Gamma-ray survey in the geological research (KRNAP area, Czech Republic)

Měření gamaspektrometrie v rámci geologického mapování (Krkonoše, Česká republika)

Skácelová Zuzana

Česká geologická služba Jeseník

Research area (Czech Republic)

5 maps of scale 1: 25 000

- Harrachov
- Špindlerův Mlýn
- Horní Maršov
- Horní Úpa
- Horní Mísečky

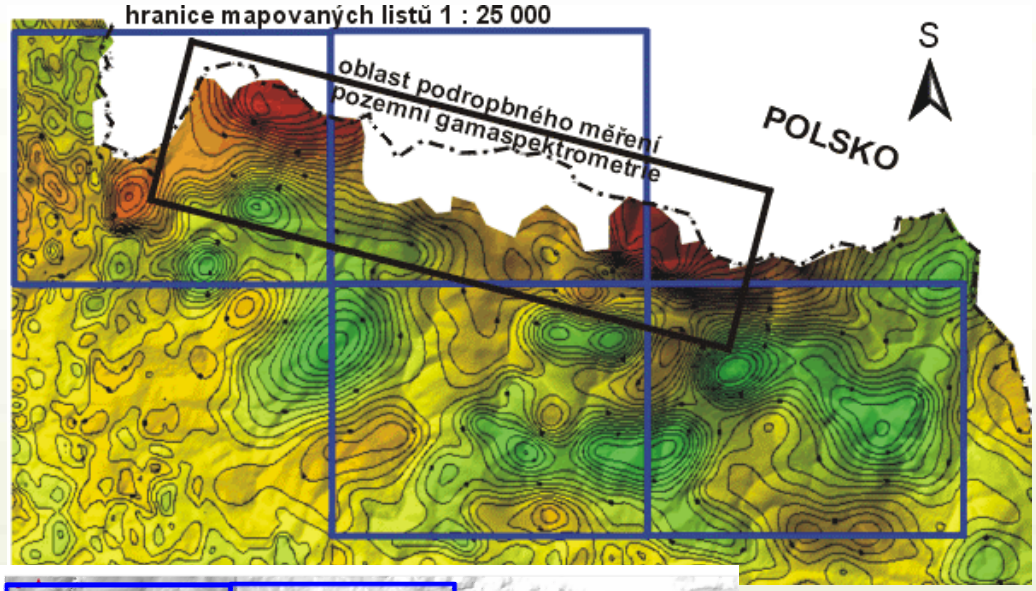
Aim of project:

Geological maps + text (geology, tectonic, geophysics, hydrogeology, geochemistry, engineering geology, deposits, interaction with enviroment)

Geophysical equipments

Gamma-ray spectrometers (GS 256 a GRM 2560)

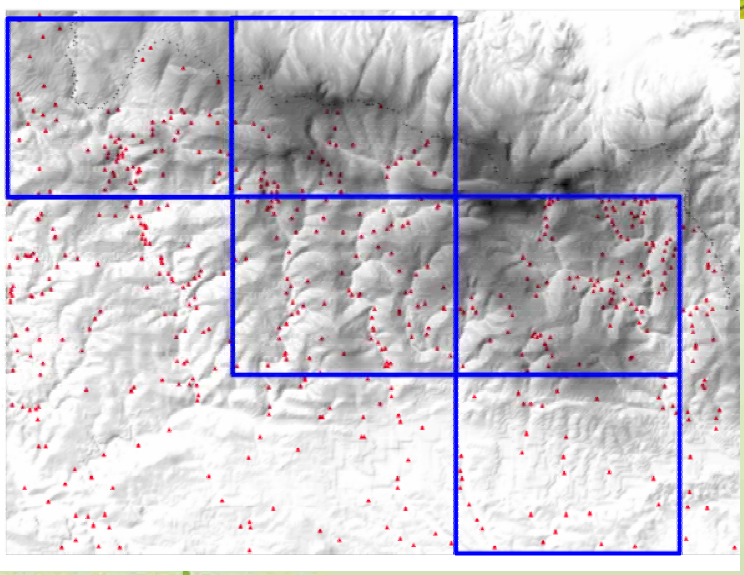
Proton-resonance magnetometer (PM-2)
Magnetic susceptibility meter

