11 Years Engineering Geology Fieldwork in Falset, Salou, and Cambrils

Science From Fieldwork

What did we Produce ?

Why did we ?

Why did we do science during fieldwork?

- Keep the staff happy
- Intellectual interest
- Keep students happy

Why keep students happy?

- It is not every year the same
- The data gathered and products produced are used, and not only for a ‘mark’


Are the students happy?

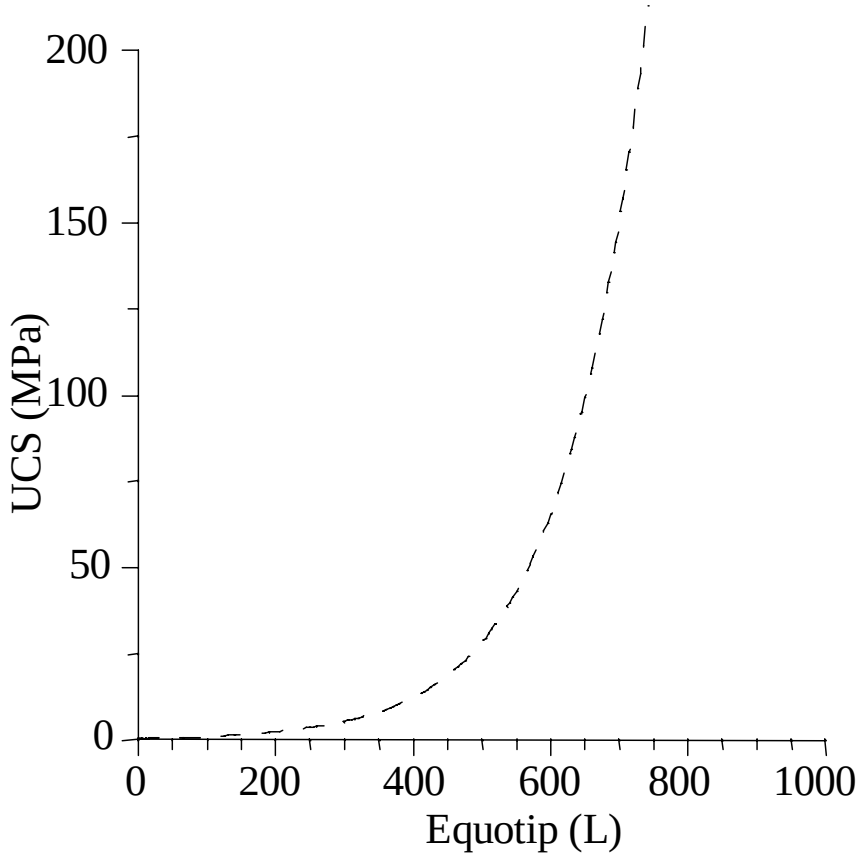
What did we Produce? (1)

- Qualitative Weathering rating
- Equotip as rock mechanics strength tester
- Visual roughness characterization
- Intermediate scale laser roughness tester
- Quantitative weathering rating
- Problem index rating for mapping (PRI)
- Slope stability probability classification (SSPC)
- 3D models on data of Falset

What did we Produce? (2)

- Methylene Blue tests
- Excavation rating model
- ‘Hamertje tik’
- Cementation effects due to Gypsum
- Numerous other features which did not (yet) made it into an article

