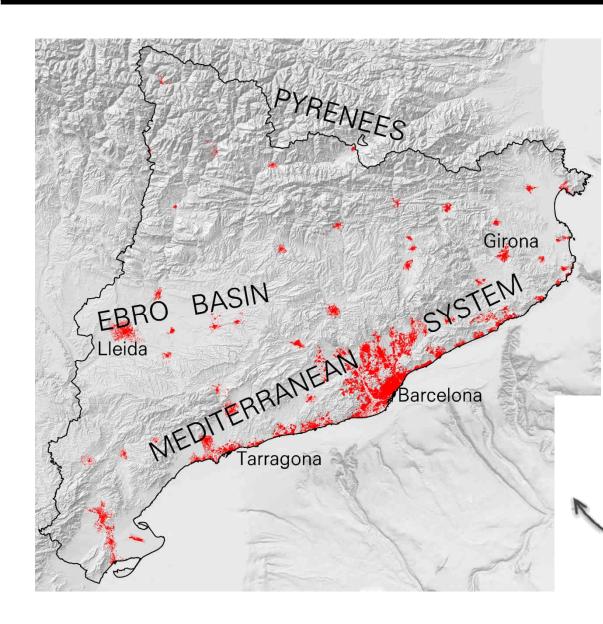


INTRODUCTION



- TARGETED STUDIES
- SYSTEMATIC CHARACTERIZATION



AREAS PLANNED TO BE MAPPED

- 1:5000 scale
- County capitals and town>10000 inhabitants
- Total of 131 towns and 2200 km²
- 260 maps
- 60% belong to Barcelona metropolitan area



METHODOLOGY

COMPILING PREVIOUS DATA

ACQUIRING NEW DATA





ANALYSIS OF THE DATA



INTEGRATION IN A DATABASE

Previous geological maps and geological studies from IGC



Other geologic maps and geoscientific studies



Applied geological studies (e.g. geotechnical)



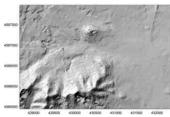


Ancient cartographic documents

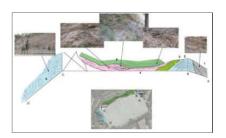




Actual cartographic documents



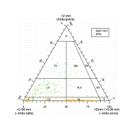
Location and characterization of outcrops

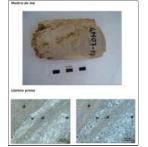




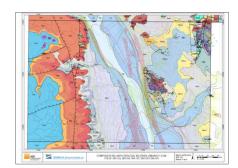
Sample analysis (petrography, geophysical and geochemical)

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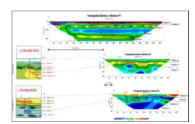


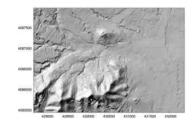


Preliminary geological maps



Other complementary works





- Definition of the operative geological units
- Homogenization of borehole, outcrops and sample data
- Improve of the geological maps



