




I FENOMENI E LE FORME CARSICHE

A cura di Stefano FURLANI

Corso di Geografia Fisica con Laboratorio di
Cartografia



Forme e processi del carsismo

ARGOMENTI DELLA LEZIONE

I FENOMENI E LE FORME CARSICHE

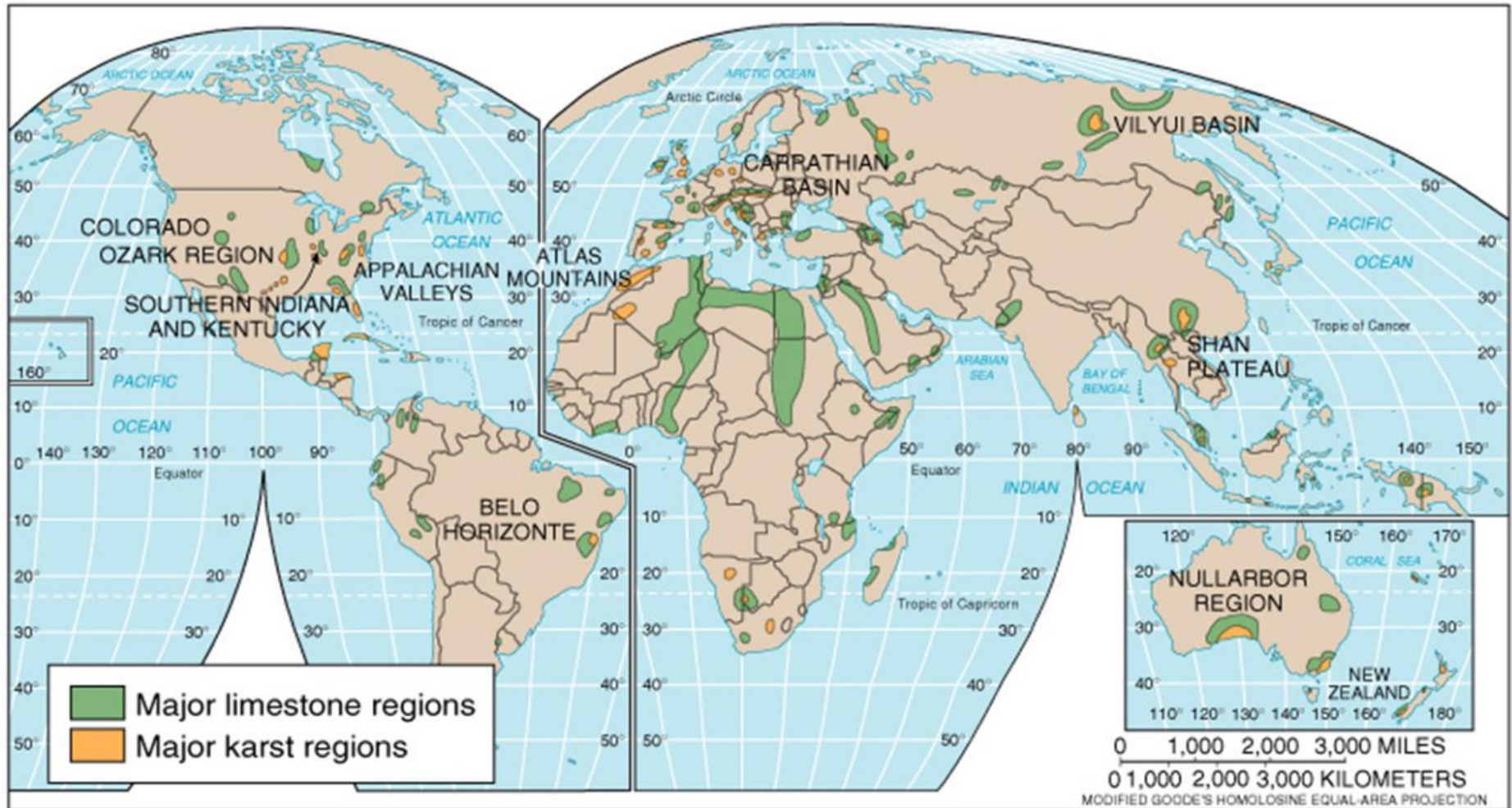
- ✘ Ambienti carsici
- ✘ Processi carsici e pseudocarsici
- ✘ Dissoluzione e precipitazione
- ✘ Forme epigee
- ✘ Forme ipogee
- ✘ Impatto antropico sul carso

COS'È IL CARSISMO?

- ✘ Quali le forme in superficie ed in profondità?
- ✘ Quali i processi?



AREE CARSIICHE NEL MONDO



CARSO TROPICALE (CUC PUONG, VIETNAM)



Carso tropicale (Cuc Phuong, Vietnam)



Carso alpino (Canin, Italia e Slovenia)



Dunnieh (Libano)



Carso costiero (Malta)



Carso dinarico (Mali Alan, Croazia)



Gran Riviere (Francia)

MEDUGORJE (CROAZIA)



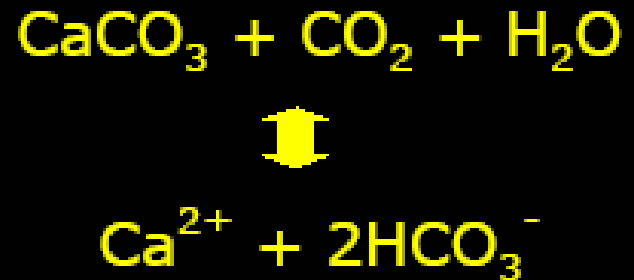
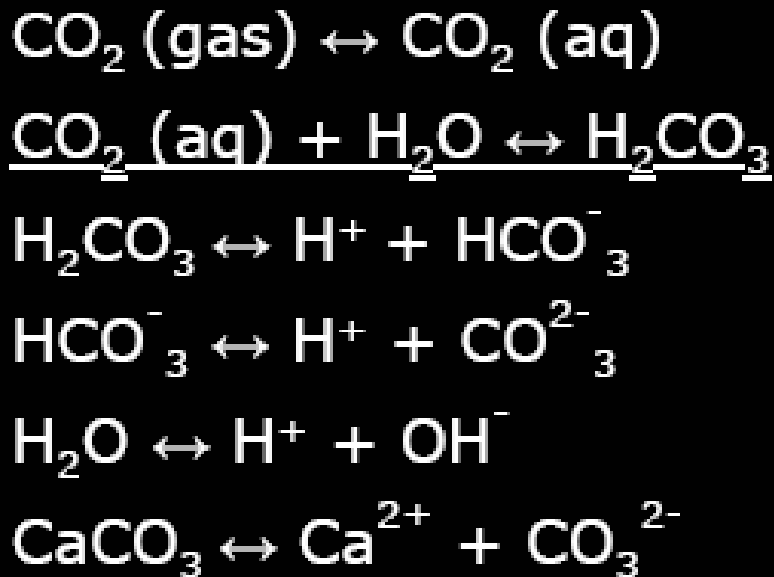
Il carsismo

I PROCESSI DI DISSOLUZIONE E PRECIPITAZIONE CARSICA

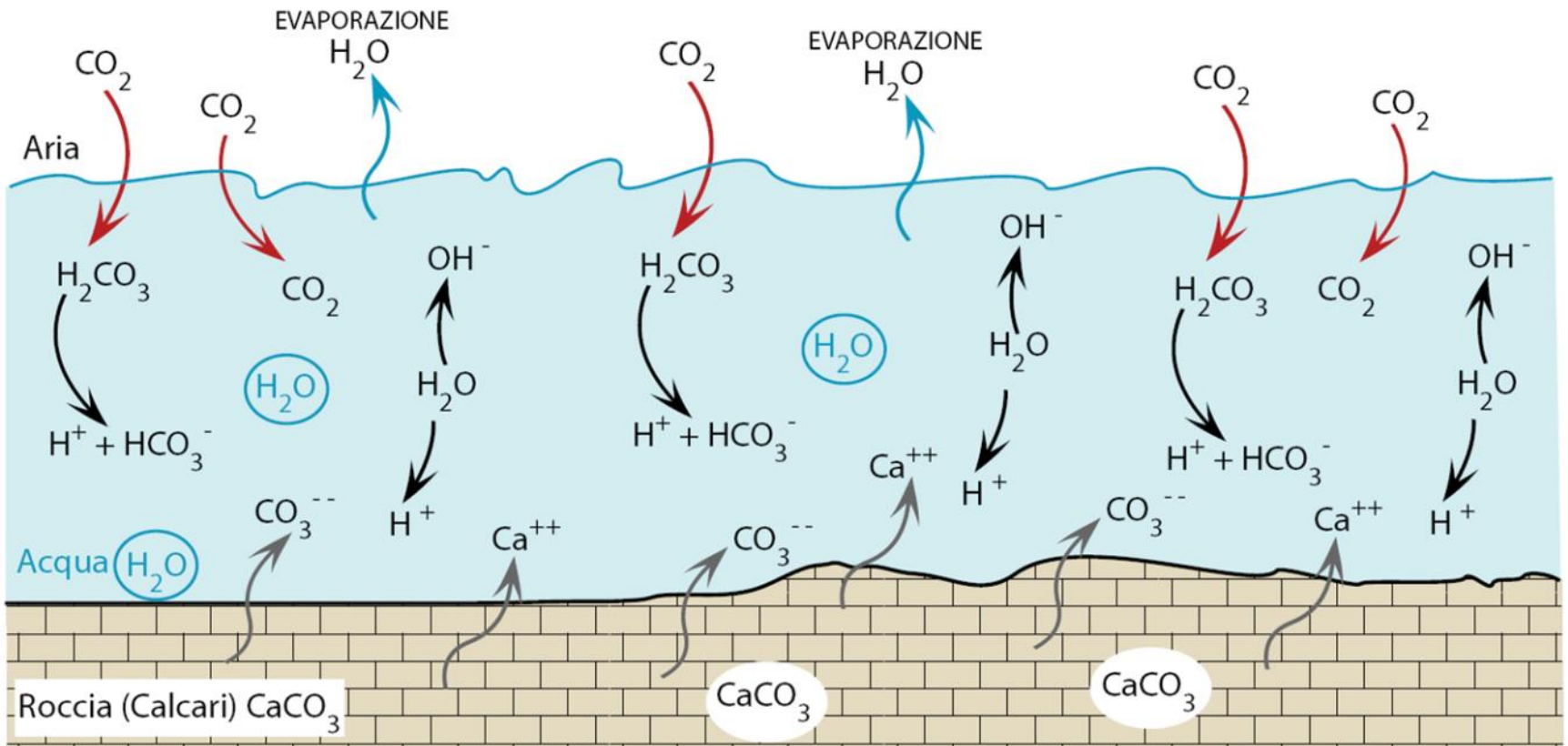
COS'È IL CARSO? : DISSOLUZIONE CHIMICA DEI CALCARI

calcite = CaCO_3

dolomite = $\text{CaMg}(\text{CO}_3)_2$



LE TRE FASI DEL PROCESSO BASE



COS'È IL CARSISMO?

É un processo chimico la cui velocità, intensità e tipologia dipendono da:

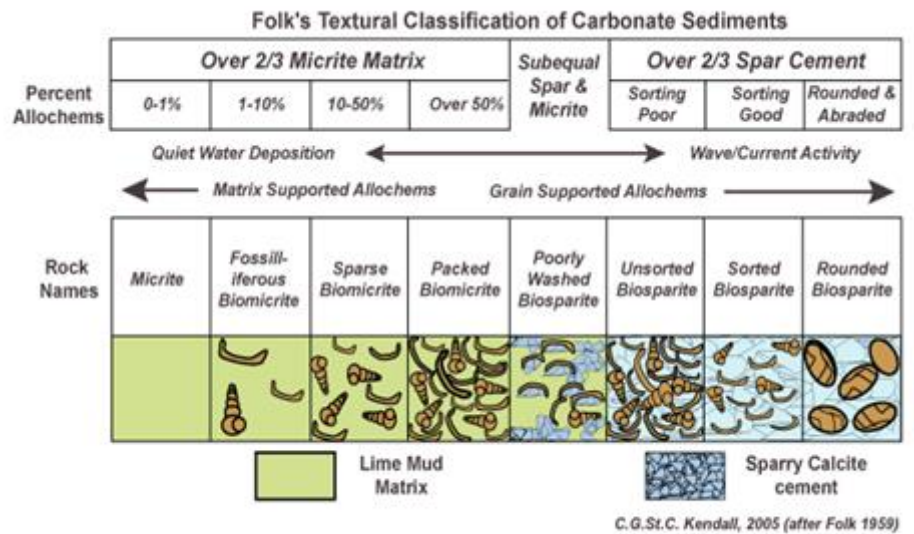
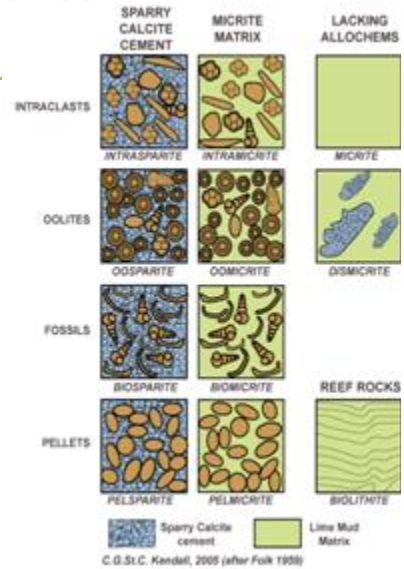
- Quantità di CO_2 (aria e suolo)
- Temperatura dell'aria, acqua e roccia
- Presenza di ioni alloctoni e/o miscela con acque di tipo diverso
- Dinamica delle acque: regimi laminari e turbolenti

Il carsismo

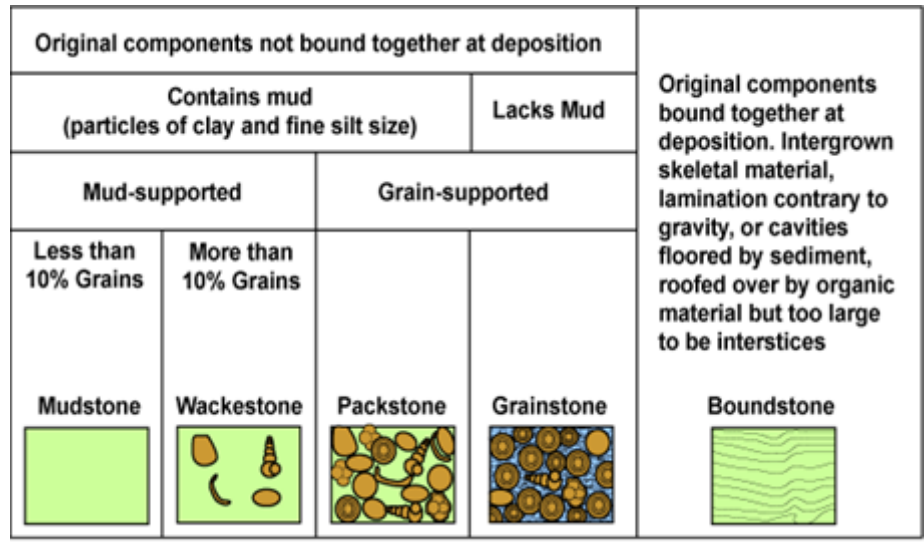
FATTORI CHE INFLUENZANO I FENOMENI CARSICI

FATTORI LITOLOGICI

Folk (1959)



Dunham (1962)



