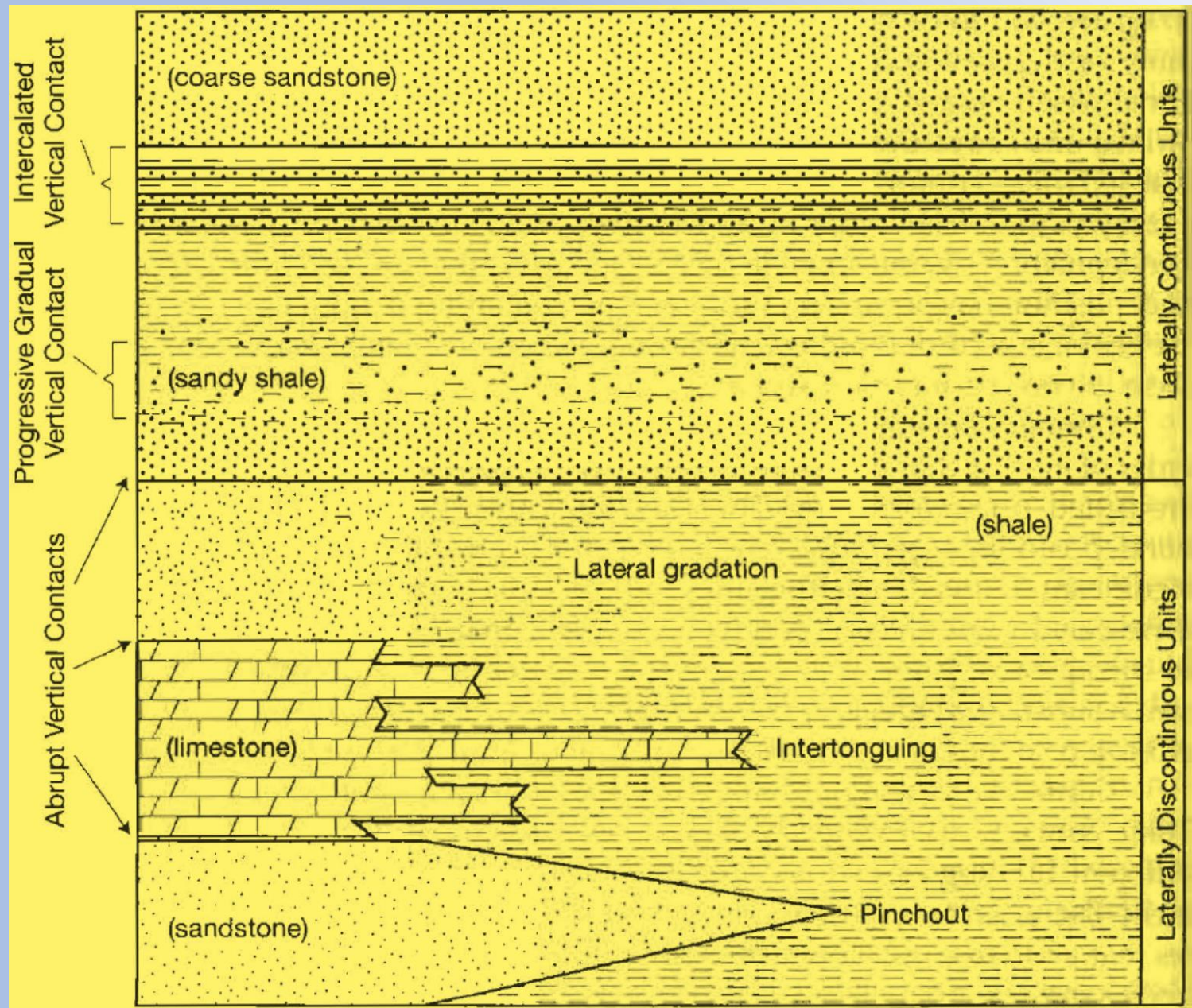


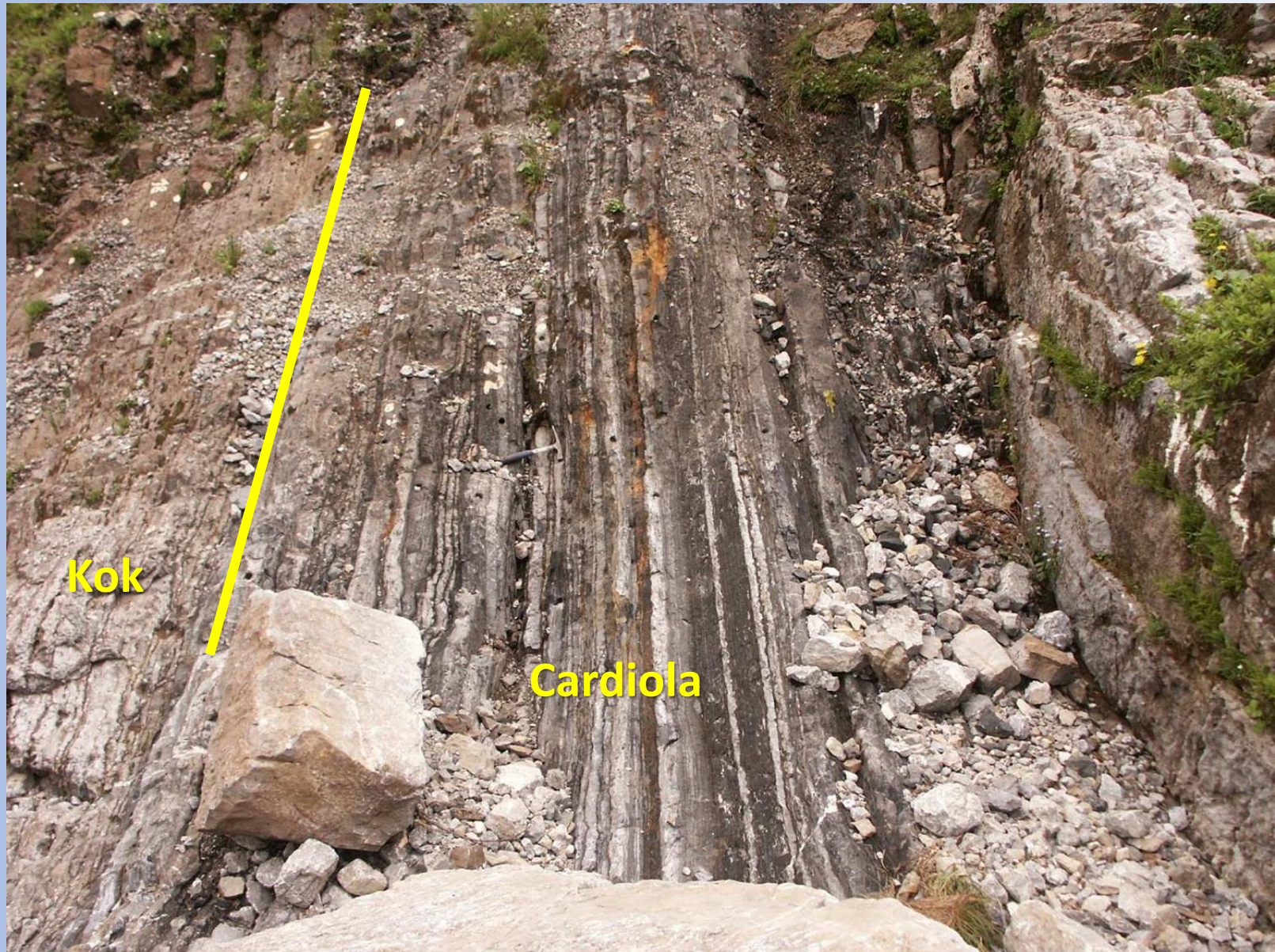
# **Contatti stratigrafici**

# Principali tipi di contatti



**Contatto  
netto**

tra la Fm. del  
Kok e la Fm  
a Cardiola  
(sezione  
Cellon – Alpi  
Carniche)