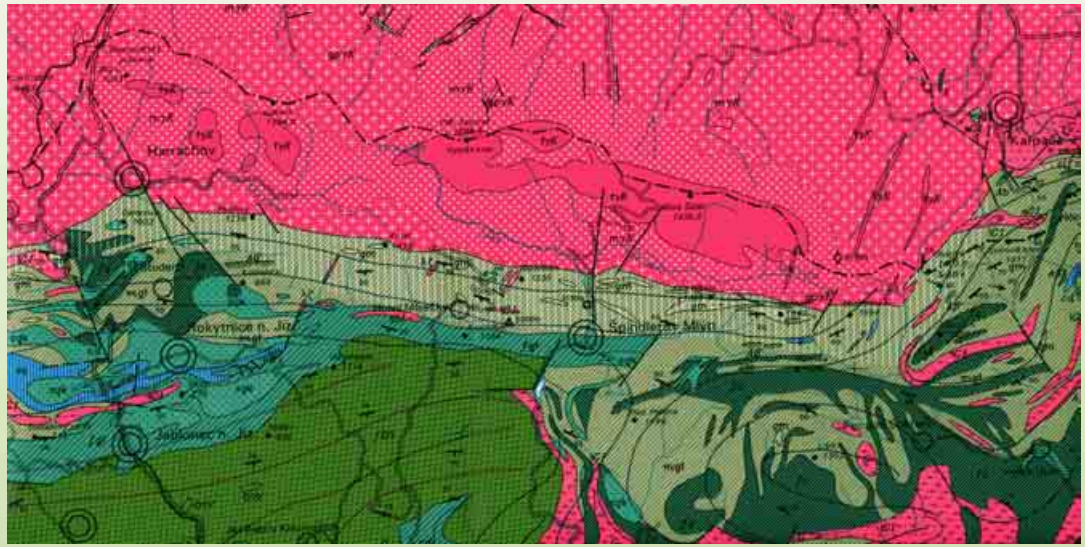


Gamma-ray surveying

Existing data:

- airborne data 1 : 200 000 (natural radioactivity)
- petrophysical data





Gamma-ray surveying in the field

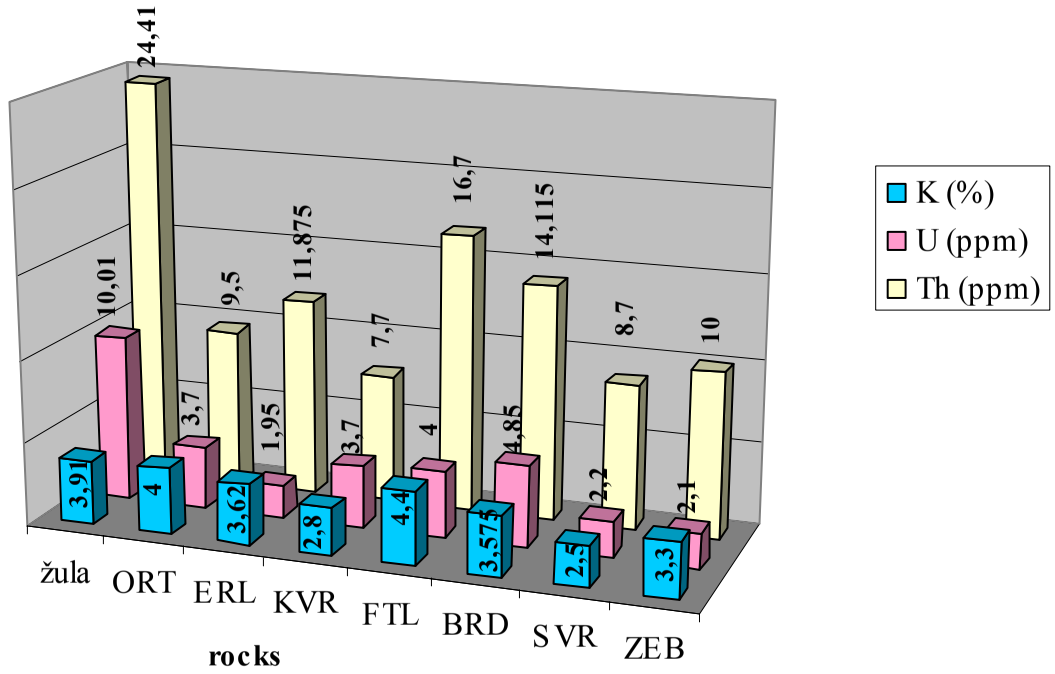
Measurement of the content of naturally occurring radioactive elements (potassium, thorium, uranium) on the rock in the field.