C. G. St. C. Kendall, 2005 (after Dunham, 1962, AAPG Memoir 1)





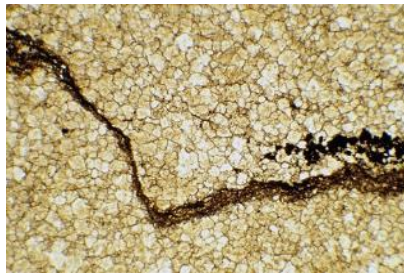
FATTORI CHE CONDIZIONANO IL CARSISMO



FATTORI STRUTTURALI



FATTORI BIOLOGICI



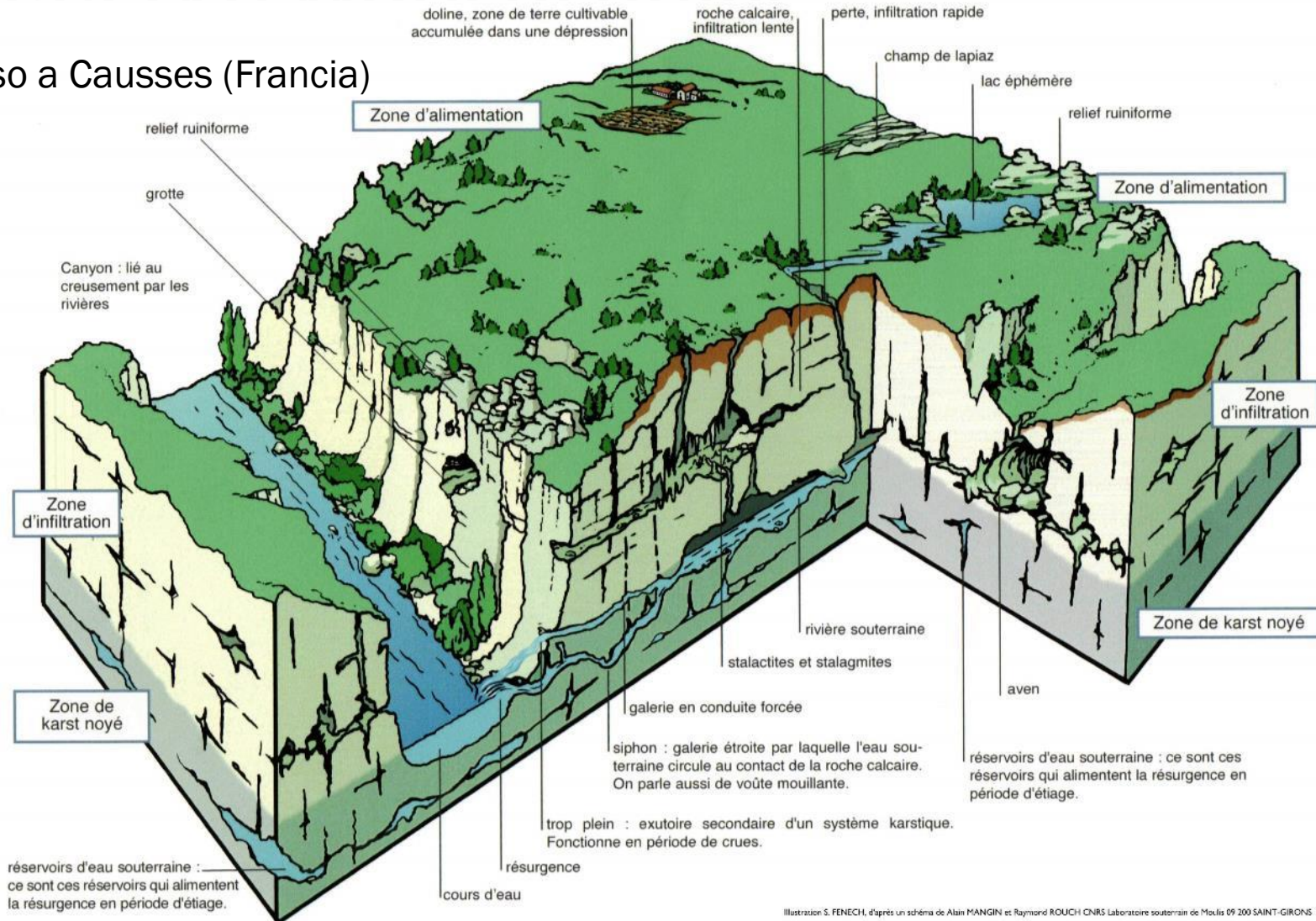
FATTORI LITOLOGICI



FATTORI CLIMATICI

RISULTATI MORFOLOGICI

Carso a Causses (Francia)



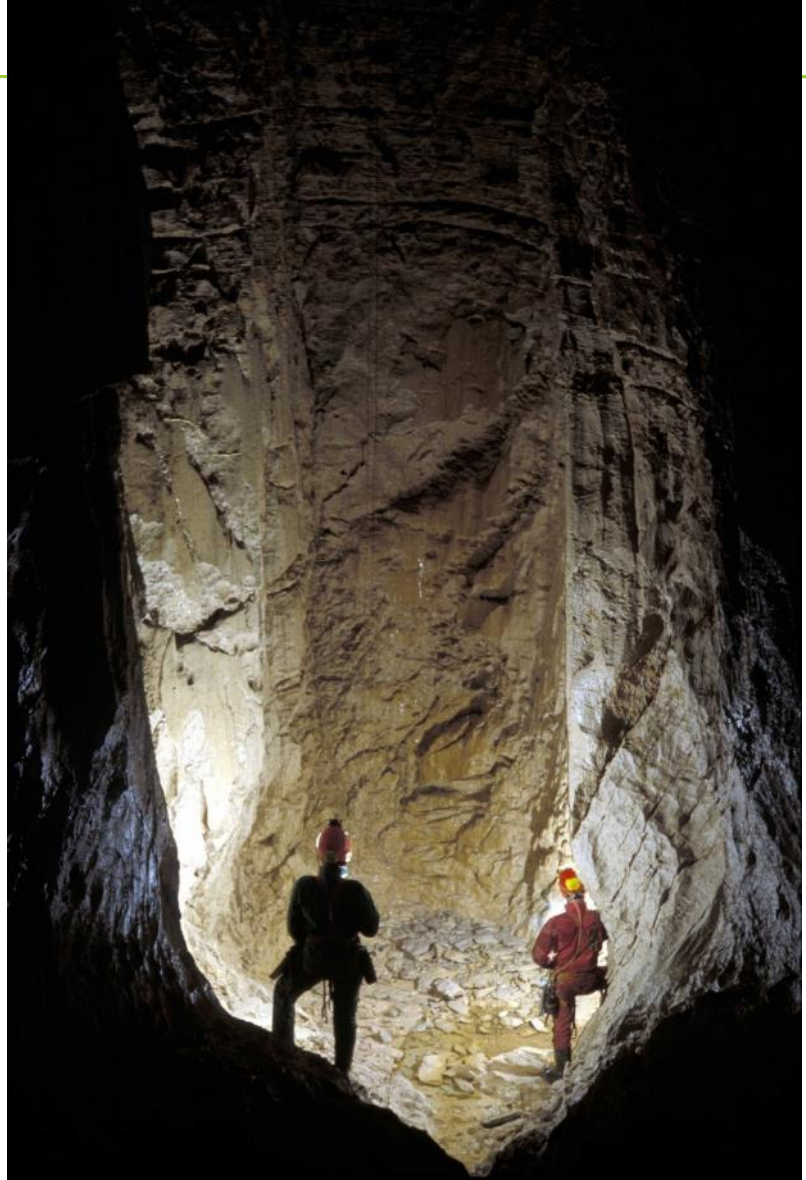
Sentiero Rilke (Sistiana-Duoino, Trieste)

FORME EPIGEE





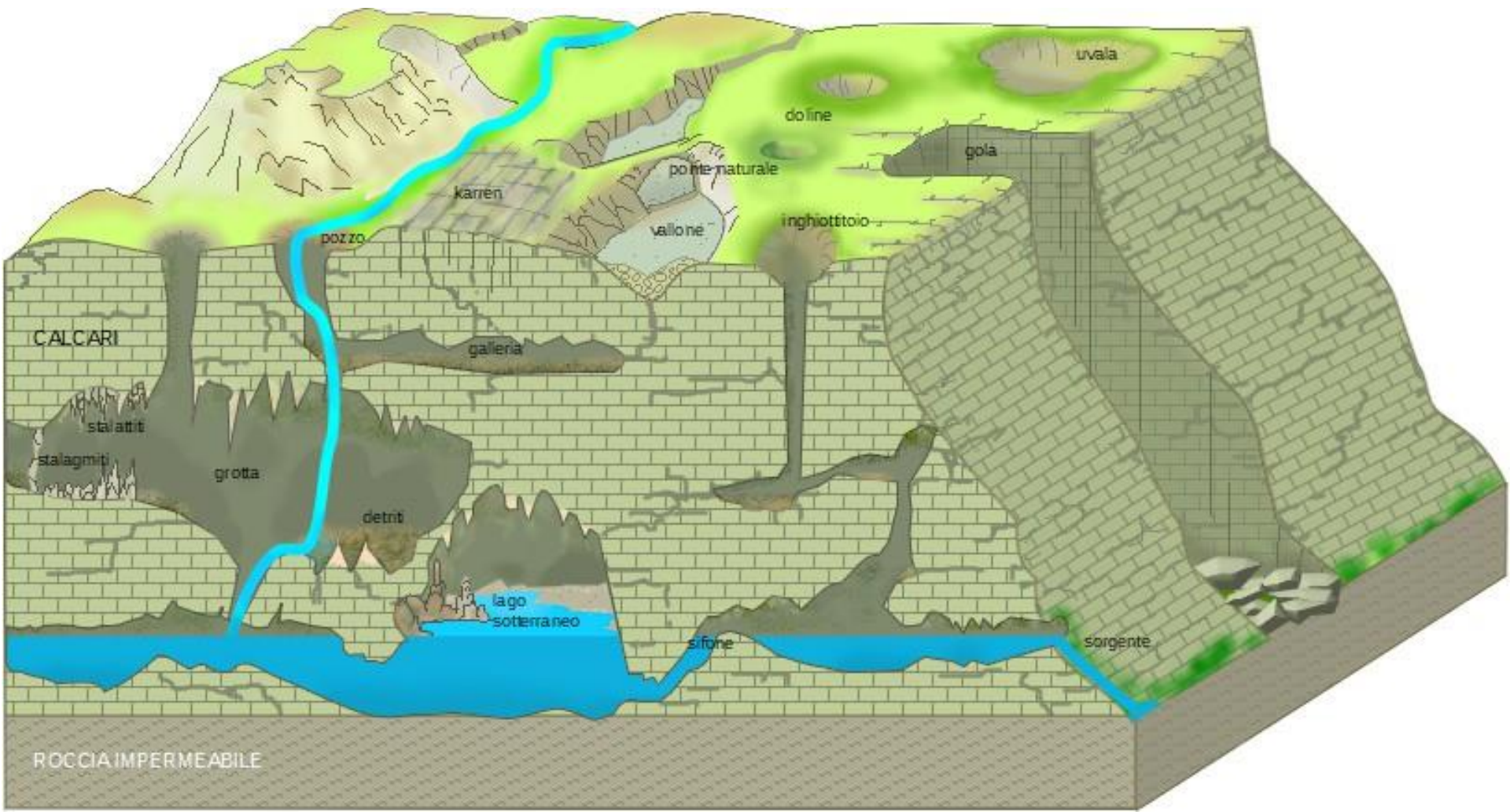
FORME IPOGEE



FORME COMPOSITE (ES. FLUVIOCARSICHE)



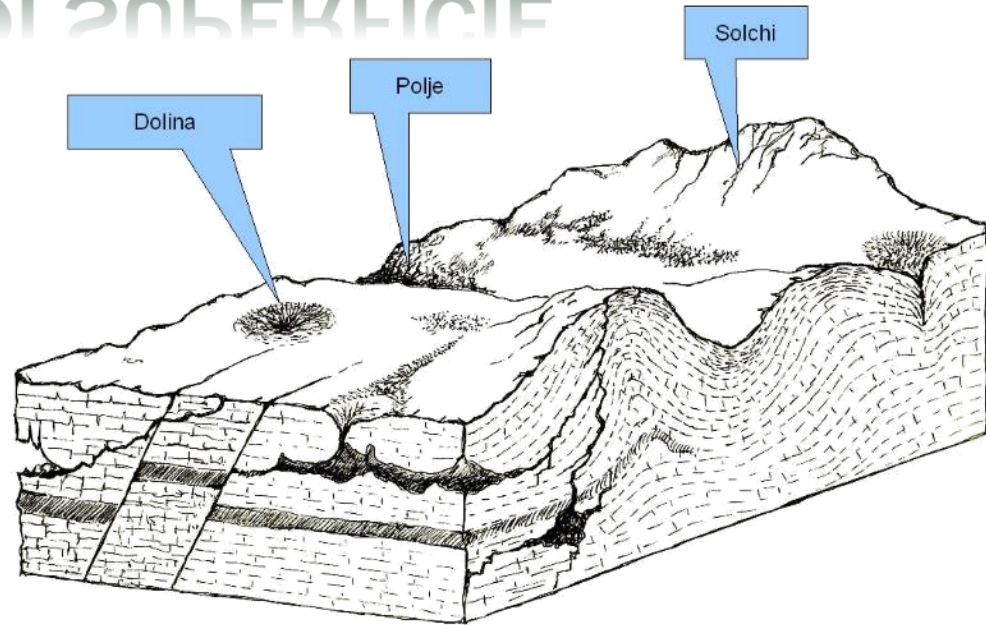
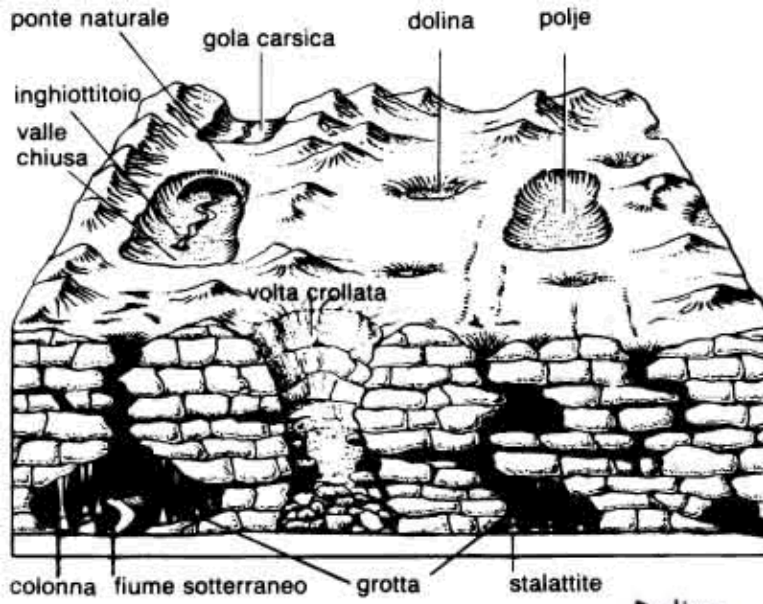
I FENOMENI CARSICI



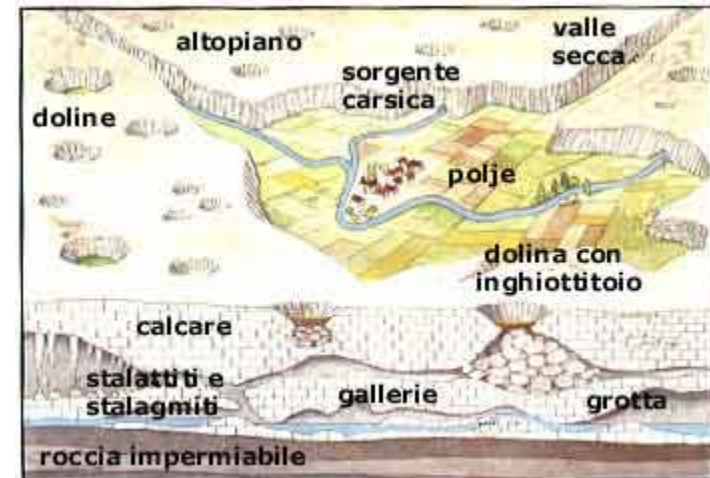
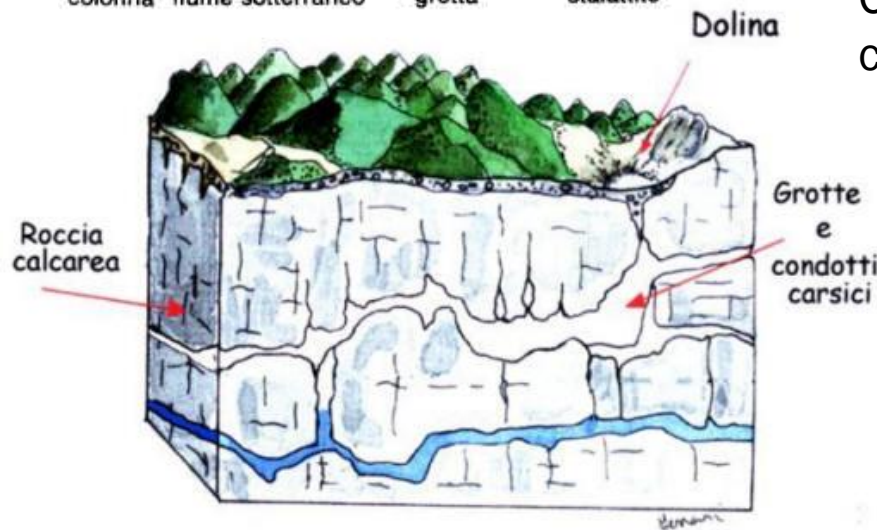
Il carsismo

