

SAPHYR

Swiss Atlas of Physical Properties of Rock

Progress Report 2013

SAPHYR Project

Compilation of all existing data on physical properties of rocks present in the Swiss Alps (not restricted to the borders of CH).

Digitization of the data using a geographical frame (GIS)

Measurements on rock samples from regions with low coverage

Physical properties

- ★ 1) Density and porosity ✓
- ★ 2) Seismic properties and their anisotropy
- 3) Magnetic properties and their anisotropy
- ★ 4) Thermal properties
- ★ 5) Gamma radiation, heat production
- ★ 6) Permeability
- 7) Electrical properties

Working Strategy

- Aim:
 - representative and complete physical properties for all rock types
- First step:
 - literature values whenever possible
- Second step:
 - **measure new/update literature values** where necessary

2012- 2013

2013

Working Team 2013

Dr. Alba Zappone

Coordination

30%

Michaela Erni

Master in Geology, ETH
Lab measurements & GIS

70%

from June 1st 2013

Dr. Nicola Tisato

Post Doc
Mechanical and electronic systems designer

20%

from May 1st 2013



Plan 2013

- 2012 produce new data, especially V_p & V_s from rock types and/or locations poorly represented in statistics and final map

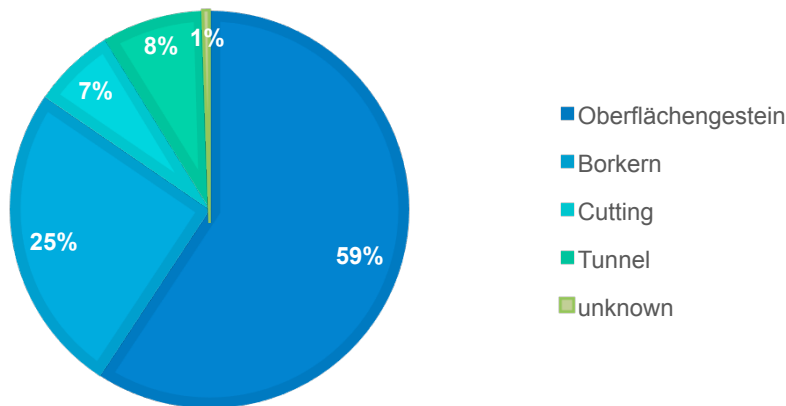
- 2013 Update all available data collected over the years
Add more information details
Enhance quality of the datapoints: check for errors & uncertainties
Search for more literature data

Results 2013

1	A	B	C	D	E	F	G	H	L	N	O	P	U	Y	Z	AA	AB
Code	Prbz	Lokalitaet	Aufschlu	X-Koo	Y-Koo	Höhe	Tiefe	Gesteinstyp	Geologie	Tektonik	Vp0	Vs0	p bulk	p grain	p f		
2651	BF_IV-51			O 664790	76991			kinzingtonite			6.19			2907	2965		
2652	BF_IV-52			O 670381	67376			paragneiss			6.31			2683	2718		
2653	BF_IV-53			O 676880	72474			paragneiss			5.95			2671	2705		
2654	BF_IV-54			O 694915	84652			dolomite			5.93			2640	2661		
2655	BF_IV-55	Strona-Ceneri		O 688650	94135			orthogneiss			5.70			2647	2695		
2656	BF_IV-6	Valle d'Ossola		O 671425	94199			mafic granofels			7.37	3.95		3067			
2657	BF_IV-7	Valle d'Ossola		O 670212	94761			pl-hb-gneiss			7.10	3.91		3108			
2658	BF_IV-8	Val Sesia		O 654936	74622			metagabbro			6.56	3.74		2790			
2659	BF_IV-9	Val Sesia		O 657353	75506			metagabbro			6.65	3.76		2942			
2660																	
2661	Burlini&Fountain 1993																
2662	IV-71 (GBL24)	Gurro, Valle Cannobino		O 685300	103300			Metapelite		Zone d'Ivrée	6.64						
2663	IV-72 (GBL261)	Cortaccio, Brissago area		O 696750	108700			Metapelite		Zone d'Ivrée	6.35	3.61					
2664	IV-73 (GBL 262)	Cortaccio, Brissago area		O 696750	108700			Metapelite		Zone d'Ivrée	6.18						

