

E-content module

Class: B. Sc. 1st Semester

Course Title: Physical and Structure Geology

Course Code: 1GELTC0101

UNIT-2

2.4: Karst topography: Erosional and depositional features of Karst topography.

CONTANTS

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- **ESSENTIAL CONDITIONS**
- **EROSIONAL PROCESS**
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1. **INTRODUCTION:** Karst topography is named after the typical topography developed in limestone rocks of Karst region in the Balkans in Yugoslavia, adjacent to the Adriatic Sea. Karst topography includes typical landforms in any carbonate region, produced by the action of groundwater through the processes of solution and deposition. Karstification of a landscape may result in a variety of large- or small-scale features both on the surface and beneath.

2. **Essential Condition for the development of Karst topography.**

- a) Presence of carbonate terrain (limestone, calcium magnesium carbonate).
- b) Carbonate rocks must be thickly bedded and massive form, hard, well cemented and jointed. Highly jointed, folded, fractured and faulted.
- c) Rocks must not be porous in which high density joints provides the permeability.
- d) Position of rocks should be above the water table to support the formation of subsurface features.
- e) Carbonate rocks should be very close to ground so that rain water may easily infiltrate in the terrain.

- f) There should be enough rainfall for the dissolution of the carbonate rocks.

3. EROSIONAL PROCESS

Erosional work is done by the surface water at the surface and underground water below the surface. Erosion is in form of chemical erosion, whereas physical erosion is negligible. Chemical erosion is done by the dissolving the carbonate rocks in form of solution. The water becomes more reactive by dissolved CO₂, carbonic acid, H⁺ ion and OH⁻ and Ca ion activity. The amount of dissolution carbonates depends on temperatures, partial pressure of atmospheric CO₂, chemical composition of carbonates. There is inverse relationship between temperature and solubility of carbon dioxide and positive relationship between dissolution of carbonate rocks and temperature.

4. EROSIONAL FEATURES

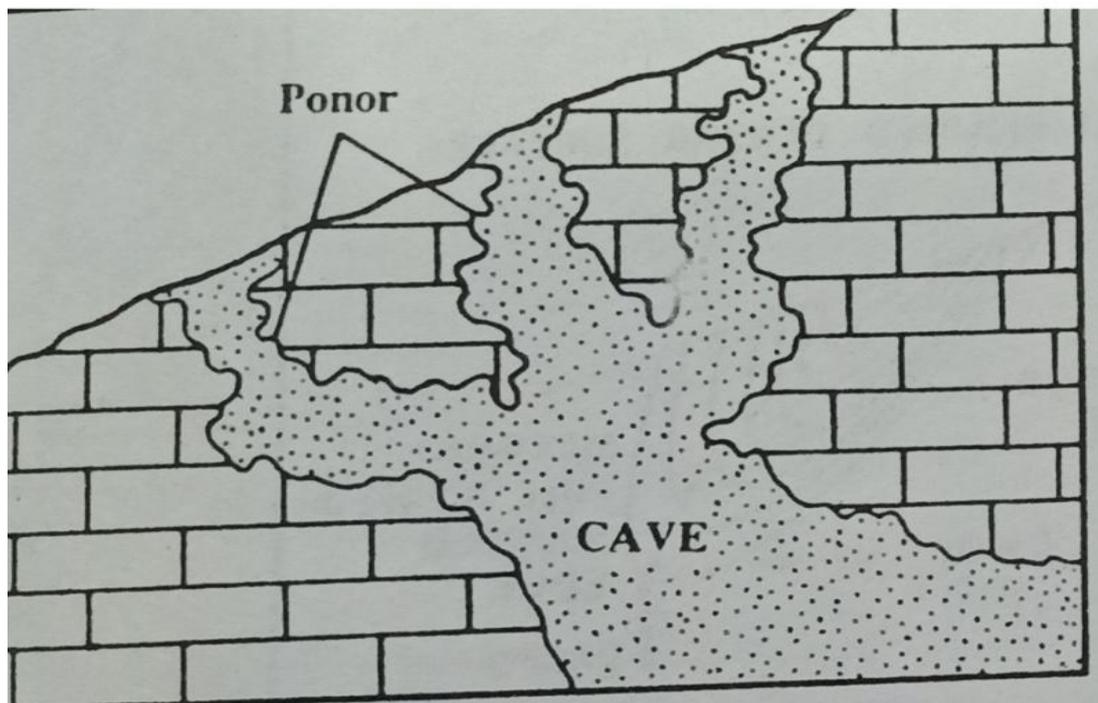
These are the Karst topographic features produced by erosional process:

- Lapies
- Terra rosa
- Sink holes
- Dolines,
- Karst windows

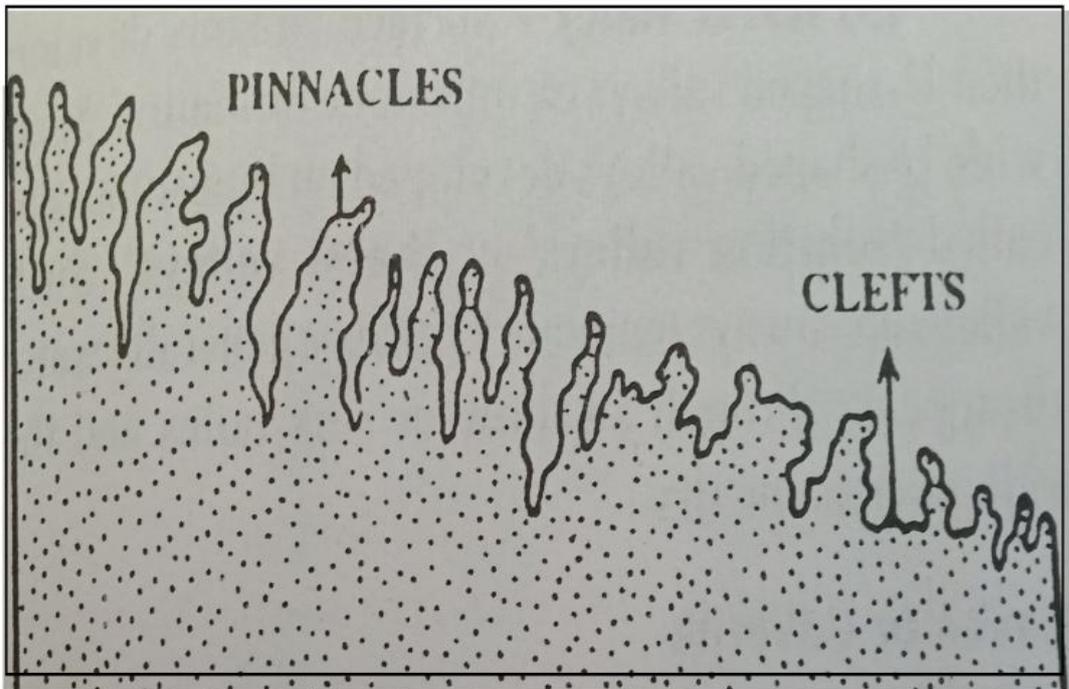
- Uvalas
- Poljes,
- Blind valley,
- Karst valley
- Caverns
- Ponores
- Natural Bridges

Lapies : Highly pitted and rough surface characterised by low ridges pinnacles and lot of solution holes formed due to corrosion along joints.

(Fig Source: Book ;GeomorphologyByS S Singh, P439) .



Sink holes: These are funnel shape hollows formed when roof of cave collapse in the limestone terrain.



Dolines: These is enlargement of holes due to continuous solution formed largest depression.

Ponores: The vertical pipe like passages that connects the caves are called ponores in Siberia.

Karst windows: These are formed by the collapsed of upper surface of sink holes/ dolines.

Uvalas: These are extensive depression up to one km.