IL CARSISMO EPIGEO

FORME CARSICHE DI SUPERFICIE

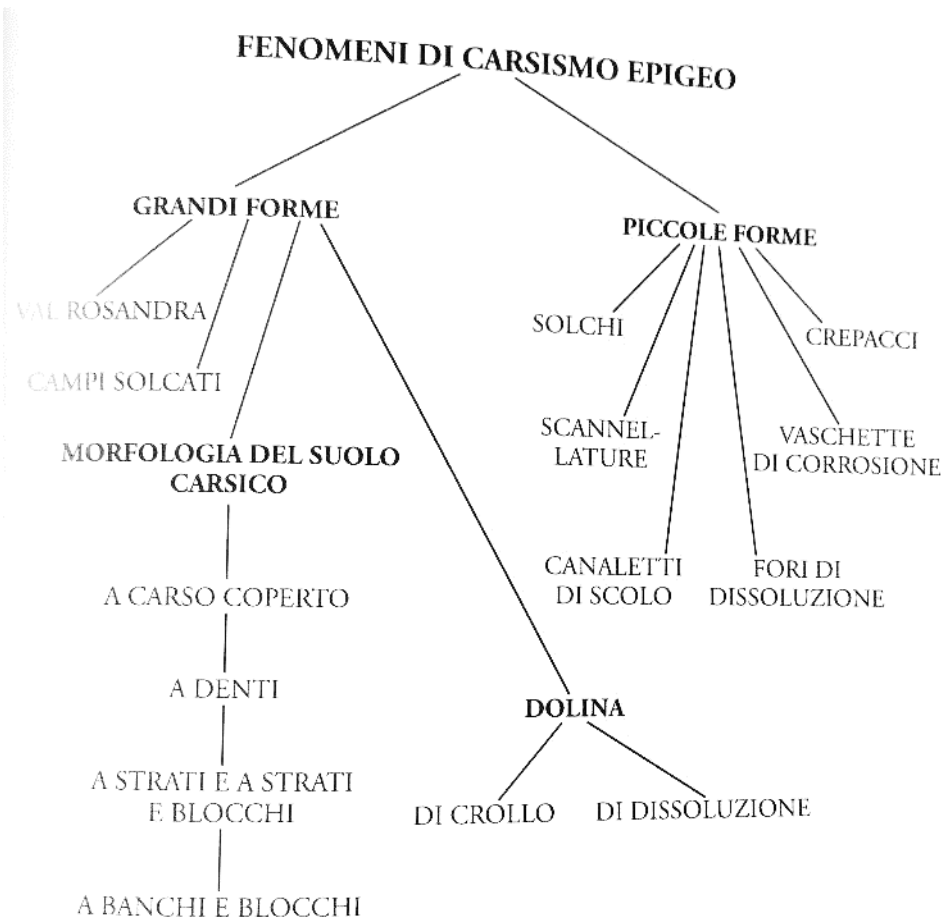


Carsismo epigeo ed ipogeo sono collegati fra loro



PRINCIPALI FORME DEL CARSISMO EPIGEO

- ✘ Campi solcati (te: *karrenfeld*)
 - + Kamenitza, solchi carsici, fori
- ✘ Grize
- ✘ Solchi terrestri
- ✘ Doline
- ✘ Polje
- ✘ Pavimenti



KARREN (PAKLENICA, CROAZIA)



KAMENITZA, VASCHETTA DI CORROSIONE, KARST POOL



FORI (MALTA)





CAMPI SOLCATI



RILLENKARREN



MICRORILLS





SOLCHI (VAL ROSANDRA, TRIESTE)

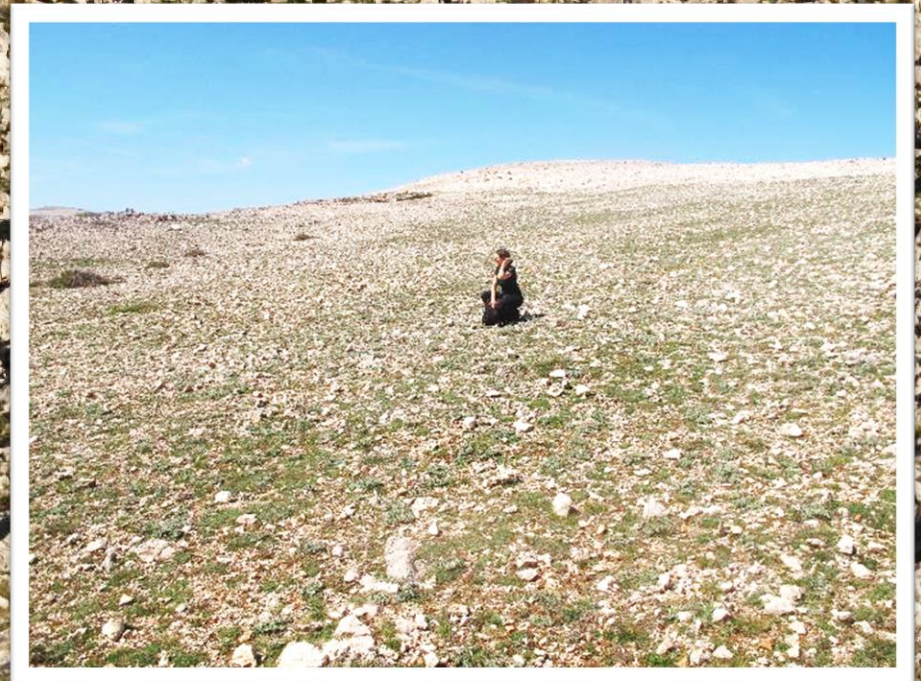


PAVIMENTO CALCAREO (*LIMESTONE PAVEMENT*) MALHAM COVE, ENGLAND



LA GRIZA

Quando il reticolo dei crepacci è ben sviluppato, il campo tende a degradarsi fino a trasformarsi in una "griza" ossia in una pietraia in cui si mescolano caoticamente massi, pietrisco e terra rossa.

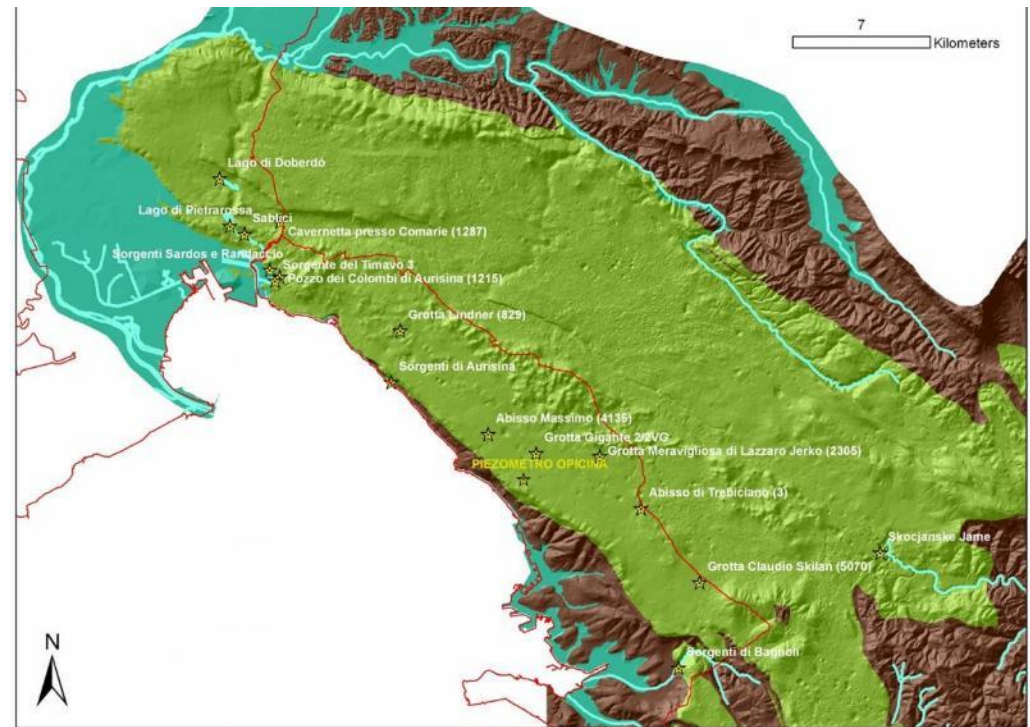
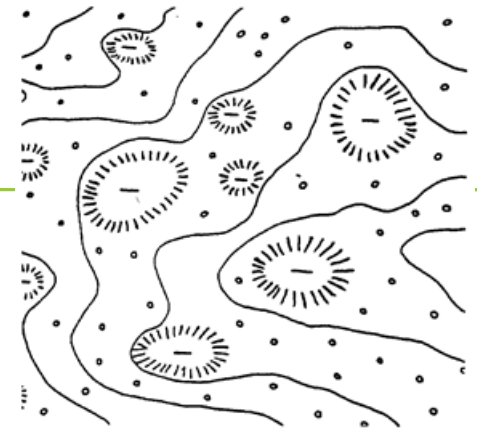


Classificazione e genesi delle doline

LE DOLINE (SINKHOLE)

DOLINA

- ✘ Una **dolina** è una conca chiusa, tipica dei plateau calcarei, formata in seguito alla dissoluzione del carbonato di calcio costituente le rocce
- ✘ è una morfologia tipica di aree in cui si manifesta il carsismo superficiale.



Da: Progetto Hydrokarst

CLASSIFICAZIONI DELLE DOLINE

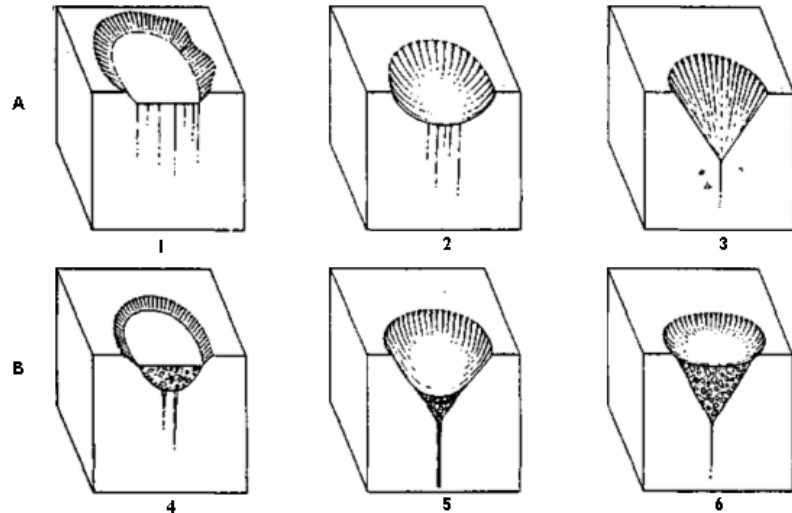


Fig. 9.5. Disegno schematico di alcuni tipi di doline.

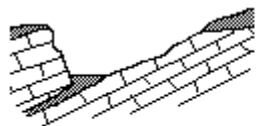
A. Doline senza depositi di riempimento: 1. a piatto; 2. a ciotola; 3. a imbuto.

B. Doline con depositi di riempimento: 4. a piatto; 5. a ciotola; 6. a imbuto.

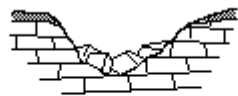
Il tipo 4 deriva dal riempimento parziale di una forma a ciotola (2), il tipo 5 da una forma a imbuto (3), così pure il tipo 6.

Morfologica

Morfodinamica



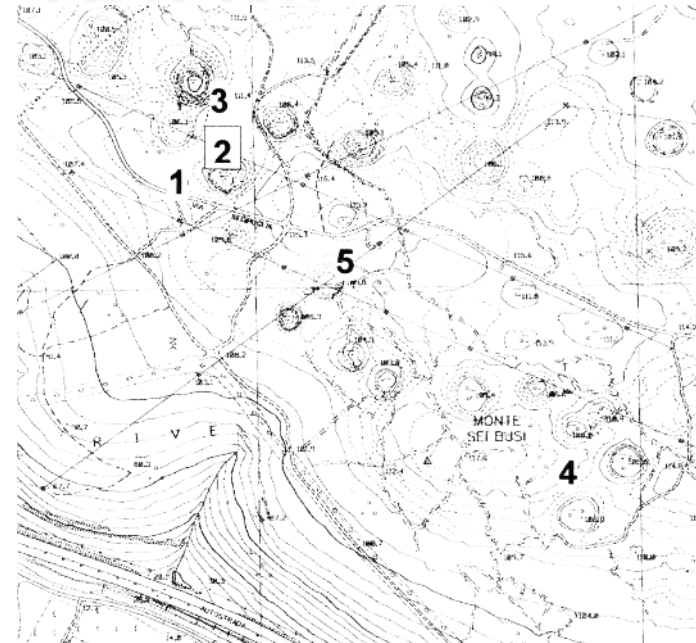
D. di dissoluzione



D. di crollo



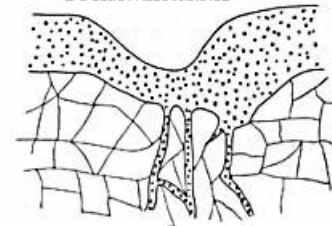
D. di crollo (dislocazione)



1 DOLINA DI SOLUZIONE NORMALE



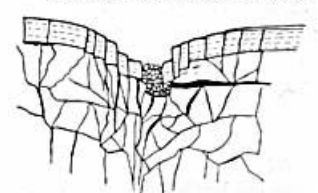
2 DOLINA ALLUVIONALE



3 DOLINA A POZZO DI CROLLO



4 DOLINA DI SUBSIDENZA IN ROCCIA



DOLINA (SINKHOLE) - PULO DI ALTAMURA



DOLINA DI SU SUERCONE (ORGOSOLO, SARDEGNA)

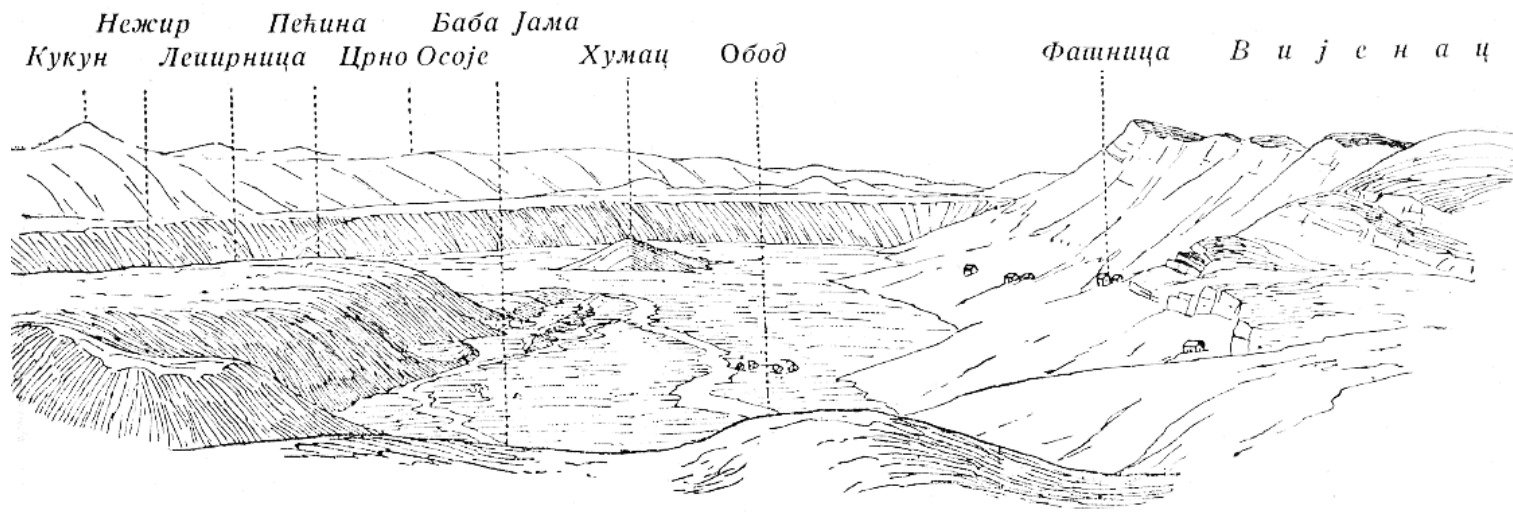




POLJE

Il *polje carsico* è una vasta dolina formatasi per effetto dei processi di corrosione ed erosione.

È delimitato tutt'attorno da un bordo roccioso ininterrotto che può raggiungere anche una certa altezza. Il fondo è piatto e molto fertile in tutta la sua estensione, tanto che il termine deriva da una parola slava che significa *campo coltivato*.



390. Фатничко Поље.