1	A	B	C	D	E	F	G	H	L	N	O	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
Code	Prbz	Lokalitaet	Aufschluss	X-Koo	Y-Koo	Höhe	Tiefe	Gesteinstyp	Geologie	Tektonik	λ t	λ pt	λ st	A λ t	λ f	λ pf	λ sf	A λ f	λ m	c m	c f		
2275	2240 P 1/3	Pfaffnau	BK	632708	231789	25	475.50	Feinsandstein	Tertiär, Untere Süsswassermol	Plateau-Molasse	2.33												
2276	2241 P 2/3	Pfaffnau	BK	632708	231789	22	478.50	Mittelsandstein	Tertiär, Untere Süsswassermol	Plateau-Molasse	1.31					2.85	2.25	1.27					
2277	2242 P 2/4	Pfaffnau	BK	632708	231789	22	478.50	Mittelsandstein	Tertiär, Untere Süsswassermol	Plateau-Molasse	1.12					2.89	2.69	1.80				767	1142
2278	2243 P 3/1	Pfaffnau	BK	632708	231789	19	481.15	Mittelsandstein	Tertiär, Untere Süsswassermol	Plateau-Molasse	0.96					1.94	1.71	1.14					
2279	2244 P 3/2	Pfaffnau	BK	632708	231789	10	481.15	Mittelsandstein	Tertiär, Untere Süsswassermol	Plateau-Molasse	1.13					2.89	2.46	1.17					
								nglomerat	Tertiär, Obere Meeresmolasse	Plateau-Molasse												4.15	762
									Tertiär, Obere Meeresmolasse	Plateau-Molasse												3.58	709
									Tertiär, Obere Meeresmolasse	Plateau-Molasse												3.25	631
									Tertiär, Obere Meeresmolasse	Plateau-Molasse												3.33	706
									Tertiär, Obere Süsswassermol	Plateau-Molasse												3.44	683
									Tertiär, Obere Meeresmolasse	Plateau-Molasse												3.72	752
									Tertiär, Obere Meeresmolasse	Plateau-Molasse												2.93	660
									Tertiär, Obere Meeresmolasse	Plateau-Molasse												2.64	731
								nglomerat	Tertiär, Obere Meeresmolasse	Plateau-Molasse												3.42	720
									Tertiär, Untere Süsswassermol	Plateau-Molasse												2.12	758
									Tertiär, Untere Süsswassermol	Plateau-Molasse												2.96	739
									Tertiär, Untere Süsswassermol	Plateau-Molasse	2.17					2.93							
									Tertiär, Untere Süsswassermol	Plateau-Molasse	2.11					2.73							
									Tertiär, Untere Süsswassermol	Plateau-Molasse	2.48						3.41	2.57	1.33				
									Tertiär, Untere Süsswassermol	Plateau-Molasse	2.27					2.82							
									Tertiär, Untere Süsswassermol	Plateau-Molasse	2.61						3.23	2.51	1.29				