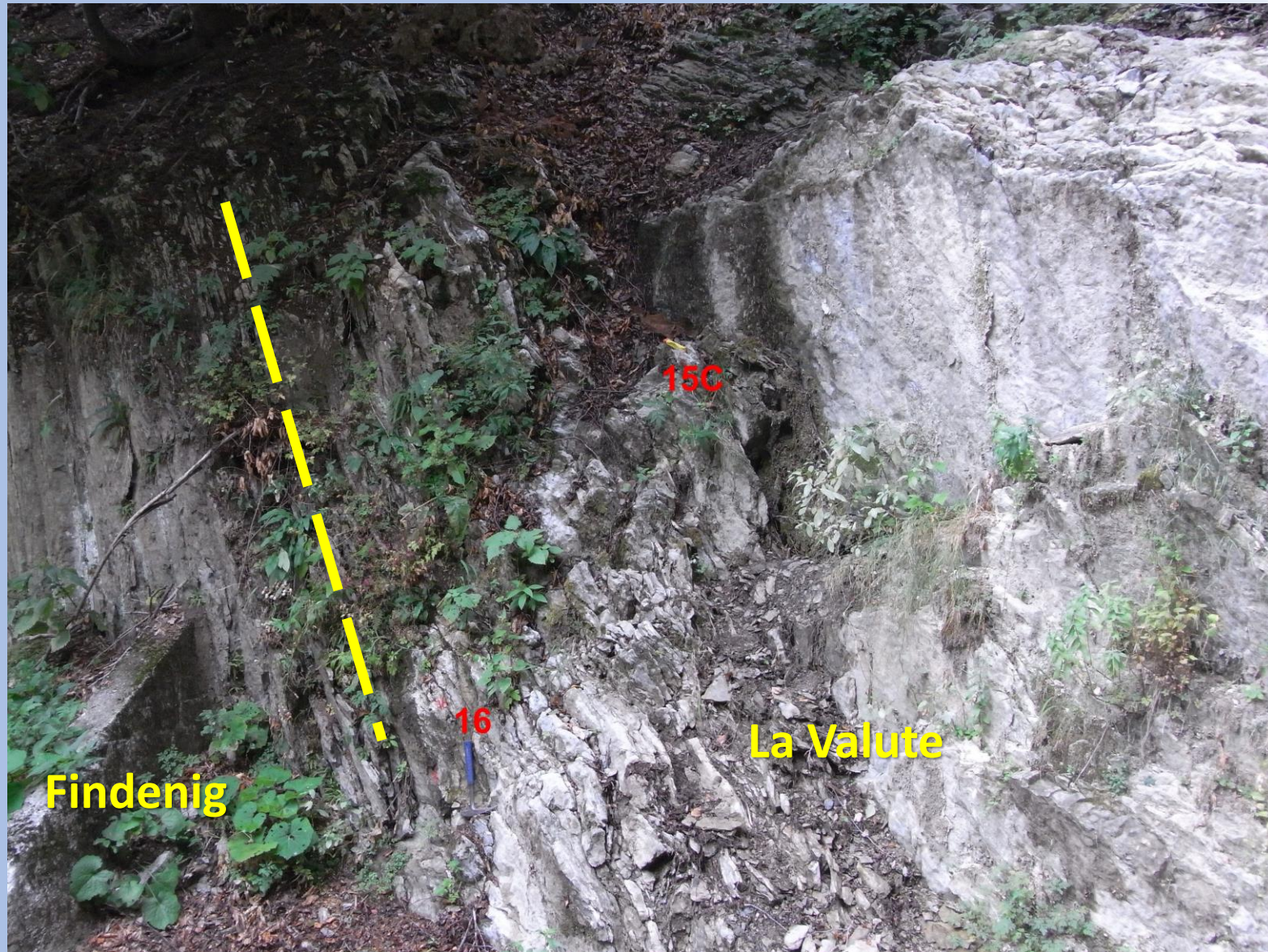


Kok

Cardiola

**Passaggio  
graduale**

tra la Fm. De  
La Valute e  
la Fm del  
Findenig  
(sezione Rio  
Malinfier  
Ovest – Alpi  
Carniche)



**Findenig**

**15C**

**16**

**La Valute**

**Ricostruire la storia geologica  
dal record stratigrafico**

**Il tempo che non c'è**

# Ricostruire la storia geologica dal record stratigrafico

## Discordanze

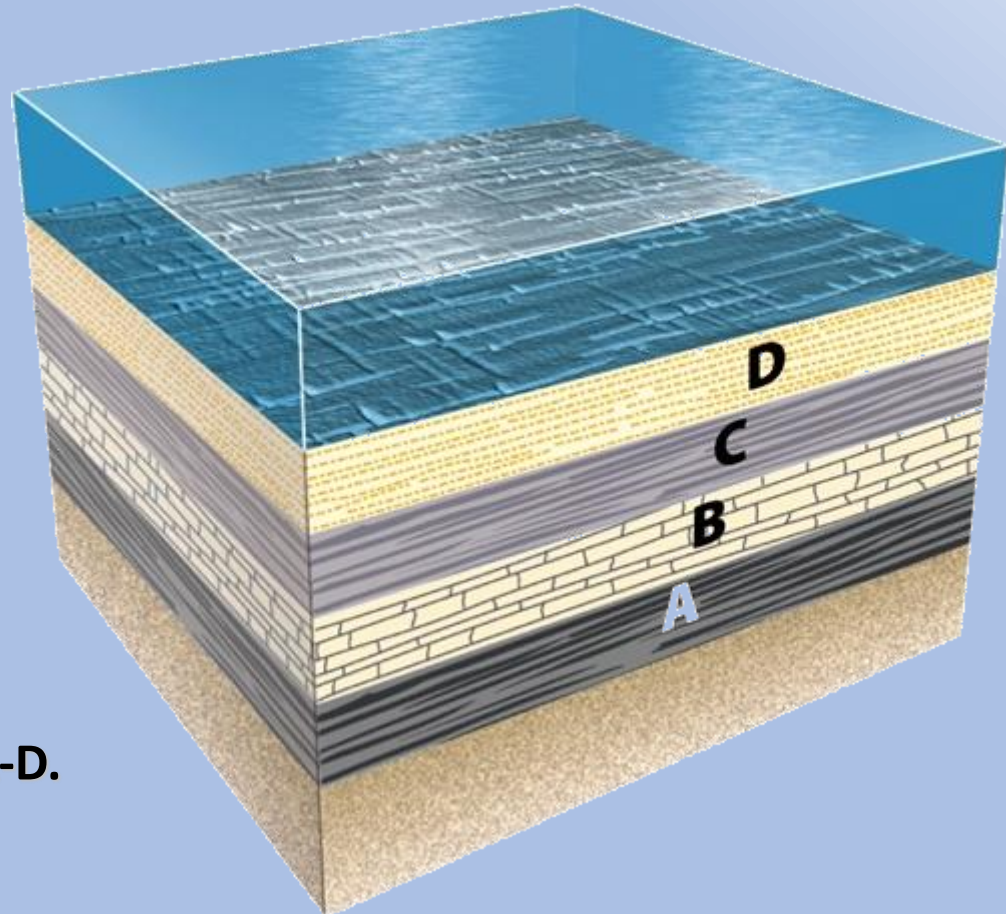
“lacune” nella documentazione stratigrafica

- **discordanza** (unconformity)
- **discordanza angolare** (angular unconformity)

