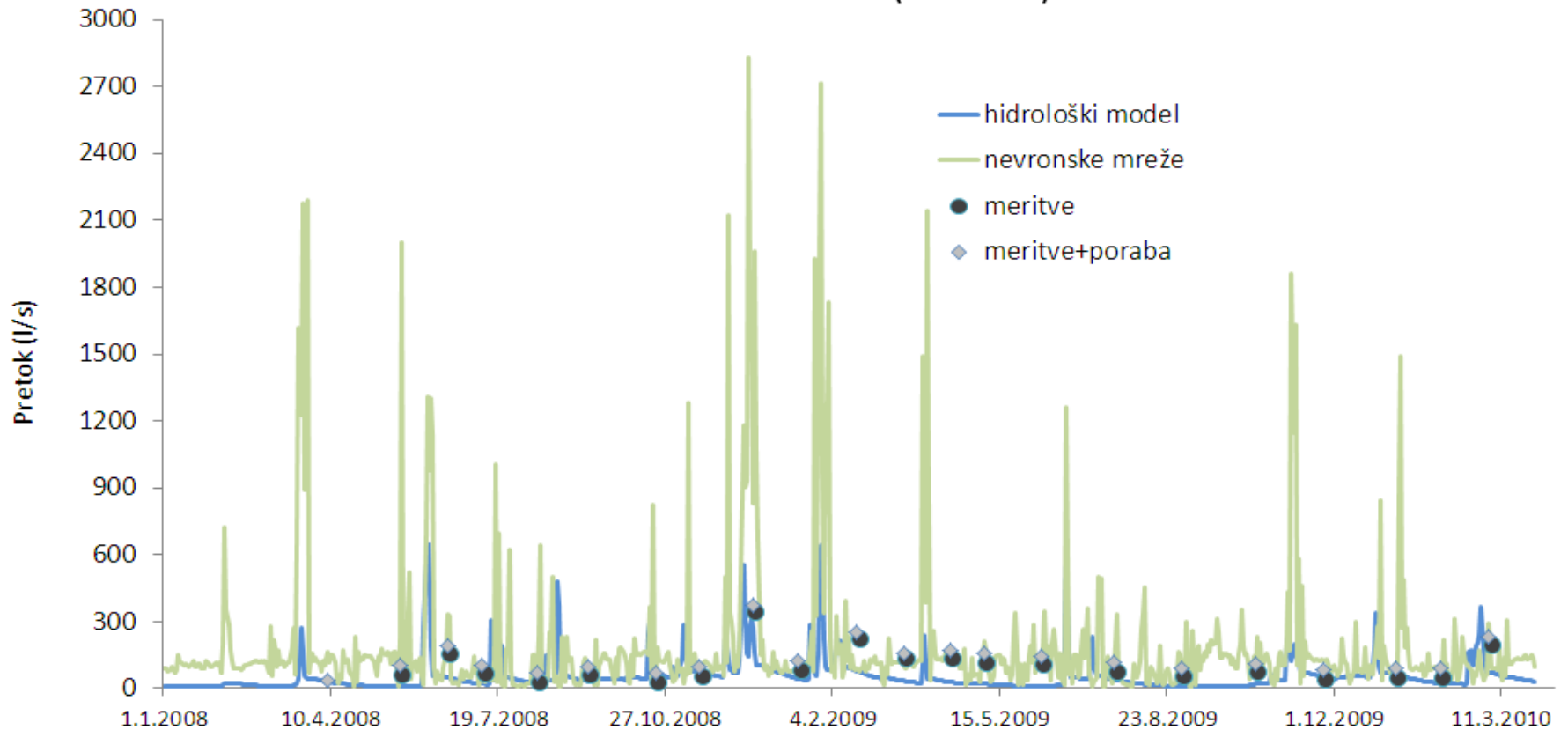
Hidrologicalical model was made by Mitja Janža, GeoZS

Iztok Bele (RSL-40)



Hidrological model was made by Mitja Janža, GeoZS

Studenice (RSL-18)



Hidrological model was made by Mitja Janža, GeoZS

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THANK
YOU

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