Свијис, 1926

IL POLJE DI DOBERDÒ (CARSO GORIZIANO, ITALIA)





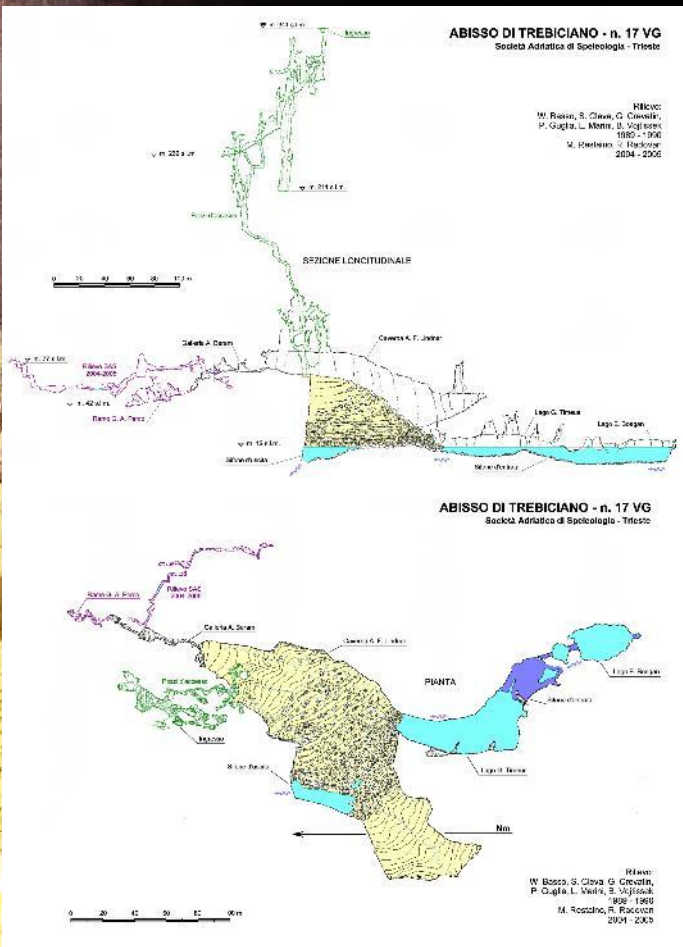
Grotte ed abissi

IL CARSISMO IPOGEO

COS'È UNA GROTTA?

- ✘ Un qualsiasi tipo di vuoto o cavità sotterranea, sia naturale sia artificiale, ovvero una cavità che si sviluppa nel sottosuolo (*ambiente ipogeo*)
- ✘ La speleologia si occupa dell'esplorazione, e in parte dello studio delle grotte
 - + *grotte primarie* quelle formatesi contestualmente alla roccia in cui si trovano
 - + *grotte secondarie* quelle formatesi in seguito all'alterazione/erosione delle rocce in cui si sviluppano.

ABISSO DI TREBICIANO (CARSO TRIESTINO)





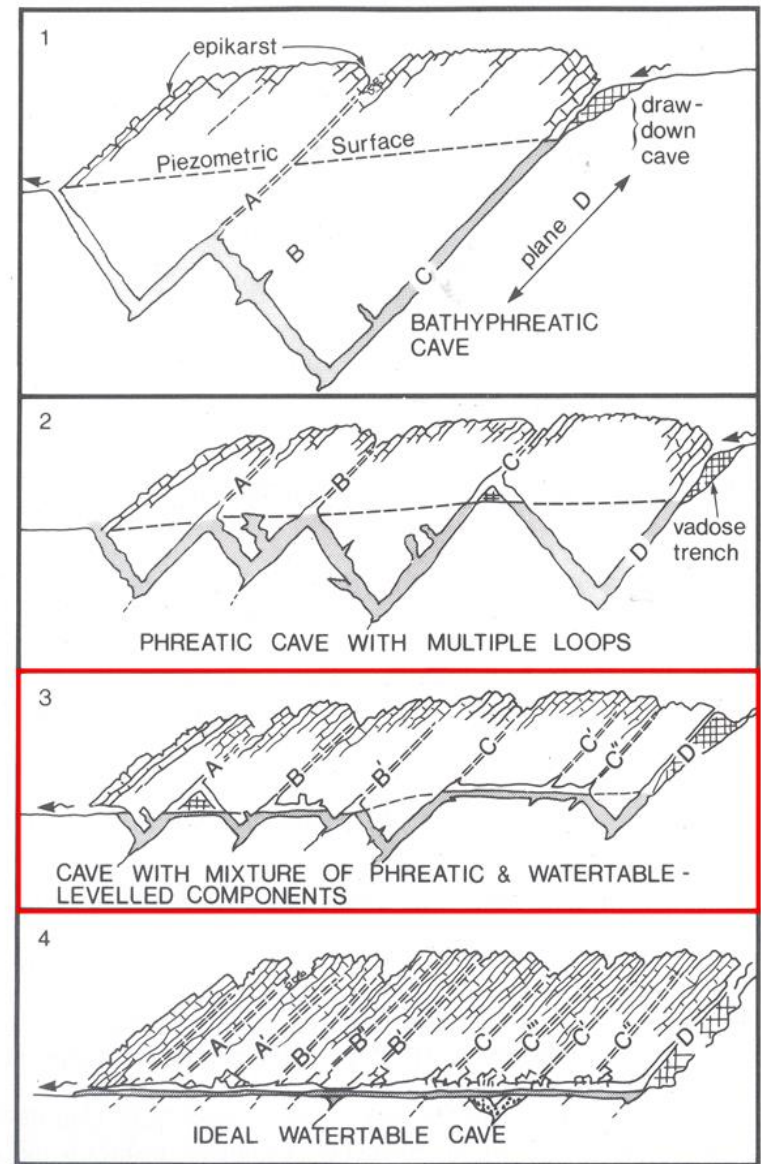
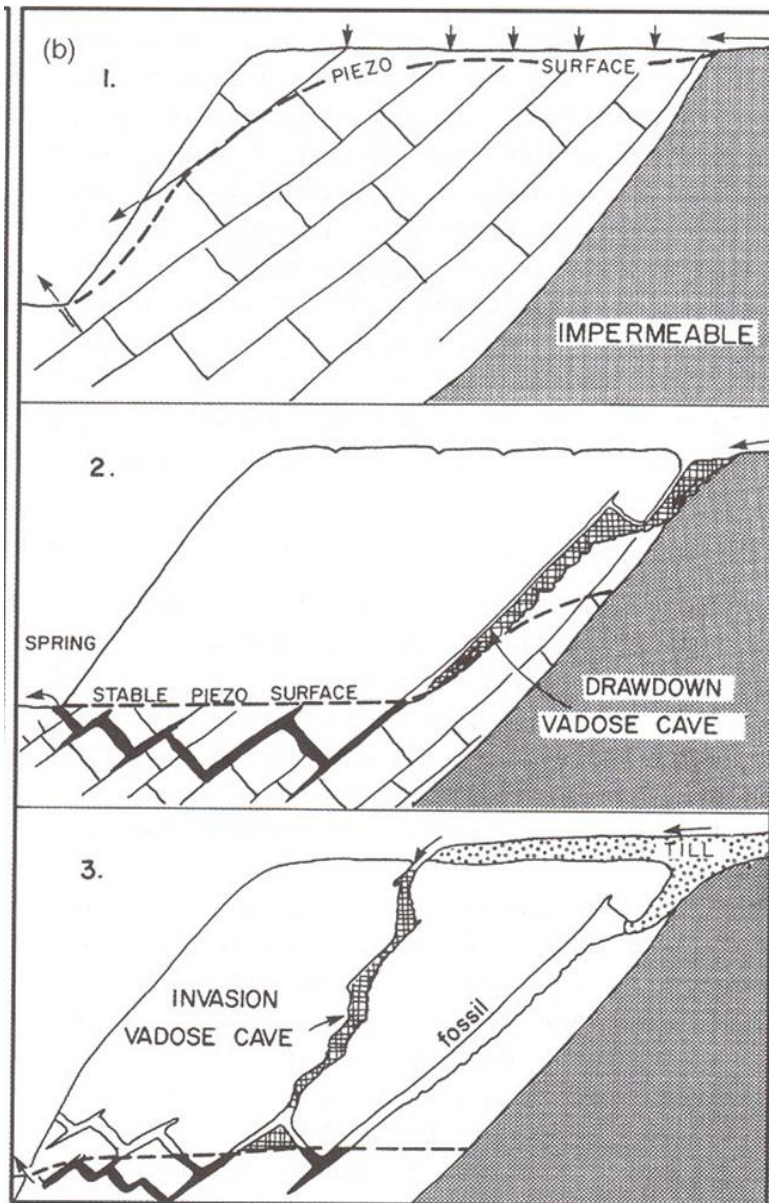


Figure 7.14 The Four-state Model that differentiates the basic types of phreatic and water table caves, drawn to correspond to the conceptual framework of Figure 7.3.

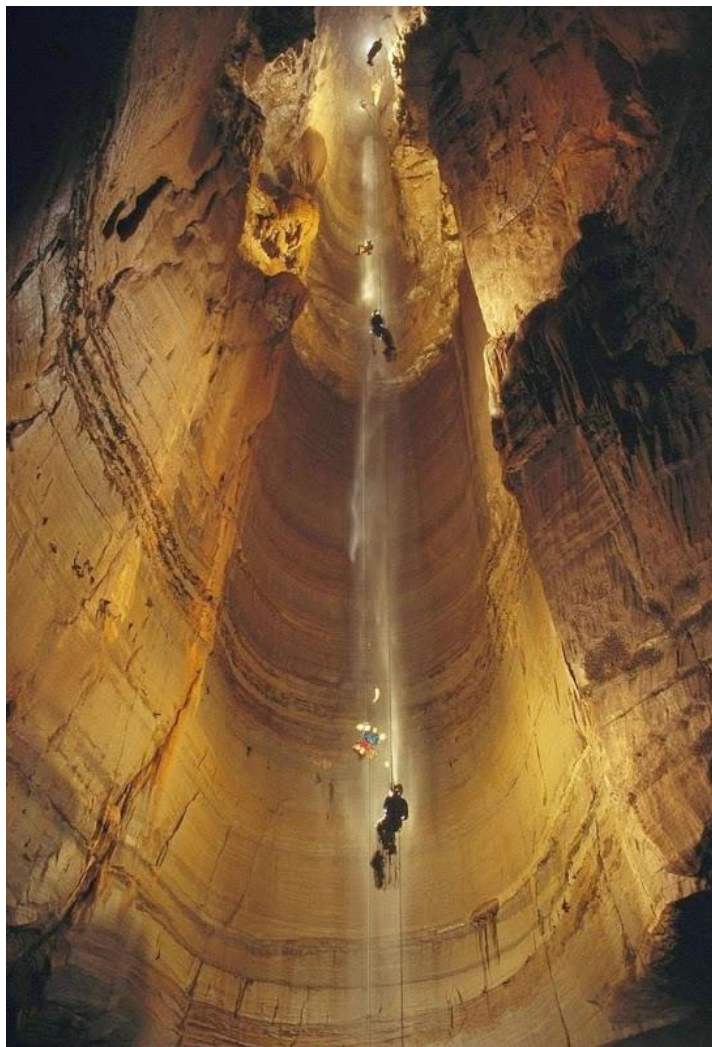




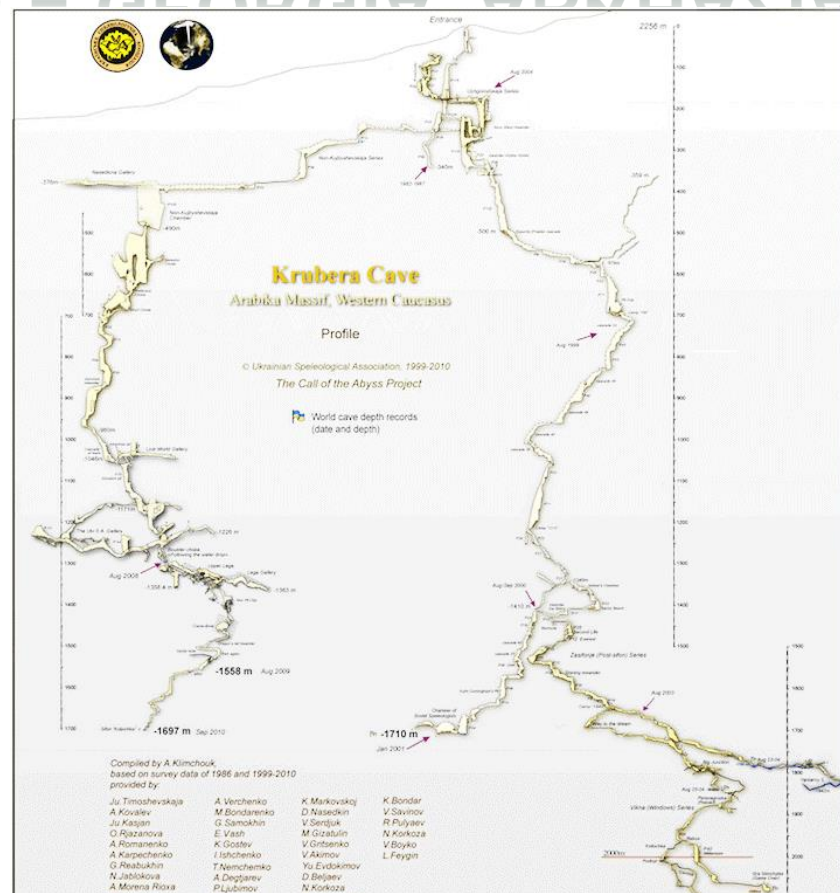
Carso profondo giovane



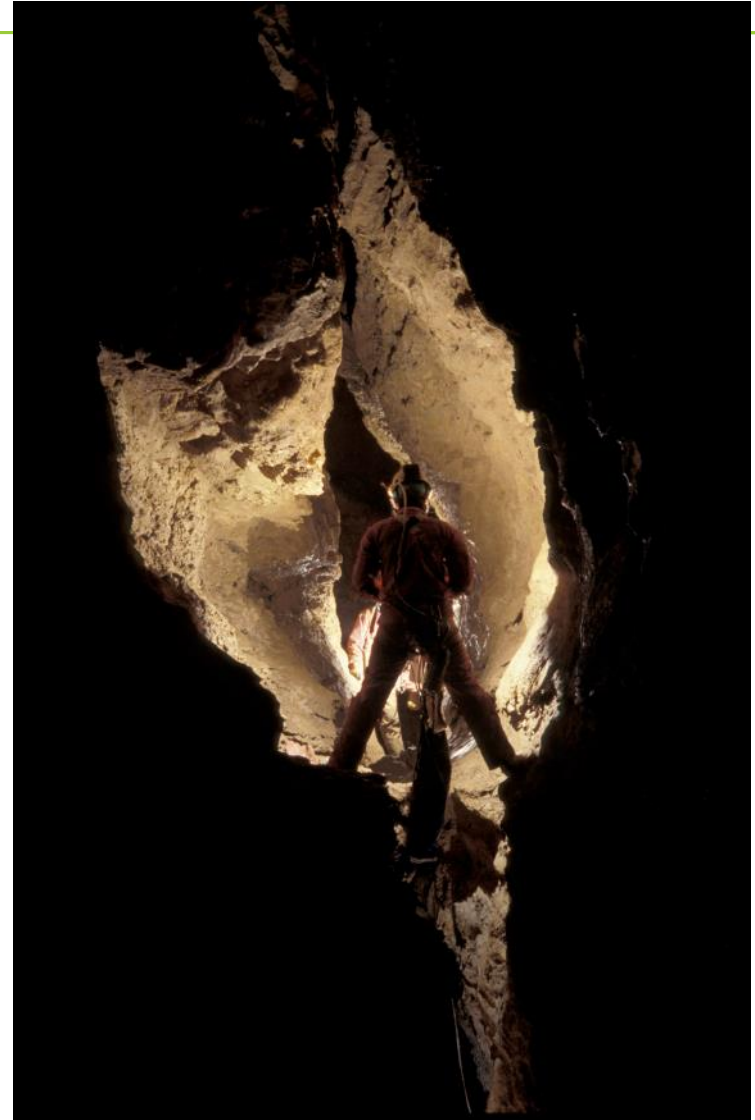
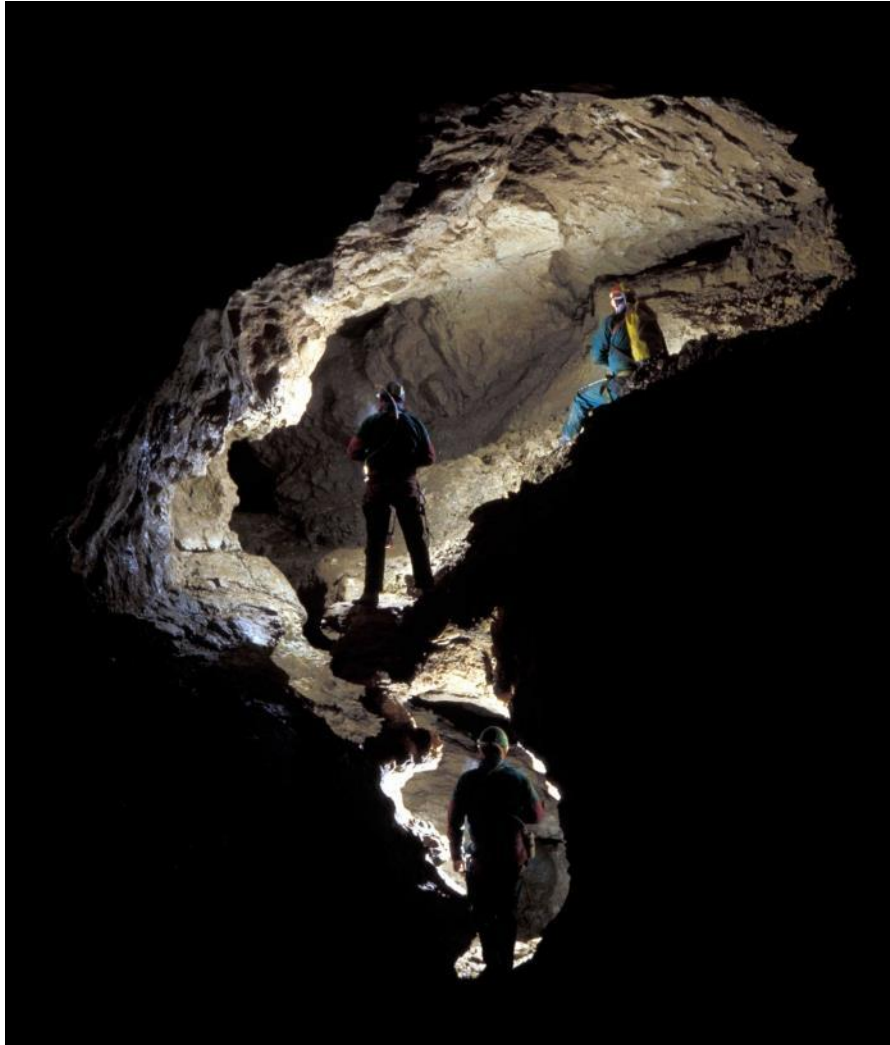
KRUBERA (RU VOROYNA) – GEORGIA, ABKHAZIA