Equotip as rock mechanics strength tester



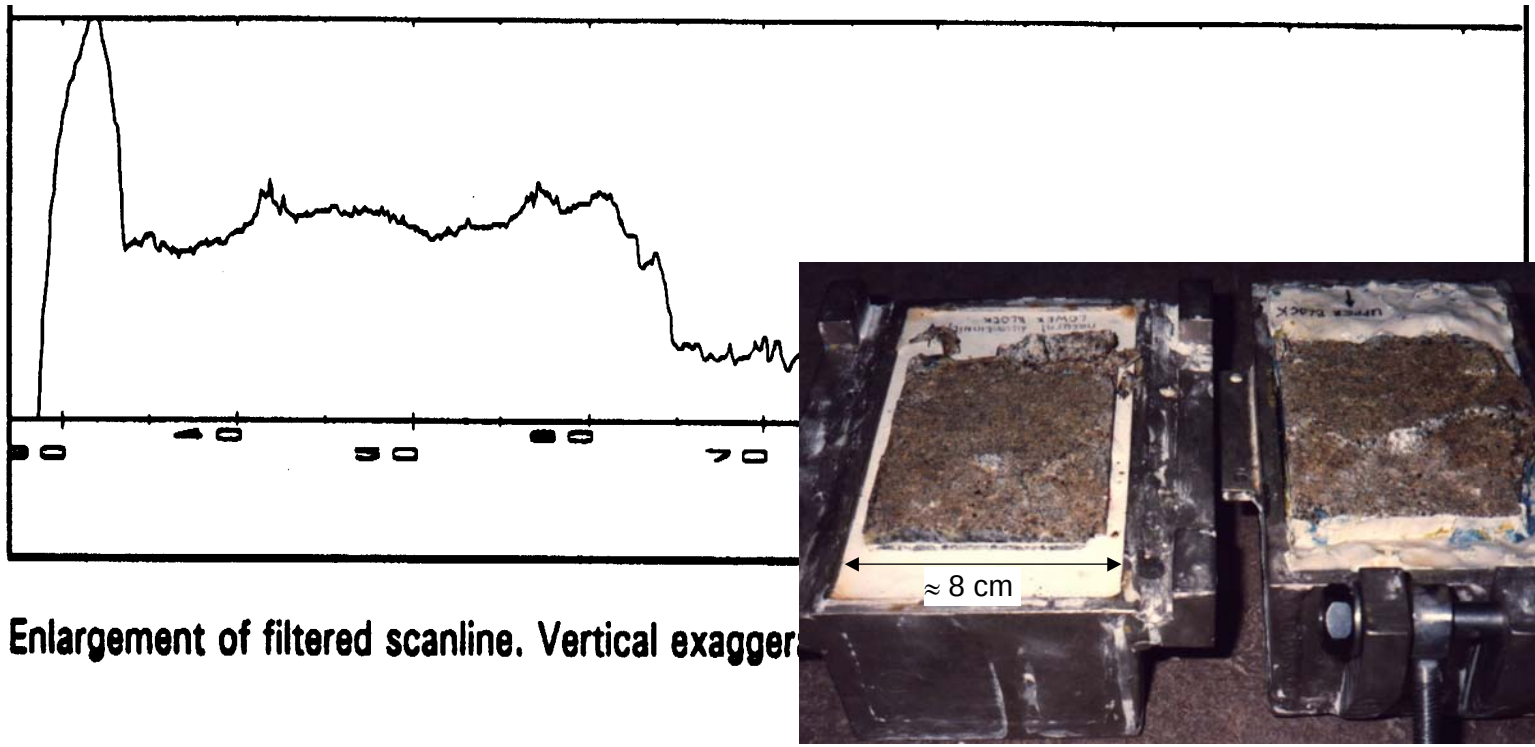
UCS vs. Equotip
(after Verwaal et al., 1993).

Visual roughness characterization

CONDITION OF DISCONTINUITIES			factor
Roughness large scale (***Rl***) (visual area > 0.2 x 0.2 and < 1 x 1 m2)	wavy		1.00
	slightly wavy		0.95
	curved		0.85
	slightly curved		0.80
	straight		0.75
Roughness small scale (***Rs***) (tactile and visual on an area of 20 x 20 cm^2)	rough stepped/irregular		0.95
	smooth stepped		0.90
	polished stepped		0.85
	rough undulating		0.80
	smooth undulating		0.75
	polished undulating		0.70
	rough planar		0.65
	smooth planar		0.60
	polished planar		0.55
Infill material (***Im***)	cemented/cemented infill		1.07
	no infill - surface staining		1.00
	non softening & sheared material, e.g. free of clay, talc, etc.	coarse	0.95
		medium	0.90
		fine	0.85
	soft sheared material, e.g. clay, talc, etc.	coarse	0.75
		medium	0.65
		fine	0.55
	gouge < irregularities		0.42
	gouge > irregularities		0.17
	flowing material		0.05
Karst (***Ka***)	none		1.00
	karst		0.92

Discontinuity characterization (after Hack et al., 1995, 1998).