300 localities

Statistics (relation with laboratory measurements)

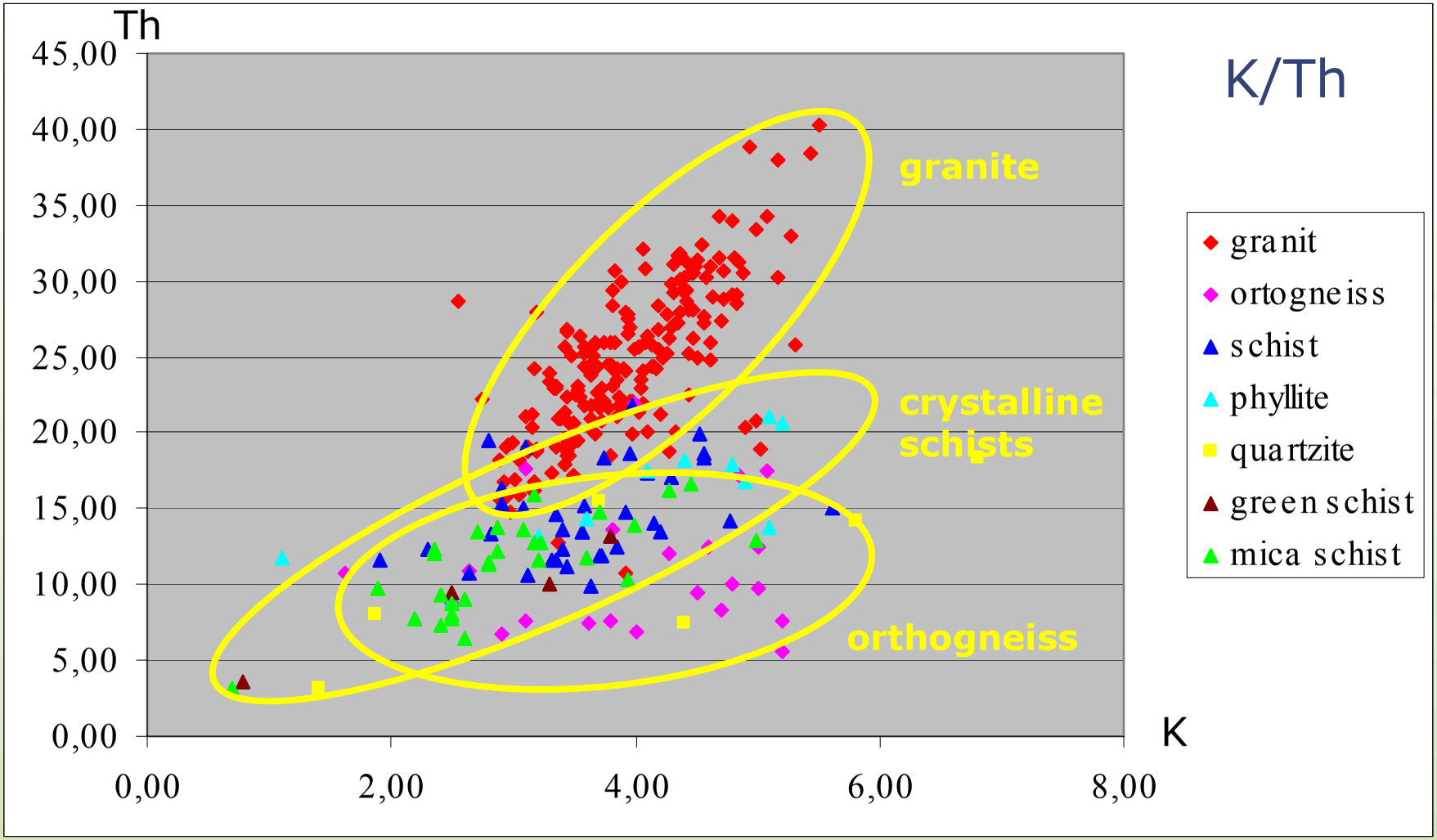
Rock	Contens of radioactive elements (median)		
	K %	Th ppm	U ppm
quarzite	2,8 (1,2)	7,7 (14,5)	3,7 (2,3)
erlan	3,1 (1,2)	11,9 (3,9)	2,0 (2,5)
crystalline schist	3,4	13,5	4,6
orthogneiss	4,0 (4,01)	9,5 (9,8)	3,7 (3,7)
granite	3,9 ± 0,5 (3,63)	24,2 ± 6 (26,15)	9,6 ± 5 (9,7)
granite (porphyritic)	3,82	24,08	8,78
granite (no porphyritic)	4,06	26,34	11,54
granite (aplite)	3,99	26,3	14,06

Crystalline schists – petrology problem?