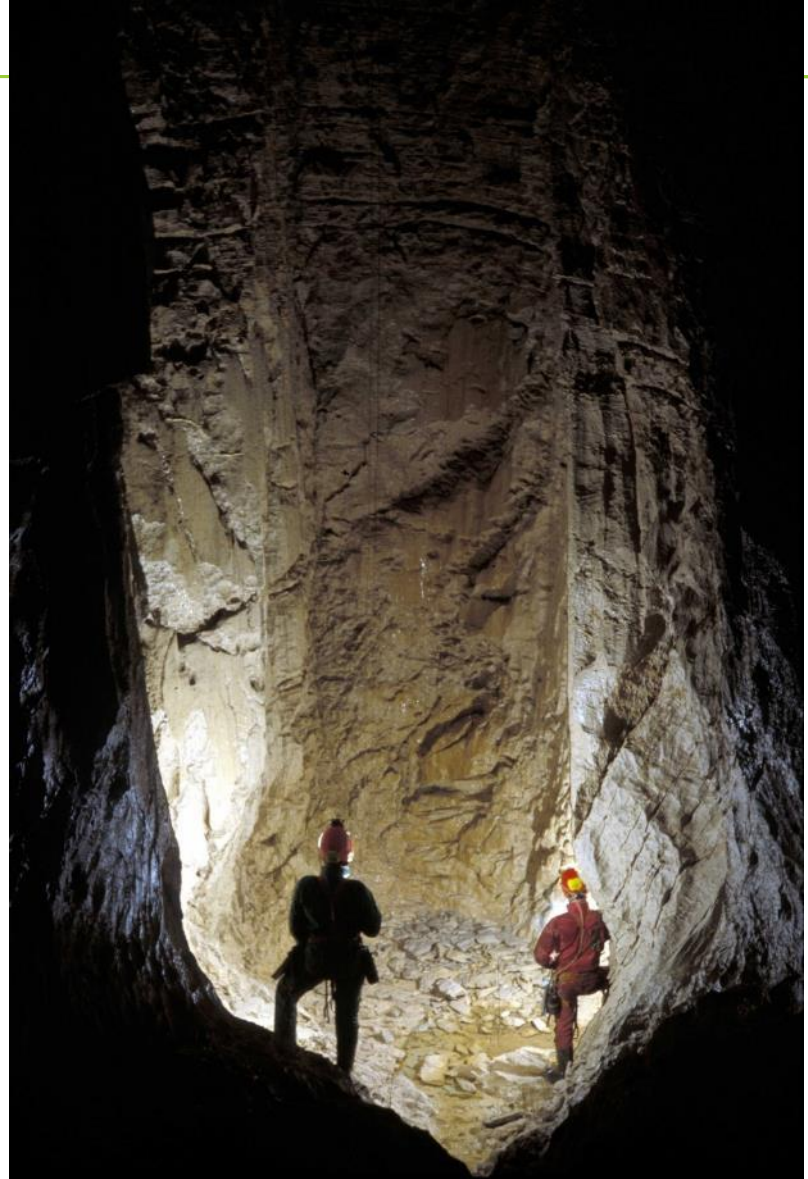
(in russo: Voronyia)

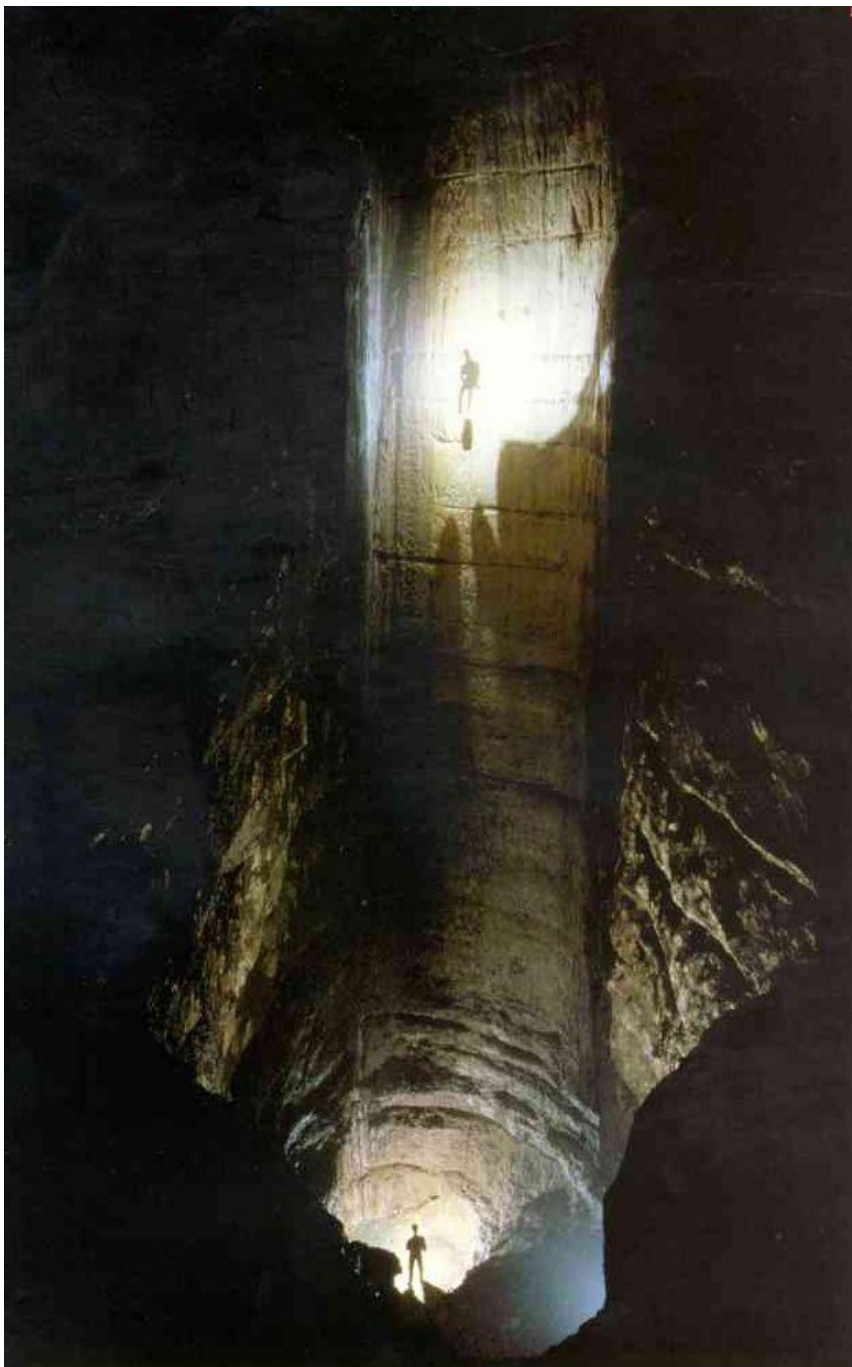


| | Nome della grotta | Località | Profondità (m) |
|----|-------------------------------|------------------|----------------|
| 1. | Grotta Veryovkina | Abkazia, Georgia | 2204 |
| 2. | Grotta Krubera | Abkazia, Georgia | 2197 |
| 3. | Illyuzia-Mezhonnogo-Snezhnaya | Abkazia, Georgia | 1753 |











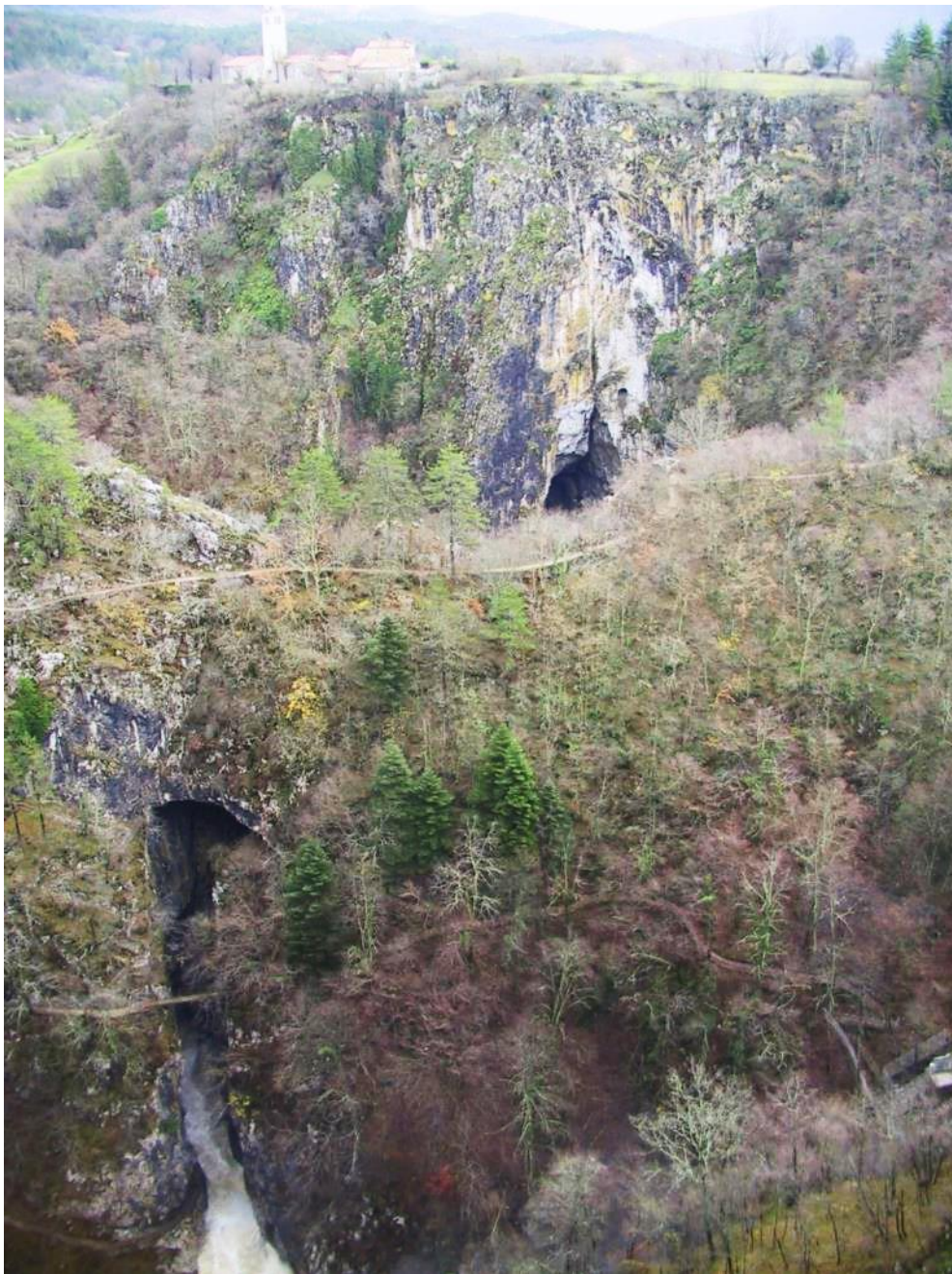








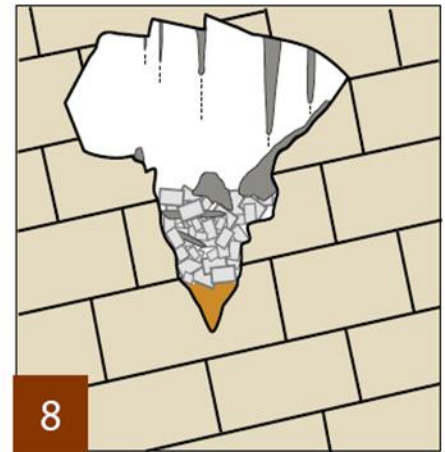
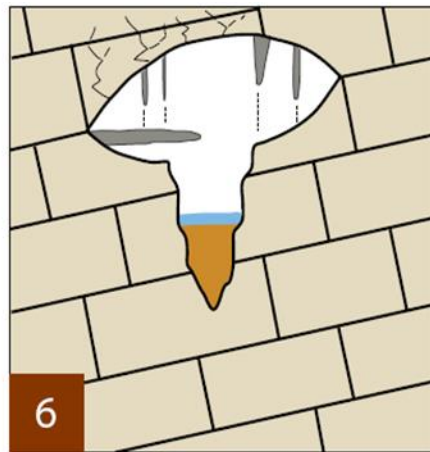
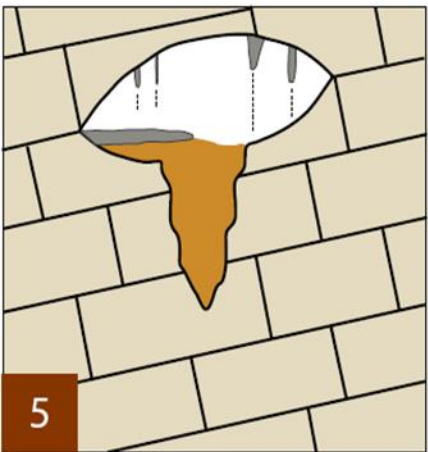
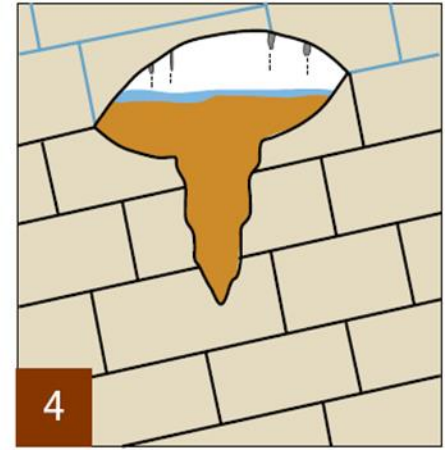
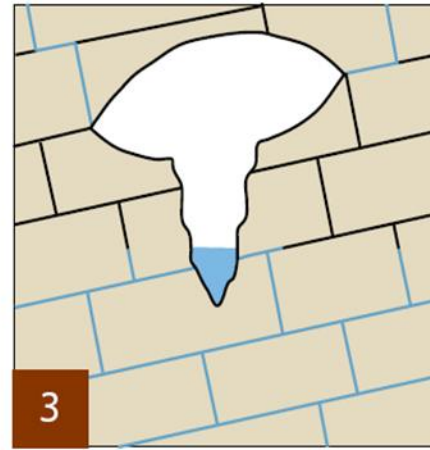
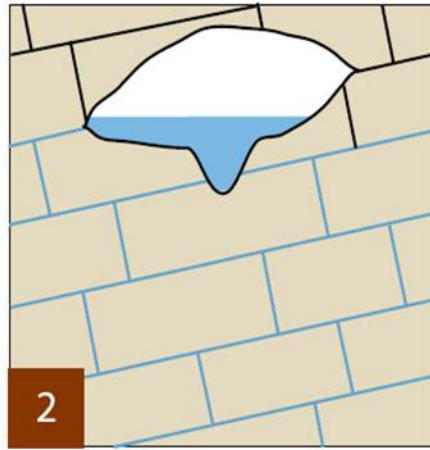
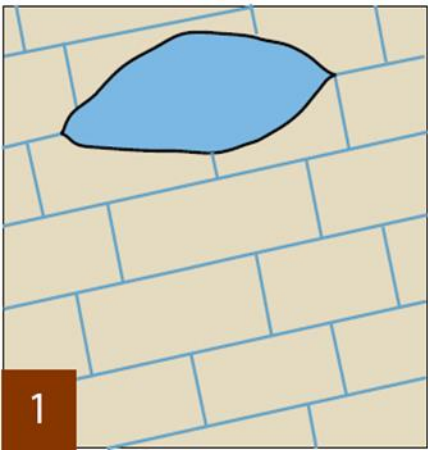
Grotte di San Canziano (Divaca, Slovenia)