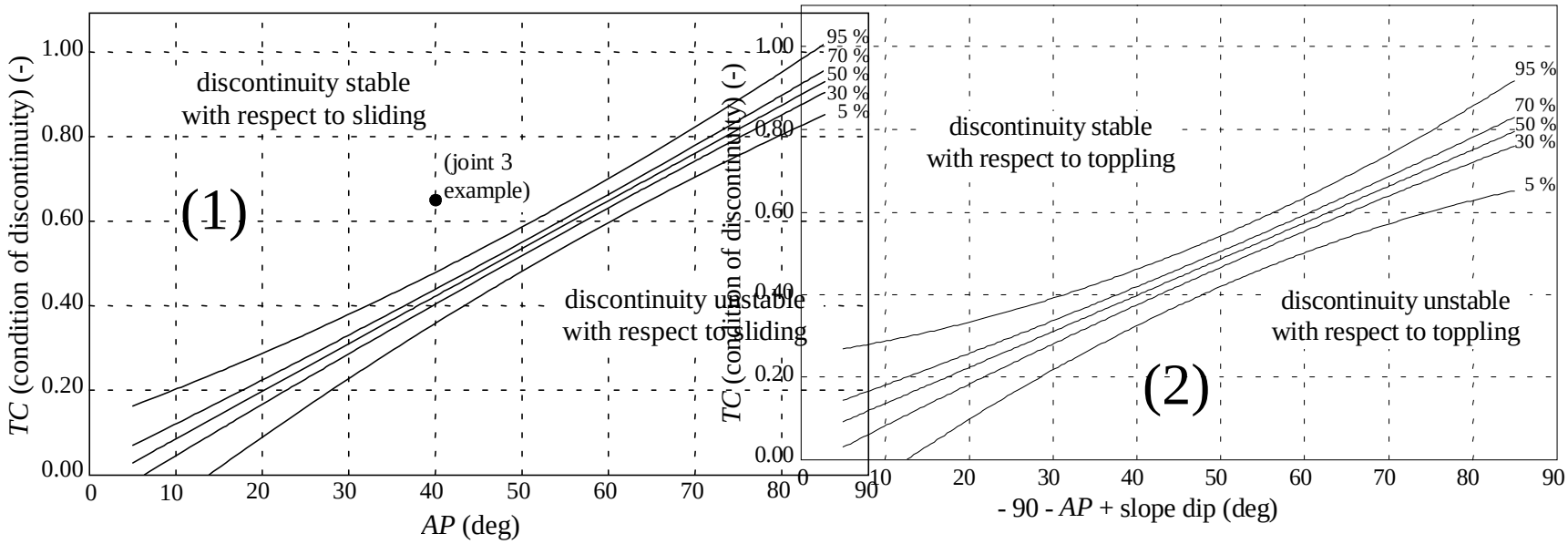
Intermediate scale laser roughness tester



