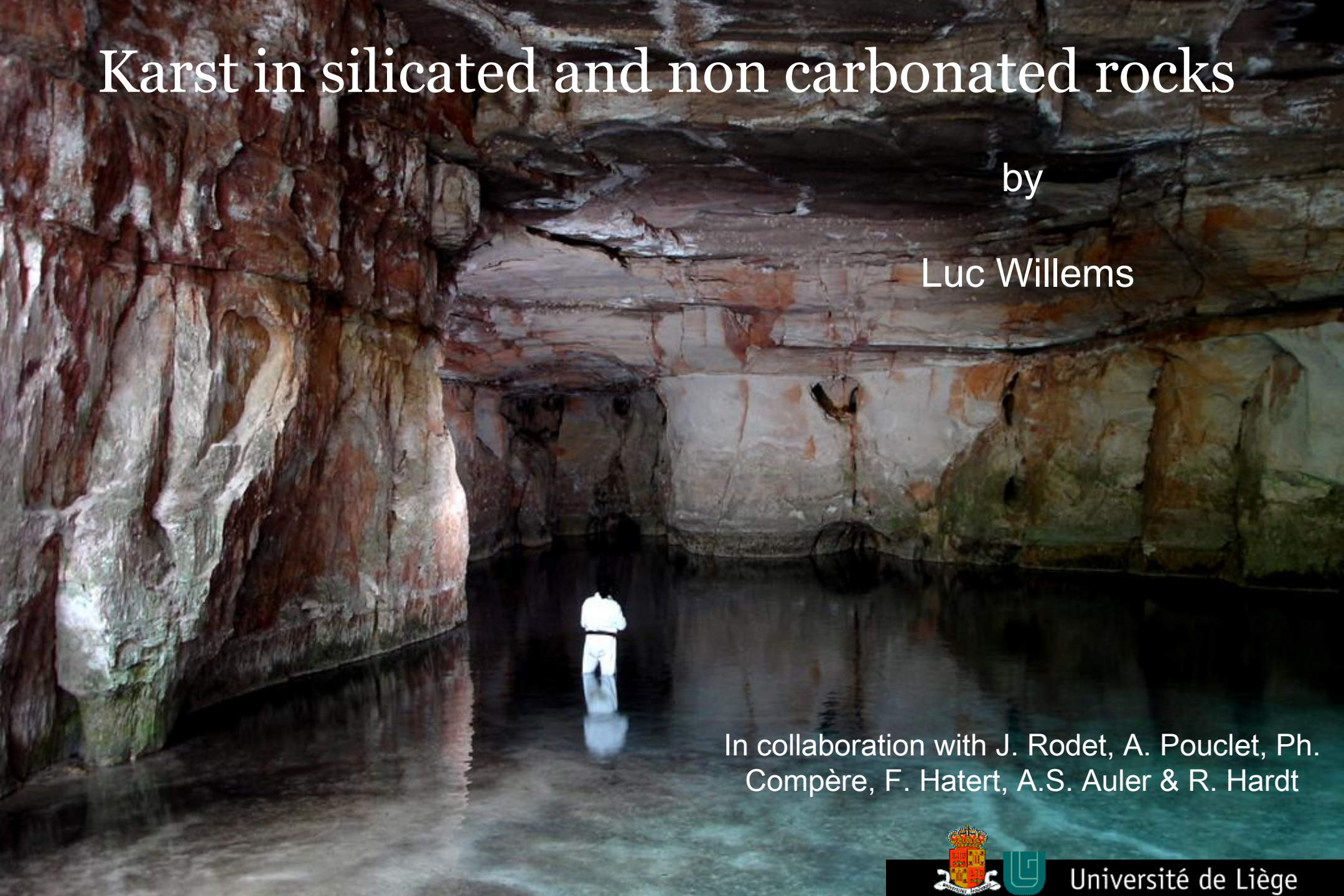
Karst in silicated and non carbonated rocks



by

Luc Willems

In collaboration with J. Rodet, A. Pouclet, Ph. Compère, F. Hatert, A.S. Auler & R. Hardt

Université de Liège

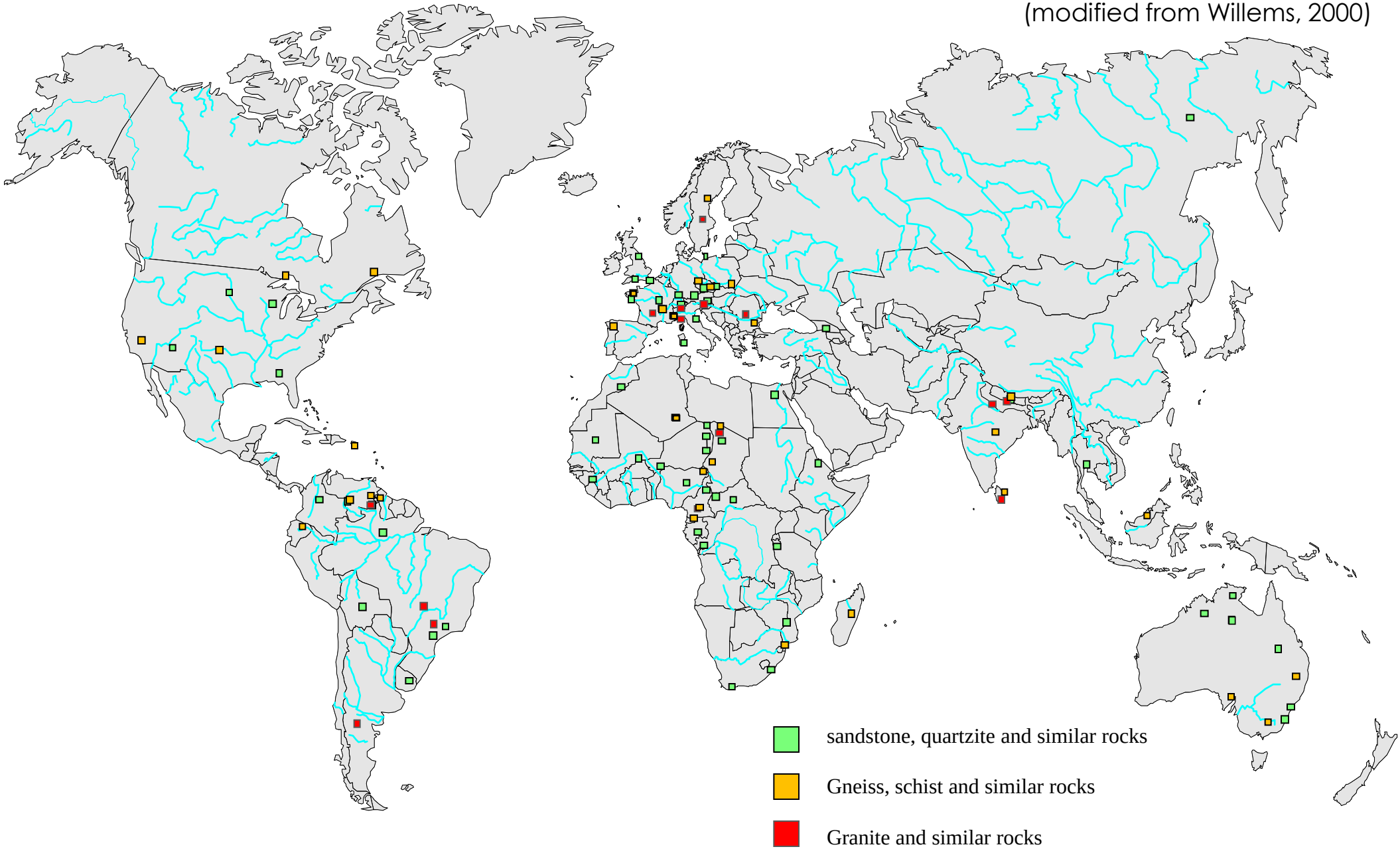
” karst” = morphologies similar to those found in limestones and generated by predominantly dissolution processes.

They are widely unknown and often called “pseudokarsts”.