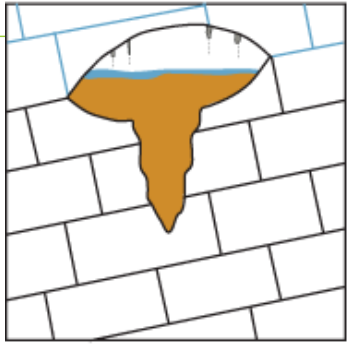
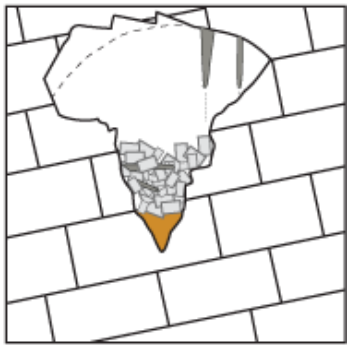
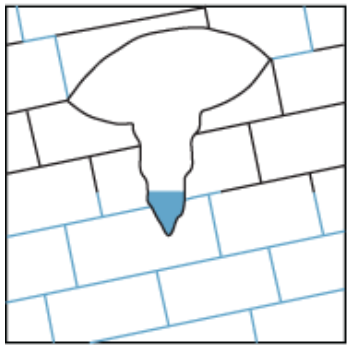
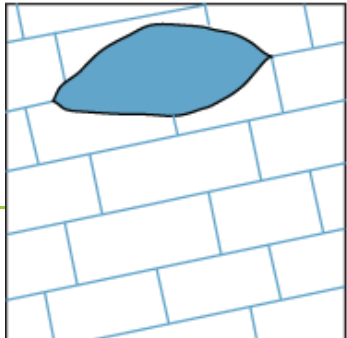


DEPOSITI DI GROTTA (*CAVE DEPOSITS*)

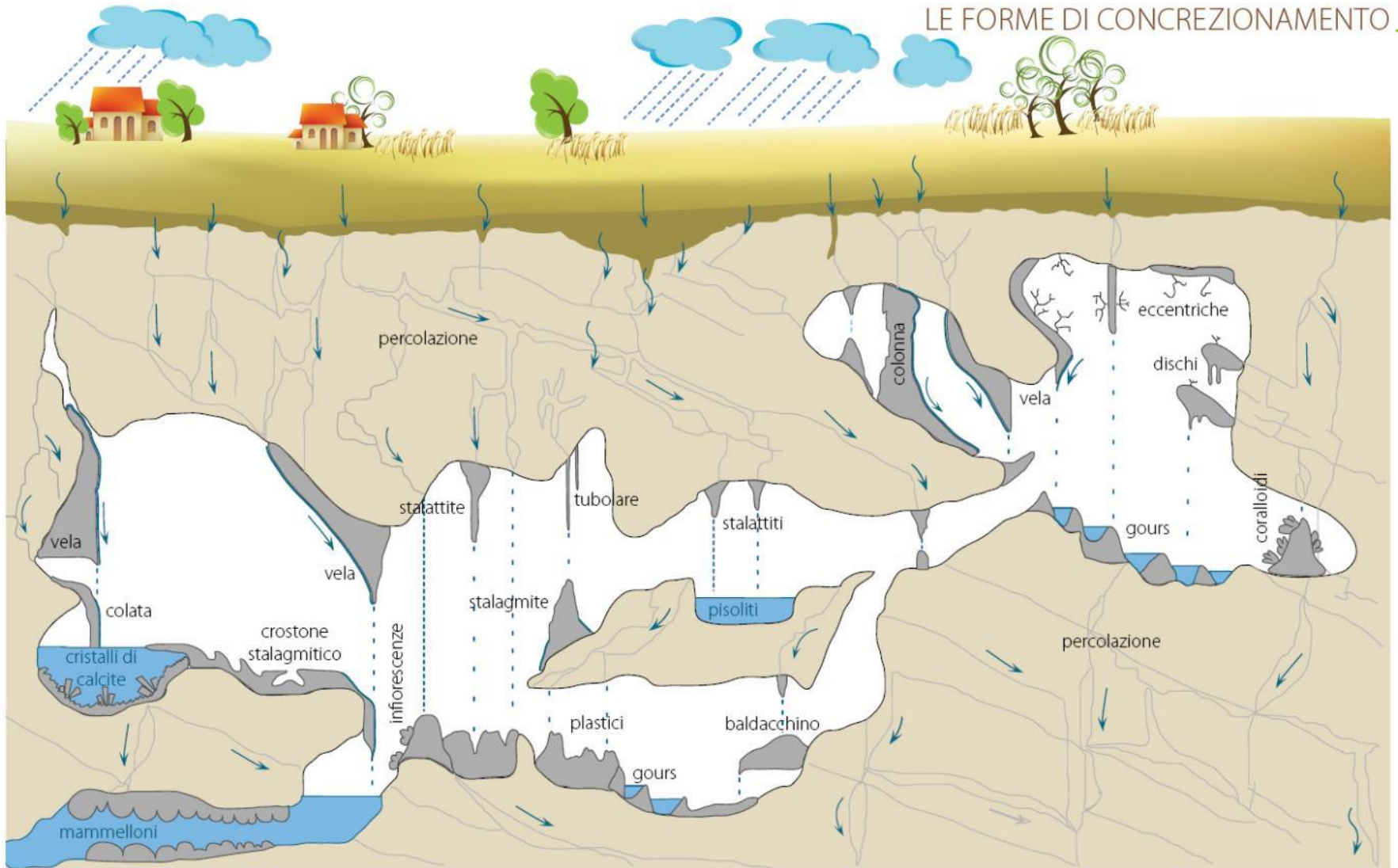
CHIMICI E FISICI:

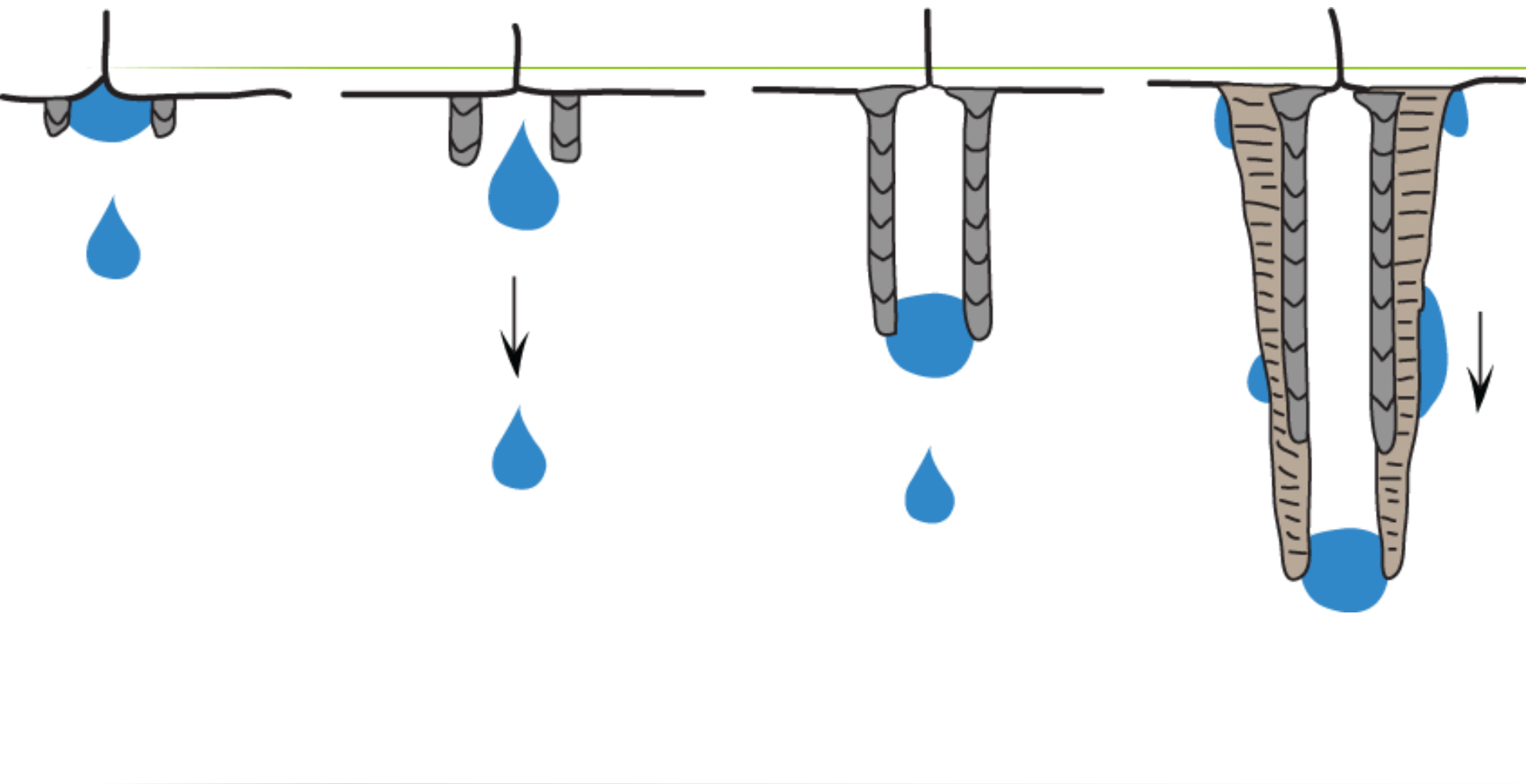
**STALATTITI, STALAGMITI, FLUSSI, GOURS,
CASCATE**





LE FORME DI CONCREZIONAMENTO

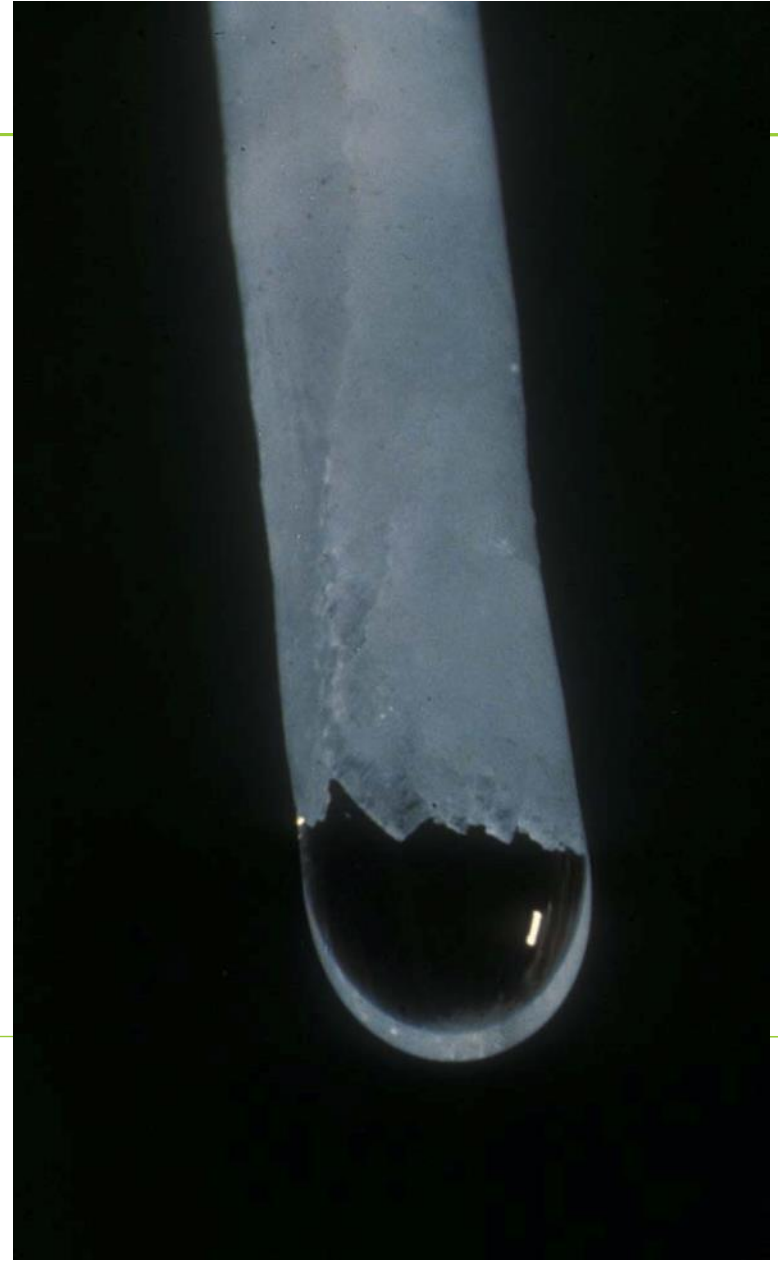
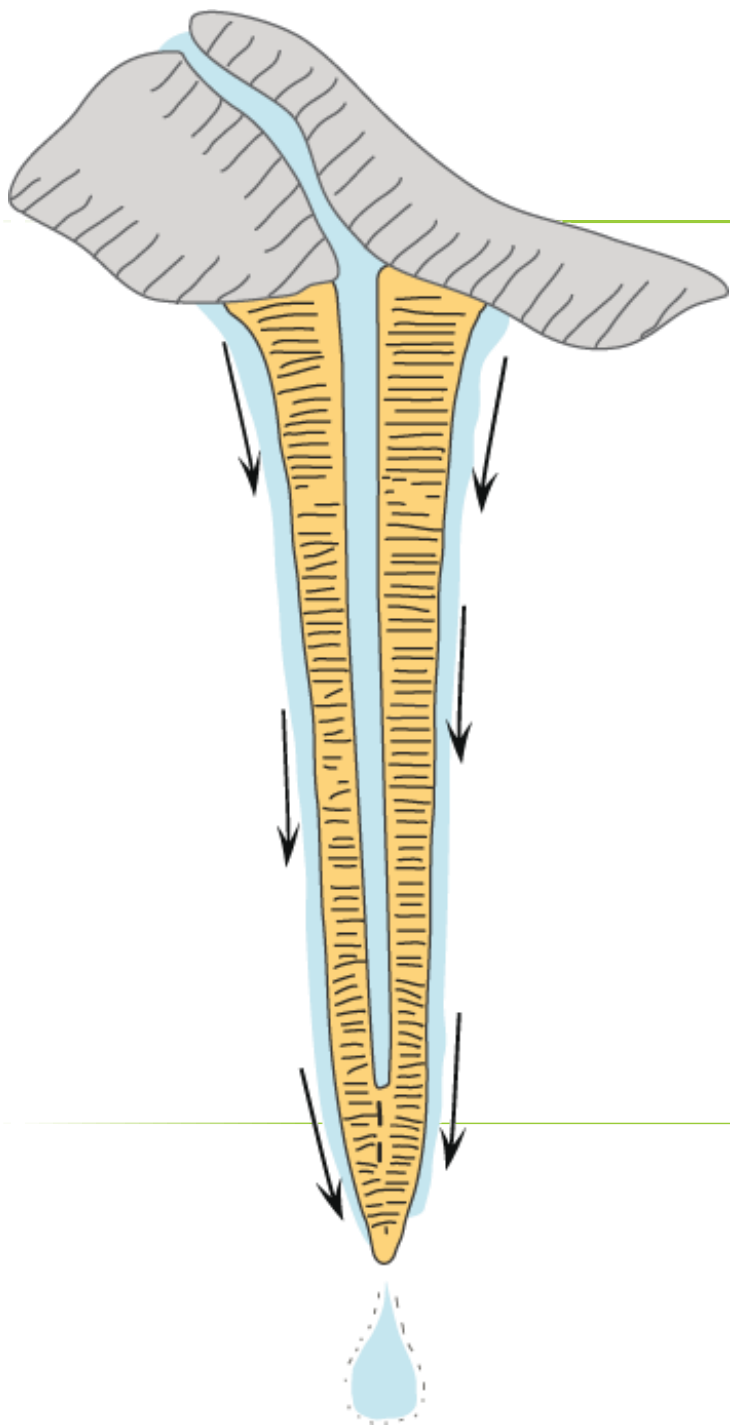