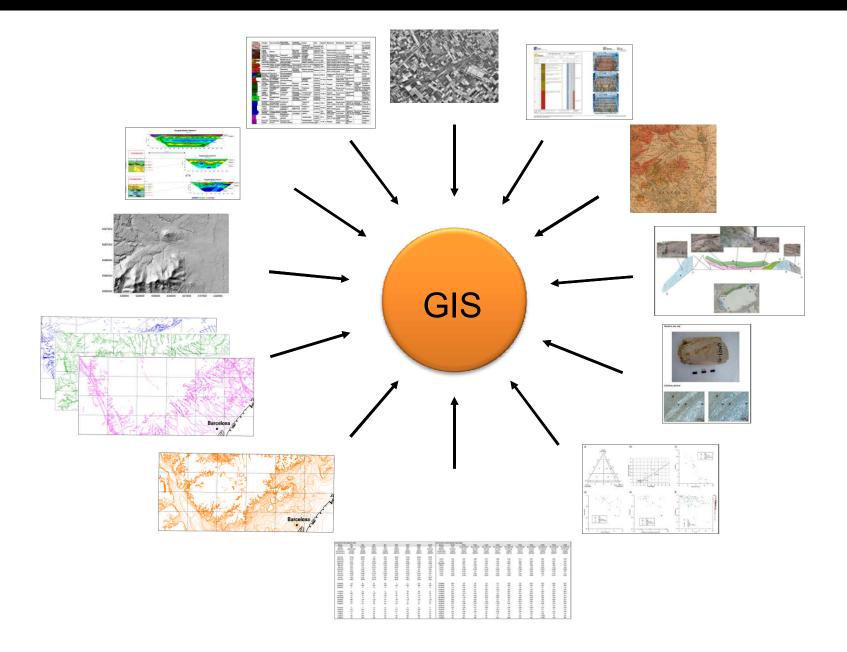
3D modelling



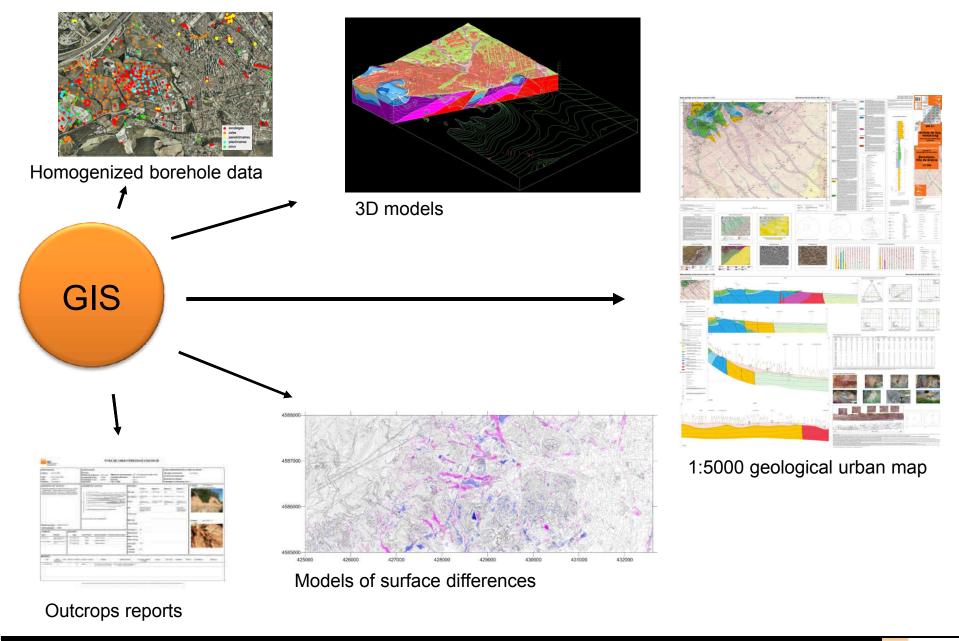
Systematic geological unit characterization

