

A topographic map of Hungary and surrounding regions, showing the Carpathian Basin and the surrounding mountain ranges. The map is color-coded by elevation, with green for lower elevations and brown for higher elevations. The Danube River is visible flowing through the basin.

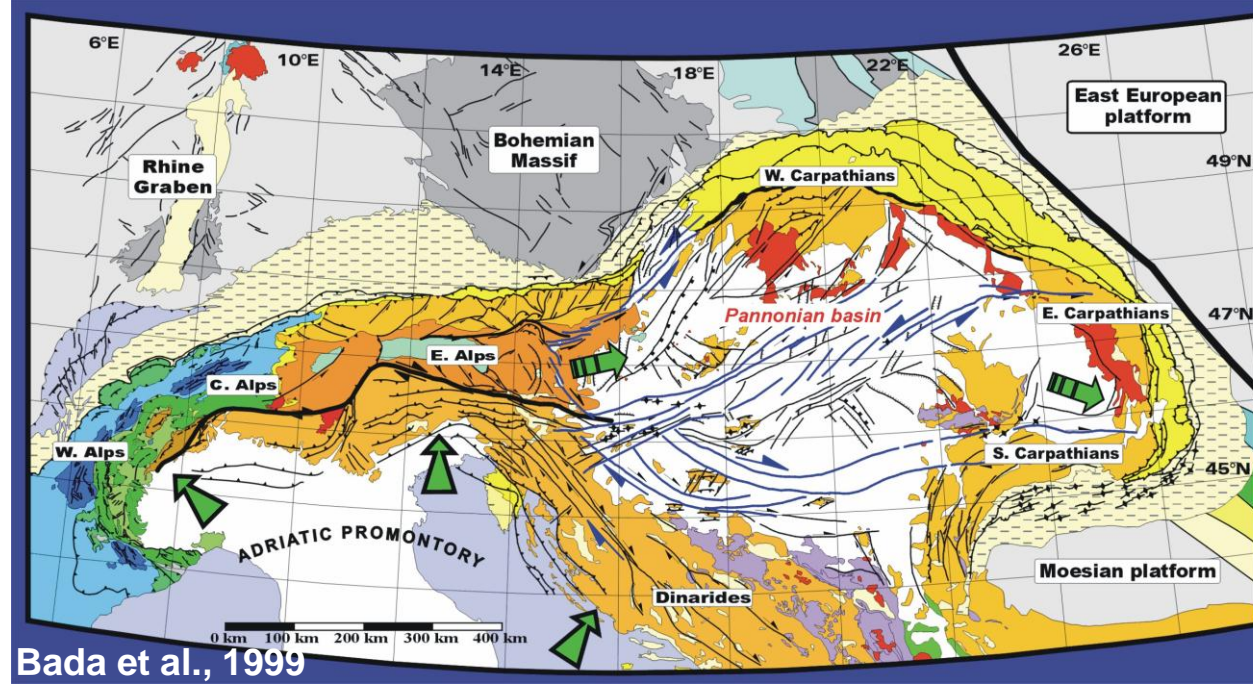
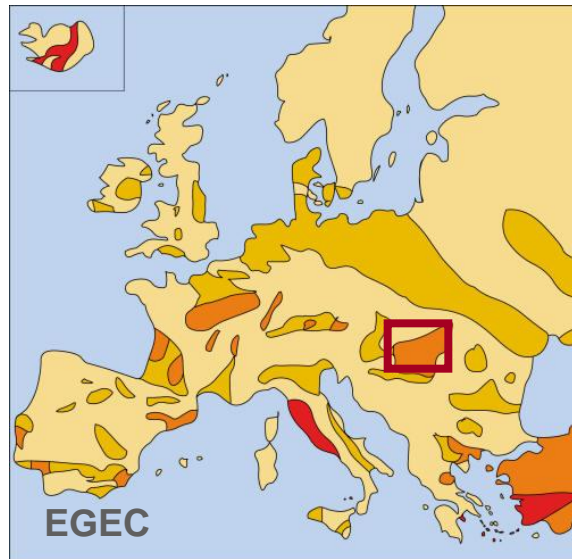
Regional geological database for deep geothermal - Hungary

Annamária Nádor

Geological Institute of Hungary (MÁFI)

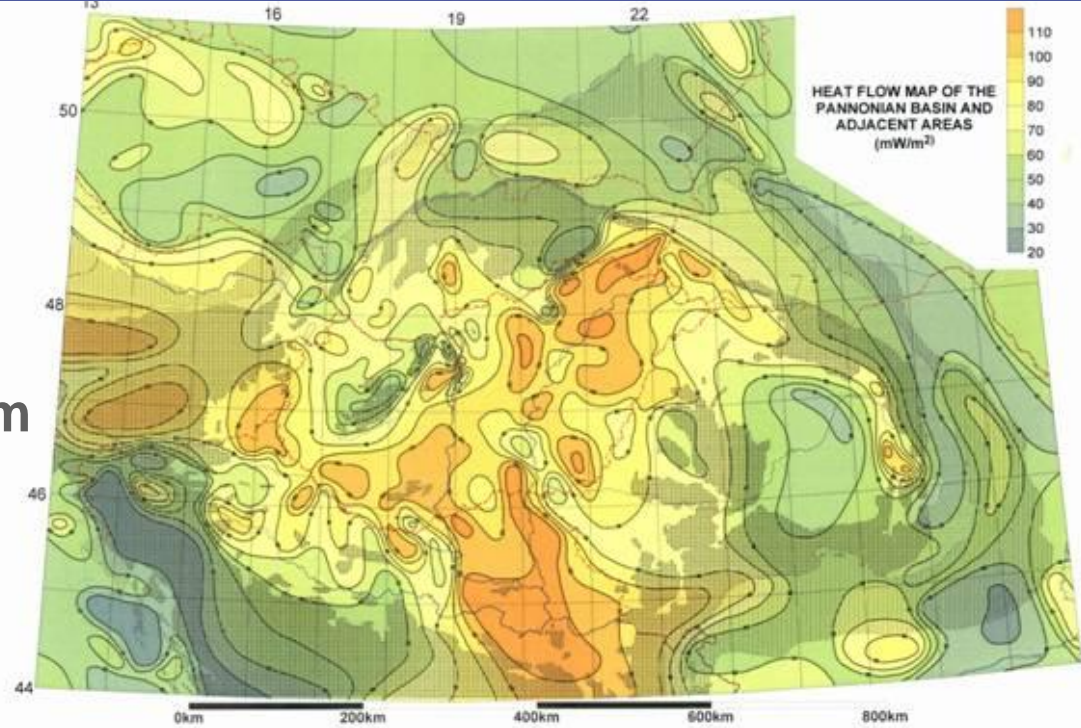
GEOELEC Workshop, February 29, 2012, Offenburg, Germany