World distribution

Main distributions of karsts in silicated and non-carbonated rocks

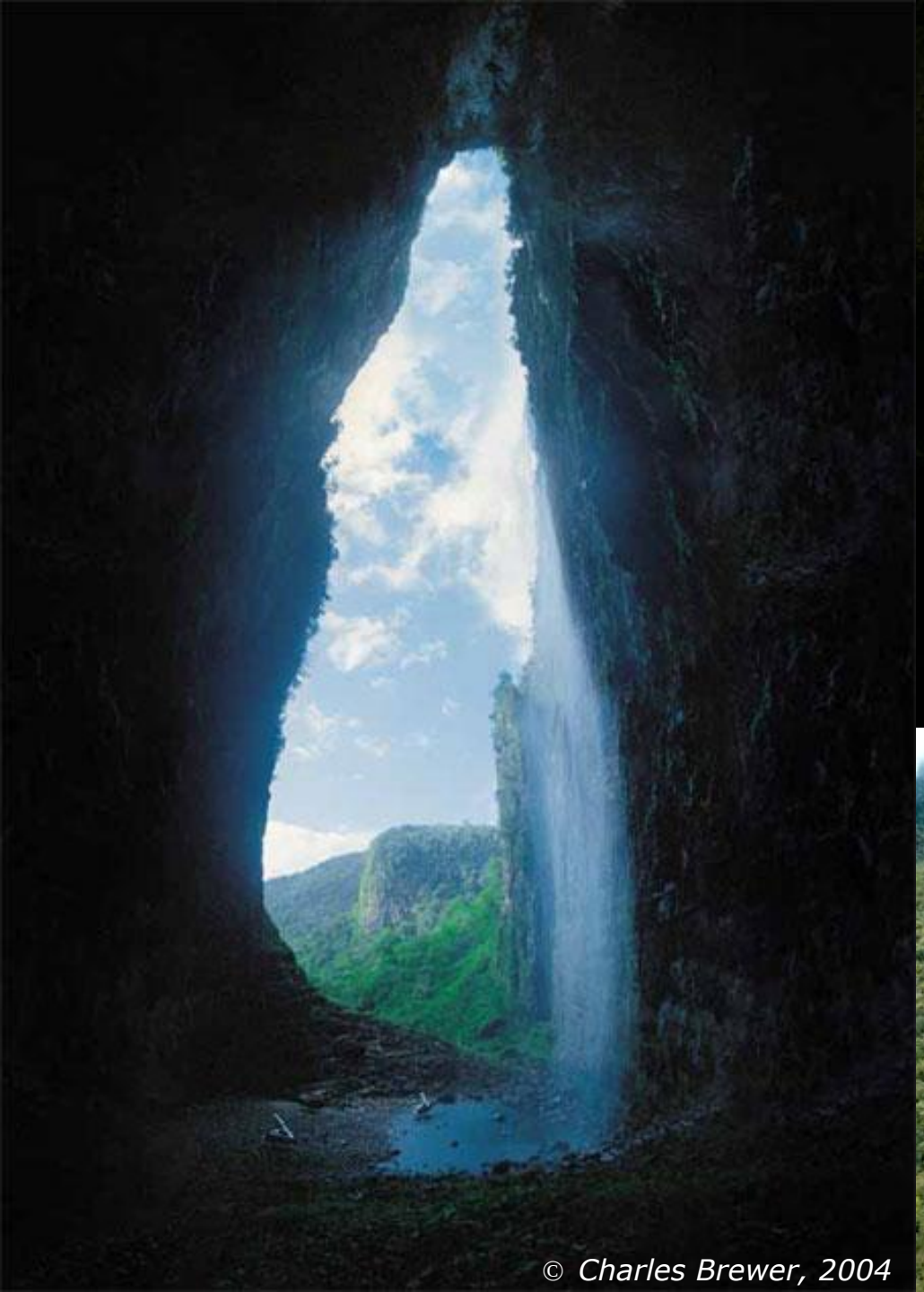
(modified from Willems, 2000)



Tepuis of Venezuela – sandstone - quartzite

Venezuela tepui, or rock plateau
Photograph by Travel Ink

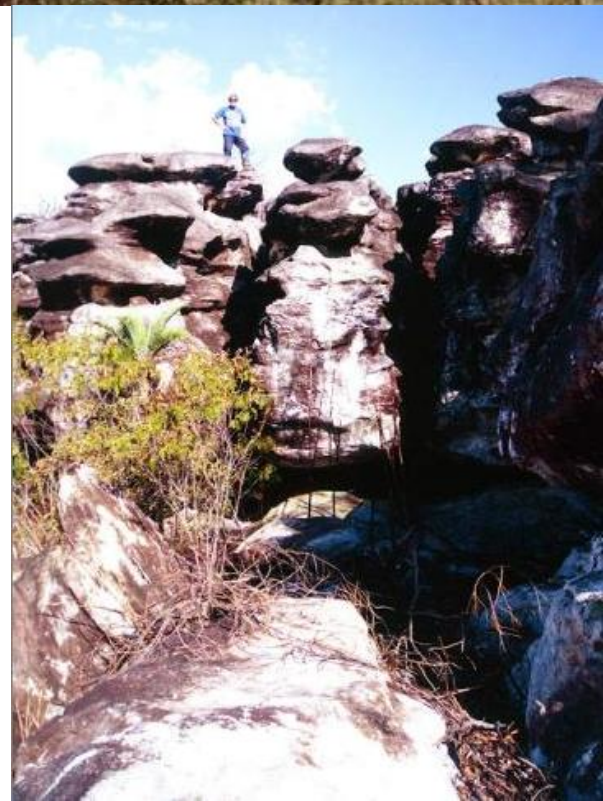
NATIONAL GEOGRAPHIC


© Charles Brewer, 2004


© Jose_Miguel_Perez_Gomez, 2011

Doline in sandstone, Niger (Google Earth, 2011)

Residual relief and lapiaz in quartzite, Rio Preto, Brazil



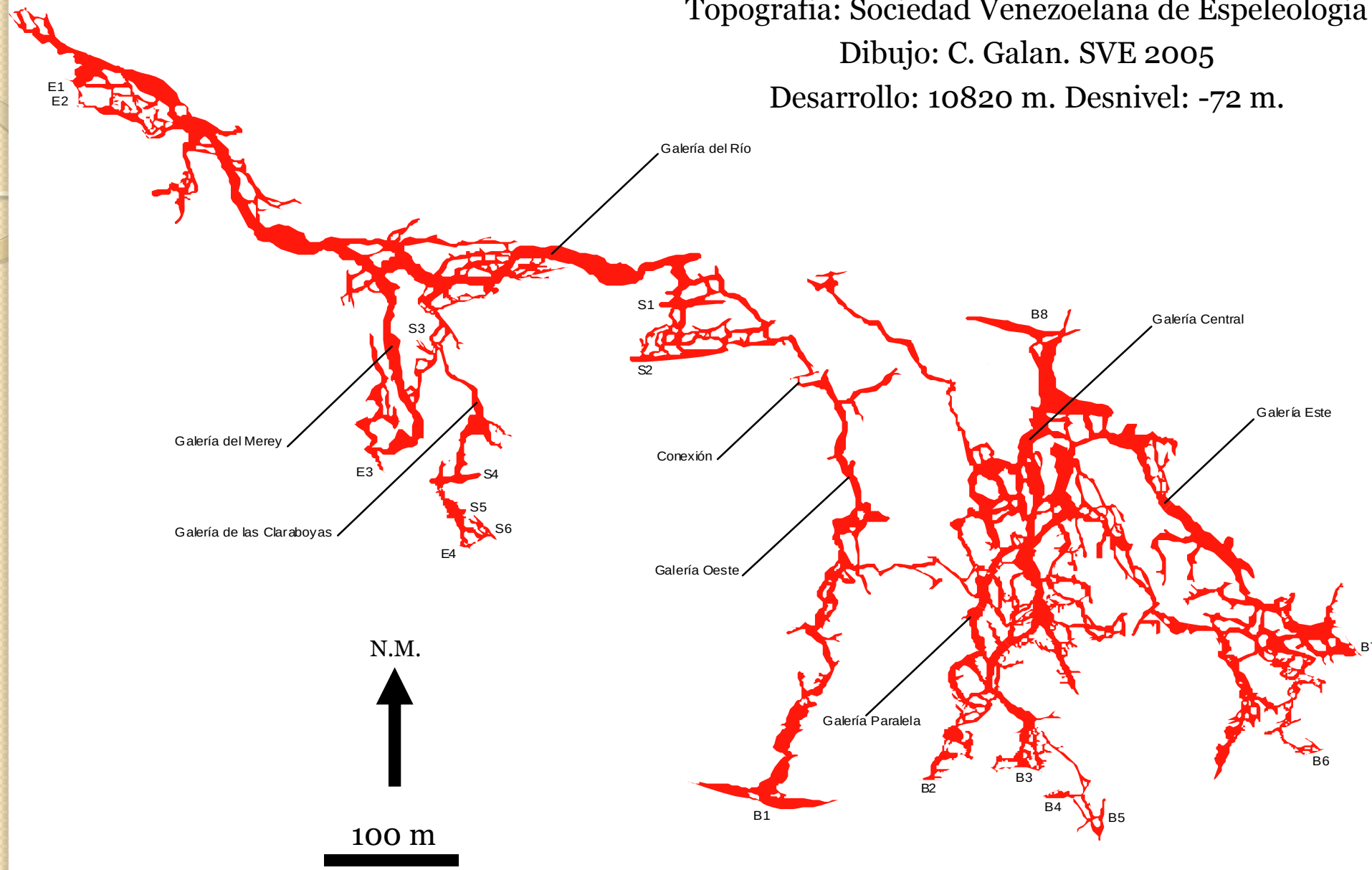
Lapiaz in quartzite, Rio Preto, Brazil

Sistema Roraima Sur.