Jnidedes artográfosa	Litología	Discontinuidades	Estructures sedimentarias	Contanido	Festion	Edet	Espeate	Estuctura	Resistancia	Alteración	Uso	Localización
1/10/10	Dépôsitos antrópicos				Terragiones relionce de value	Reciente	16 m			Adeptedión relieve		Riu Francis Phropasa da conuntración
	Lutter premie y graves	Masiva		Motuscos, rectos de naturio sepinica		Customens Holocono Heavens		carrillus bilandes	may fige-media		1	Plu Francoli
	Lufften con- retein ynnetes Graves	Miselva con cationes rocceon a muro	Secuencia granodecrestente	Vacimiento vertebrados la Boella	Cokryleins attyrisks Tuytelss	Customers			Suero smywodel Roje-muy dwose Rosses blancker		Communitie Archier Graverse	Les Georges Torres Cavades
THE STATE OF	Luttes areniscas y	Mesiva con paleocanales incididos	Nivelies dri de résites certenditos entre les juilles	Travertinos	Continentales abanicos aruvalos distates y paluetes	Micceno		Subhoncortal services into vice	freedom a tree moderad, duran	Ped stencer		Lee Gavarres
74		Maskis, en marco medide, estratif- cación des-m	Estratificación cruzada y ondolada Laminación pamisia	forarrindaren		Miccorro	Max.	cartifica inference	Roces dures	attention 2-bin	Pedra dei Middel	Sant Para I Sant Pau
49.0	Congression	Masive	Secuencia granodecrecienta	Molyscos, equividos verteficados	Markres, absoluces contente provinces	Miccens	5-30 m	Subhorizontal falles normales	Roces transes- duras	Porti atteración 2-3 m	Ornamental Pedra d'Alplena	Punta del Mirade
	Bioques de dolorvias calms y Littus	bréchica muy	Bioques decemetri- ons a hecturolificos del Mescarolco			Micourus	5-60 m	Destromments o Alppes	Roces dures muy dures	Cantificación		Ermits del Licetto
		Estratificación m y cruzada Base erontya	Secuencias granodecedentes		Gurtipertales strancos sicviales	Paledgeno Palessano	36-100 m	Plegada	Sale orecas firme-rocas moderad, duran	3 mi		Certificates Autovia (A-7 Jone Storon
	Celizas con luttas a muro	Estratificación dm-m tableada a muro	Breches Intraformacionales	Moluscos Caroffina	Lacustres	Crestocion	12-40 m	Piegeds	House blendar- thuy duries	Porti alteración <1-2 m	Omamente Pedra de LLiede	Muralias Terragona
	Dolomias y caltras	Estradificación ondulesta dm-m	Laminaciones. carriolas y esticitos	Moluscos Foraminiferos	Piataforna marina	Christops Turnierae	45-52 m	Piegada teles normales	Roces dures- muy dures	Carelficación	Ornamental Pedra de Sente Teda	tio Sant Pay
	Cutton, cuton y provinces	Masive a estratificación dm	Laminación paraleix	Molyecos, foramin/feros y peloides	Transicionales y continental	Cestacico	10-56 m	Plegeda faltes normales	Roces blendan- dures	Pert alwards 3-4 m Destarrentes		Mas Enricy Conviers exems Lions
COM	Caltres	Estradificación dm-m	Bioturbeción	Muturcox, styre equividos foremin/ferce	Piateforma merina	Creticion	8-13 m	Plagada tatas normales	Rocas duras muy duras			Corretors Corretors
		Mestra y tréctica purrusimente estrat, cm-dm	persiella		Plataforma marins	Juntaico	150 m	Plegada tatas rormales	Roces duras- muy duras	Ppiockarut y karetidm, can refere de finos		
	Celtras y luttas	Estratificación dm-m	Laminación paneles y eletructura modulosa	Ammonitus Belamvitas	Piataforna marina	Jurásico Rejoleres	25-35 m	Plegeda falos inversas	Ploces blanders durant	Perfi alteración Z m		Portal de Sant Anton
	Dolomias y taucissa dolomiticas		Laminación parallela y cruzada Bioturbación	Pelades orabes Crincideos	Pieteforne merins	Juntaico	120- 200 m	Plegade tales normales a investure	Roose dunes muy dunes	Palookant y kant dr. sor want de lino		Balcó del Mediterran
-	Lutter	Masive y brichica	Laminación paralela		Continentales	Trásico superior	25 m	Plegada teles nomeles	Rocas Standar- moderationents duran	Perfi		Arrifteatre Roma
計	Dolomias luttices	Estratificación cm-dm	Biolumención terrinación pereiota		Transitionales marino-confinantal	Trásico medio	17-30 m	Plegada	Piccos blandan- duras	Porti altersolon 2 m		Amfiteatre Romá