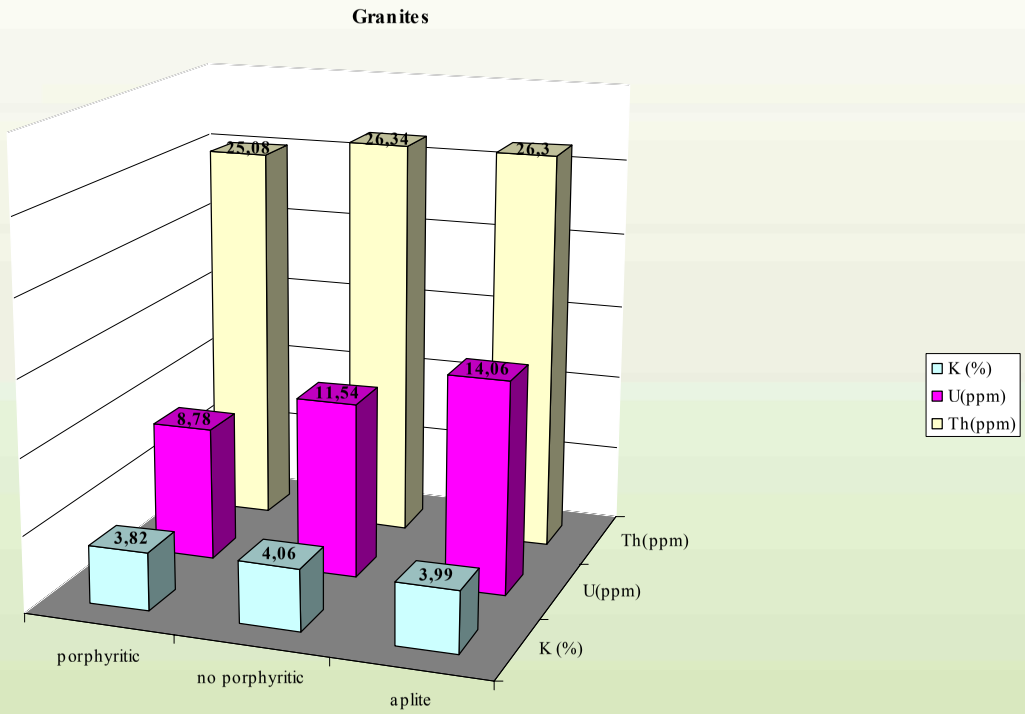
Laboratory measurements (1981) versus field gamma-ray surveying (2006):

- **FLT K = 2,82 % (4,4) U = 2,2 ppm (4,0) Th = 11,5 ppm (16,7)**
- **SVR 2,98 (2,5) 3,0 (2,2) 12,3 (8,7)**