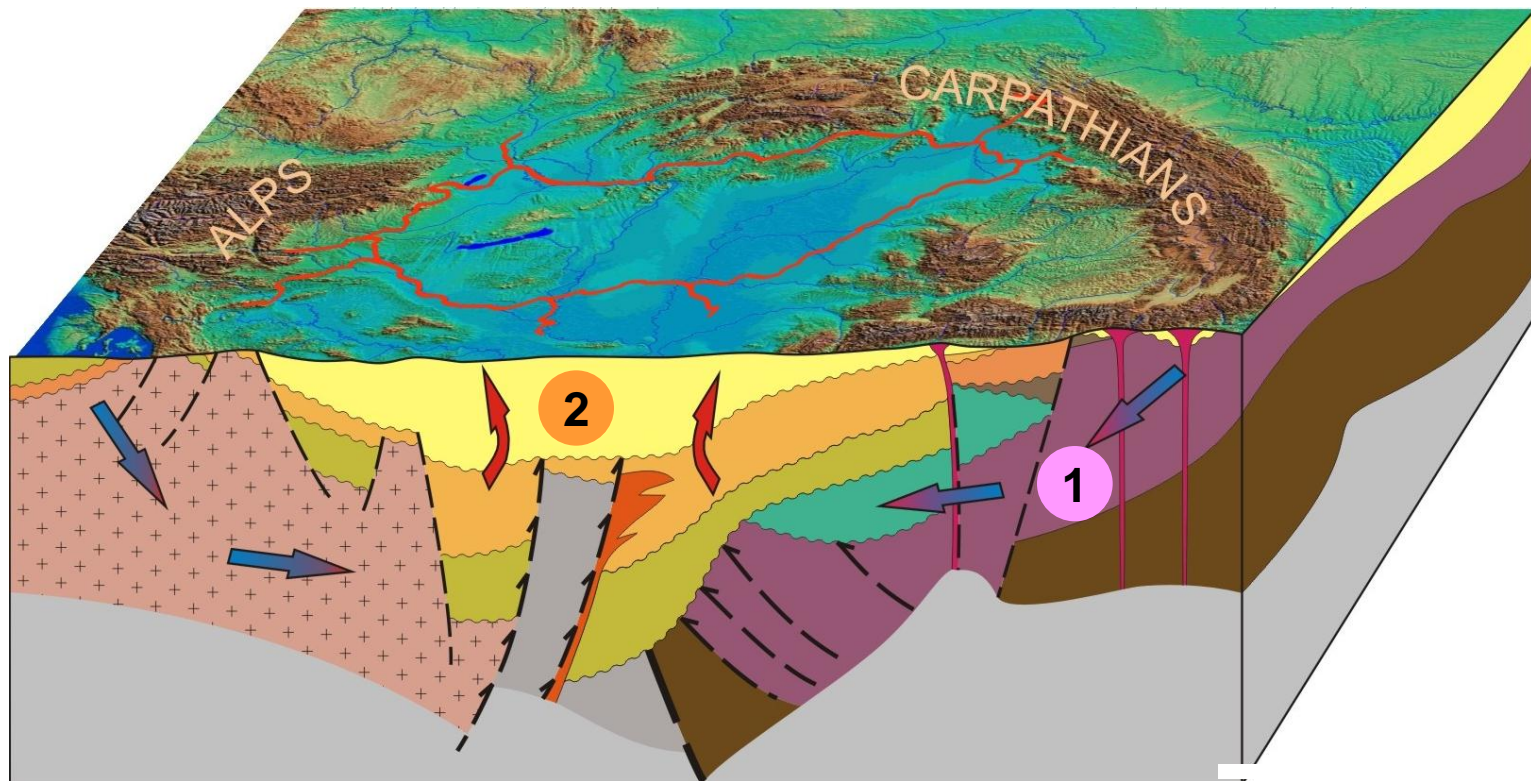
Pannonian basin



Average terrestrial heat flow: 100 mW/m²

Geothermal gradient: 45 °C/km



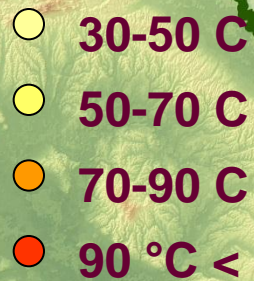


Main geothermal reservoirs	1. fractured, karstified basement rocks (Palaeozoic-Mesozoic)	2. porous multi-layered sandstones, shales (Upper Miocene-Pliocene basin fill)
thickness	80-100 m (upper part)	200-300 m
depth, temperature	>2500 m, >100-120 °C	800-2000 m, ~60-70 °C
porosity	< 5%	20-30%
permeability	500 -1500 mD	500 -1500 mD

~1300 thermal wells (>30 °C)

788 operating (2010)

Heat capacity: 654,6 MWt



National databases

Mining Law 1993. XLVIII: geological and geophysical data produced before 1992 are state owned and they are accessible free (*except for areas of production / exploration*)

- **Hungarian Office for Mining and Geology (MBFH):** authorised manager for state geological data (www.mbf.hu)
- All data are stored in the **National Geological and Geophysical Archive** handled by MBFH: mostly hard copy of reports (e.g. well-documentations), no uniform digital databases
- Although state data are free, but service fee for data handling, (compilation of various datasets, copies) is requested by MBFH
- MBFH: databases for state of exploration (boreholes + seismics) and mining related registers **including register of geothermal energy**
- Digital geological databases (boreholes, maps) available at the Geological Institute of Hungary (www.mafi.hu), digital geophysical databases at the Eötvös Loránd Geophysical Institute (www.elgi.hu)
- „Data policy”: no raw data, but value-added interpretations