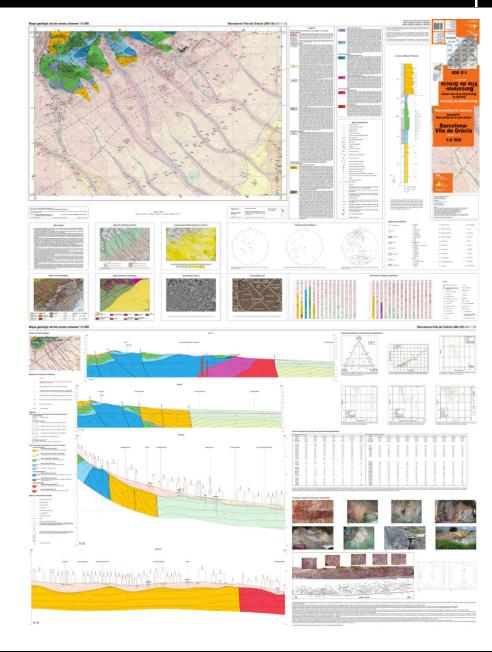


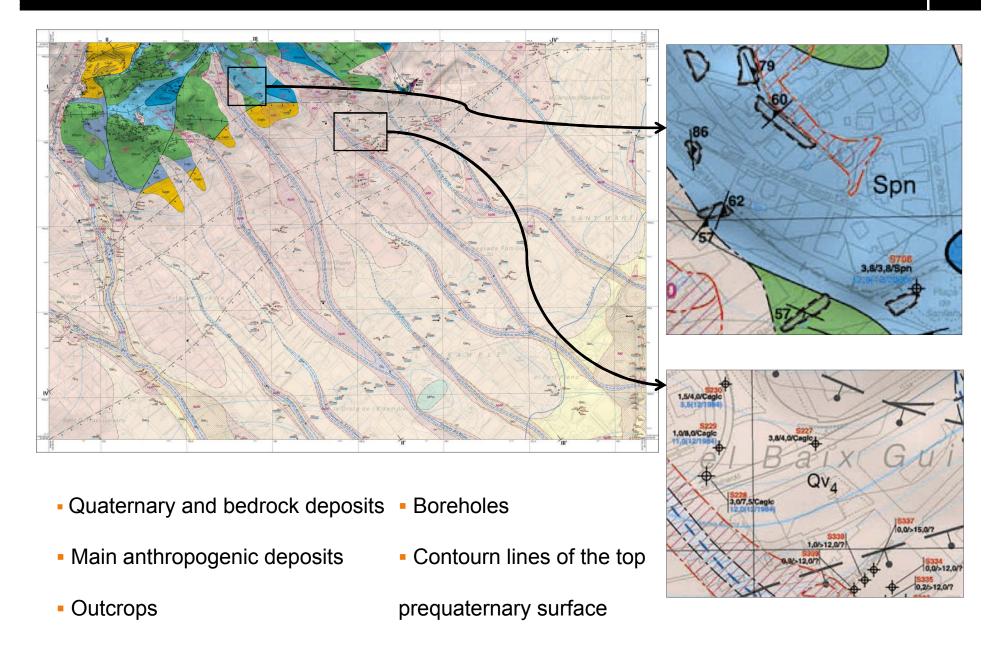
IGC Institut Geològic de Catalunya



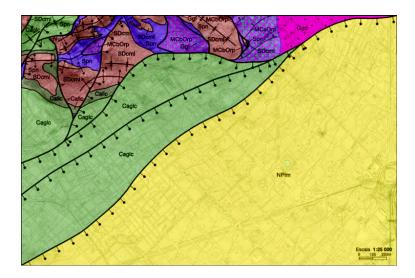
THE 1:5000 SCALE URBAN GEOLOGICAL MAP OF CATALONIA PRODUCT

- Main map of 8 km²
- Several complementary elements related to the map area
- The content may change depending on geological features and available data

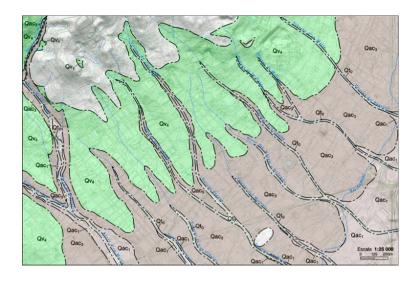




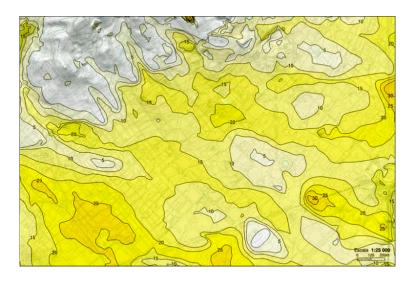
Bedrock map



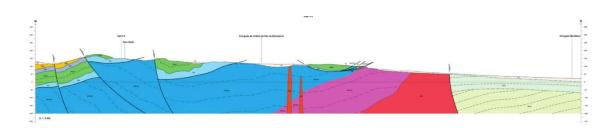
Quaternary deposits map



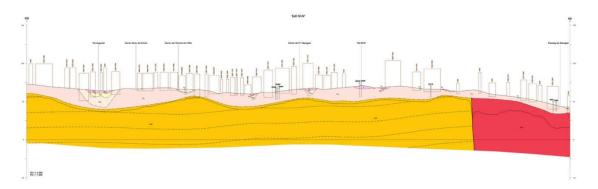
Model of thickness of artificial and quaternary deposits



