

## READINGS / REFERENCES

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2. Pekcan, N. 2019. Karst Jeomorfolojisi (3. Baskı). Filiz Kitapevi, İstanbul
3. Erinç, S., 2001, **Jeomorfoloji I**, Der Yayınları, İstanbul.
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5. Huggett, R.J., 2015, **Jeomorfolojinin Temelleri** (Çeviri Editörü: Prof. Dr. Uğur Doğan), Nobel Akademik Yayınları, Ankara.

## Course Contents

1. Introduction to Karst Geomorphology
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# Karren

## Trittkarren (Heelprint Karren)



<https://www.hoehlenag.de/exokarstformen.html>

# Karren

## Rillenkarren (Solution flutes)

These are small, straight, narrow solutional furrows closely spaced in parallel, originating at the peak of exposed rock slopes and shrinking off downslope. Typically found on limestone surfaces, they measure approximately 1.2–2.5 cm in width, 2–6 mm in depth, and 10–30 cm in length. Each furrow exhibits a parabolic cross-section and is separated by distinct cusp lines. In plan view, they often form a straightforward arrangement of parallel flutes, displaying remarkable uniformity in shape and size. Their formation on either side of a crest frequently creates a distinctive herringbone pattern.



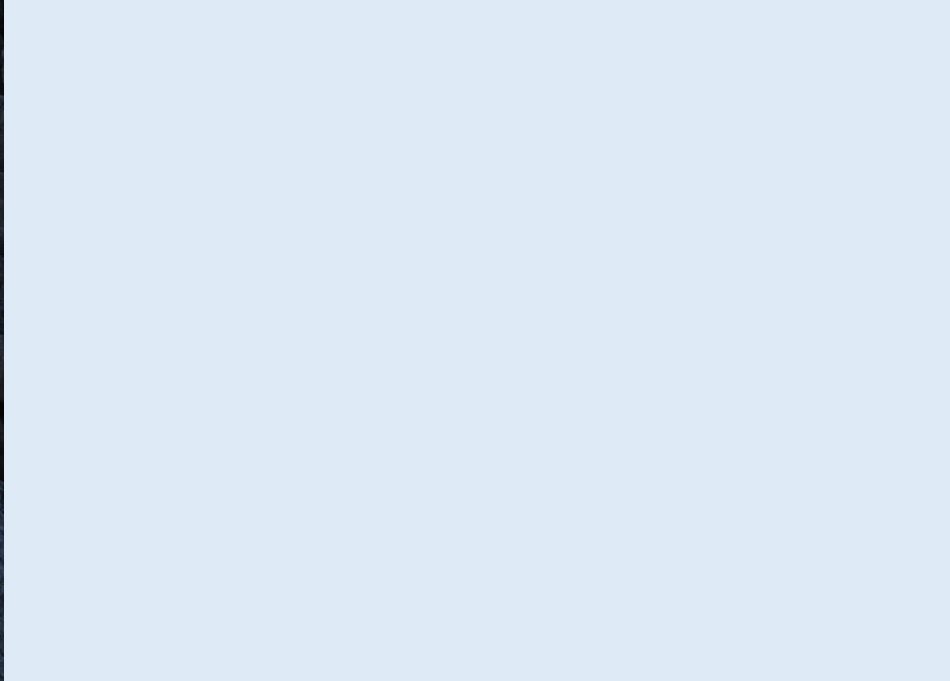
# Karren

Rillenkarren (Solution flutes)



# Karren

Rillenkarren (Solution flutes)



# Karren

## Rillenkarren (Solution flutes)



# Karren

## Rinnenkarren (Solution runnel)

Rinnenkarren are solution channels, such as runnels or flutes, that run parallel to each other, aligning with the slope's dip direction.

Mesokarren features are characterized by linear channels or furrows that typically widen and deepen as they descend slopes. Streams of runoff water, cascading down the sides of rocks, gather into these channels to form solution runnels with widths and depths ranging from 5 to 50 cm, and lengths that vary widely (usually between 1 to 10 m, but sometimes exceeding 30 m). Due to the diverse topographic conditions and the sources of water feeding into them, these channels exhibit a remarkable diversity in cross-section and plan patterns, which may include tributaries.