Digital borehole database at MÁFI

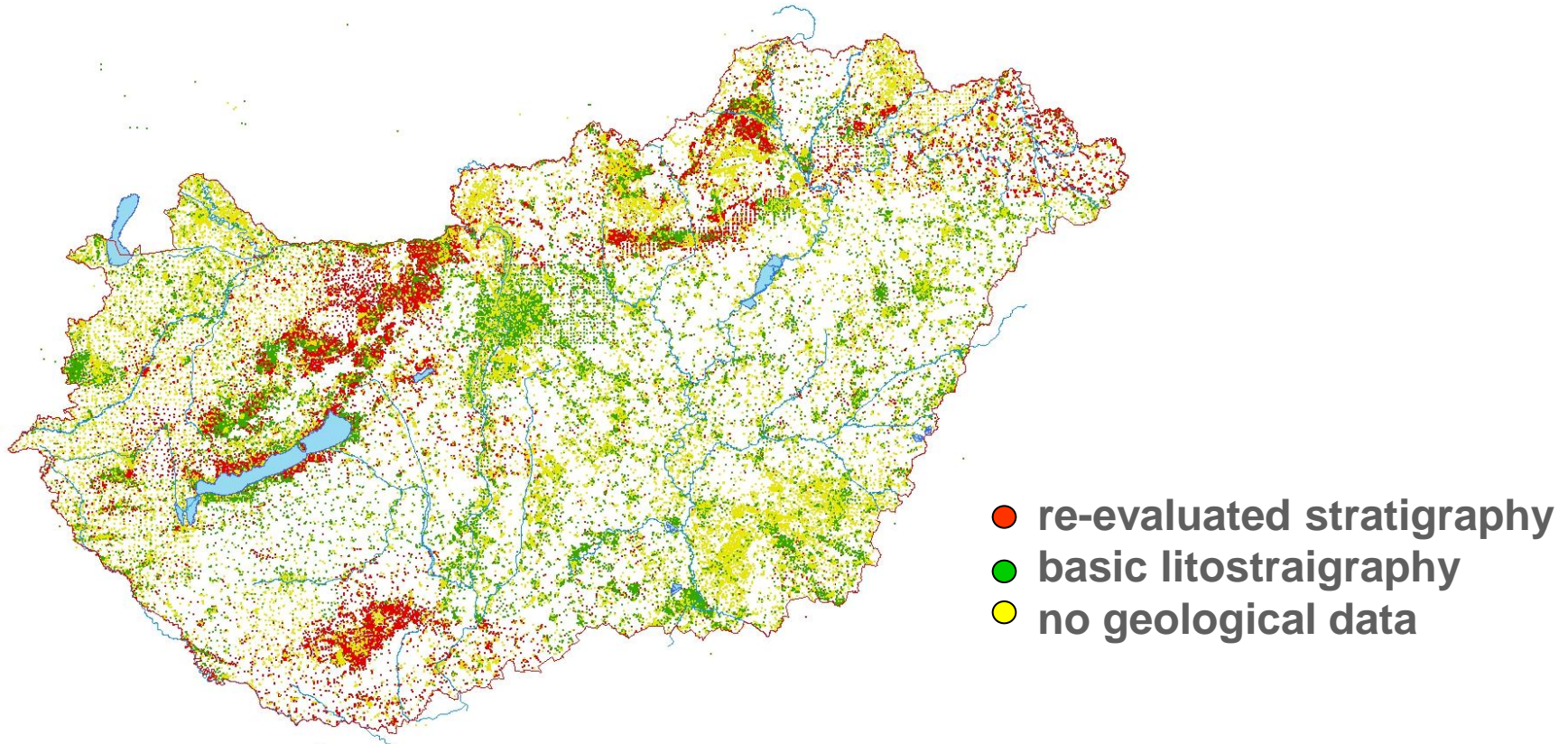
borehole database (~200 000 boreholes: basic data + geology)

~8 000 hydrocarbon wells

~n x 10 000 water prospecting wells including ~1000 thermal water wells

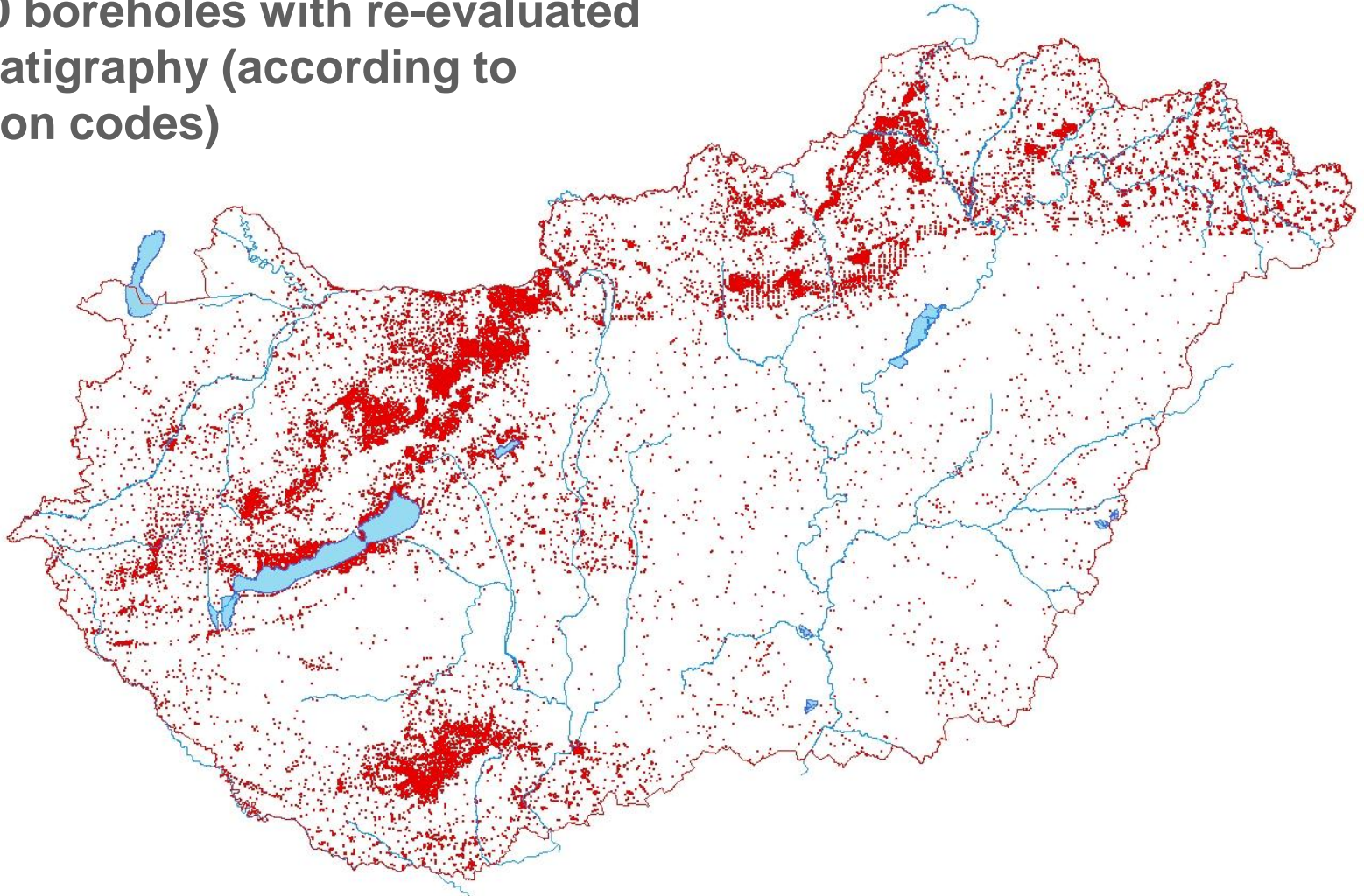
~n x 1 000 structural-geological exploration („basic boreholes”)