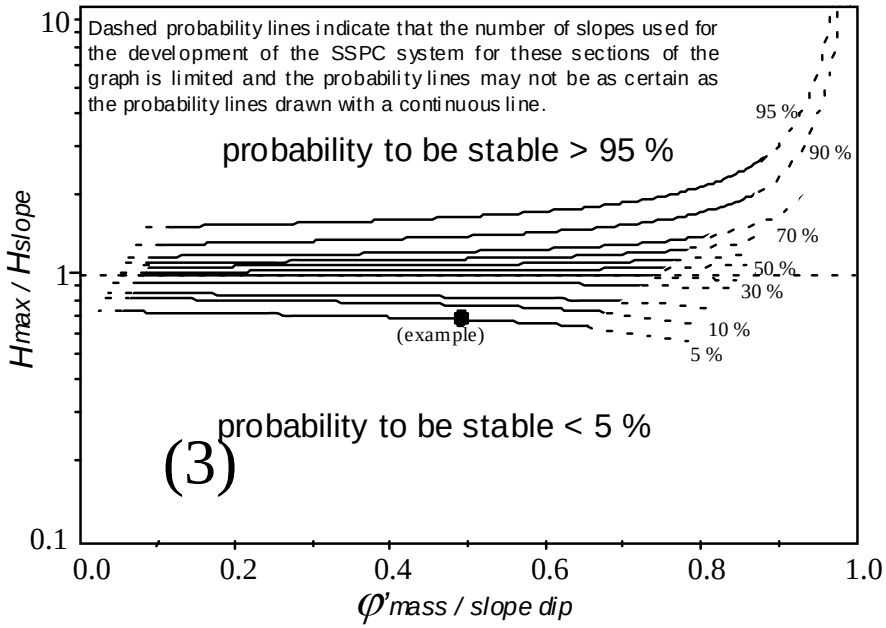
Enlargement of filtered scanline. Vertical exagger

Laser roughness profile of sample in photo (after Baardman, 1993)

Slope stability probability classification (SSPC) (1)



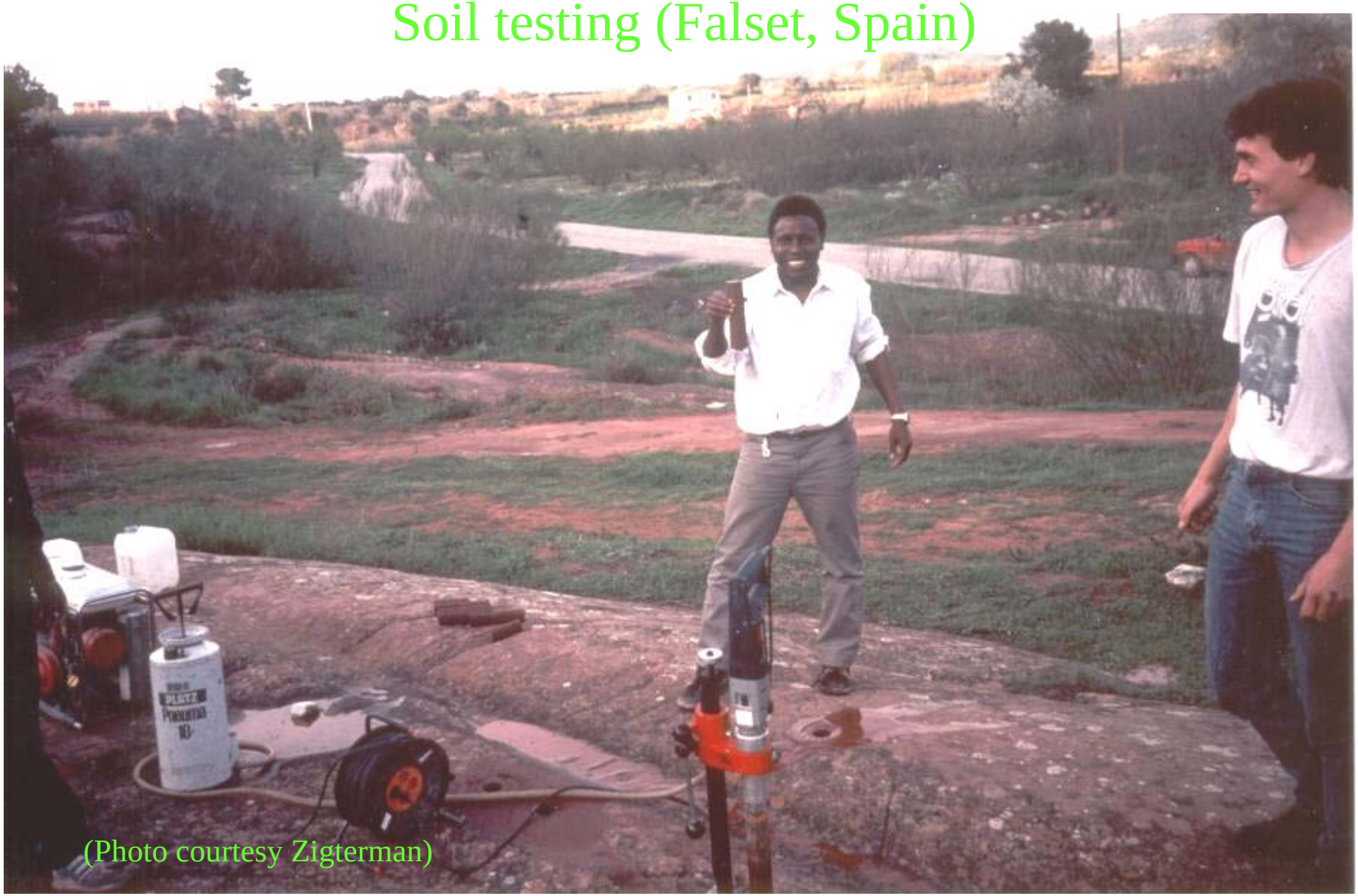
Slope stability probability classification (SSPC) (2)