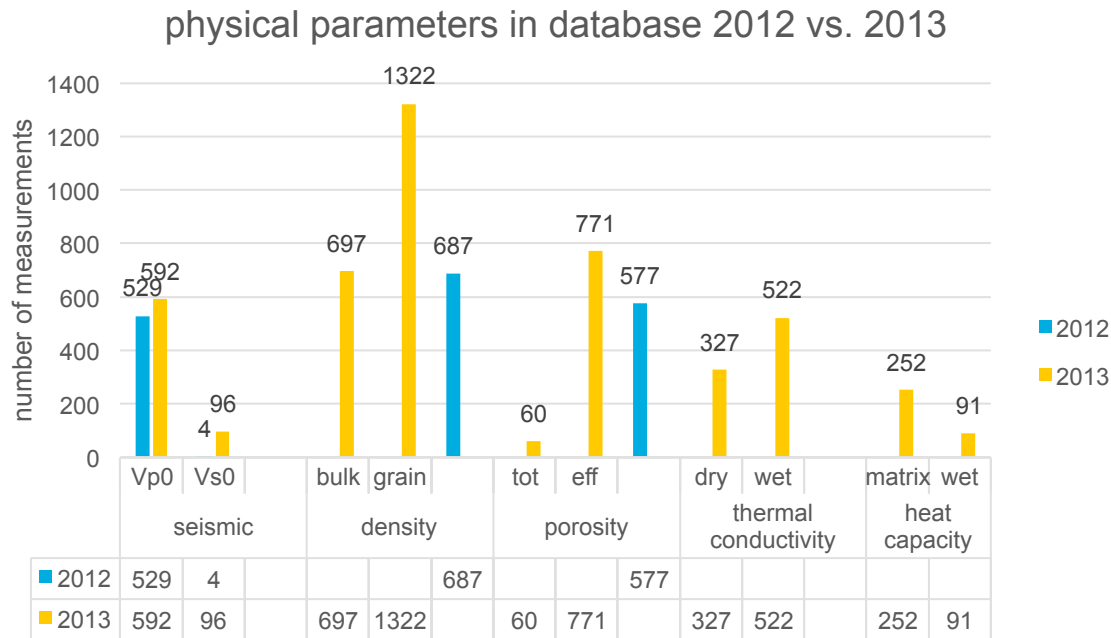
DISTRIBUTION OF SAMPLE POINTS



2012: 1067 tot. data points
 2013: 3073 tot. data points ⁶



Results 2013

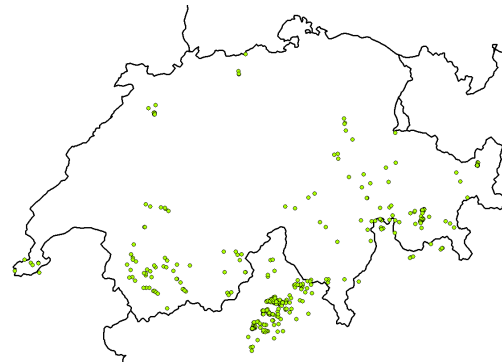
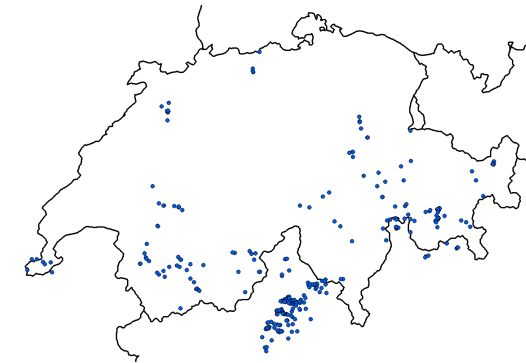


The new database contains more information about a sample:
 (2012) Rock type → (2013) rock type, sample details, location, type of outcrop, geologic & tectonic information

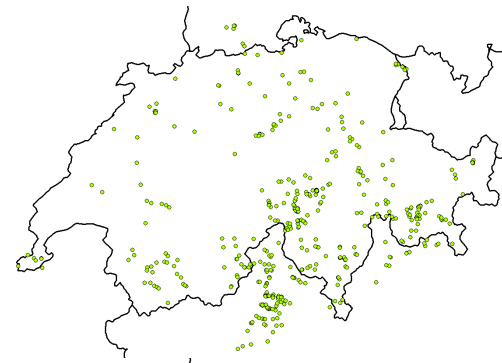
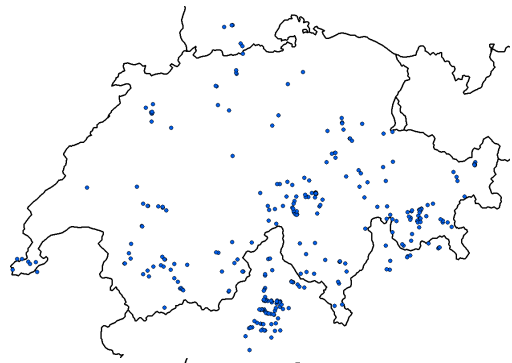
The new database is more specific and therefore more precise:
 (2012) Density → (2013) grain density & bulk density

2012

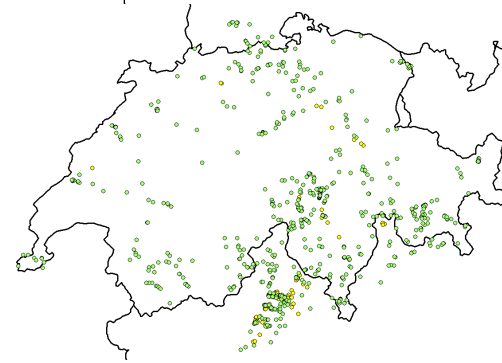
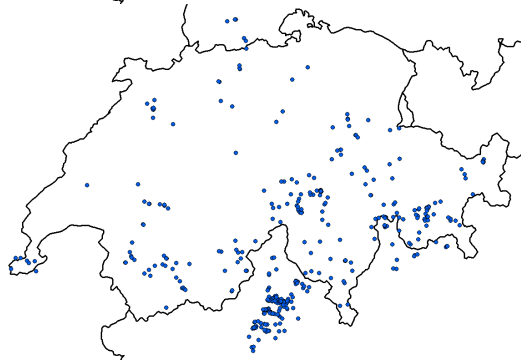
2013



Vp0



porosity



density

More work done in 2013

- Continuous updating of the ultrasound velocity Rig
- Implementaion of velocity measurement system in the permeability rig
- Attenuation module

(Nicola Tisato)

→ Example picture

Continuous implementation in the software of data processing

(Claudio Madonna)