## Relazioni di “cross cutting”

- **faglie**
- **intrusioni**

# Come si forma una discordanza? (disconformity)

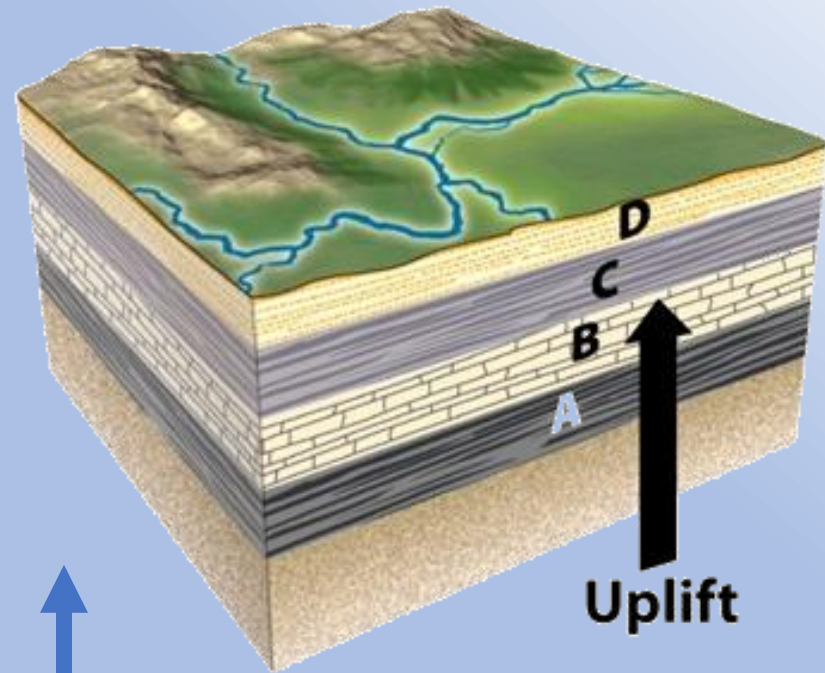


**TEMPO 1**

**Su un fondale marino  
si depositano i livelli A-D.**

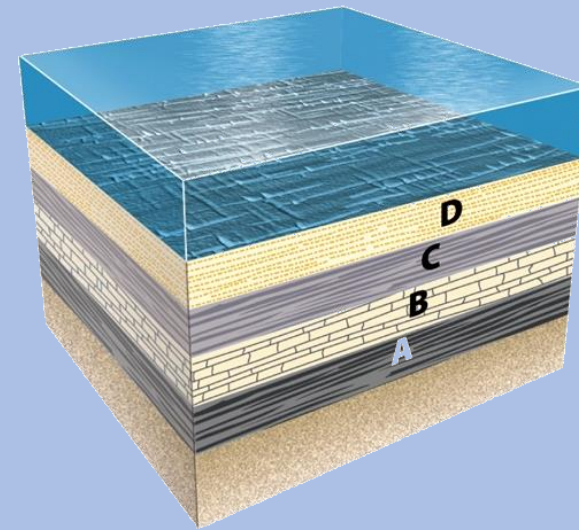
**TEMPO 2**

Successivamente le forze tettoniche causano l'emersione degli strati, esponendoli all'erosione



**TEMPO 1**

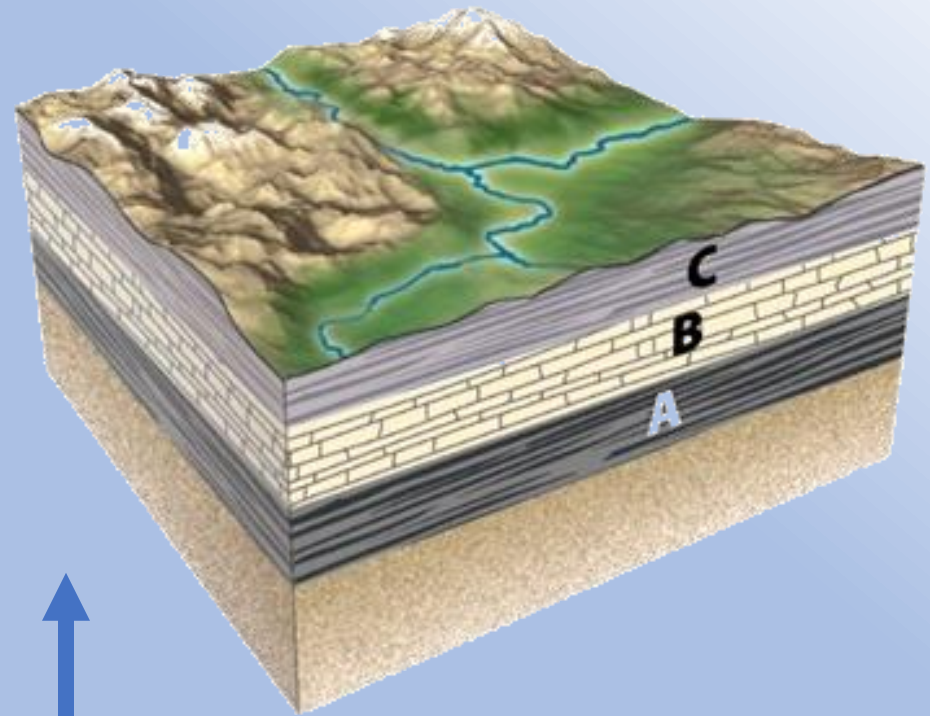
Su un fondale marino si depositano i livelli A-D.





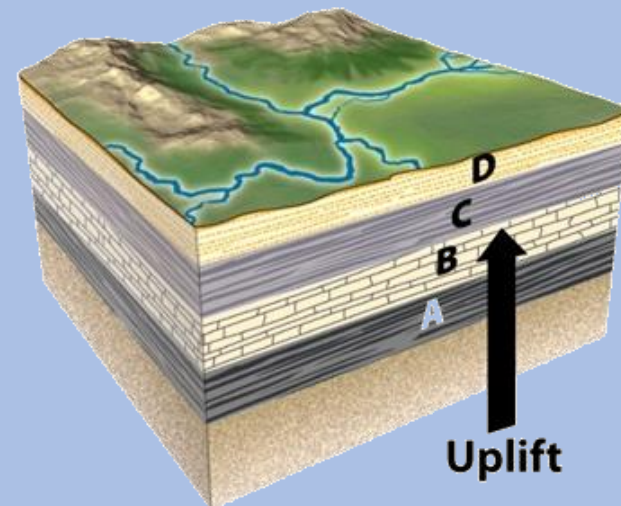
## TEMPO 3

L'erosione elimina il livello D e parte del livello C, lasciando una superficie irregolare con valli e colline