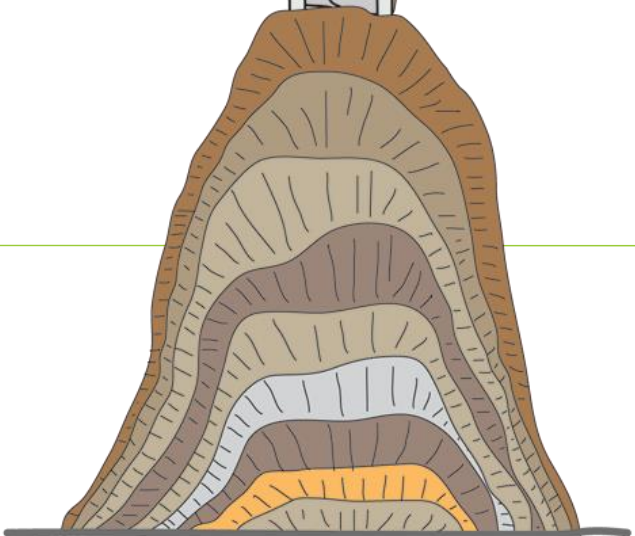
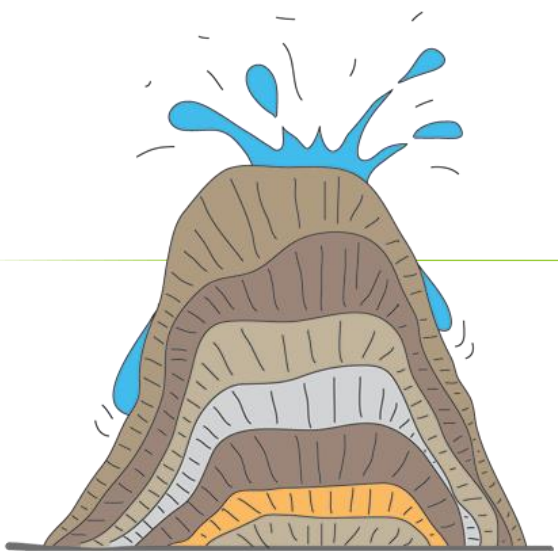
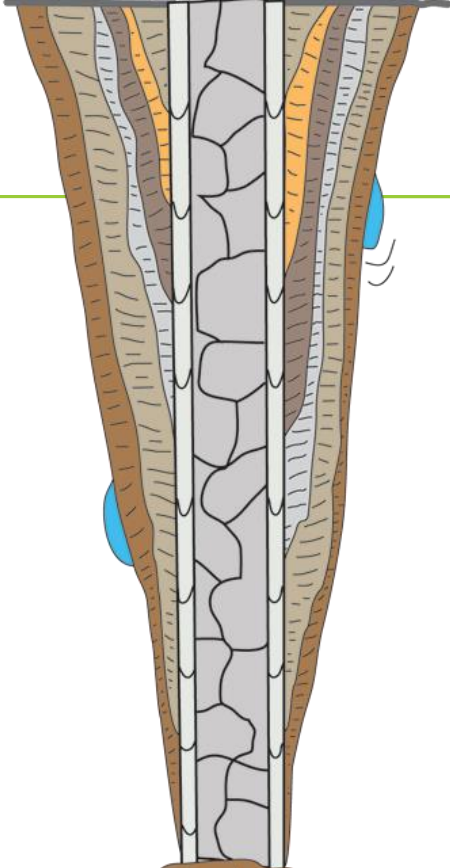
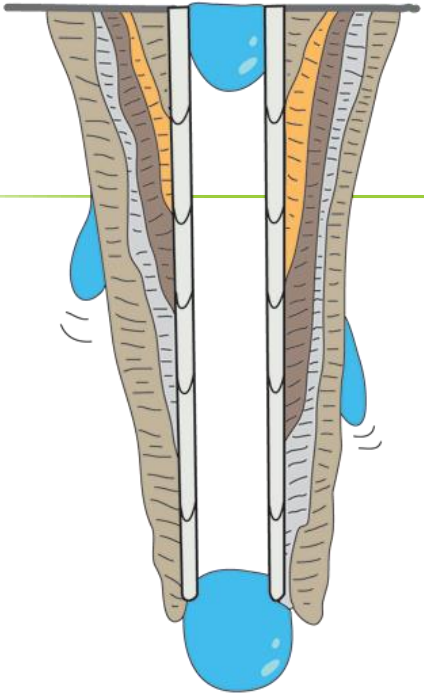


Classical Karst morphologies: stalactites, stalagmites,...

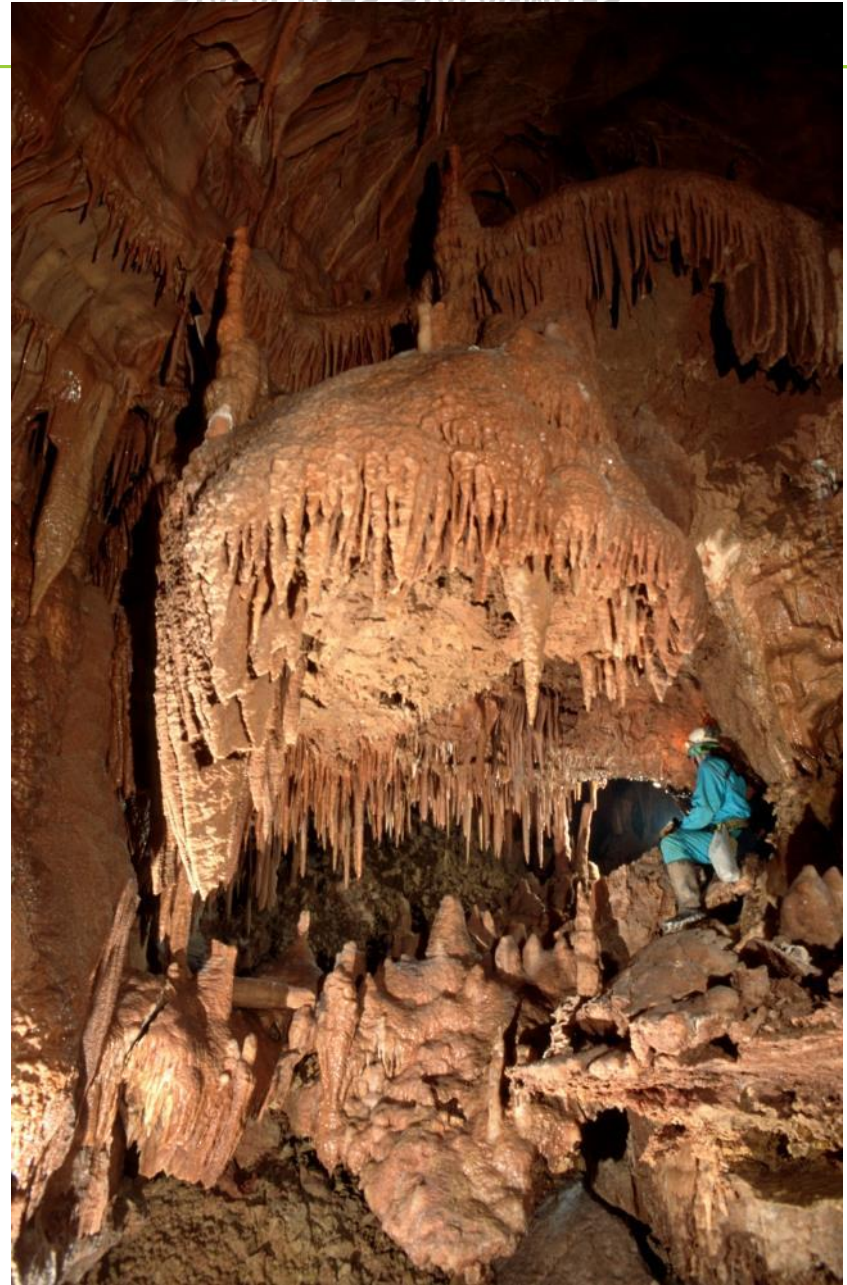
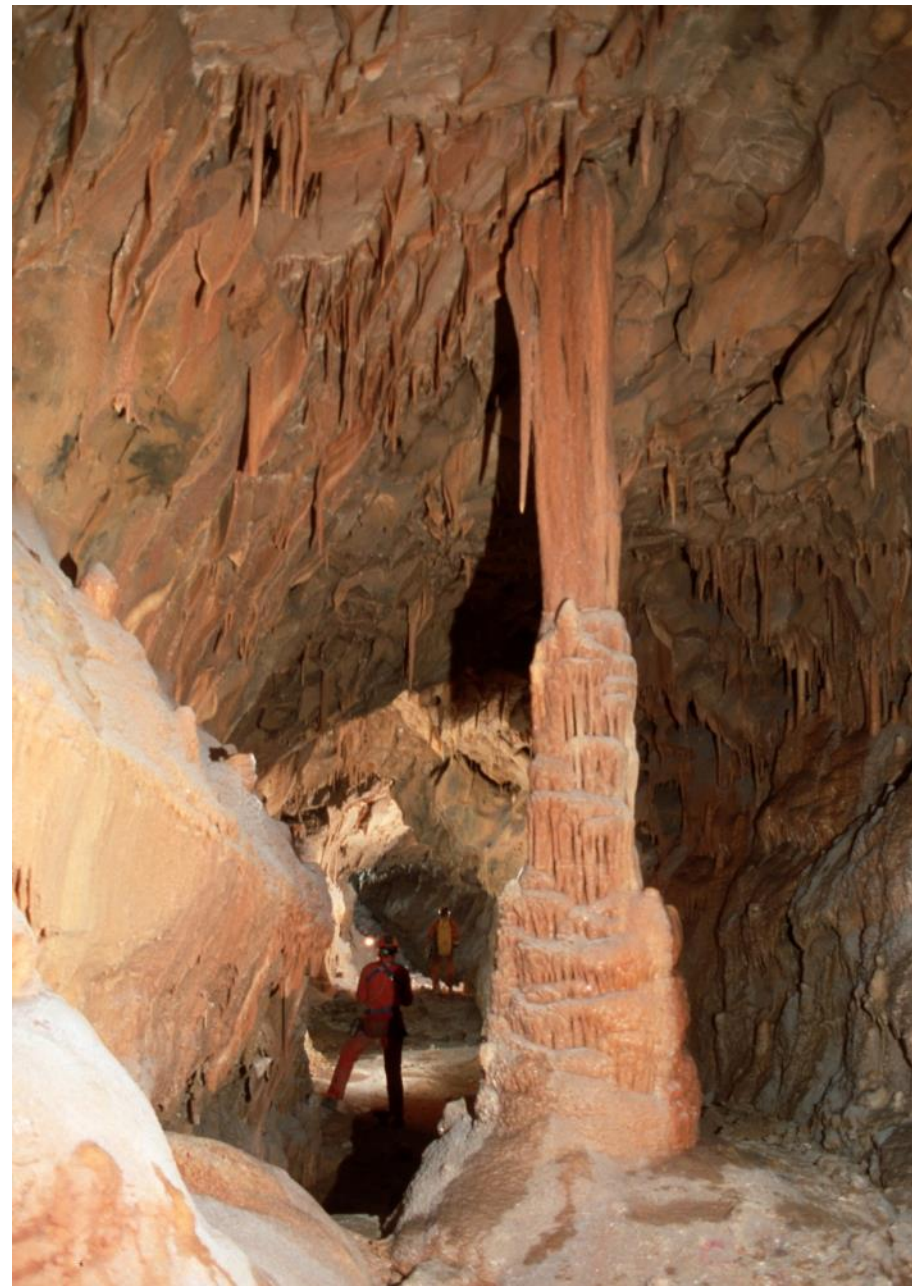