Topografia: Sociedad Venezoelana de Espeleologia

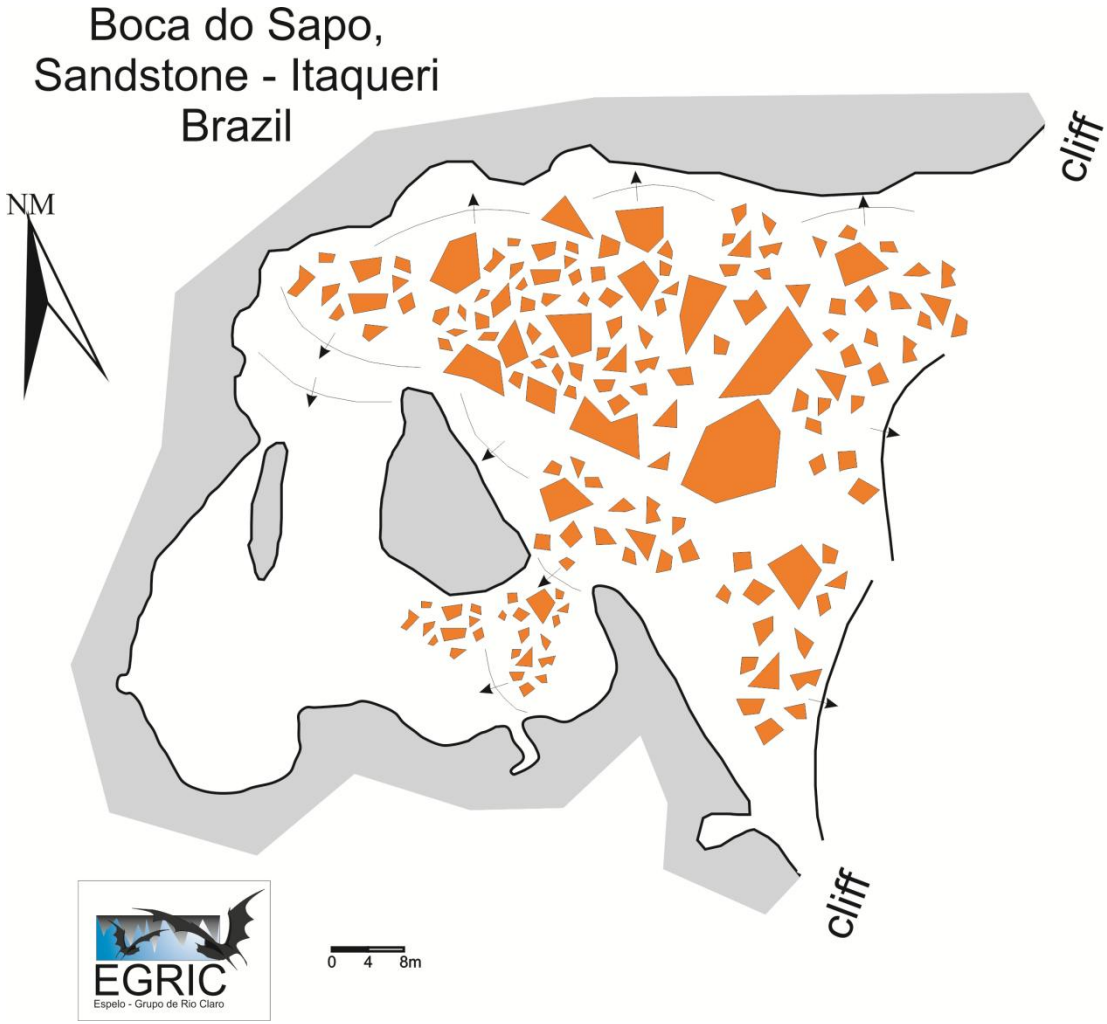
Dibujo: C. Galan. SVE 2005

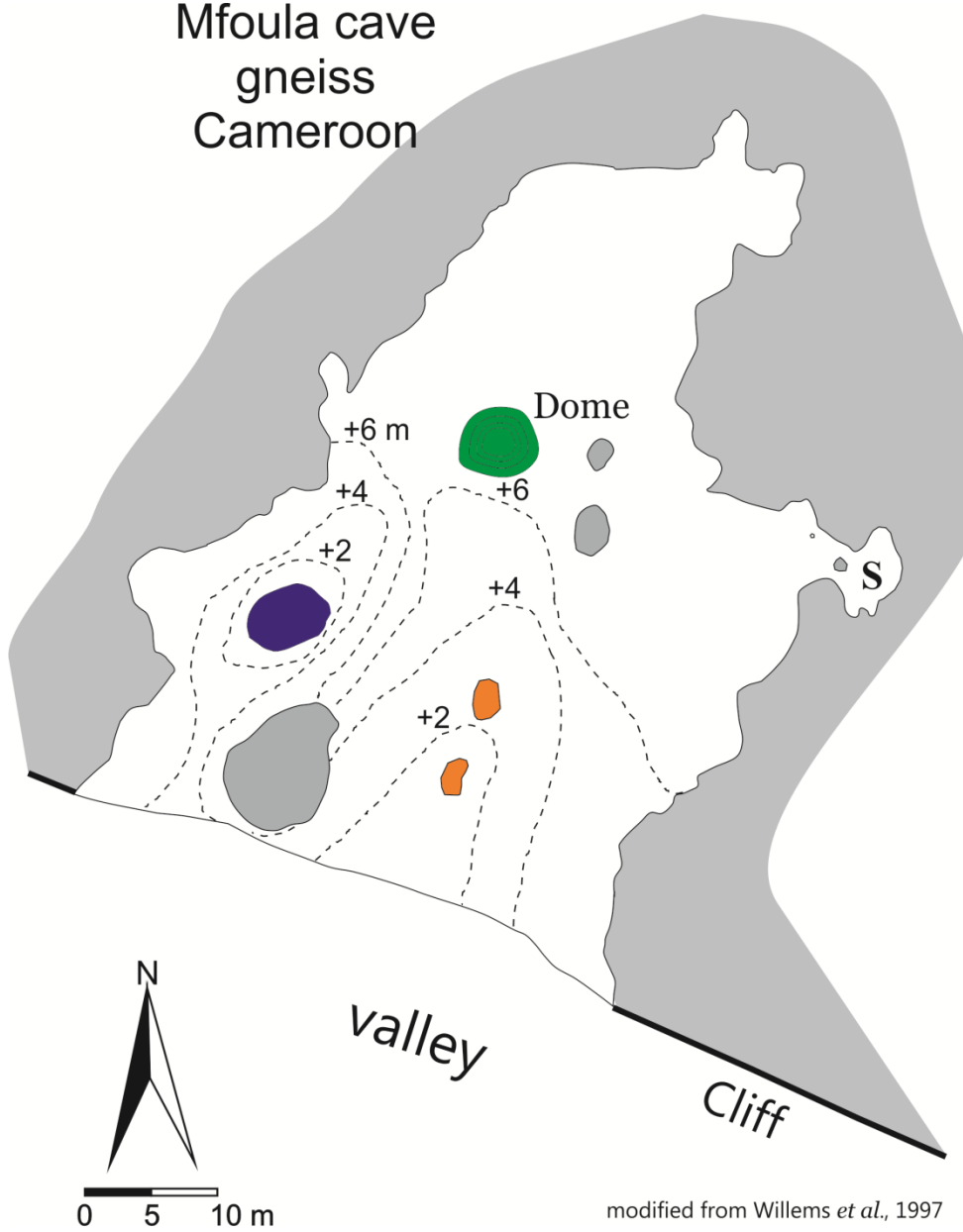
Desarrollo: 10820 m. Desnivel: -72 m.