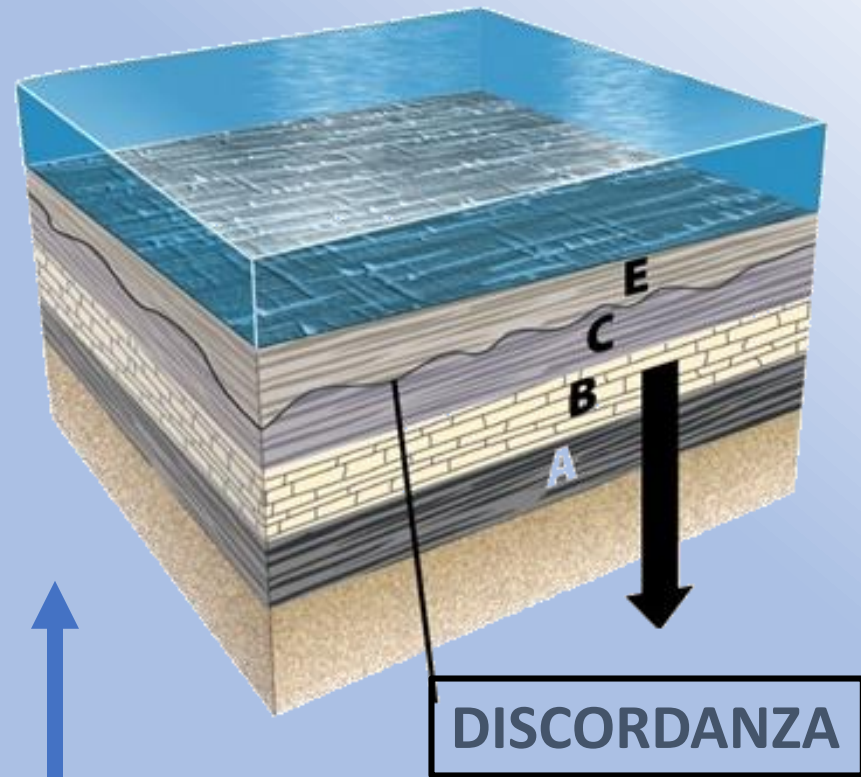
## TEMPO 2

Successivamente le forze tettoniche causano l'emersione degli strati, esponendoli all'erosione.

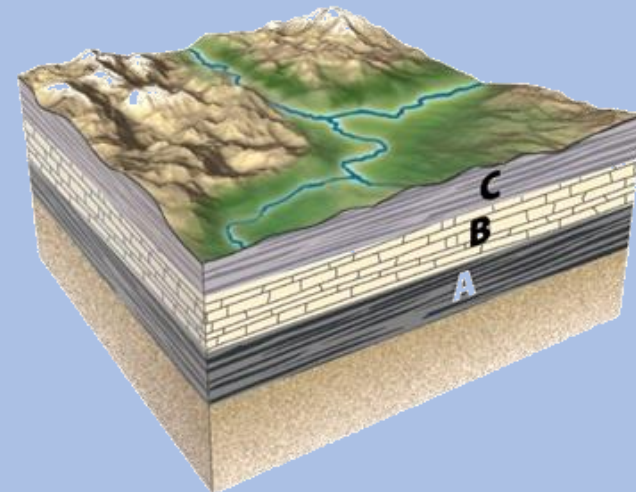


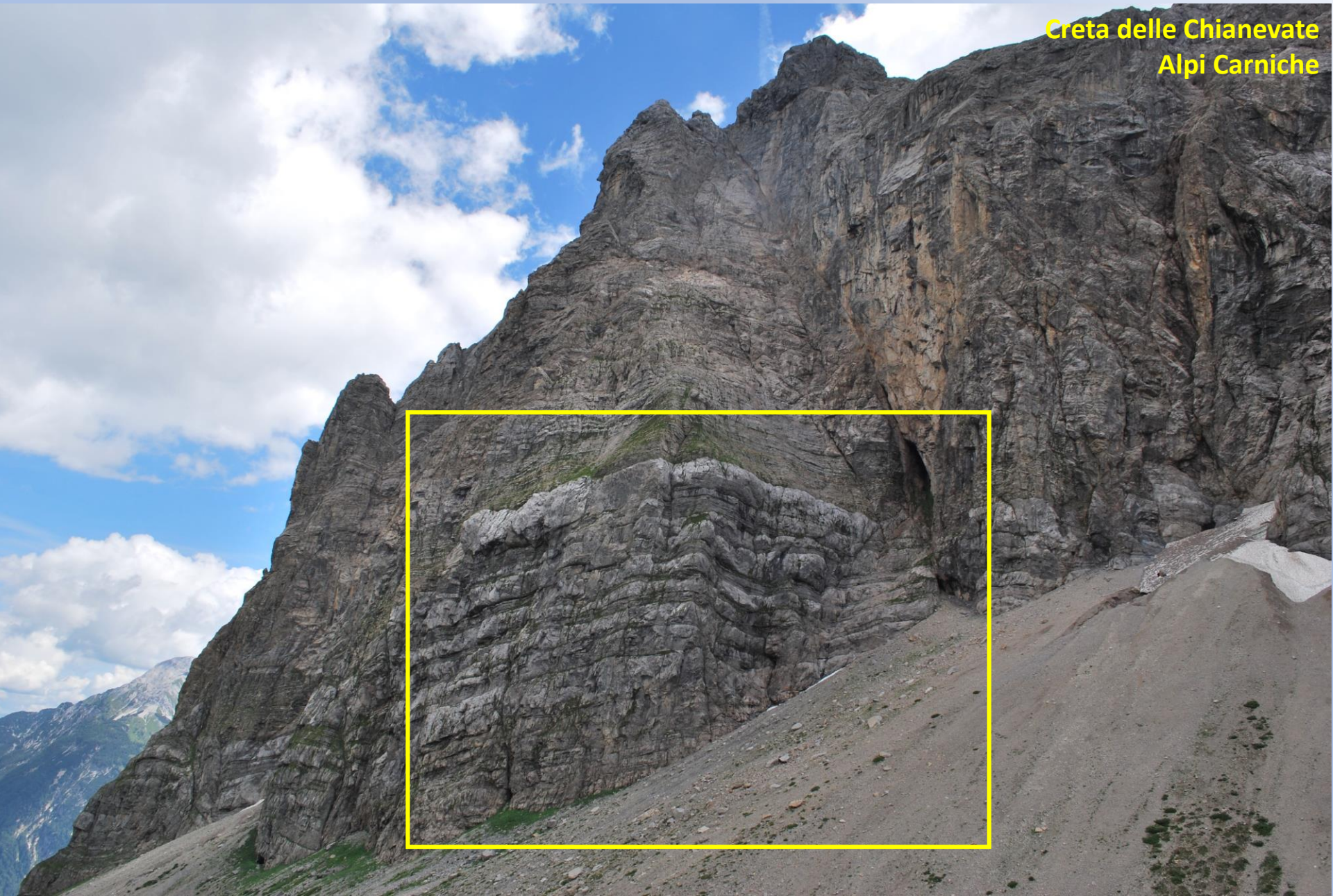
**TEMPO 4**

L'area viene nuovamente inondata dal mare e si deposita un nuovo livello, E. La superficie irregolare al tetto di C si conserva come una discordanza.

**TEMPO 3**

L'erosione elimina il livello D e parte del livello C, lasciando una superficie irregolare con valli e colline