(1) +(2) +(3) give

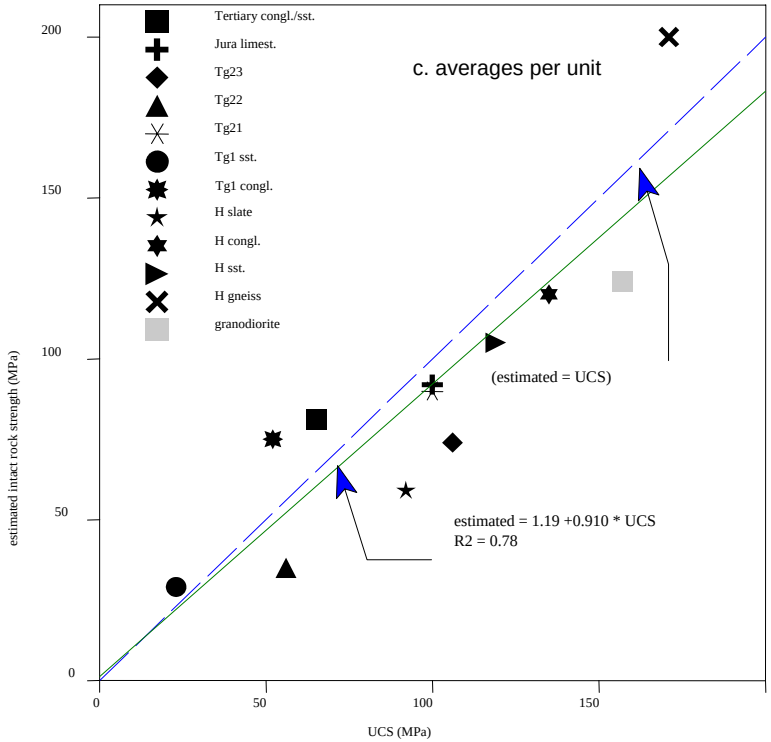
Likelihood of a slope to be stable

Soil testing (Falset, Spain)