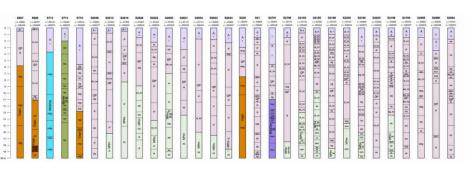




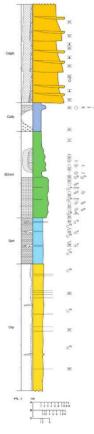
Detailed cross section



Harmonized borehole logs



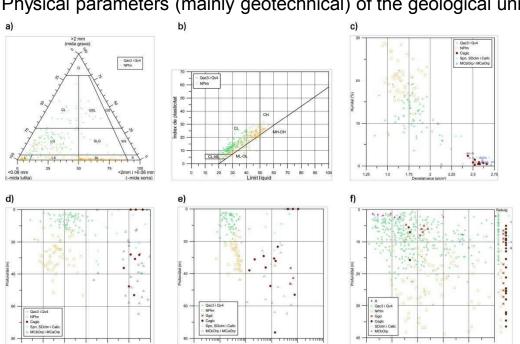
Simplified lithostratigraphic section



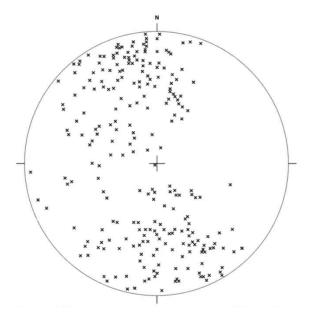
Geochemical composition of representative rocks sediment and topsoil samples