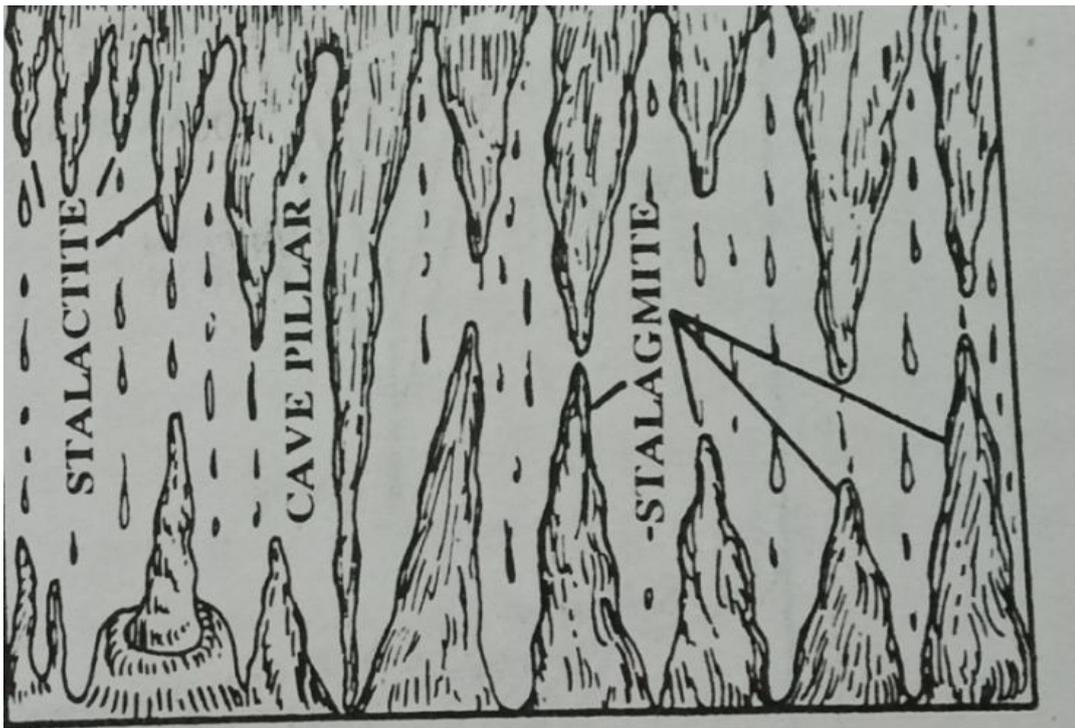
Blind valley: Valley of surface stream which disappear in the limestone formation through sink holes.

Karst valley: Surface stream formed U-shaped valley in limestone terrain also called solution valleys.

Caverns: The tunnels and underground chambers. Developed by the gradual enlargement of joints enlargement of joints.

Poljes: These are closed basin; Most extensive larger than dolines depressions. Characterised by vertical side walls, flat floors irregular borders

Natural Bridges: These features are Formed by the caves roof collapse or by the formation of valleys below the ground surface and reappearance of disappeared streams.



5. DEPOSITIONAL PROCESS

The dissolved material by the subsurface are carried in solution and are deposited in the open spaces . The deposition of this dissolved material

took place due to loss of dissolved CO₂ from water, evaporation decrease of temperature and high pressure.

The various deposition land forms of the karst topography are;

- Stalactites
- Stalagmite
- Cave pillars
- Travertines
- Calc-tuffs
- Helicitites
- Flowstones

Cave pillars: These are formed when stalactite and stalagmite meet.

Travertines: These are banded calcareous deposits.

Calc-tuffs: These are calcareous deposits softer than travertine at the mouth of the cave.

Helicitites: These are dripstones growing sideward from stalactite and stalagmite

Flowstones: Floor deposits caused by seepage water and water flowing out of stalagmites.

A **stalactite** is a type of karst feature in limestone terrain.

that hangs from the ceiling of caves. formed by the deposition of calcareous material carried by water dripping through cave ceiling.

Stalagmites : features that rises from the floor of a limestone cave due to the accumulation of material deposited on the floor from ceiling drippings. Stalagmites are typically composed of calcium carbonate.

Borra caves: Ananthagiri hills of the Araku valley in A.P have one of the largest caves of the Indian subcontinent called the Borra Caves. These caves are spectacularly known for their stalactite and stalagmite formations that have withstood the passage of time for over a million years. The caves

discovered by William King George in 1807 are said to have originated from the river Gosthani due to its continuous flow of action over the limestone terrain.

6. SUGGESTED READINGS

1. <https://www.geographynotes.com/topography/karst-topography/karst>.
2. <https://www.for.gov.bc.ca/hfp/publications/00189/Karst-Mgmt-Handb...>
3. <https://study.com/academy/lesson/karst-topography-definition-features.html>

4. <https://www.nps.gov/subjects/caves/karst-landscapes.htm>

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