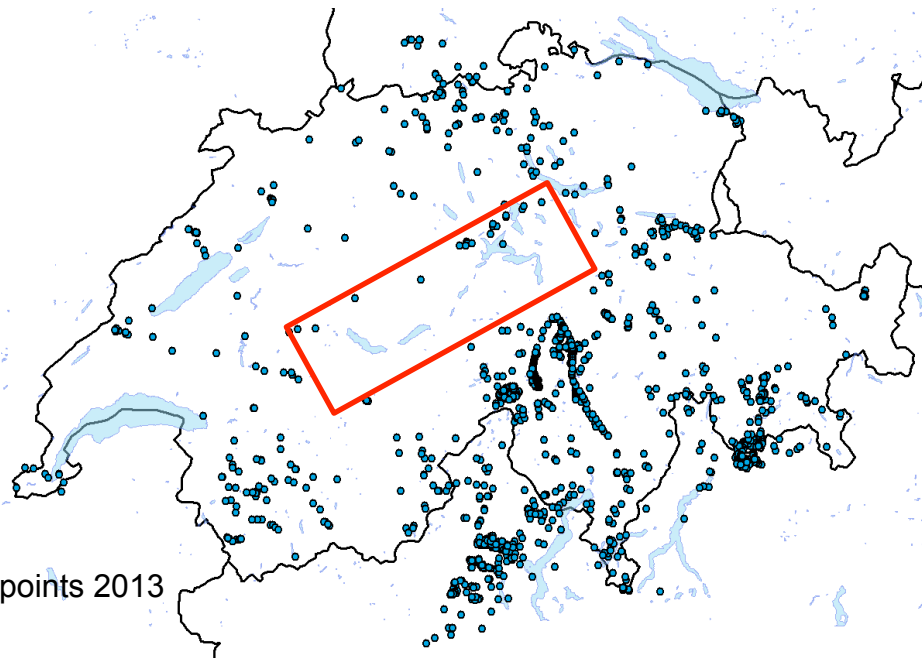
→ Example picture



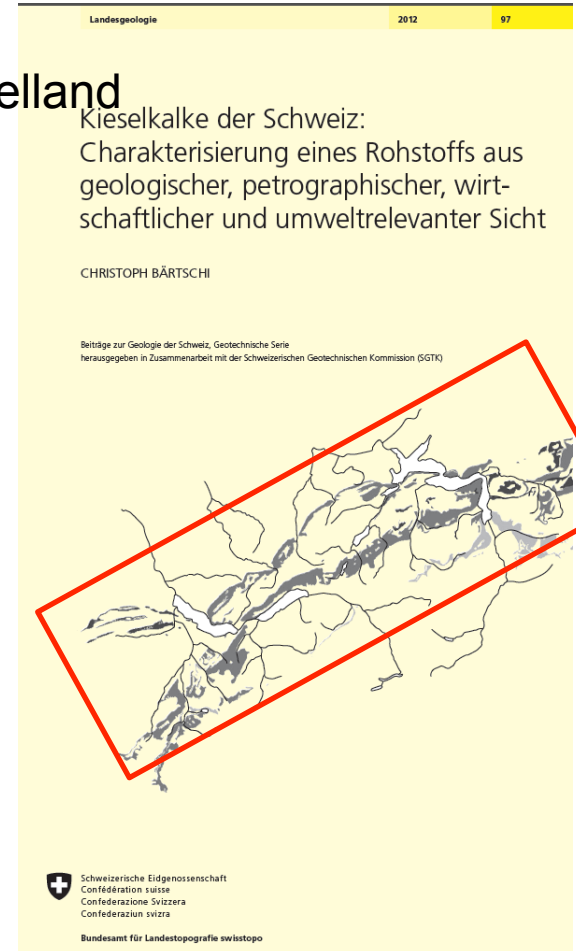
Plan for 2014

New measurements on the kieselkalke, mainly in the Mittelland
 Number of kieselkalke in database at the moment <10

Bärtschi/ offer us all samples to do more measurements
 Description, coordinates already done



All datapoints 2013





Outreach

2012 ✓

2013

European Geoscience Union, Vienna, April 2011

- Oral presentation: «The Swiss Atlas of Physical Properties of Rocks (SAPHYR): progress and developments»

- Annual report

- Paper on Swiss Journal of Geosciences

in submission to Swiss Journal Geosciences

- SGPK web- page

ready to hand in

Zappone A., Brunjin R, (2013) Density map & VP_0 velocity map in: “ Geologie Schweiz – das Wissen aus dem Untergrund» Beres M. Ed Swisstopo , Bern, 132pp

- Annual report