Rinnenkarren (Solution rannel)



# Karren

Rinnenkarren (Solution rannel)



# Karren

Rinnenkarren (Solution rannel)



# Karren

## Wall karren (Wandkarren)

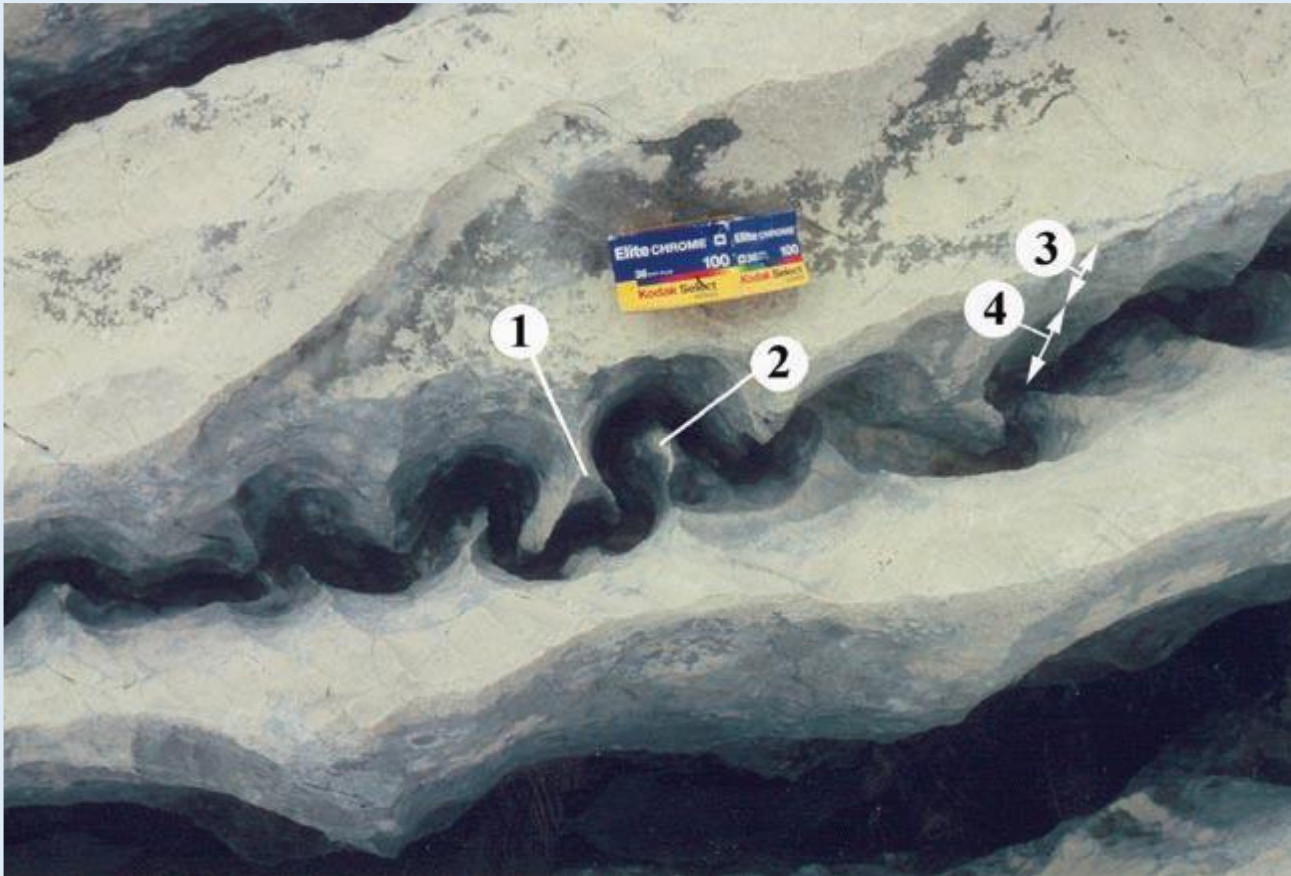
Rillenkarren, rinnenkarren, and wandkarren form as a result of water movement across slopes.

Linear furrows commonly occur on nearly vertical rock faces due to water runoff. These furrows often qualify as macrokarren features, as they can extend to lengths nearing 100 meters. There is often an overlap between wall karren and certain types of decantation runnels.



# Karren

## Meanderkarren



Veress, M. 2010. Karst Environments: Karren Formation in High Mountains, Springer.

# Karren

## Grikes, (Kluftkarren, Splitkarren, Cutters)

Grikes are deep clefts, ranging from 1 cm to 50 cm in width and extending several meters in depth. They represent a common mesokarren feature, typically measuring between 1 m to 10 m in length, formed by the gradual dissolution of **joints** or **cracks**. Their linear orientations are dictated by prominent structural features like joint sets or fault lines. Grikes serve as prominent elements of the epikarst, as they are surface manifestations of underlying fissures within the karstifiable rocks.



Goldie, H.S. 2009. Kluftkarren or grikes as fundamental karstic phenomena, In: Karst Rock Features Karren Sculpturing (Eds: Gines et.al.), Zalozba ZRC.

# Karren

Grikes, (Kluftkarren, Splitkarren, Cutters)



# Karren

## Pinnacles (Spitzkarren)

Vertical dissolution along joints and fractures erodes the adjacent rock surfaces, creating isolated spires or pinnacles that can reach heights ranging from a few meters to tens of meters. Typically, the flanking walls feature deep grikes with intersecting runnels, forming distinct ridges and peaks. These formations represent an advanced stage of karren development and often result from the refinement of subsoil pinnacles following exposure due to soil erosion.