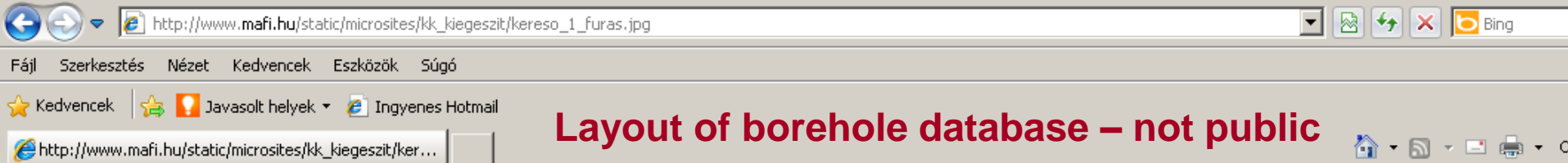
~n x 10 000 mineral resource exploration boreholes



Digital borehole database at MÁFI

~65 000 boreholes with re-evaluated lithostratigraphy (according to formation codes)





Layout of borehole database – not public

MAFI webklien - Windows Internet Explorer

http://www.mafi.hu/static/microsites/kk_kiegeszit/kereso_1_furas.jpg

Fáj Szerkesztés Nézet Kedvencek Eszközök Súlyó

MAFI webklien

Menü > Fúrás

Fúrás

Keresés Üres lap Mentett keresések M

☐ Keresés térképlapok alapján

Szelvény

☐ Keresés tetszőleges téglalap alapján (X>400000, Y<400000)

A téglalap északnyugati sarkának EOY koordinátája X Y

A téglalap délkeleti sarkának EOY koordinátája X Y

További keresési feltételek

Település

Fúrás jele

Fúrás szinonima, alias

Numerikus azonosítók

Megjegyzés

Fúrás típusa

☒ Csak átértékelt fúrás ☐ Csak adattári

Cél rétegszint

Projekt

Szakértő

Réteg földtani egysége

Fácies

Litológia (lista)

Keresés korok alapján (csak átértékelt fúrásokra)

Kor eleje (alja)

Query options

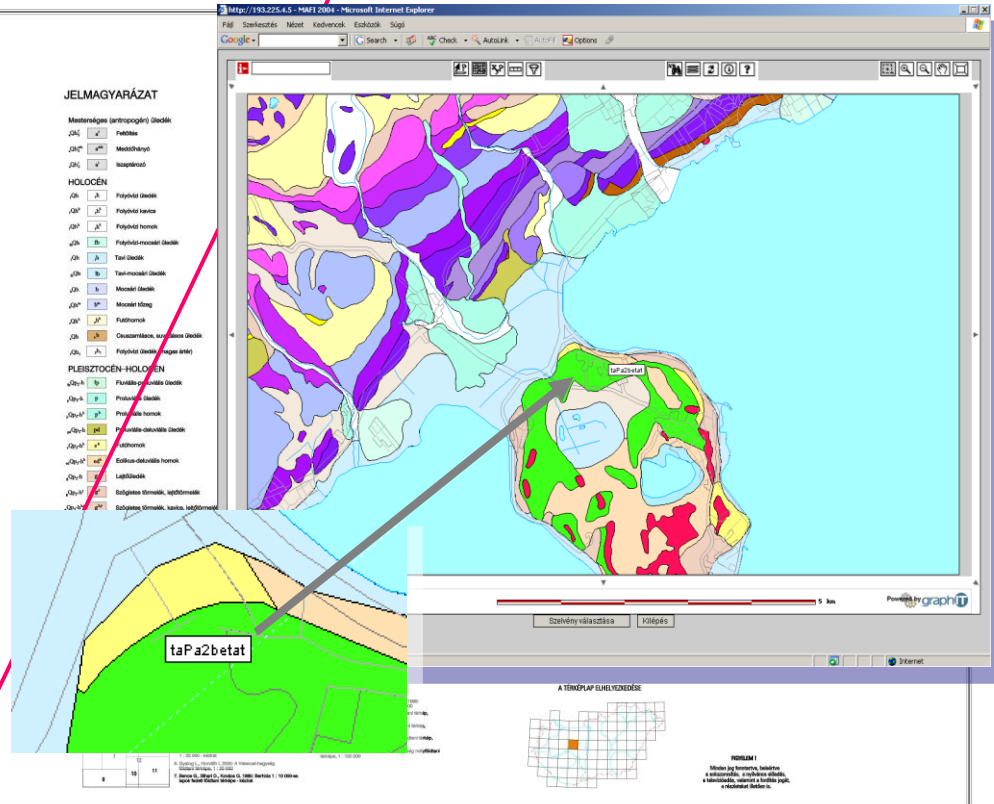
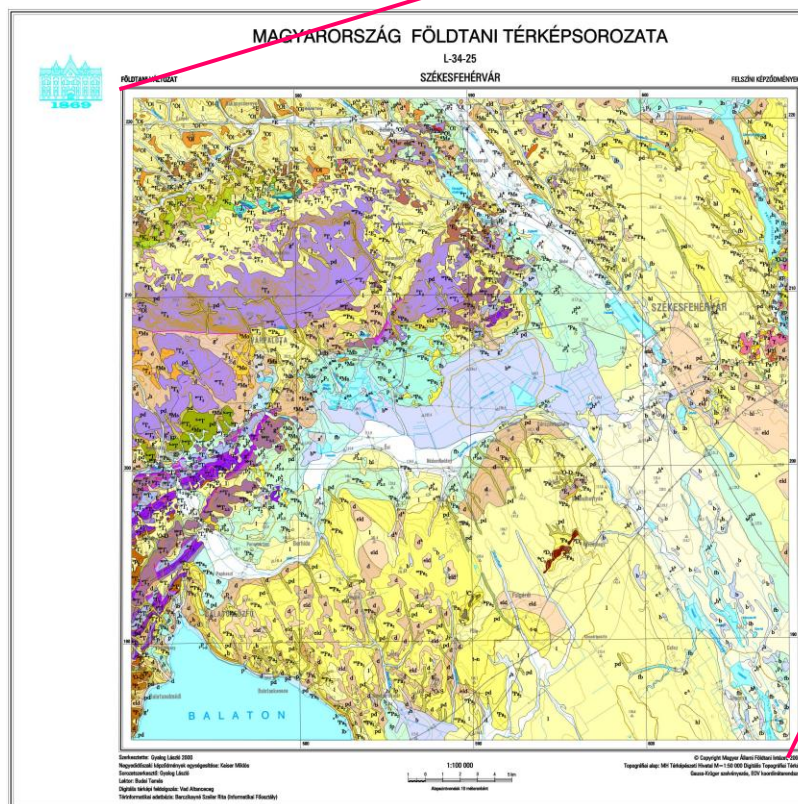
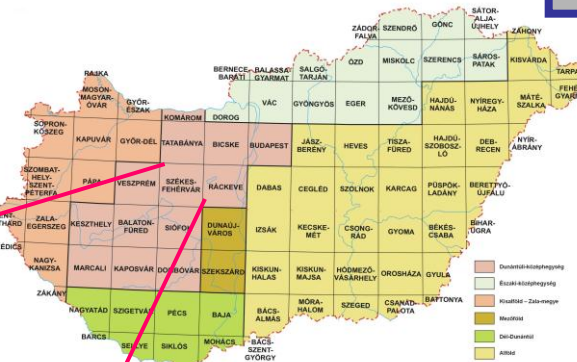
- ✓ coordinates
- ✓ settlement
- ✓ well
- ✓ formation
- ✓ facies
- ✓ lithology
- ✓ geological age
- ✓ Over / underlying strata
- ✓ + combined querys