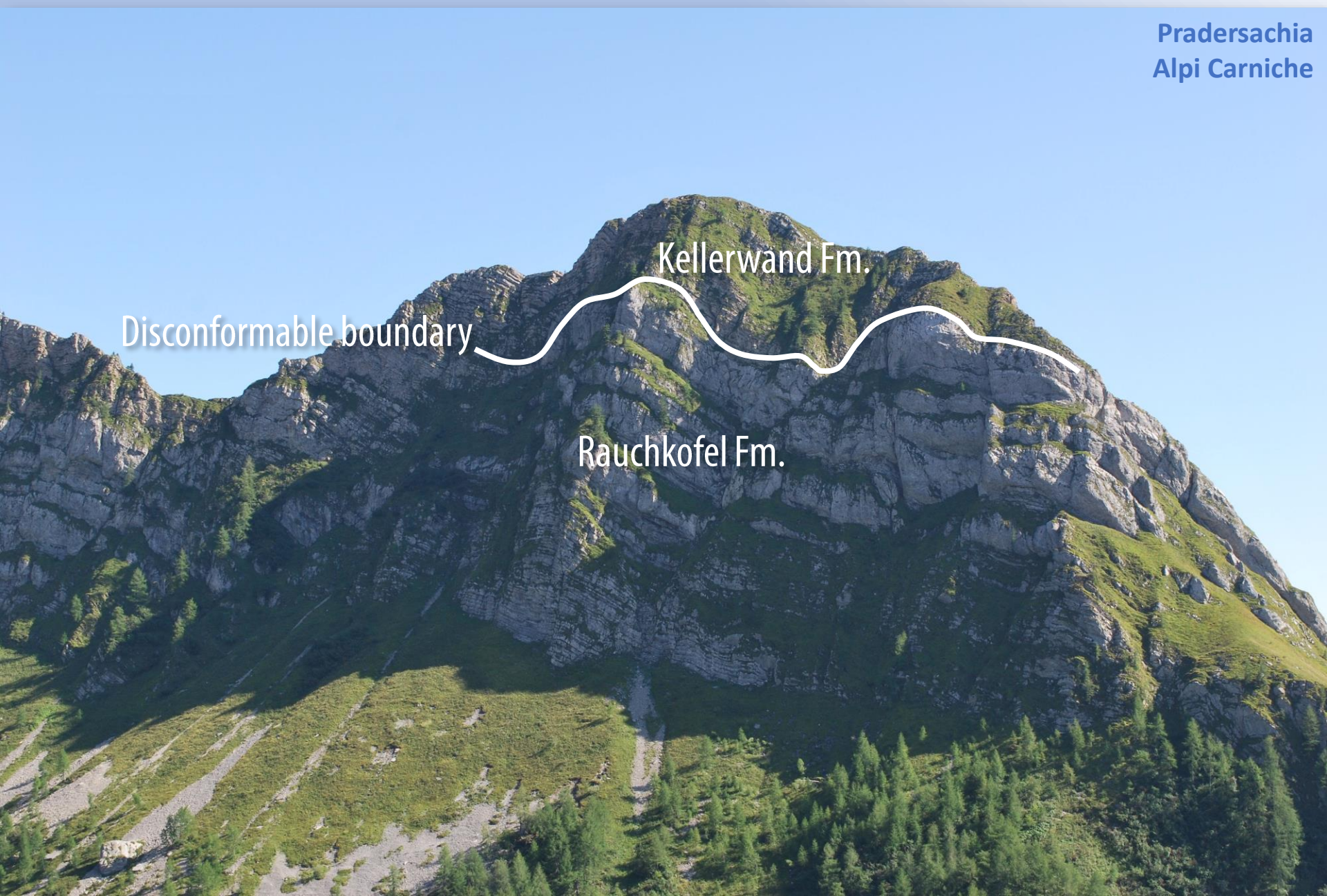


Creta delle Chianevate  
Alpi Carniche



Creta delle Chianevate  
Alpi Carniche

Pradersachia  
Alpi Carniche



Disconformable boundary

Kellerwand Fm.

Rauchkofel Fm.



Freikofel (sezione FRK)  
Alpi Carniche



Freikofel (sezione FRK)  
Alpi Carniche

Rauchkofel Boden  
Alpi Carniche

Kok Fm.

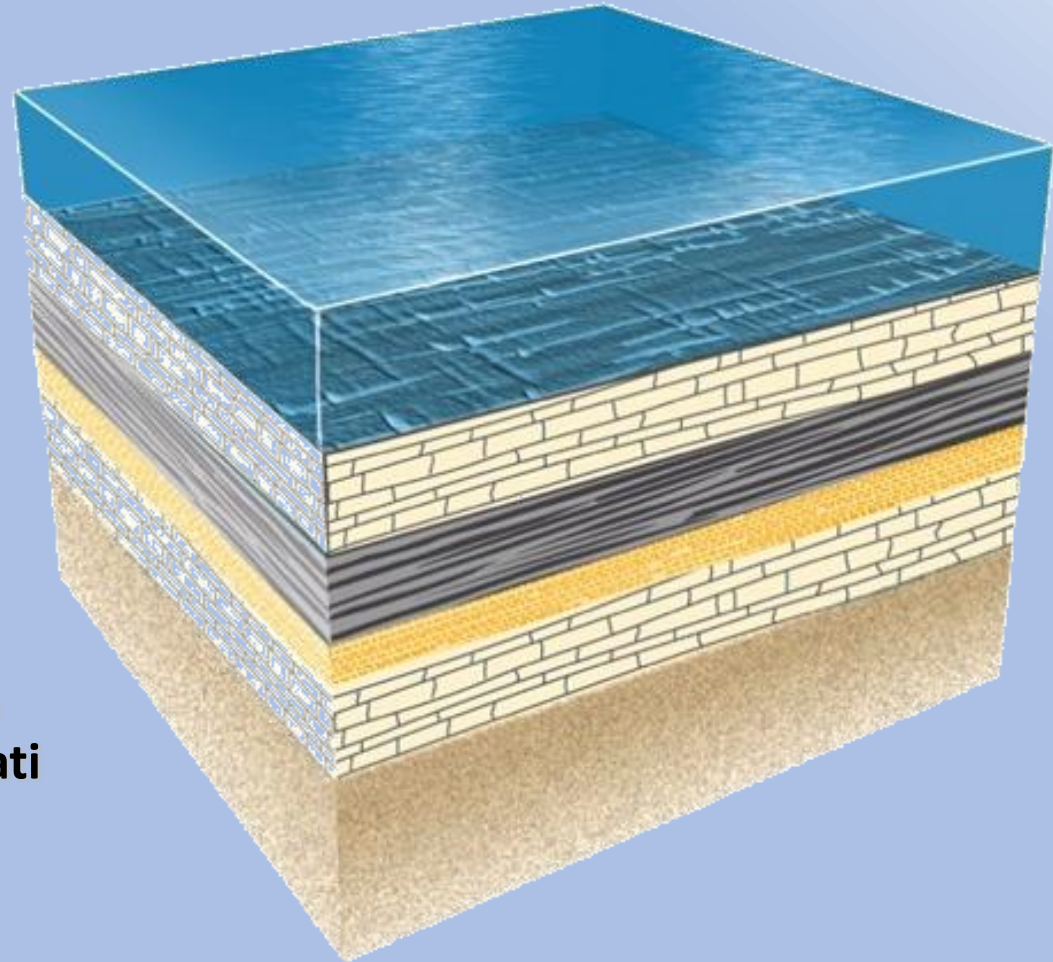
Mancano circa  
15 Milioni di anni

Wolayer Fm.