(F. Urbani, 2007)

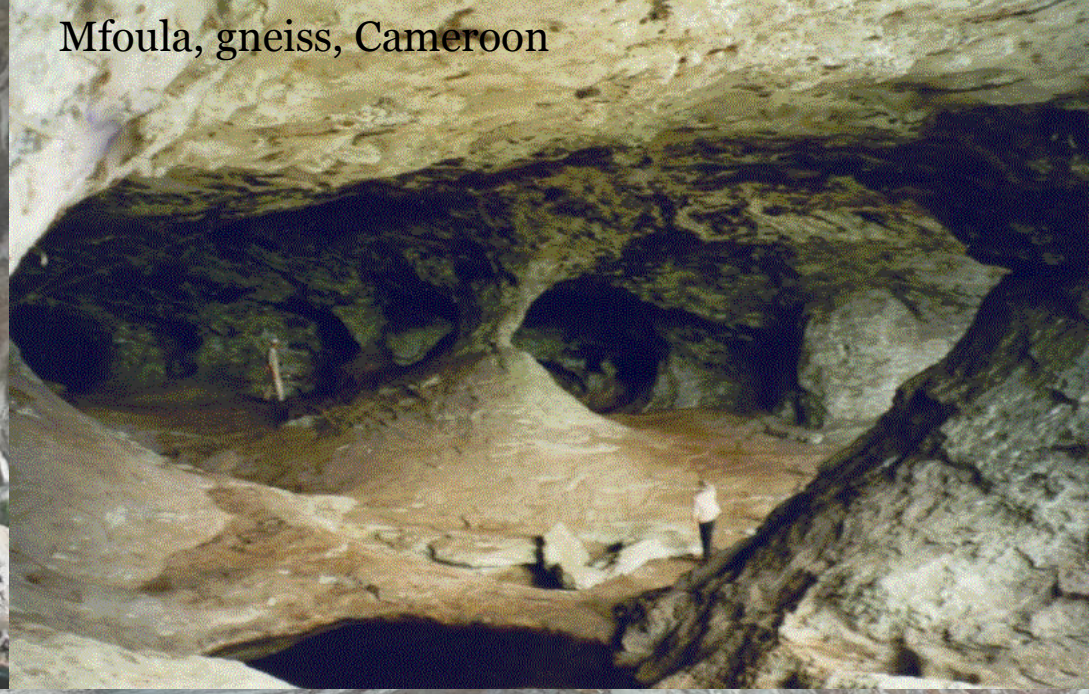
Typology


Boca do Sapo,
Sandstone - Itaqueri
Brazil
NM
cliff
cliff
0 4 8m
EGRIC
Espelo - Grupo de Rio Claro

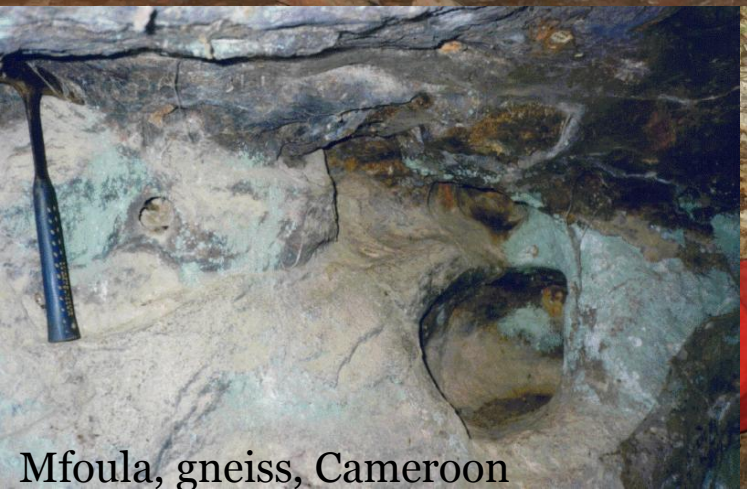

Mfoula cave
gneiss
Cameroon
Dome
+6 m
+6
+4
+2
+4
+2
S
N
valley
Cliff
0 5 10 m
modified from Willems et al., 1997

First type


Itaqueri, sandstone, Brazil


Mfoula, gneiss, Cameroon


Itaqueri, sandstone, Brazil


Mfoula, gneiss, Cameroon


Ibitipoca, quartzite, Brazil

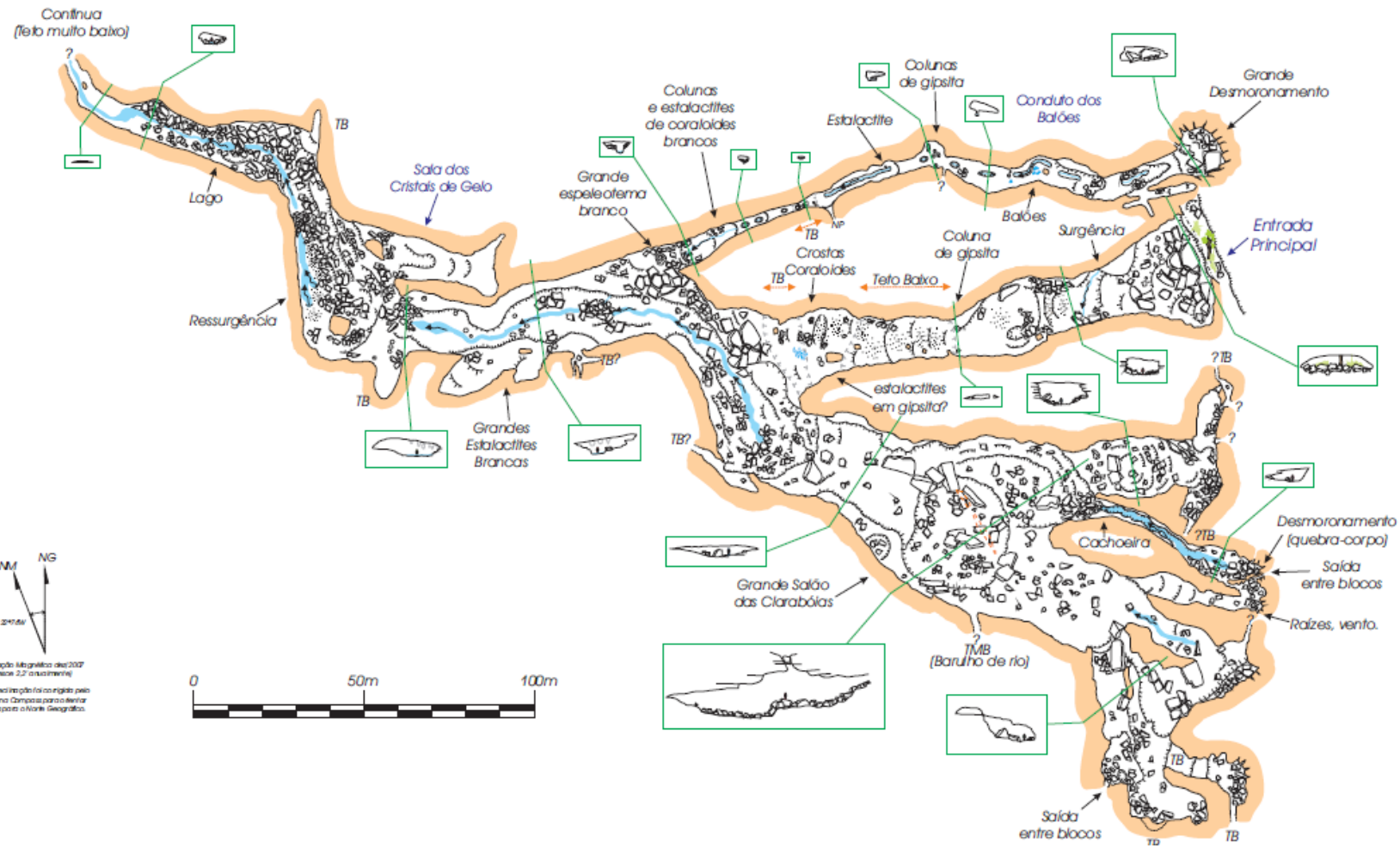

Itaqueri, sandstone, Brazil

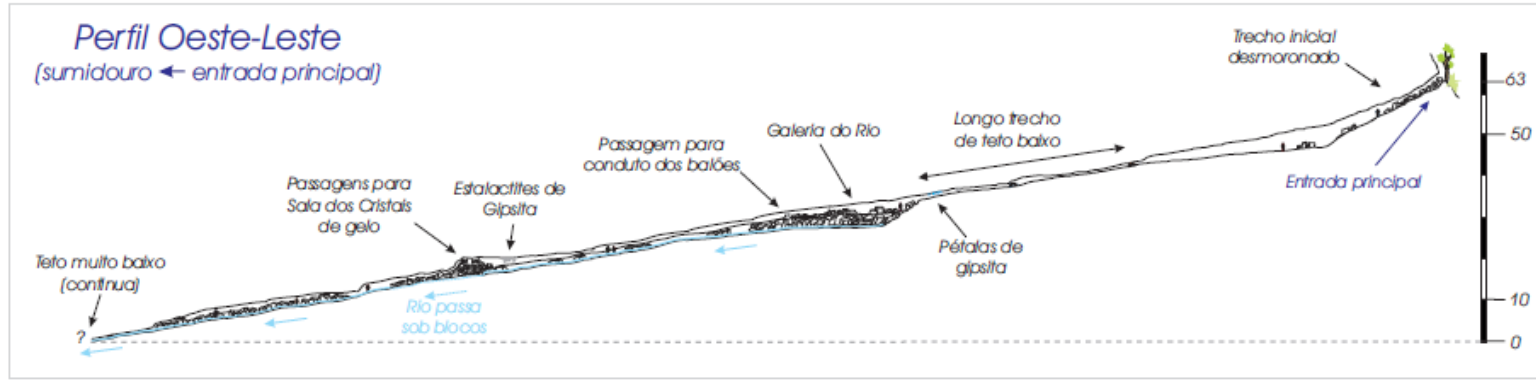
Gruta dos Atoleiros
R*BA-543
Fazenda Zuca
Ituaçu, BA

Coordenadas
Latitude: S 13°47'29,8"
Longitude: W 41°12'30,6"
Altitude: 1109m Datum: WGS84

Projeção Horizontal: 1.240 m
Desenvolvimento Linear: 1.270 m
Desnível: 63 m
Topo grau: 4C Método: BCRA
Litologia: Quartzito.