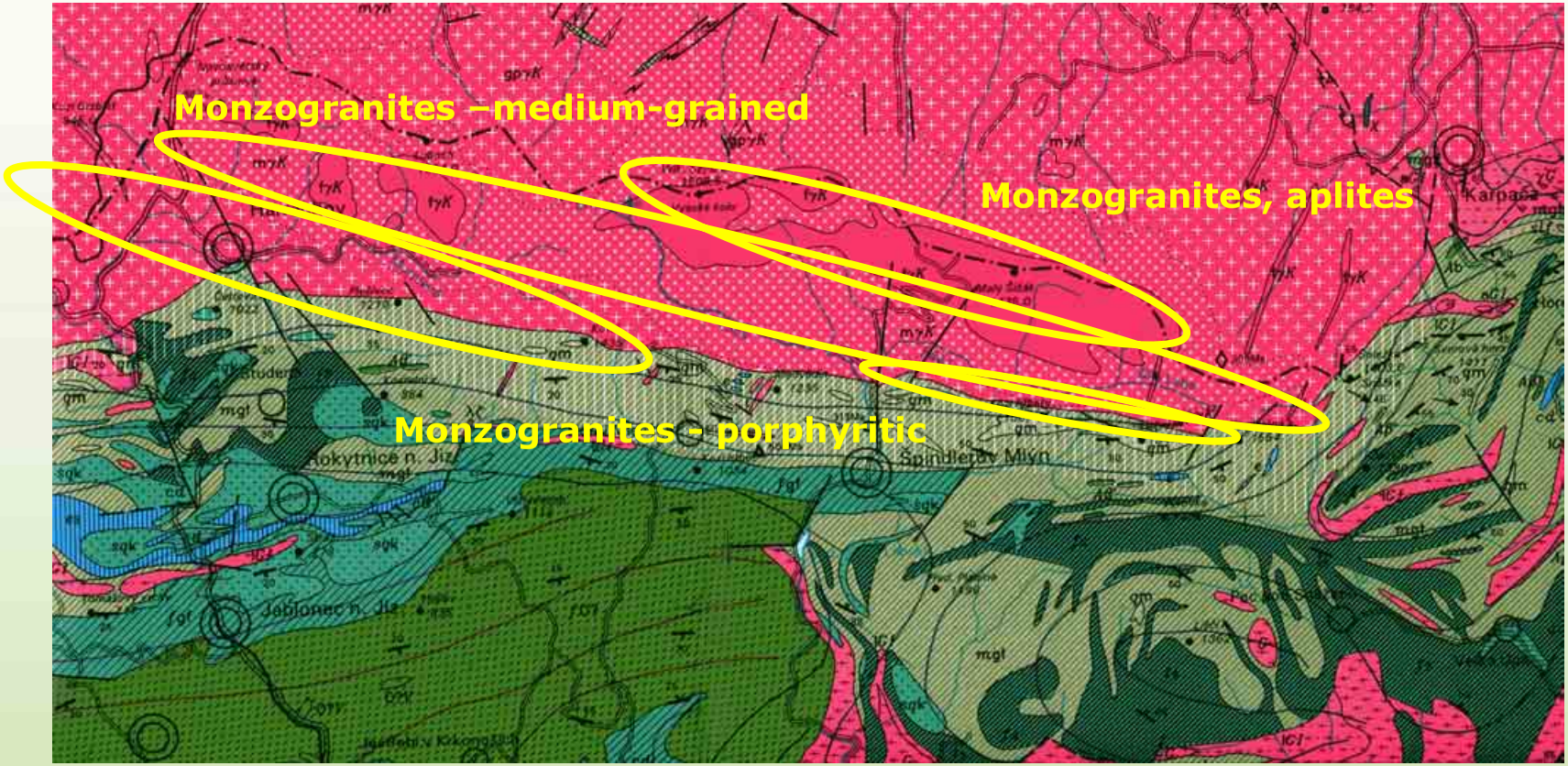

Th
45,00
40,00
35,00
30,00
25,00
20,00
15,00
10,00
5,00
0,00
0,00
2,00
4,00
6,00
8,00
K
granite
crystalline schists
orthogneiss
K/Th
granit
ortogneiss
schist
phyllite
quartzite
green schist
mica schist

Granite

Statistics – minimum contrast between types ?