Digital geological maps of Hungary

surface, various depths, thematic and regional maps at various scales

www.mafi.hu



Geophysical databases at ELGI

- ✓ Seismics (2D reflectional)
- ✓ Well-logs (partly hard copyl)
- ✓ Geoelectric
- ✓ Magnetotelluric
- ✓ Gravity
- ✓ Air geophysics

KINGA Közéltű Internetes Geofizikai Adatszolgáltatás - Windows Internet Explorer

https://kinga.elgi.hu/kinga_html/

Fájl Szerkesztés Nézet Kedvencek Eszközök Sűgő

Kedvencek Javasolt helyek Ingyenes Hotmail

KINGA Közéltű Internetes Geofizikai Adatszolgáltatás

Oldal Biztonság

Azonosító

Jelszó

Bejelentkezés

Menű

Nyitó oldal

Kapcsolat

Szakmai tartalom

Adatkeresés

Térképtár

Szakkönyvtár

Adattípusok

Alkalmazás

Geofizikai szótár

Kapcsolódó oldalak

Projekt ismertető

Útmutató

GYIK

Névjeggy

Látogatók száma: 94827

Letöltött lapok: 229406

Készült a smartPORTAL™ rendszer felhasználásával

MSZ EN ISO 9001: 2001 MS 0524-078

KERESHETŐ ADATTÍPUSOK ISMERTETÉSE

Ezen az oldalon a KINGA Portálon elérhető geofizikai adattípusokhoz kapcsolódó rövid módszertani ismertetőket találja meg.

Lyukszelvényezés, lyukgeofizika, mélyfúrás-geofizika, kapcsolás mérés

Szeizmika (reflexiós szeizmika, szeizmikus reflexió, most csak 2D, 1993-ig)

Potenciálterek (gravimetria, Eötvös-inga magnetometria)

Geoelektromos mérés (VESZ, TEM, MT, TE)

Légi geofizika

Monitoring (szeizmológia, geodinamika, geomágnesség)

Földfizika: Pannóniai Paleomágneses mérés

Geofizikai kutatási dokumentációk

Utolsó frissítés: 2010. 09. 02.

A KINGA portál a Nemzeti Fejlesztési Terv "Gazdasági Versenyképesség Operatív Program" GVOP-4.2.2. "Információs társadalom- és gazdaságfejlesztés" prioritásának támogatásával valósult meg 2006 és 2008 között.

Geothermal database

based on compilation of P. Dövényi at Eötvös Loránd University

- 4477 wells (drilled before 1993, mostly CH wells)
- deeper than 200 m, temperature higher than 30 °C
- 55 000 temperature measurements (T- depth datasets + simplified lithology. e.g. basement carbonate)
- Types of measurements:
 - ❖ steady state condition measurements (majority, mostly BHT)
 - ❖ measured during production tests (DST)
 - ❖ T data calculated from outflow water temperatures

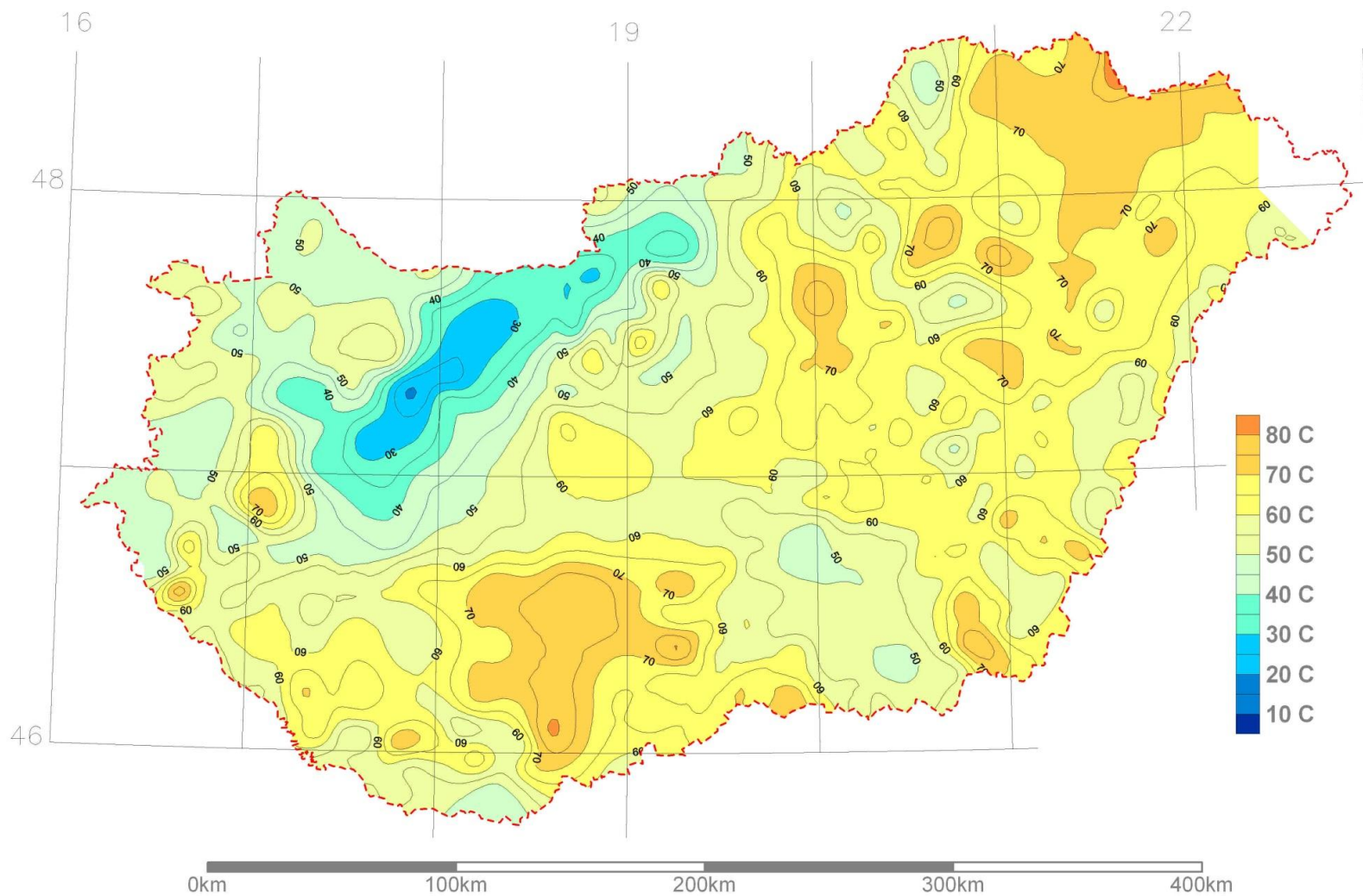
Fúrás neve és száma	Talp	EOV-Y	EOV-X	Z	Orig.Koord.
ALGYO - 112	2570 m	743043	100658	84 m	+ST