Second type



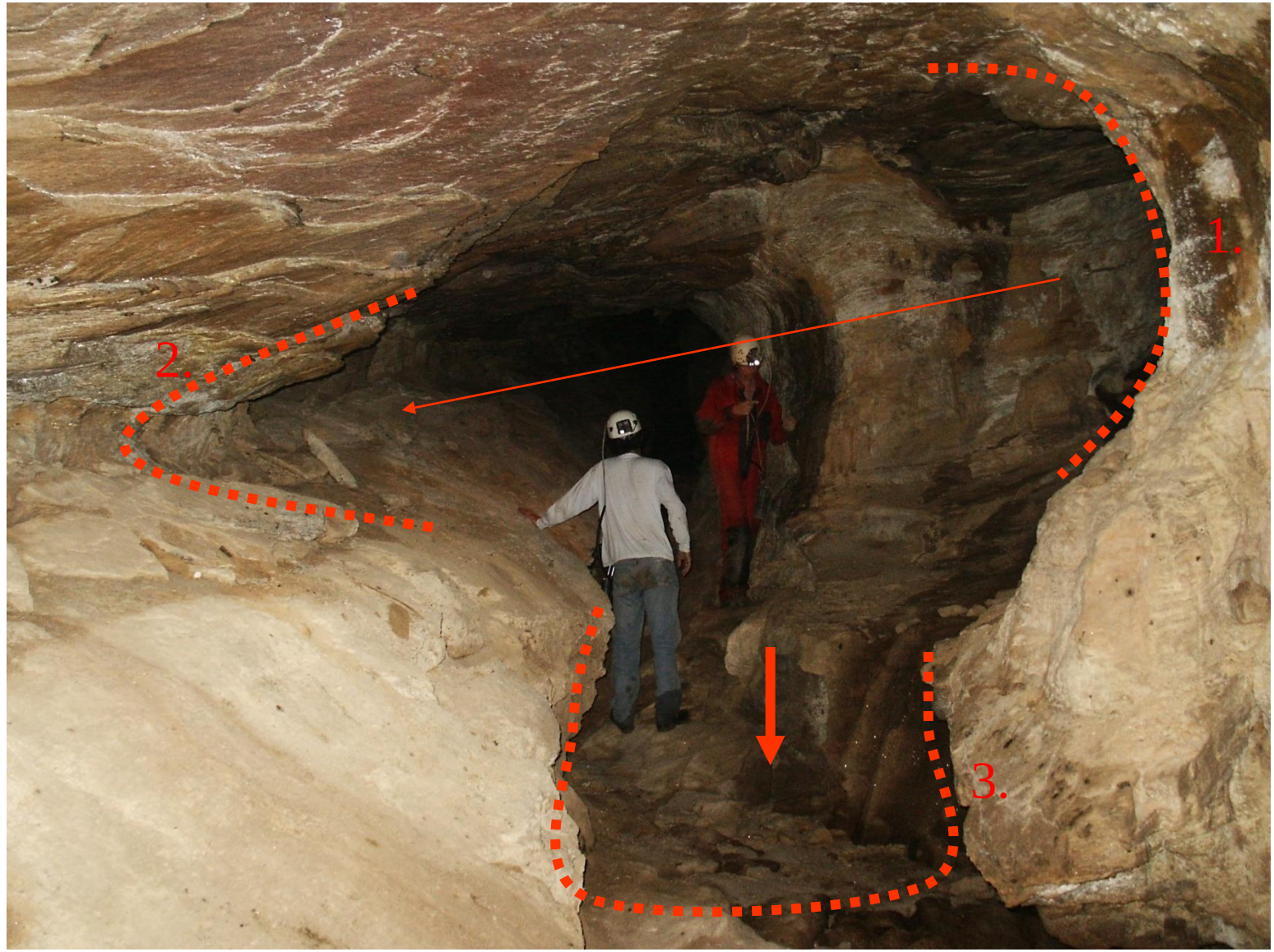


Projeto:
Instituto do Carste

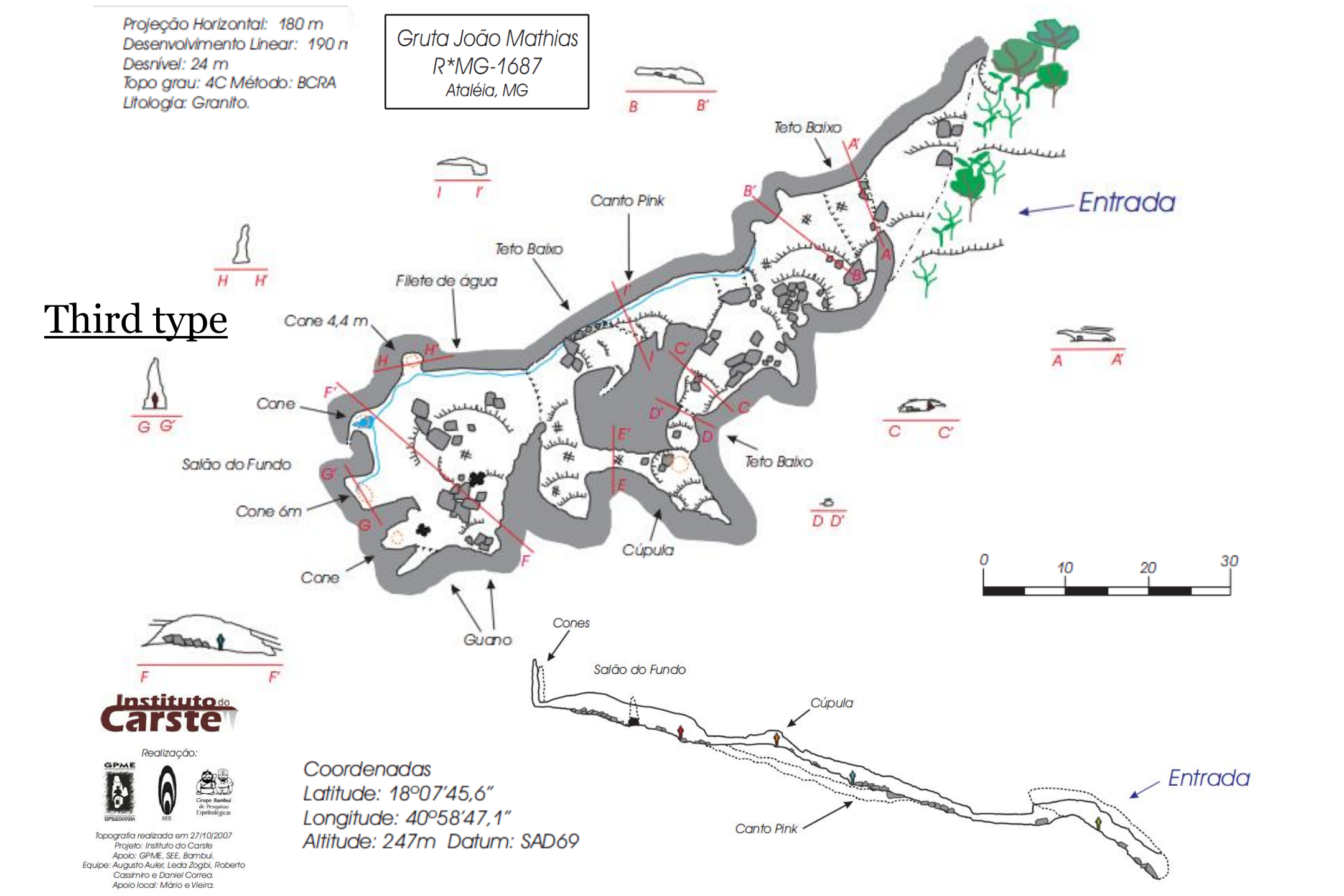
Realização:
GPME
Grupo Bambuí de Pesquisas Espeleológicas

Equipe: André Bernardes, Augusto Auler, Daniel Menin, Leda Zogbi, Renata Andrade, Roberto Cassimiro, Thiago Lima