# Come si forma una discordanza angolare? (angular disconformity)

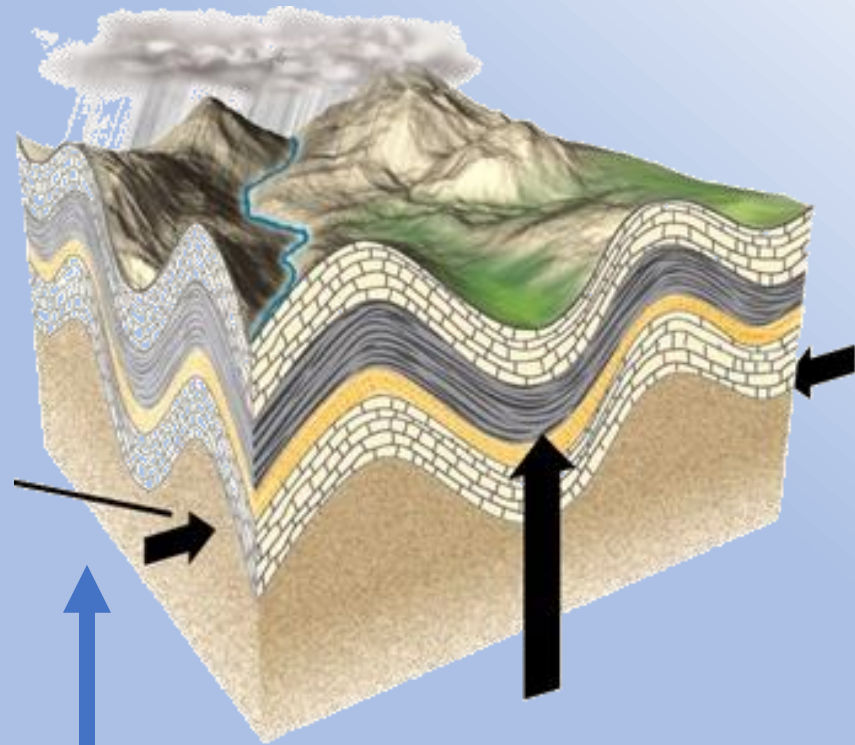


**TEMPO 1**

**Su un fondale marino  
si depositano vari strati  
di roccia.**

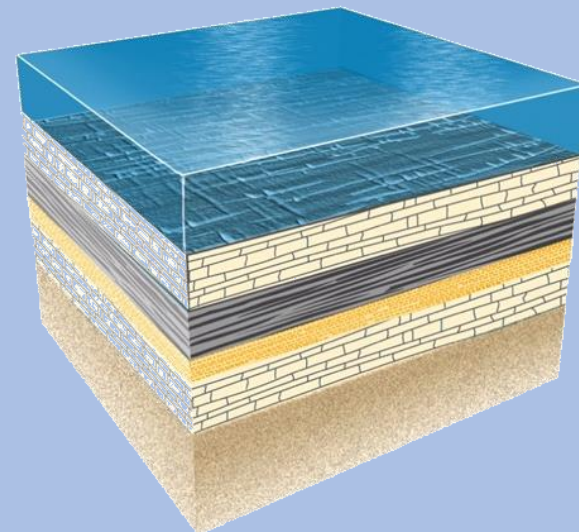
**TEMPO 2**

**Successivamente le forze tettoniche causano l'emersione degli strati e la loro deformazione**



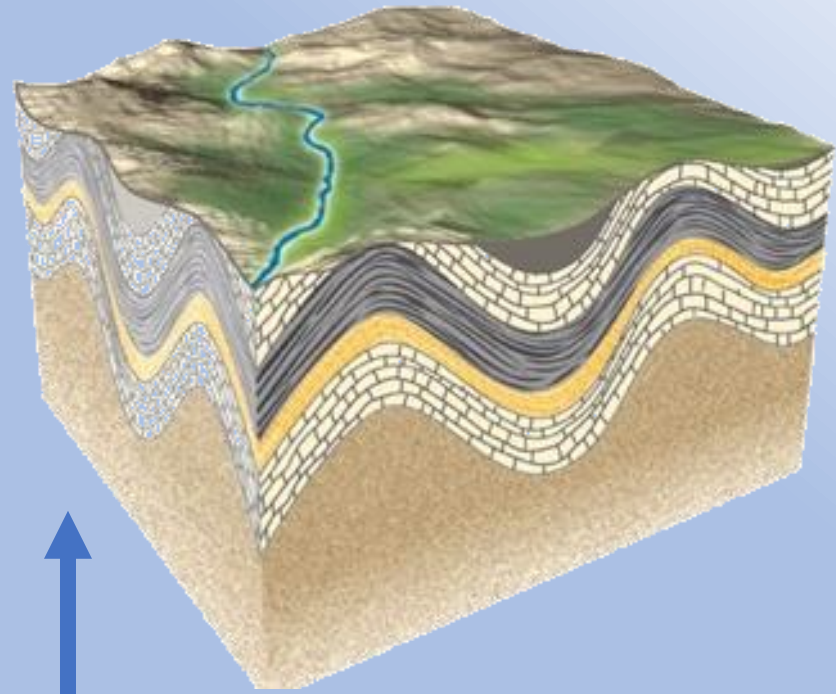
**TEMPO 1**

**Su un fondale marino si depositano i livelli A-D.**



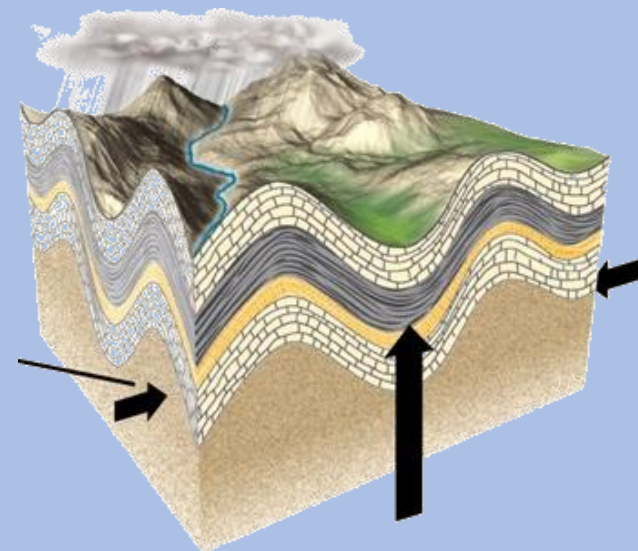
## TEMPO 3

L'erosione elimina le parti più alte lasciando una pianura irregolare in cui affiorano parti di numerosi strati piegati



## TEMPO 2

Successivamente le forze tettoniche causano l'emersione degli strati e la loro deformazione