Réteg kora, litológája	feküje	Kalk?	Kód1-Kód2	Pe/Ps?	Pe%	"k"
Q+PL3 HA,AH	713 m	Kalkulál	2 - 4	Igen	69%	
PA2 H,HK,A,AL,AM	1949 m	Kalkulál	4 - 5	Igen	22%	
PA1 AL,AM,HK,MG,MMG	2538 m	Kalkulál	6 - 10	Igen	67%	
PZ GNEISZ	2570 m	Kalkulál	52 - 58	Nem		3,12 W/mK

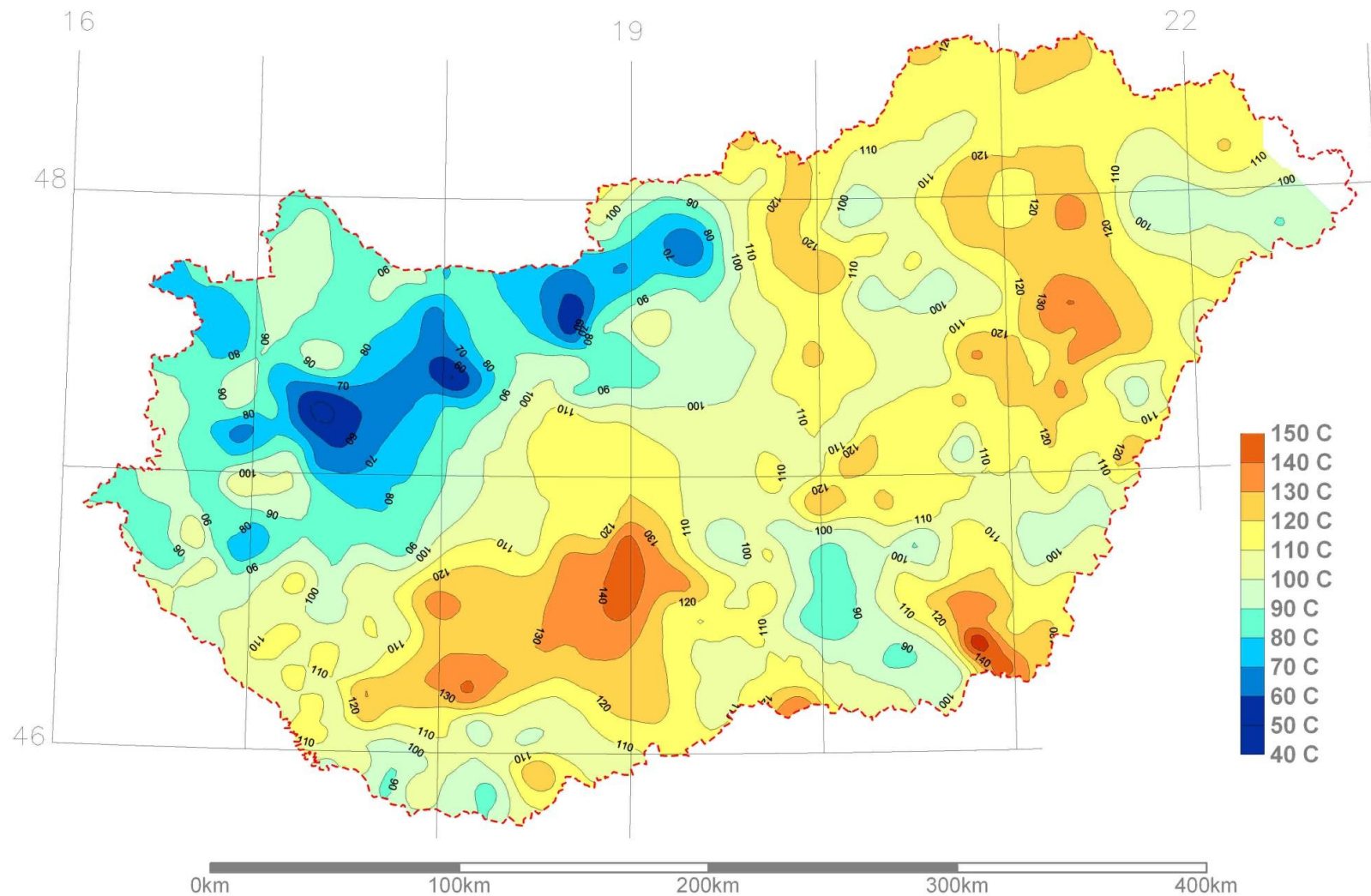
Mélység	Hőm.	Típus	Tól-ig	Hozam	Idő	Átm.	Ref.	Q1	Q	Zkalk	Tkalk
1713 m	89.0°	Kapac.	1732m - 1734m				Olajipari	4	1723 m	89°	
2420 m	122.0°	Kapac.	2441m - 2445m				Olajipari	4	2432 m	122°	
2570 m	101.0°	Talpfőm.		3	216mm	Olajipari		0			
2570 m	106.0°	Talpfőm.		6	216mm	Olajipari		0			
2570 m	110.0°	Talpfőm.		10	216mm	Olajipari		0			
2570 m	121.0°	Talpfőm.		20	216mm	Olajipari		4	2570 m	123°	

corrections needed!