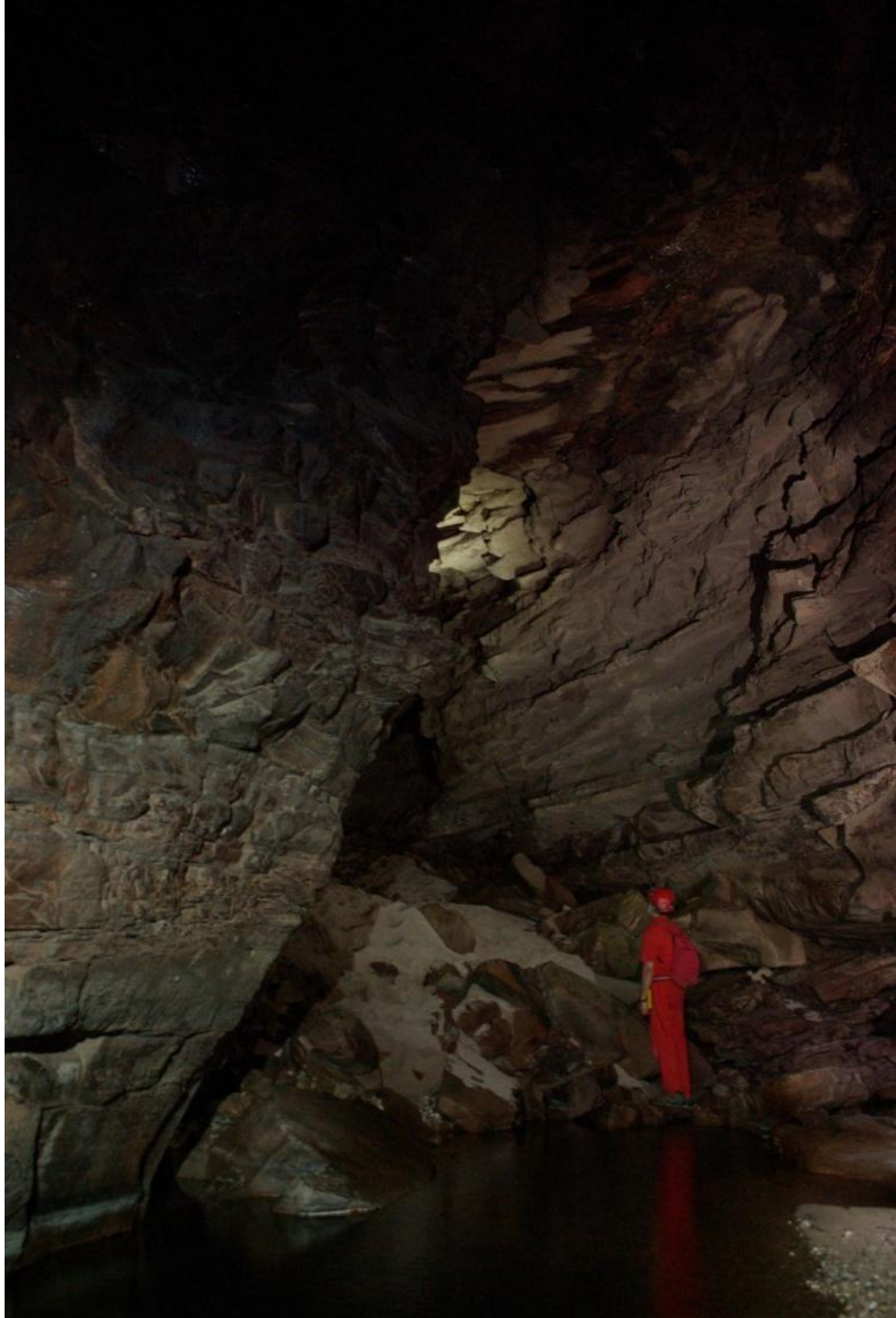
Sandstone, Mato Grosso, Brazil



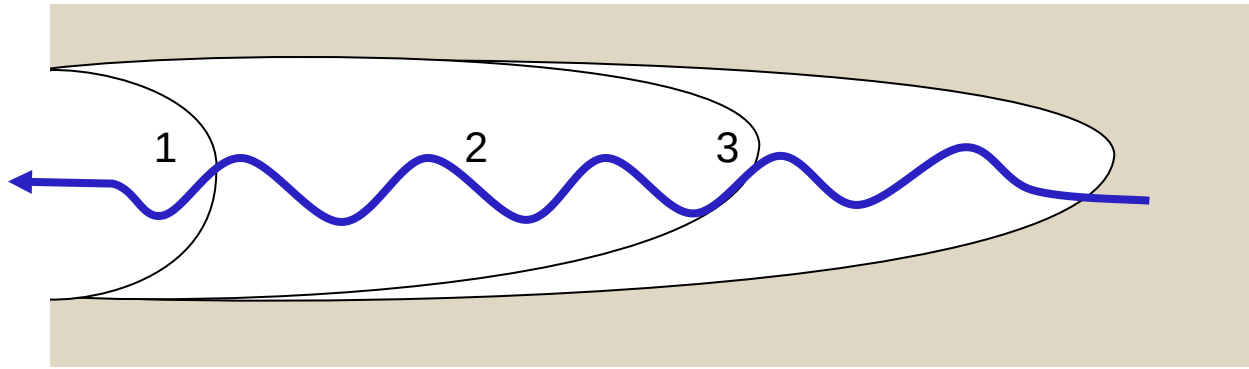
Third type


Projeção Horizontal: 180 m
Desenvolvimento Linear: 190 m
Desnível: 24 m
Topo grau: 4C Método: BCRA
Litologia: Granito.
Gruta João Mathias
R*MG-1687
Ataléia, MG
Teto Baixo
Canto Pink
Entrada
Filete de água
Cone 4,4 m
Cone
Salão do Fundo
Cone 6m
Cone
Guano
Cúpula
Teto Baixo
Cones
Salão do Fundo
Cúpula
Canto Pink
Entrada
0
10
20
30
Instituto do Carste
Realização:
GPME
SEE
Grupo Bambuí de Pesquisas Espeleológicas
Topografia realizada em 27/10/2007
Projeto: Instituto do Carste
Apoio: GPME, SEE, Bambuí.
Equipe: Augusto Auler, Leda Zogbi, Roberto Cassimiro e Daniel Correa.
Apoio local: Mário e Vieira.
Coordenadas
Latitude: 18°07'45,6"
Longitude: 40°58'47,1"
Altitude: 247m Datum: SAD69