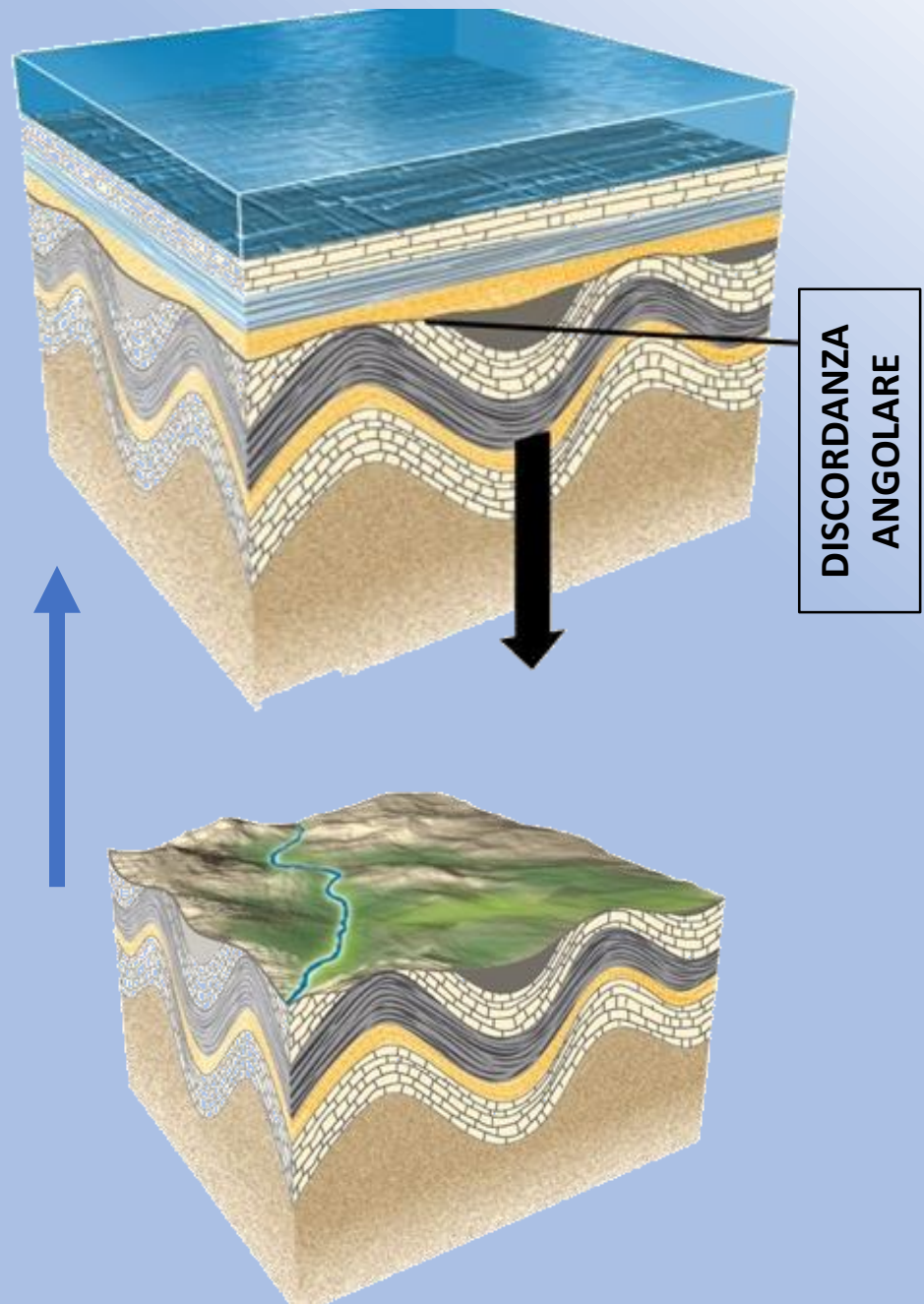


## TEMPO 4

L'area viene nuovamente inondata dal mare e si depositano altri livelli. Gli strati piegati e quelli nuovi incontrano formando un angolo tra loro.

## TEMPO 3

L'erosione elimina le parti più alte lasciando una pianura irregolare in cui affiorano parti di numerosi strati piegati



Teljero beach  
Portogallo



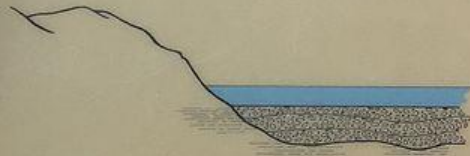
**Carlin Canyon  
Nevada**



Carlin Canyon  
Nevada

## The Rocks Tell a Story

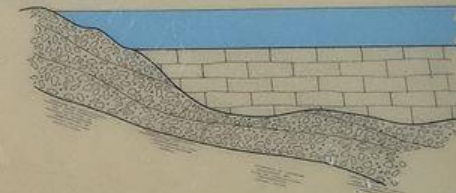
Welcome to Carlin Canyon. The rocks around you reveal some of the earth's history. What story do the exposed sedimentary layers in front of you tell?



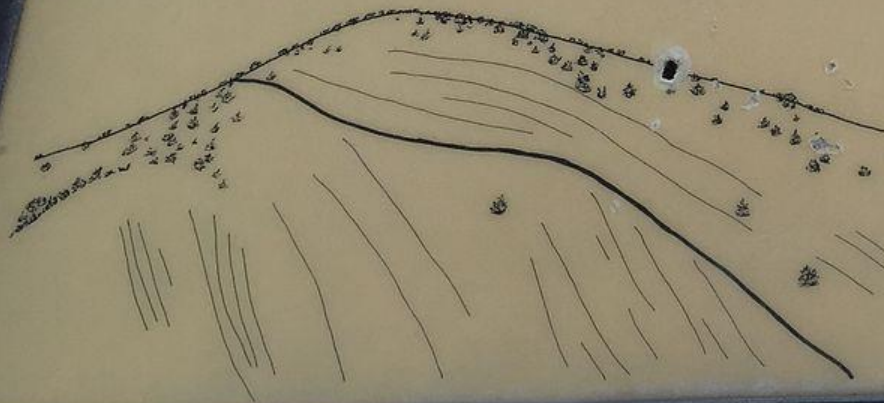
Long, long ago, before dinosaurs roamed the land, there was an ocean where you're now standing. Stones and boulders from the nearby mountains washed into the ocean in long horizontal bands. Eventually, these rocks were cemented together to form the yellowish-black pebbly rocks at the bottom of the hill.



But the bands aren't horizontal anymore. How did that happen? Faulting is the answer. Faulting, and associated earthquakes, shook this area and tipped the massive block containing these bands. One end of this block moved up and the other down, tilting the bands and, over time, forming a new mountain range.



Over millions of years wind and water eroded the upper end of the block. Sea levels rose, covering the eroded surface with a warm, shallow ocean. In this ocean, sediments were deposited gradually, forming the gray limestone layers now visible at the top of the hill.



The layering of limestone over the older eroded block records a gap in this portion of the earth's history. This gap is called an unconformity. Because the yellowish-black rocks meet the gray limestone at an angle, geologists call this an angular unconformity.

The ocean has been gone for millions of years now; the land has continued to change. More faulting tilted the gray limestone layers and further tipped the pebbly bands. This faulting and continued erosion created the rounded hills and river canyon you see today.

Follow the paved road through the canyon for a closer look at the unconformity and at the next pullout discover who traveled this route before you.