ncentració total (di	gestió total)							Concentració parcial	(digestió Aqua Regla)	0								
Mostra	E5315	E5542	E5540	E5093	E5147	E5352	E5164	Mostra	M513	M508	M509	MS10	MS11	M512	MS18	M519	MS20	MS17
Unitat	Qv ₄	Mcborp	MCaOrp	Cagic	Cagic	Cagic	SDcmi	Unitat	Sel Superficial	Set Superficial	Sol Superficial	S-61 Superficial	Set Superficial	Sel Superficial	Sit Superficial	Sit Superficial	Sel Superficial	Sitt Superfic
Material	sediment	pelica	corniana	gres	gres	microconglomerat	calcária	Material	sauló	sediment	sediment	sediment	sediment	sediment	sediment	sediment.	sediment	sediment
Coordenada x	429630	430782	430630	428884	428936	428911	430351	Coordenada x	430860	432073	430973	430302	430328	430857	429443	429303	429242	429476
Coordenada y	4585500	4585273	4585307	4584534	4585521	4585273	4585431	Coordenada y	4585305	4583943	4583930	4584035	4585084	4585331	4585281	4585555	4585439	4585309
sio, (%)	32,56	69,08	57,92	70,21	72,44	79,18	12,57											
Al ₂ O ₂ (%)	7,25	13,58	20,96	12,52	12,2	7,34	3,01	AI (%)	1,33	2,63	1,92	1,73	1,54	3,12	1,68	2,63	0,0	1,6
Fe ₂ O ₃ (%)	2,83	4,75	6,91	4,85	4,63	3,49	4,64	Fe (%)	1,85	3	2,59	2,36	2,55	6,94	2,37	13,2	3,14	2,27
MnO (%)	0,062	0,005	0,051	0,058	0,049	0,077	0,536	Mn (ppm)	412	549	497	460	761	270	563	2600	4180	363
MEO (%)	1.13	0,98	2.4	1,55	1,4	0,99	11,25	Mg (%)	0.31	0.78	0.78	0.6	0,78	0,58	0,72	1,3	4,27	0,45
CaO (%)	26,65	0,4	0,25	1,02	0,46	1,62	29,82	Ca (%)	0,42	8,09	3,93	2,36	6,35	5,93	2,9	8,07	12,3	3,02
Na ₂ O (%)	0,69	0,09	0,33	1,91	1,64	1,41	0.07	Na (%)	0,076	0.057	0,12	0,074	0,058	0.091	0,072	0,041	0,025	0,028
K ₂ O (%)	1,38	4,26	4,55	2,22	2,15	1,06	0,64	K (%)	0,27	0,53	0,58	0,44	0,44	0,79	0,4	0,55	0,25	0,38
TiO2 (%)	0,416	0,516	0,928	0,738	0,714	0,402	0,178	Ti (%)	0,02	0,07	0,09	0,07	0,06	0,03	0,09	< 0,01	< 0,01	0,01
P,O, (%)	0,09	0,28	0.16	0.1	0,12	0,07	0,09	P (%)	0,038	20,0	0,177	0,111	0,153	1,07	0,077	0,195	0,085	0,074
LOI (%)	26,38	3,33	4,2	3,18	2,89	2,87	36,45	57/48/67										
Total (%)	99,43	97,25	98,66	98,35	98,7	98,51	99,24											
As (opm)	16	186	7	4	27	14	21	As (opm)	0,2	12,8	5,6	2,3	16,3	19,7	13.7	117	52,7	31,9
Da (ppm)	464	9696	998	525	503	385	266	Da (ppm)	88,9	202	273	208	322	196	408	557	907	300
Be (ppm)	2	4	3	2	2	<1	<1	Be (ppm)	0,8	1,2	0,8	0,6	1	2,7	8,0	3,7	1,2	1,1
								Cd (ppm)	0,0%	0,26	0.38	0,2	1.5	0,34	5,28	3,35	0,47	1,55
Co (ppm)	3	5	15	12	11	8	<1	Co (ppm)	3,7	12,4	8,6	6,7	10,2	32	12,6	88,88	27,2	9,2
Cr (ppm)	40	160	100	70	90	60	20	Cr (ppm)	51,1	53,1	53,7	17,9	53,5	60,5	50,3	34,8	16,1	50
Cu (ppm)	40	150	30	20	10	20	60	Cu (ppm)	7,33	60,2	53.2	39,1	95,8	189	60,4	209	111	136
Mo (ppm)	<2	17	≪2	< 2	4	3	2	Mo (ppm)	3,06	2,18	3,67	0,93	4,37	10,2	6,15	17,7	5,83	25,2
Ni (ppm)	30	50	40	30	50	30	90	Ni (ppm)	4,6	38	22,1	12	31,7	58,6	31,4	646	106	64,2
Pb (ppm)	7	1230	16	< 5	7	6	14	Pb (ppm)	147	45,6	92,4	49,2	141	103	169	104	23,9	105
5b (ppm)	< 0,5	10,1	< 0,5	< 0,5	< 0,5	< 0,5	8,0	Sb (ppm)	< 0,02	0,92	0,86	0,47	1,69	3,3	1,15	3,66	1,73	3,33
20000000	245	400	92	200	100	- 4	102	Se (ppm)	0,5	0,5	0.7	0,3	0,8	4,8	1,2	6,3	2,1	5,2
Sn (ppm)	4	4	6	4	4	3.	2	Sn (ppm)	1,51	2,26	2,54	2,33	3,79	0,55	2,1	1,25	0,47	1,59
Th (spm)	8.2	10,5	16,2 0,6	10,2 0,4	10,5	5,8	2,7	Th (ppm)	16,1	6,3	6,1		4.2	7,7	9,4	4,1	1,1	2,1
TI (apm)	< 0,1		0,6	0,4	0,4	0,2	0,2	TI (ppm)	0,11	0,25	0,25	0,21	0,36	1,28	0,37	1.91	1,04	0,97
U (ppm)	2,8	21,1	3,4	3.1	2,9	1.7	1	U (opm)	1.2	0.8	1	1	1.2	12.1	1,7	4,6	1	4,9
V (ppm)	97	1769	150	91	86	57	35	V (ppm)	23	59	56	54	63	238	72	115	58	154
In (ppm)	50	1510	390	90	60	70	2530	Zn (ppm)	67	124	160	127	383	116	1010	1490	103	279

Physical parameters (mainly geotechnical) of the geological units



Stereographic projections of the main discontinuities and structures



Photography gallery



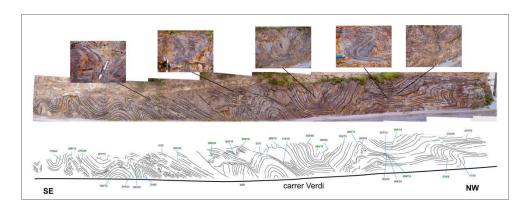












RESULTING MAP SHEET AND BINDING COMPONENTS Legend (petrologic, ◄ geotechnical and genetic) Geological setting ■ 1:100.000 geological map ◆ 1:100000 schematic geological map

CONCLUSIONS

The 1:5000 urban geological map of Catalonia

- systematic urban mapping survey
- self-consistent database
- wide range of uses
- update required

World wide applicability