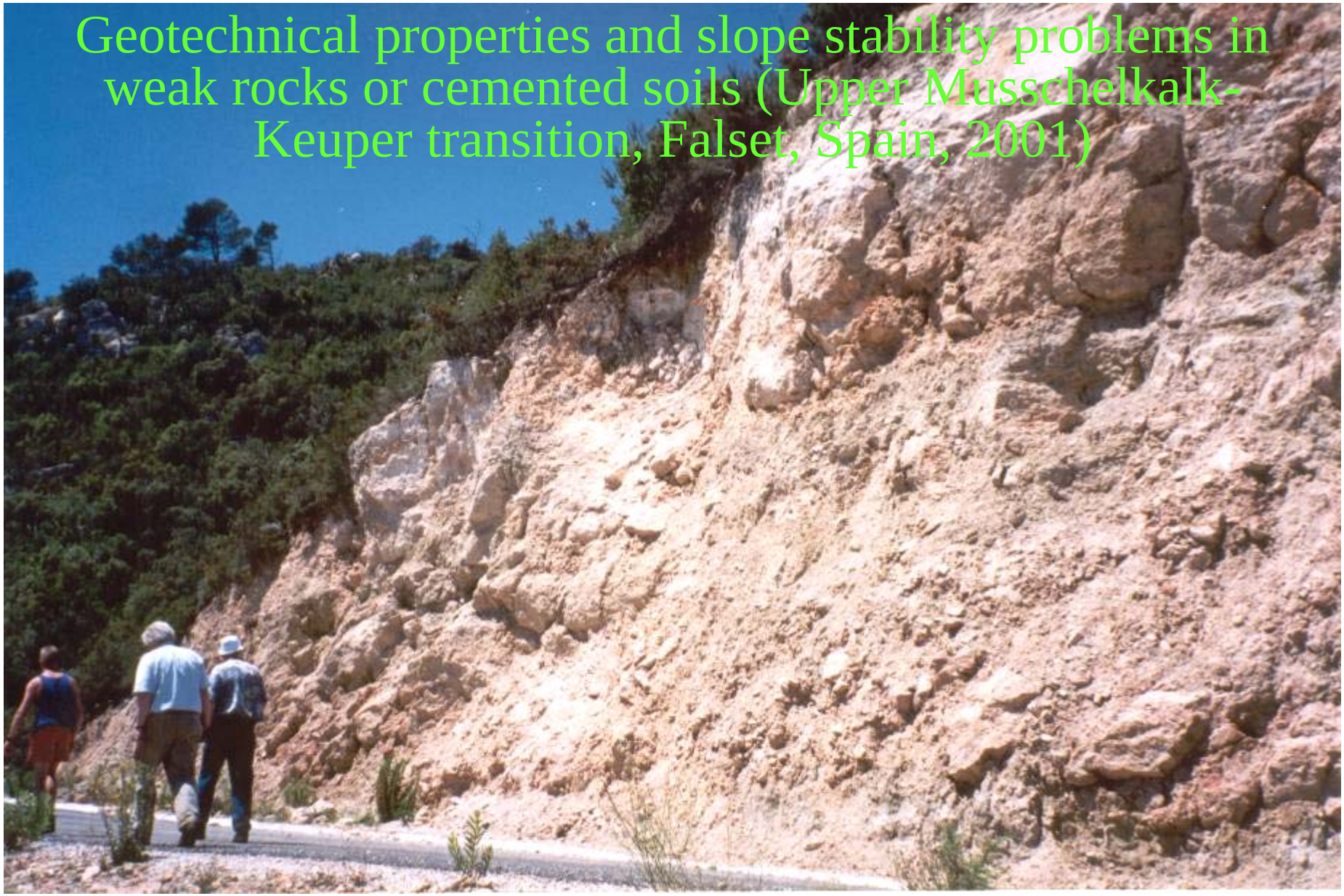


(Photo courtesy Zigterman)

‘Hamertje tik’



Geotechnical properties and slope stability problems in weak rocks or cemented soils (Upper Musschelkalk-Keuper transition, Falset, Spain, 2001)