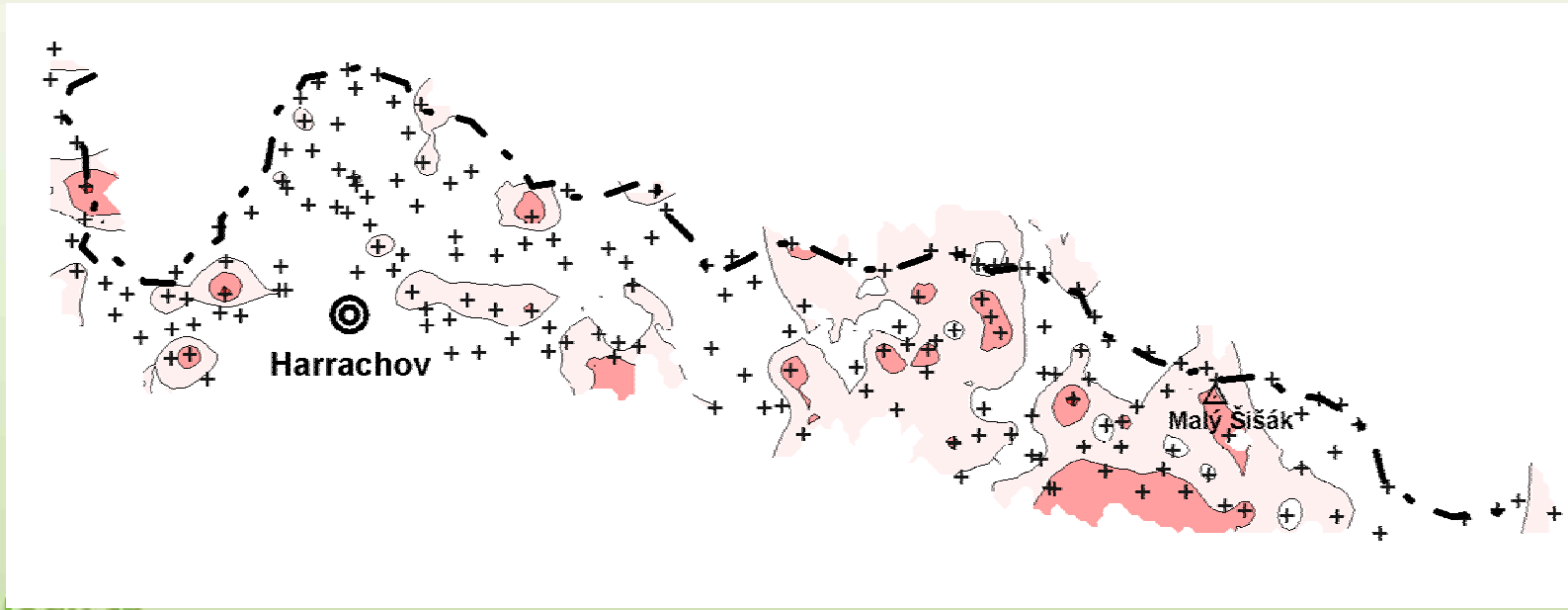


Reality in the field ?



Potassium (K %)