Temperature at -1000 m bsl



Temperature at -2000 m bsl



Hydrogeological databases

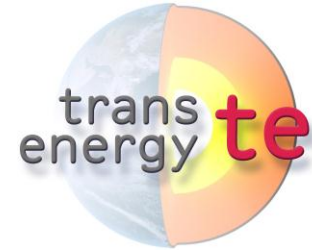
ownership, data handling, access rights are shared among water management authorities and institutions – not clear (Water Research Institute (VITUKI), Regional Inspectorates for Environment, Nature and Water („green authorities”), National Water Management Chief Authority (OVF), etc.

cadastral register of thermal water wells: basic data, screened intervals, static and dynamic groundwater level, yield, outflow temperature, status of well

quality and quantity databases of groundwaters related to the integrated river basin management plans (Water Framework Directive) (www.vizeink.hu)

Multi-lingual joint database (MS-Access)

438 parameters, 12 main parameter groups



general (borehole identification, purpose, ownership, etc.)

utilization (heating, balneology, agriculture, reinjection, etc.)

technical (borehole dimensions, screened intervals, etc.)

geology (lithology, stratigraphy, facies, etc.)

hydrogeology (permeability, porosity, pressure logs, etc.)

geothermics (BHT, T-outflow, thermal conductivity, etc.)

geochemistry

➤ **basic chemistry**

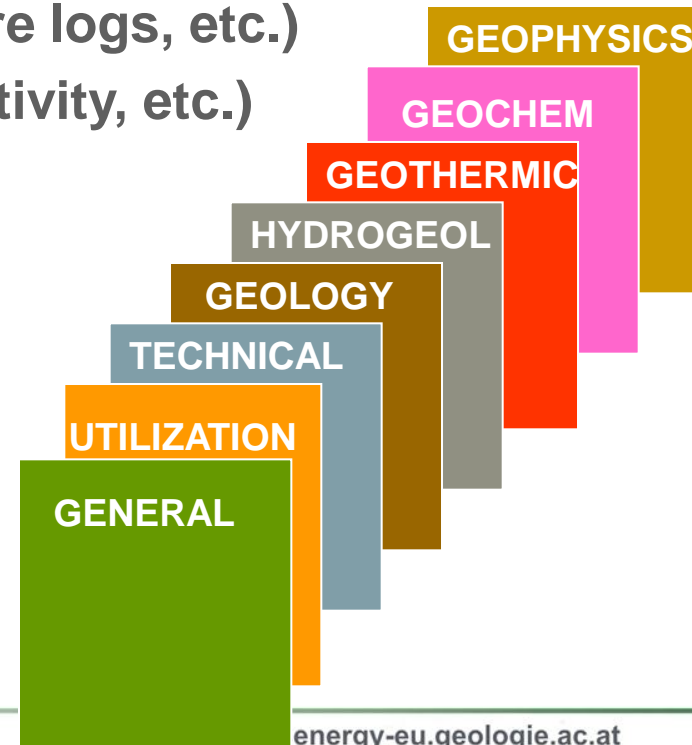
➤ **isotopes and noble gases**

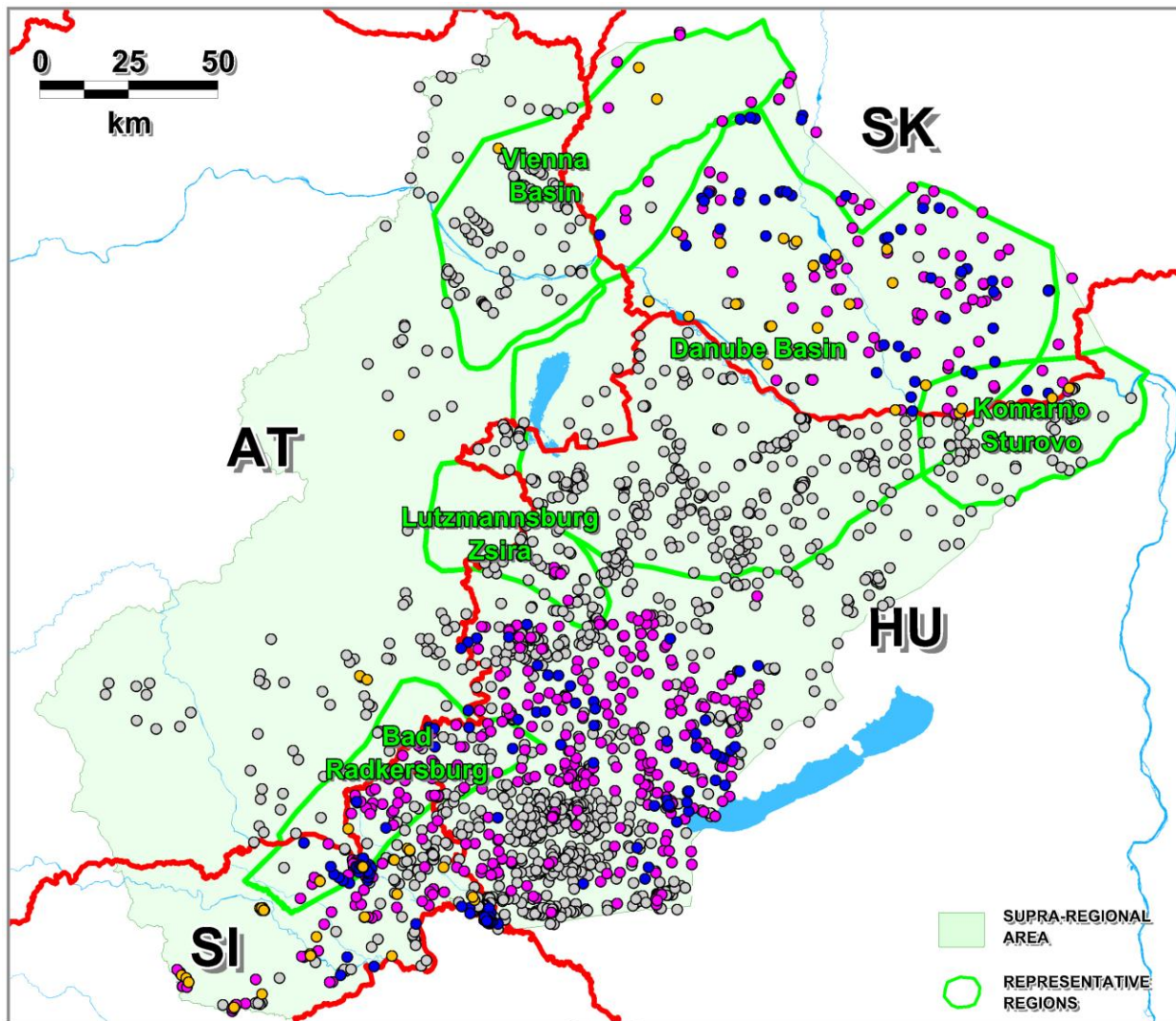
➤ **organic components**

➤ **trace elements**

➤ **gas analyses**

geophysics (borehole logs)