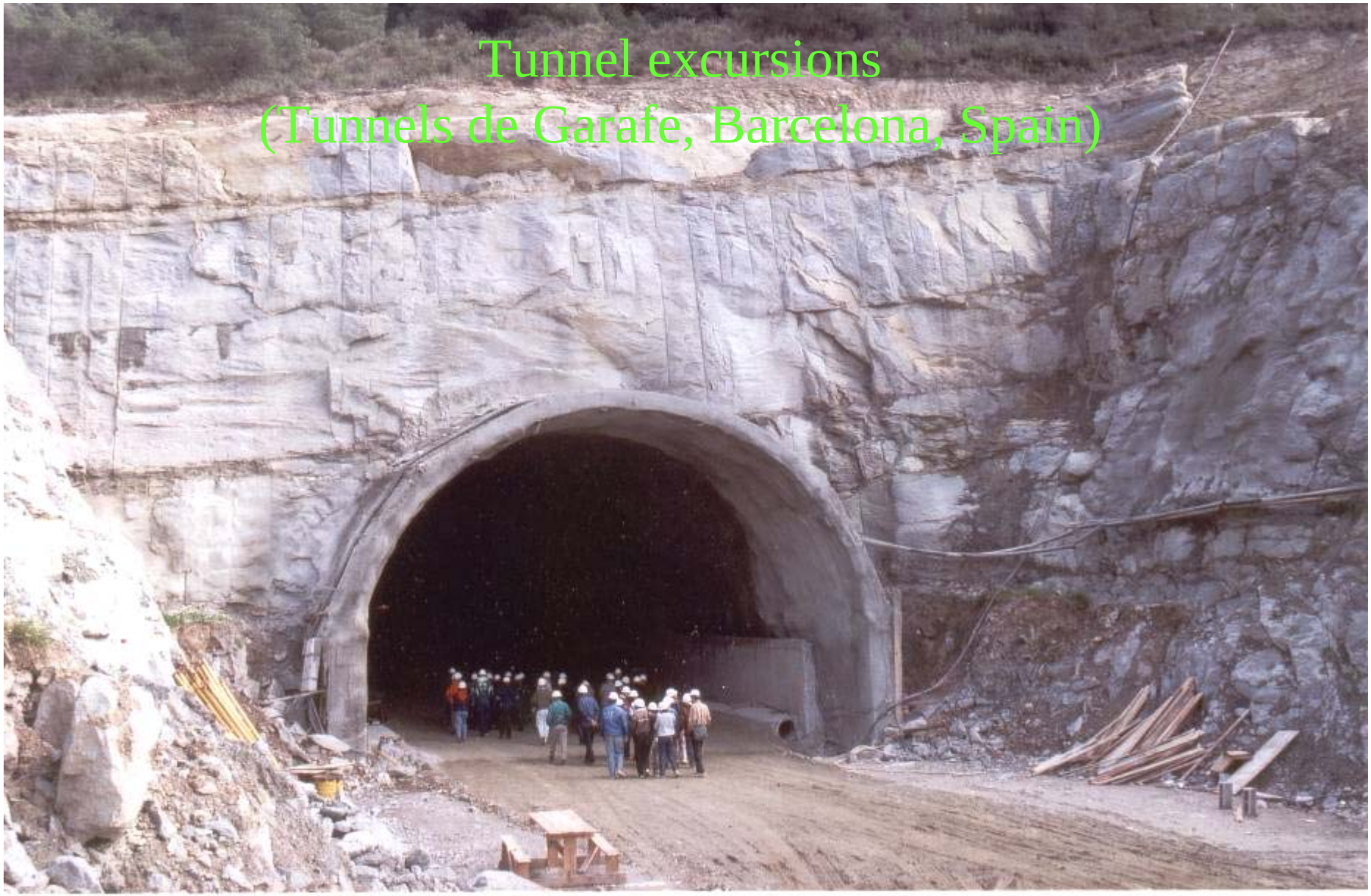


Karst and cemented (crust) layers. (Falset, Spain, 2001)

Future

- Continue at location
- Weathering – time relation
- In-homogeneity

- Shallow 3D resistivity to identify crusts ?
- ??


Tunnel excursions
(Tunnels de Garafe, Barcelona, Spain)