**CLASSICAL KARST MORPHOLOGIES:
STALACTITES, STALAGMITES,...**

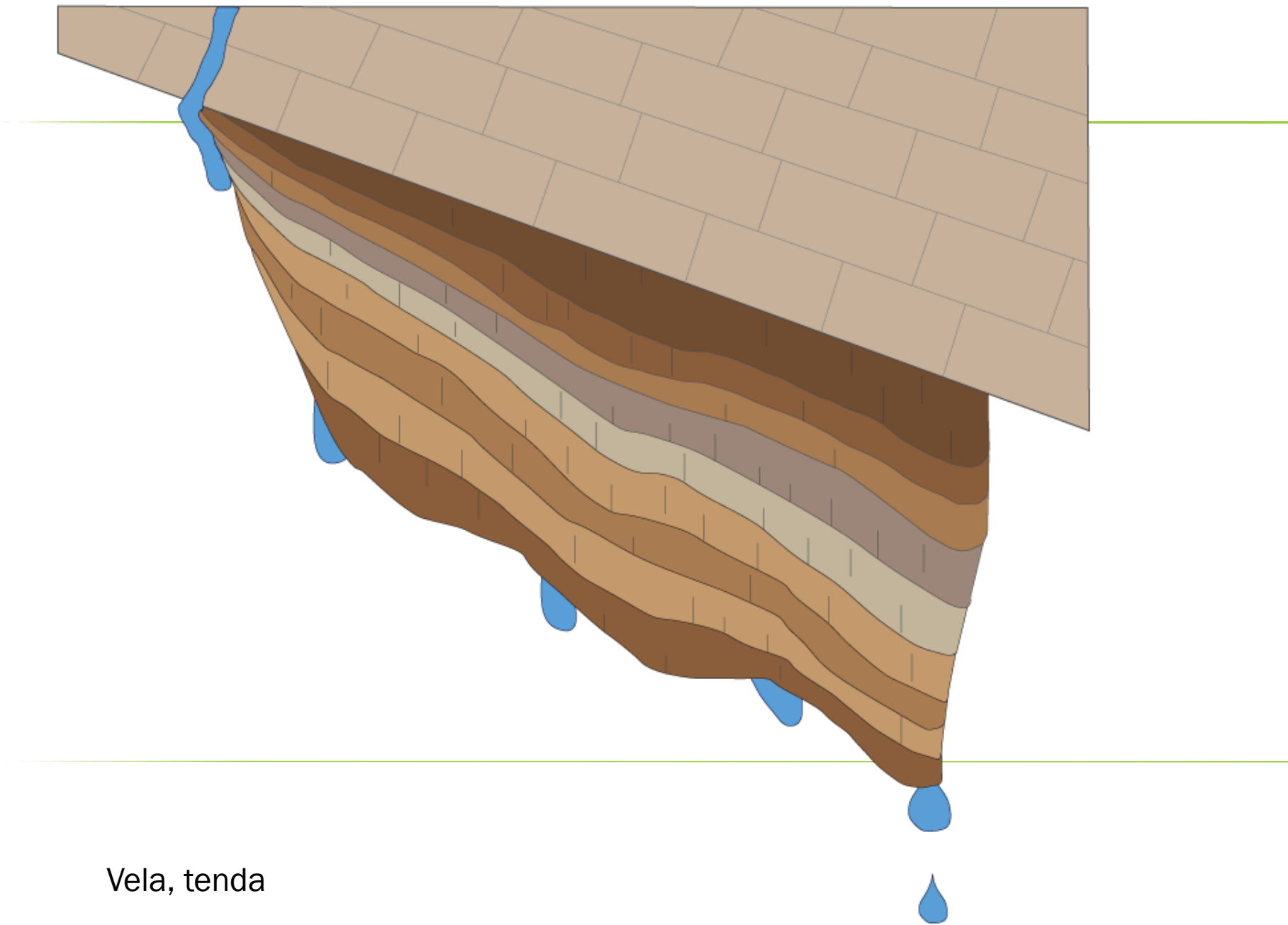




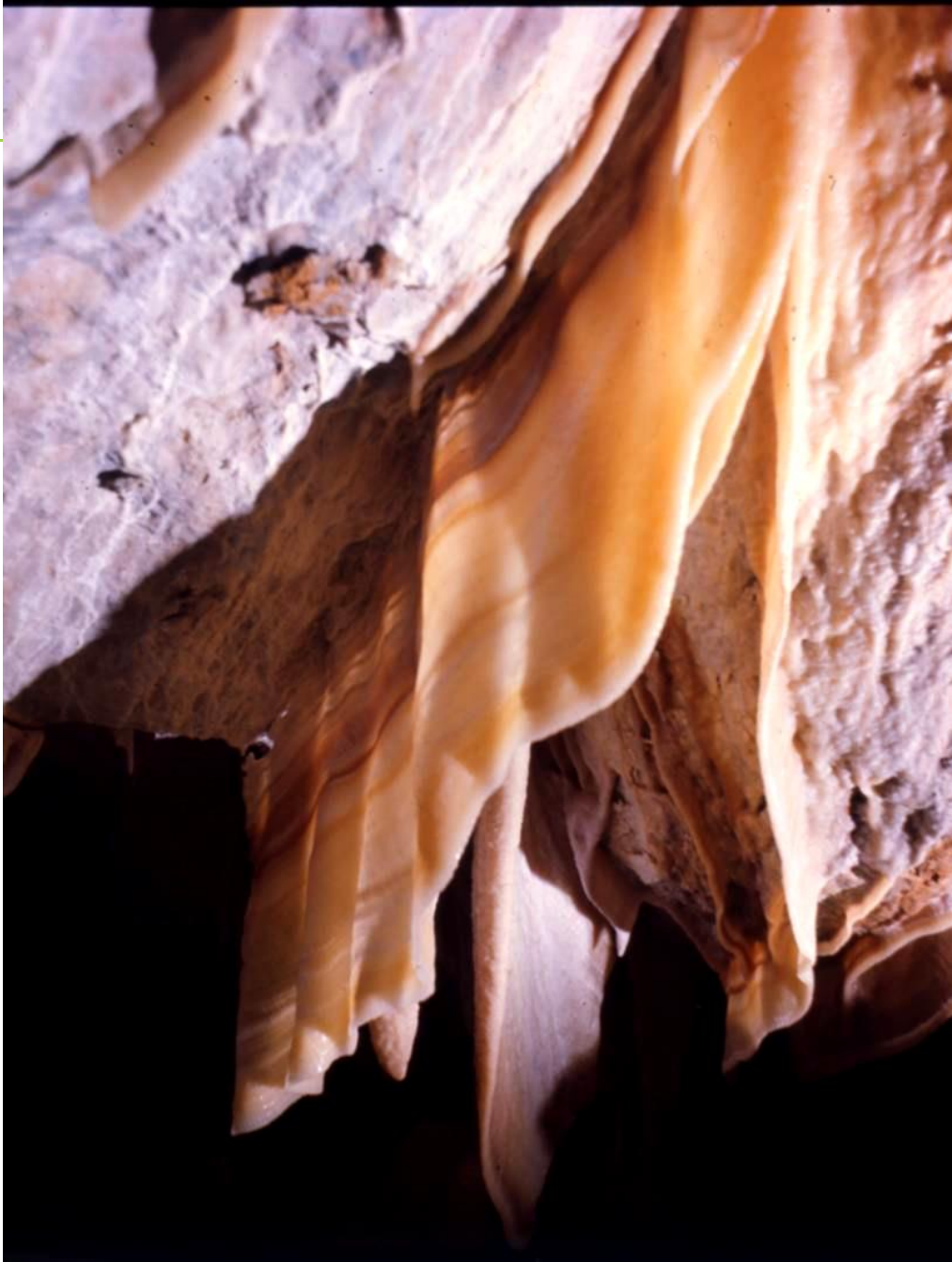


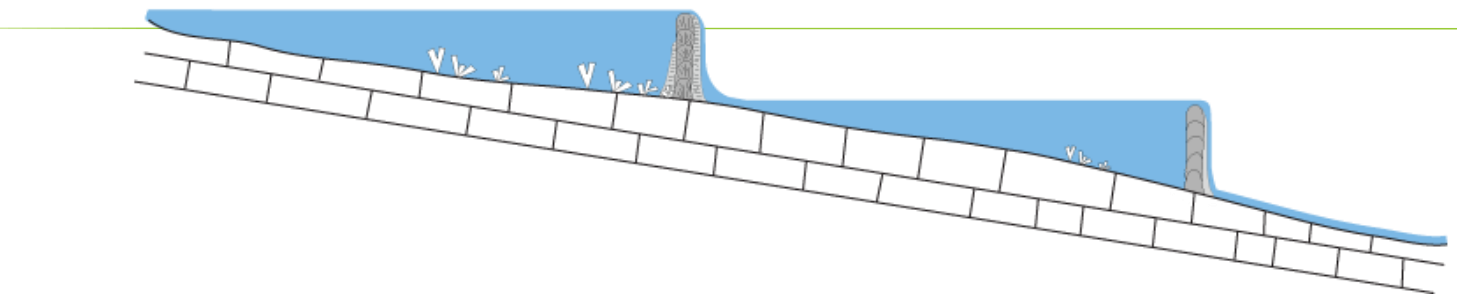
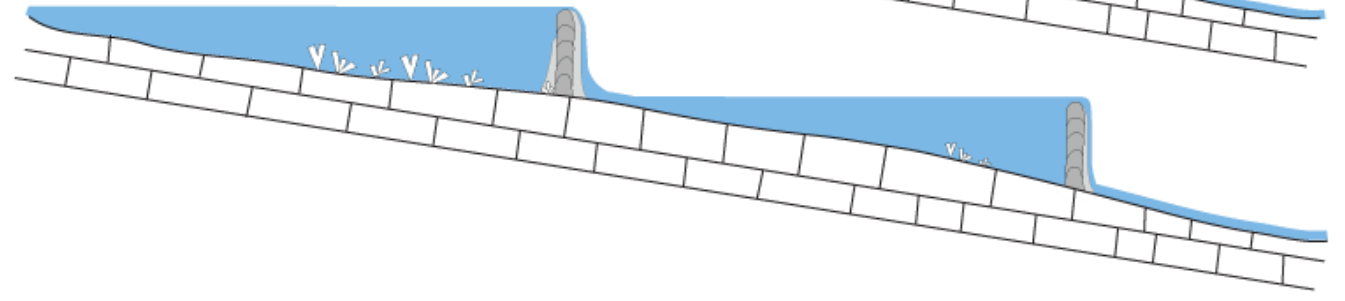
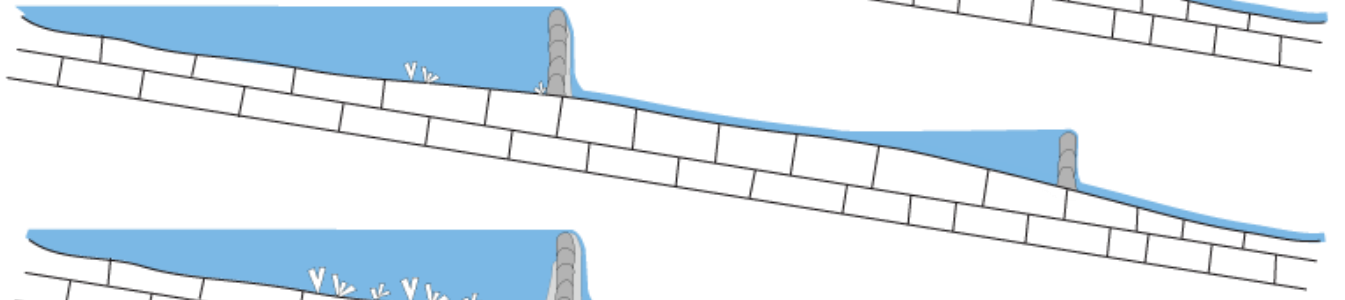
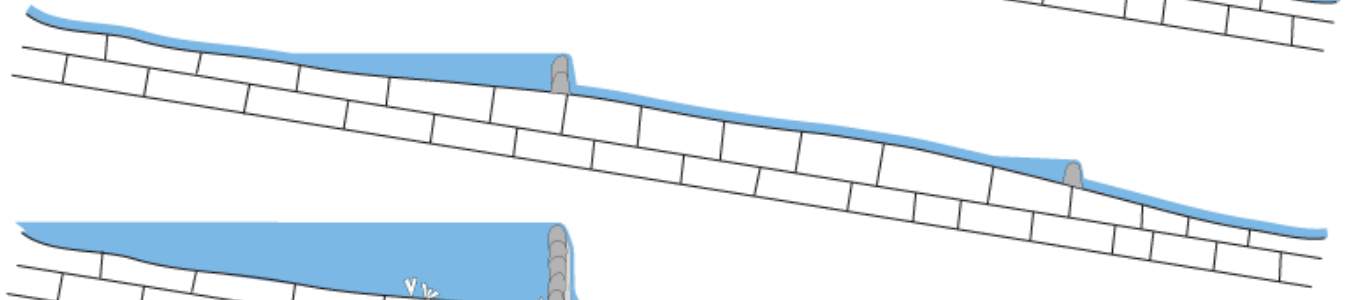
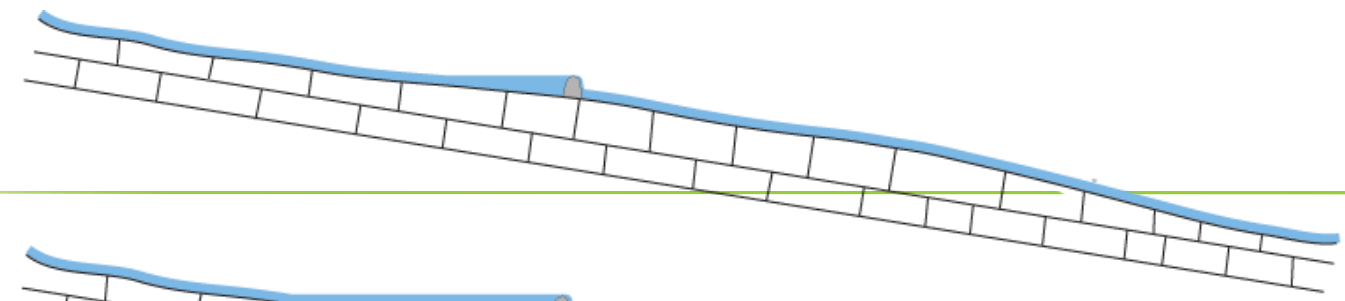
Stalagmite (Colonna Ruggero): Grotta Gigante





Vela, tenda





Gour

Caves and speleothemes (Cervo cave, Italy): the world of speleologists









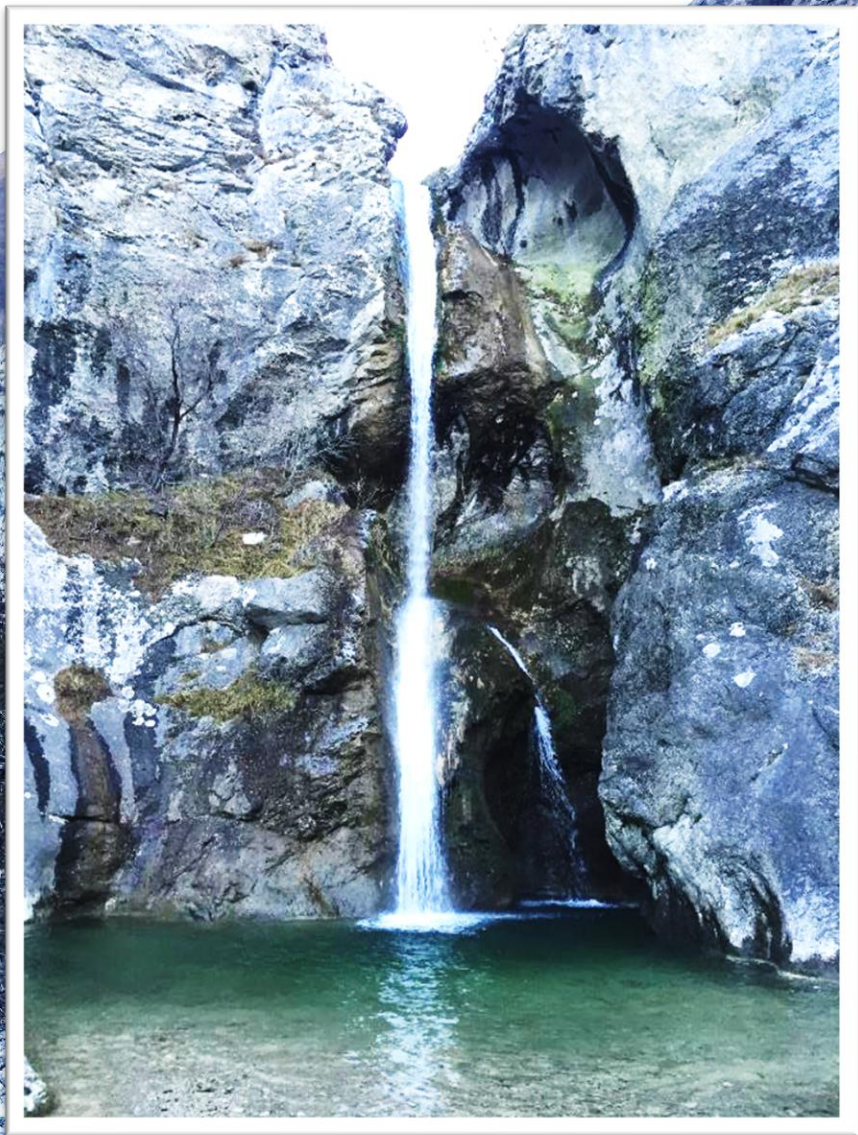




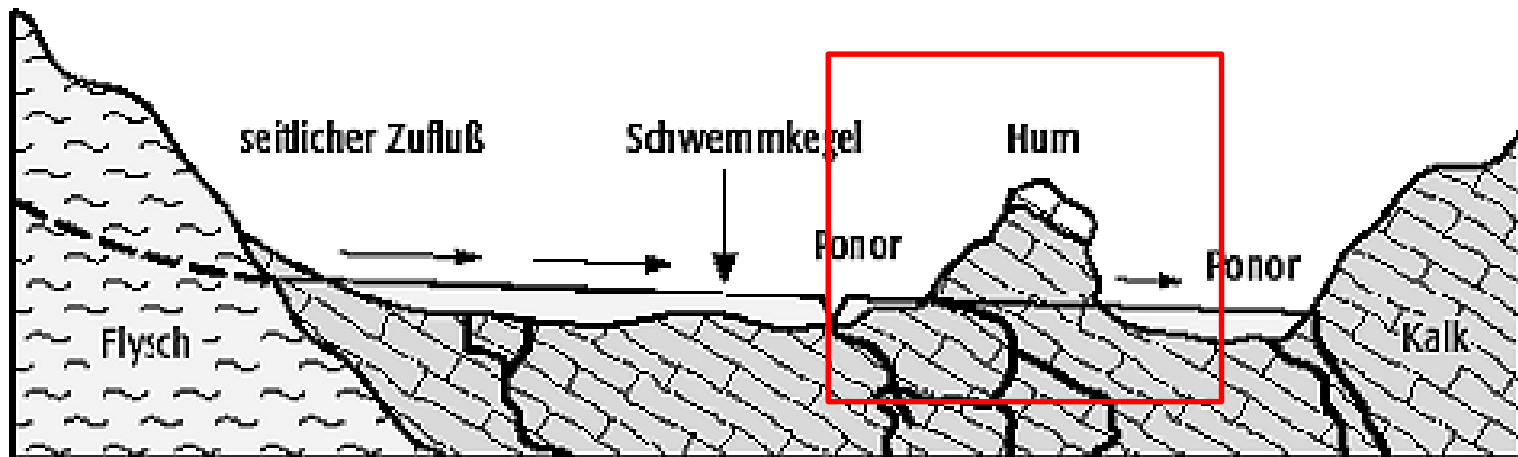


Il carsismo e le forme complesse

CARSISMO A CONI, FLUIOCARSISMO, E ALTRE FORME CARSICHE



HUM



HUM (INSELBERG CARSICI)

Forme di carsismo residuale



MOGOTES



UVALA



UVALA





KRKA (CROAZIA)



COSA ABBIAMO IMPARATO?

1. Cos'è il fenomeno carsico
2. Quali sono le forme epigee ed ipogee
3. Le doline, i polje
4. Depositi di grotta
5. Carsismo costiero
6. Impatto antropico sul carso
7. Carsismo poligenetico