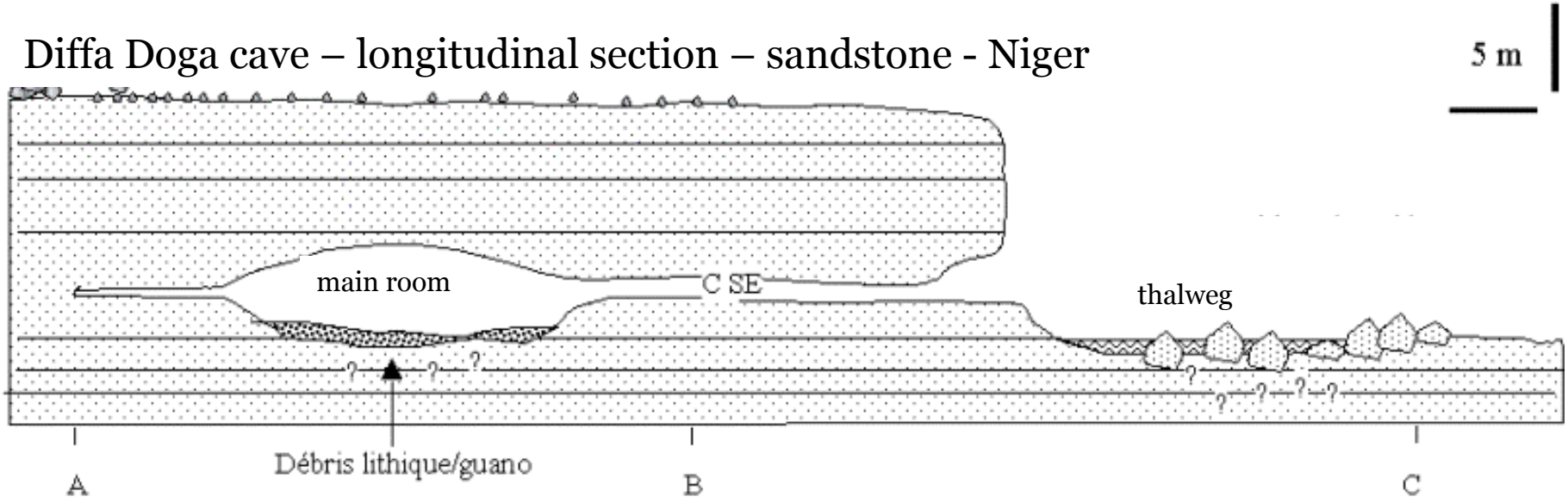
Formation processes…

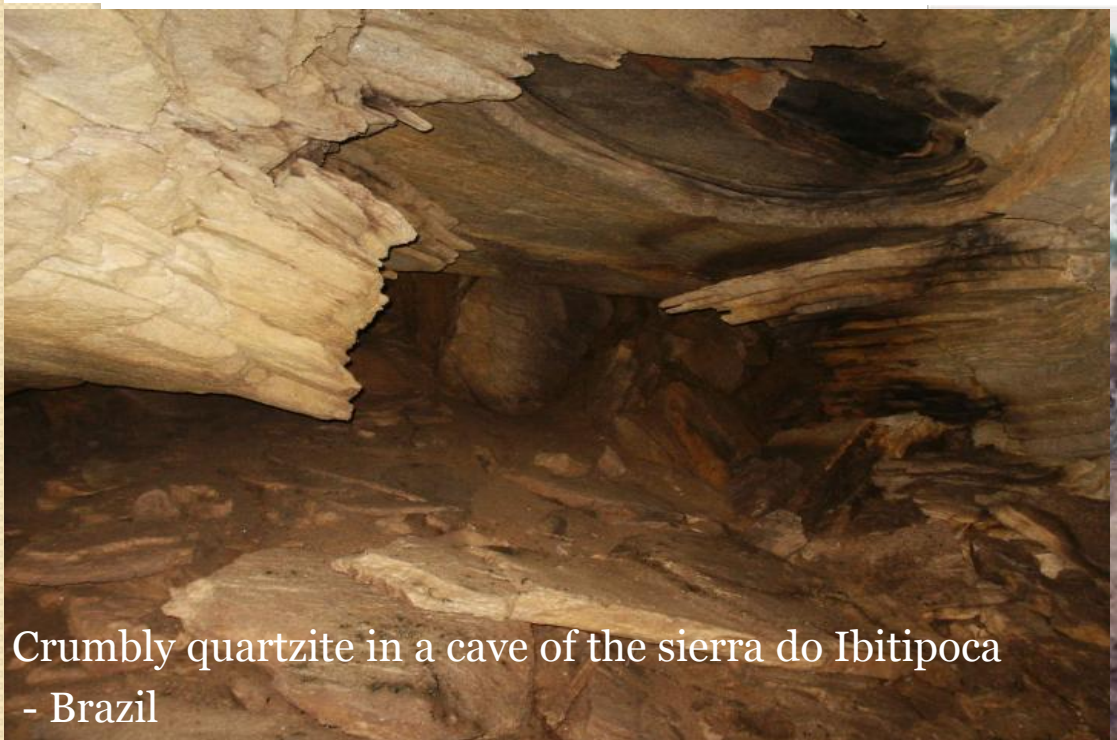


Classical view for cave formation in silicated and non- carbonated rocks



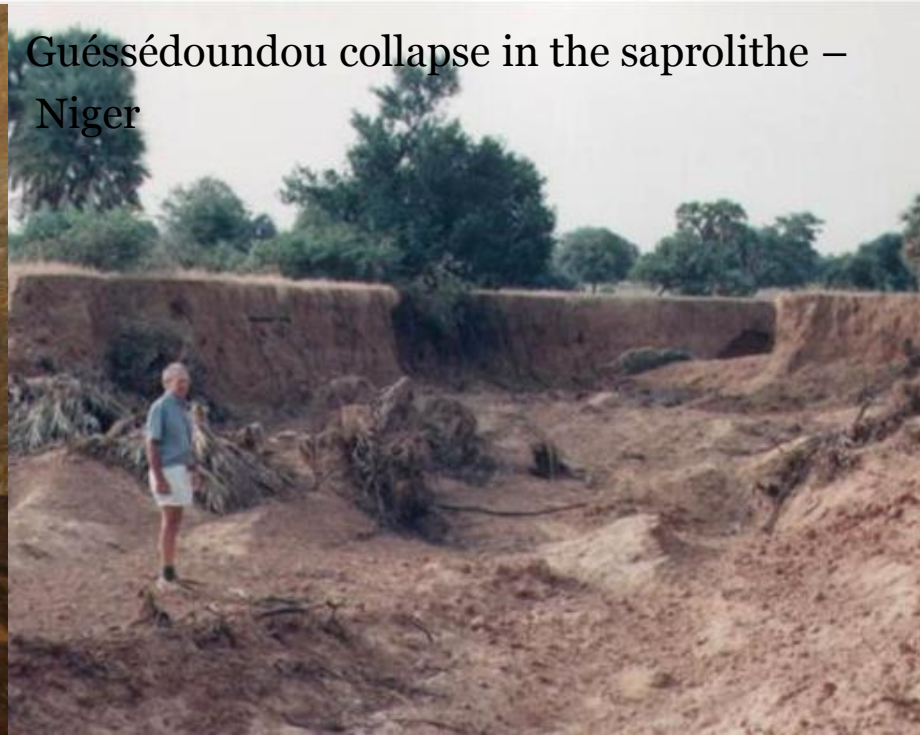
Diffa Doga cave – longitudinal section – sandstone - Niger





Crumbly quartzite in a cave of the sierra do Ibitipoca - Brazil

Guéssédoundou collapse in the saprolithe – Niger



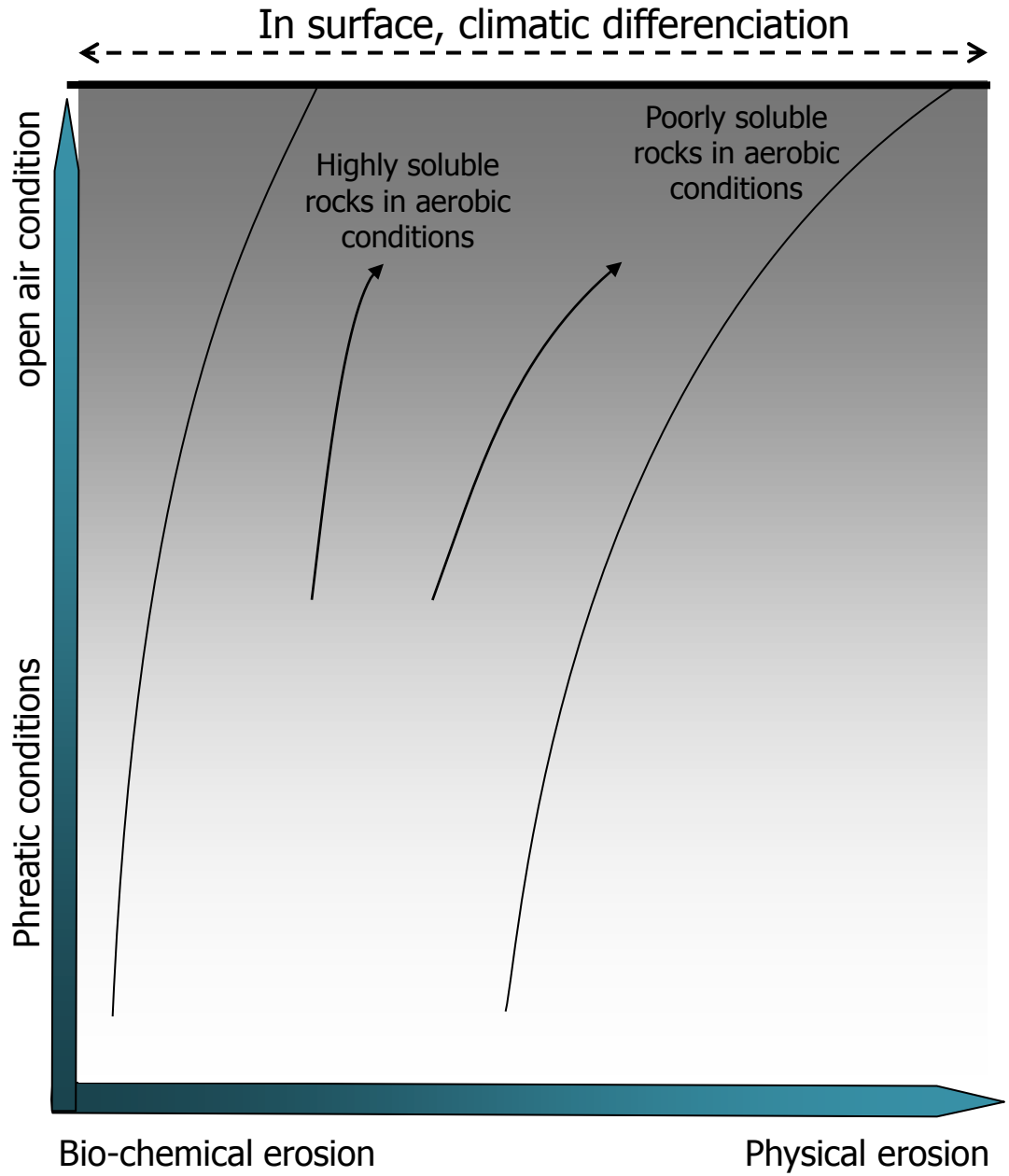
Micaschiste (Akok Bekoé, Cameroon)