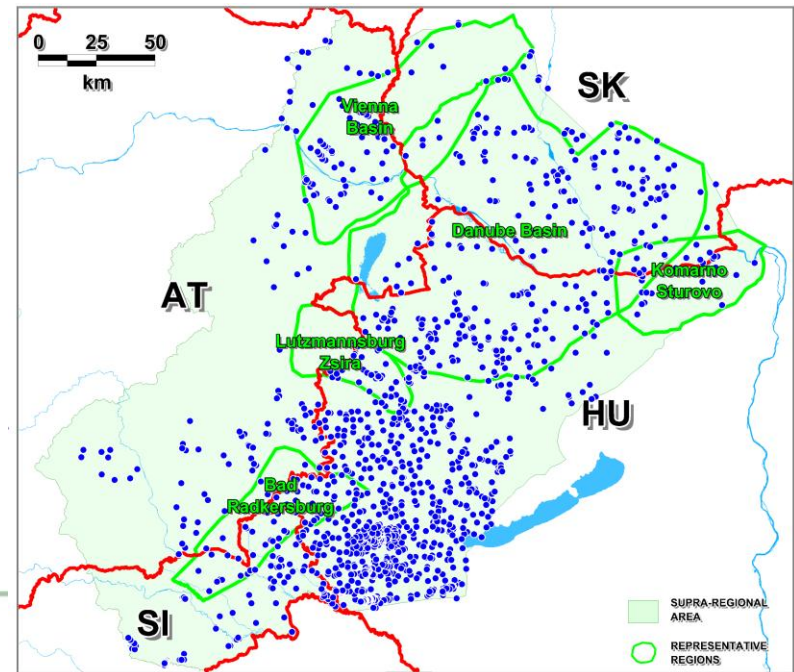
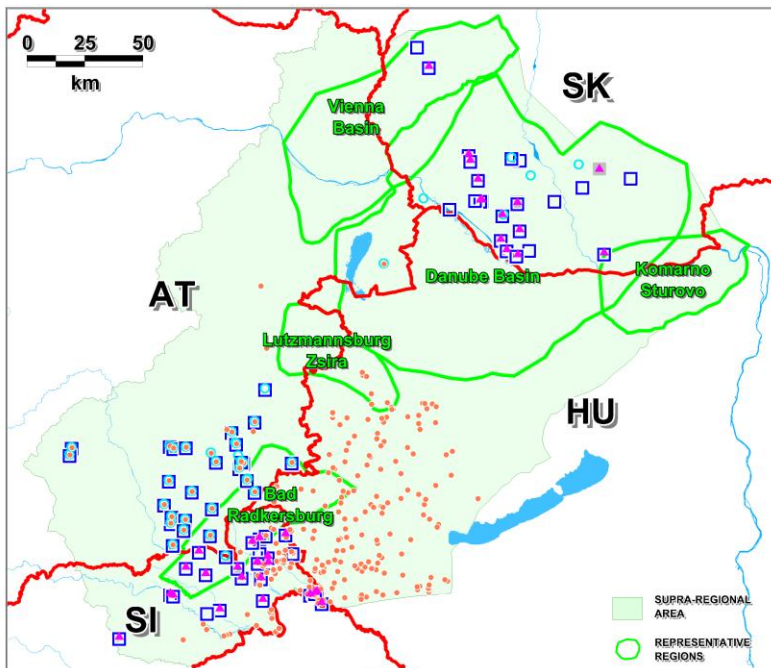


**Expert database:
~ 2500 boreholes**

Public database

selected parameters of general data, geology, hydrogeology, geothermal and chemistry

	groupe of parameters					Objects
	hydrogeology	geothermal	gas	chemistry	general	
ŠGÚDŠ	45	0	1	32	59	59
Geo-ZS	90	61	0	73	126	129
MÁFI	518	355	97	421	742	742
GBA	0	58	17	43	60	115
All	653	474	115	569	987	1045





T-JAM

Table name	Hungary		Slovenia	
	expert	public	expert	public
General data	792	158	404	99
Drilling purpose	792	158	439	103
Water use	792	158	427	123
Utilization parameters	148		293	
Geological records	10379	2606	477	477
Hydrogeology data	136	136	524	80
Water temperature at well-head	194		232	
Bottom hole temperature	310	179	132	0
Core thermal conductivity	0		124	
Surface heat flow density	0		26	
Chemical parameters	14498	4735	10885	3878
Pumping tests	0		416	

expert: 792 HU, 404 SI
public: 158 HU, 99 SI



T-JAM

Query in the multi-lingual geothermal database

Identify

GeneralData - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://akvamarin.geo-zs.si/t-jam_boreholes/GeneralData.aspx?ID=1535

Most Visited Getting Started Latest Headlines Suggested Sites Web Slice Gallery

T-JAM borehole database

GeneralData

T-JAM SI HU

Naložba v vašo prihodnost
Operacija delno financirana Evropska unija
Evropski sklad za regionalni razvoj

REPUBLIKA SLOVENIJA
SLUŽBA VLADE RS ZA LOKALNO SAMOUPRAVO
IN REGIONALNO POLITIKO

RAZVOJNA AGENCIJA
SINERGIJA
DEVELOPMENT AGENCY

GeoZS GEOLOŠKI ZAVOD SLOVENIJE

LEA Pomurje

T-JAM borehole database

General Data Geology Hydrogeology BHT Chemistry

Borehole ID	1535	Drilling Purpose	hydrogeological borehole
Ime objekta	Hévíz	Utilization	bathing and swimming (including balneology)
Locality	Hévíz		
Latitude			
Longitude			
X SI			
Y SI			
Z SI			
X EOV	507755		
Y EOV	162265		
Z BALTI	138		
Azimuth			
Dip			
Drilling Depth	117.9		
Casing Depth	117.0		
Drilling Start			
Drilling End	1960		
Screen Top	70.0		
Screen Bottom	117.0		
Object Manager	State		
Object Status	production borehole		
Comment			

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Search string

search>

Project

Partners

Project results

Current

Contact

Photo gallery

2. meeting of project group

Second coordination meeting of project group was February 11 2010 in Sombately.

več...

Kick off meeting

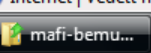
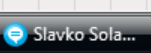
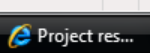
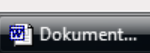
Project partner have been participating at a kick off meeting at September 10 2009 in Moravske Toplice.

več...

Project results:

- Structural-geological model
- Geochemical, geothermal, hydrogeological model
- Mathematical model
- Recommendations for the use of the best technology practice
- Definition of the potential transboundary thermal water flow direction
- Suggestion of the delineation of the potential common thermal groundwater body
- Identification of the transboundary geothermal potential
- Guidelines on the joint transboundary management of the potential transboundary thermal aquifers
- Guidelines on the joint transboundary monitoring of the potential transboundary thermal aquifers
- Demonstration heat pump
- Publication of the joint final results on the internet in form of 3-lingual publication
- Joint 3-lingual publication on the CD-s
- 2-lingual leaflets on the best technology practice for heat pumps
- Project webpage.

The results of the project will require making better prognoses on the reasonableness of deep research for the capture of thermal water in cross border interest areas. The project will contribute to establishing common border geothermal aquifers, which have formed between Styria, north-east Slovenia and west Hungary. Enhanced cooperation and joint management of cross-border aquifers is of strategic importance to the neighbouring country. The joint promotion and publications of the project will achieve a higher level of awareness among the general public on both sides of the border.



<http://transenergy-eu.geologie.ac.at>