Anomalies over 4 % – monzogranite, aplite

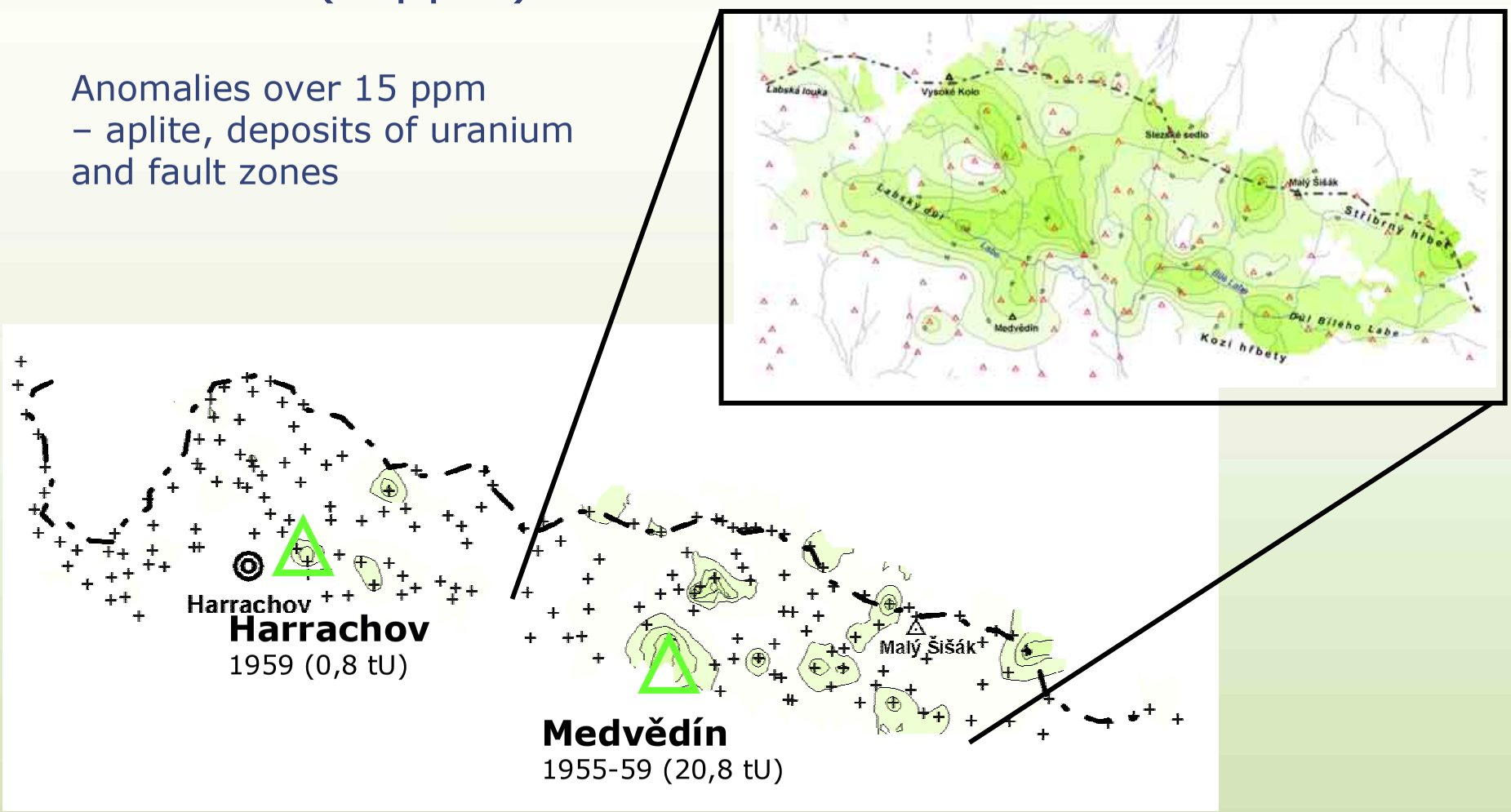


Thorium (Th ppm)

Anomalies over 25 ppm – monzogranite, aplite

Uranium (U ppm)

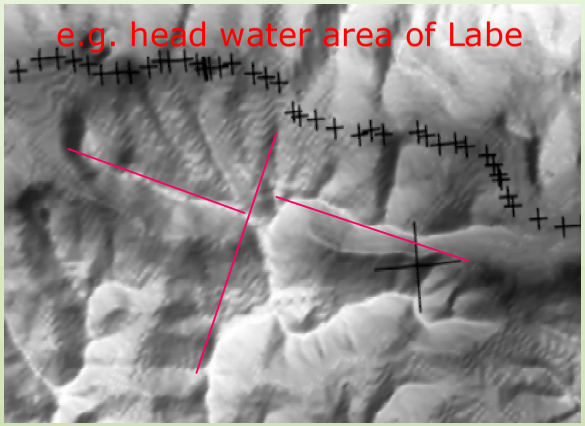
Anomalies over 15 ppm
– aplite, deposits of uranium and fault zones

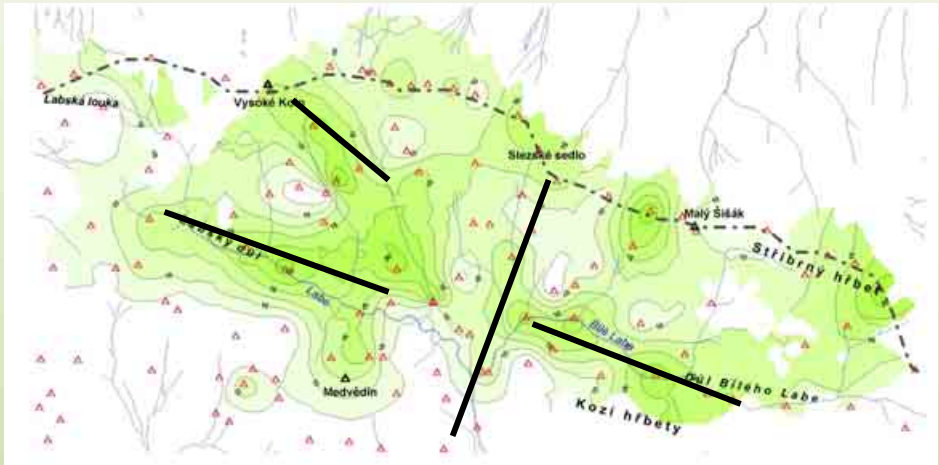


Relationship between U-anomalies and morfotectonical analysis (Lysenko 2006) – preliminary results

- ✓ **Morfotectonic analysis from Radarsat, ERS-2 SAR, Landsat 7ETM+satellite images**
- ✓ **Frequent coincidence in relation with U-anomalies:**

a) Linear structures of NW-SE trends (faults and borders of lithological units)
b) Structures of NE-SW trends – delimitation of the morphostructural blocks and faults





Thank you for attention