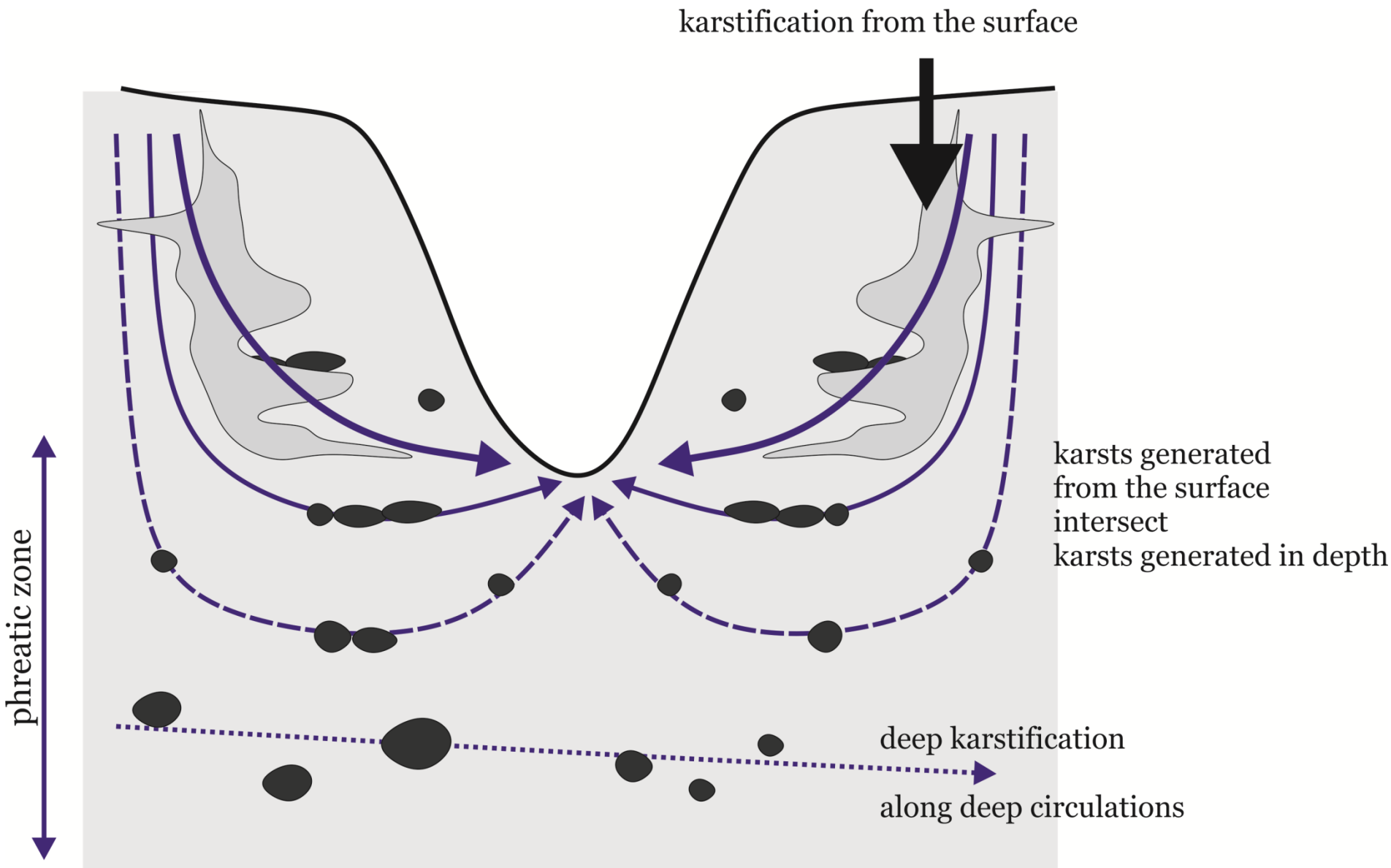
Example of two types of solution

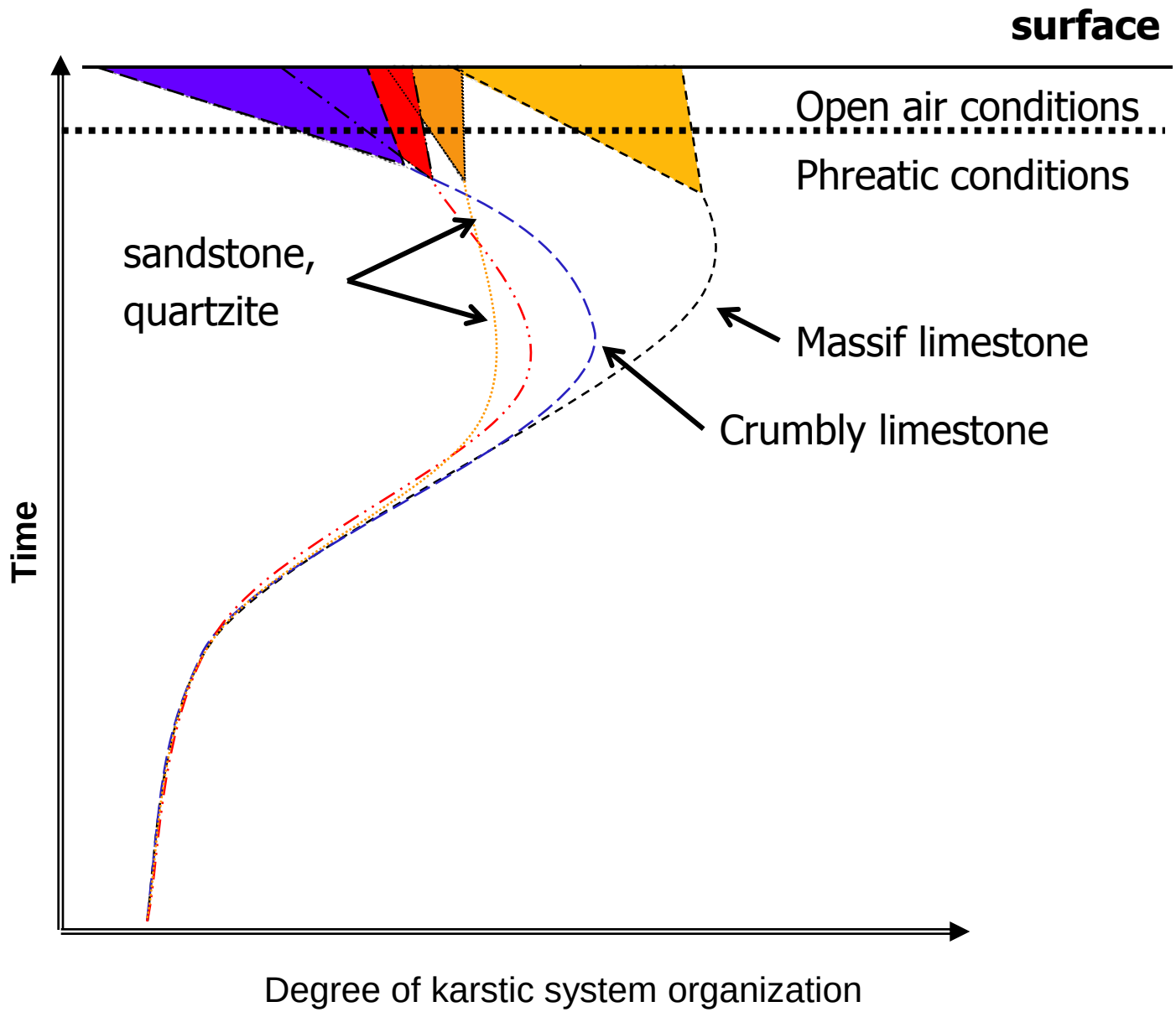
Cave network in Continental terminal sandstone – Niger

Dome in the Mfoula cave, gneiss - Cameroon

An other view…


In surface, climatic differenciation
open air condition
Phreatic conditions
Highly soluble rocks in aerobic conditions
Poorly soluble rocks in aerobic conditions
Bio-chemical erosion
Physical erosion


karstification from the surface
phreatic zone
karsts generated
from the surface
intersect
karsts generated in depth
deep karstification
along deep circulations


surface
Open air conditions
Phreatic conditions
sandstone,
quartzite
Massif limestone
Crumbly limestone
Time
Degree of karstic system organization

Département de Géologie
Université de Liège
pétrologie sédimentaire
Université de Liège