Siccar Point  
Scozia





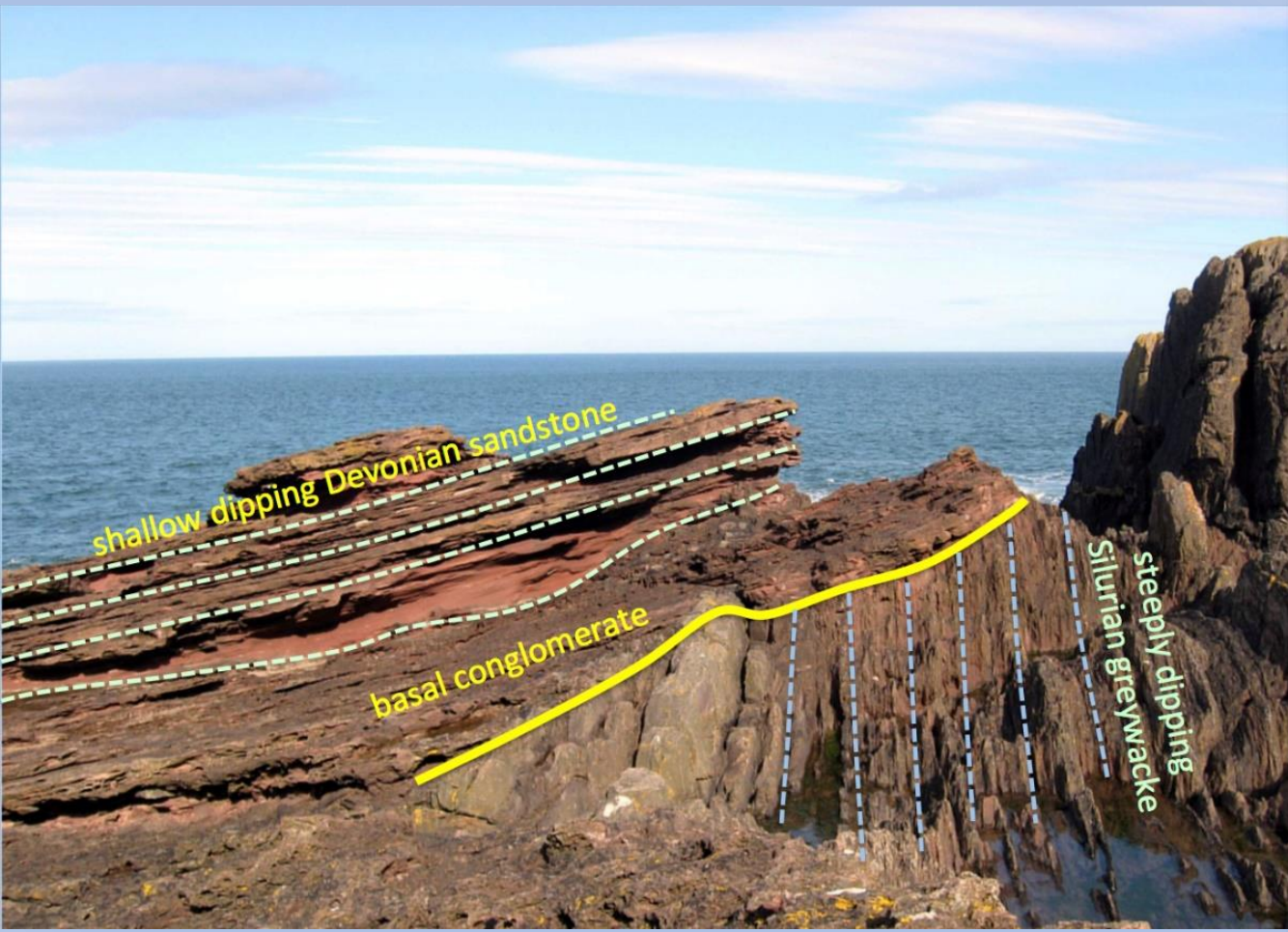


**Shallowly dipping  
Devonian red  
sandstones**

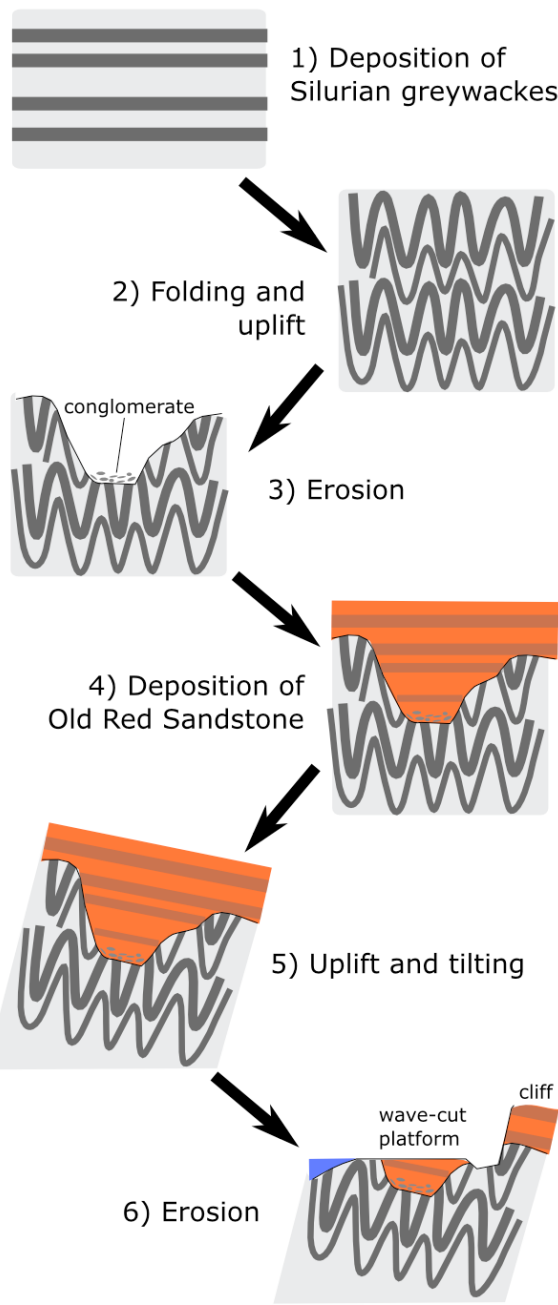
**Basal  
Conglomerate**

**Steeply  
dipping  
Silurian  
greywackes**

# Discordanza angolare



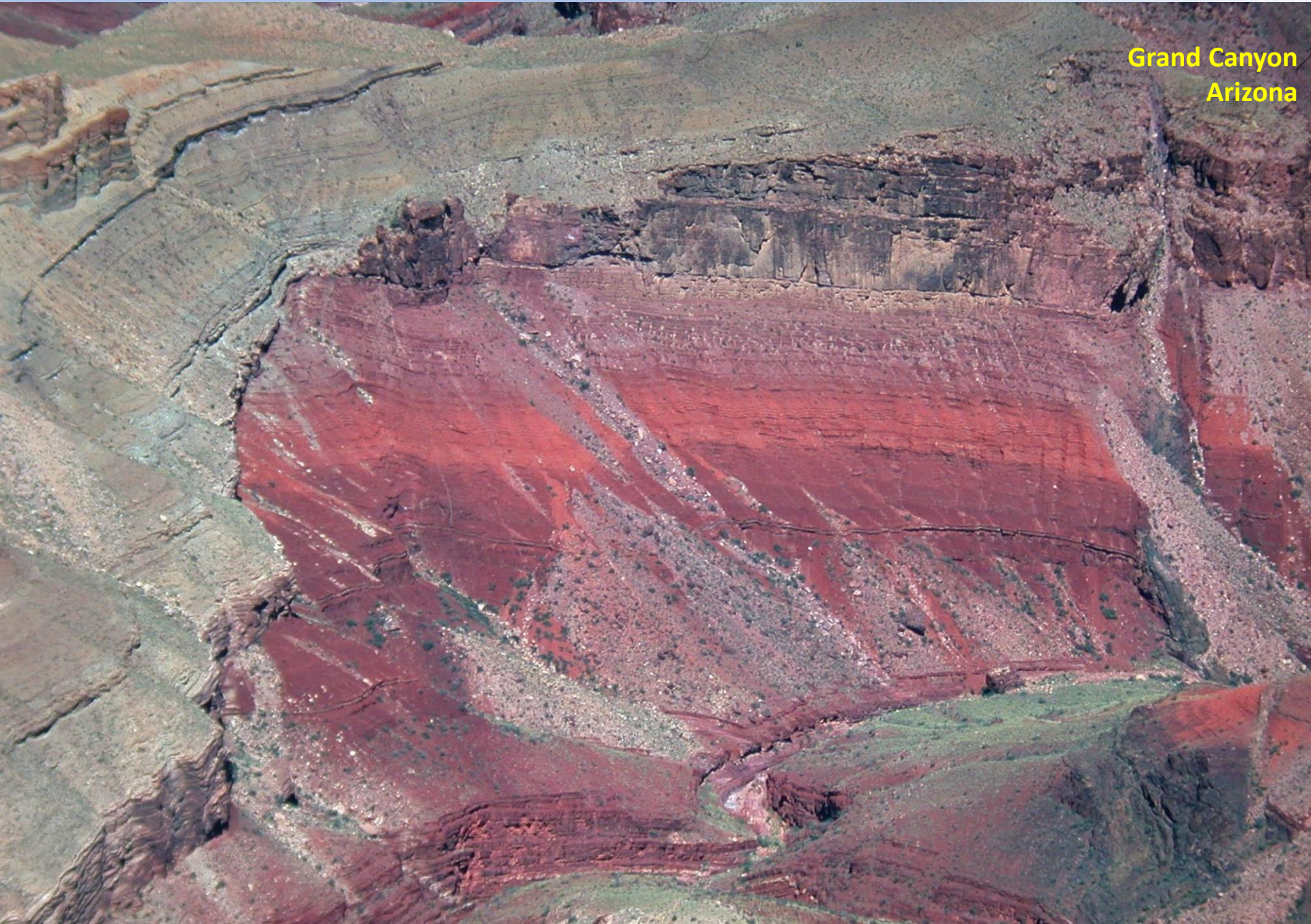
## The story of Siccar Point



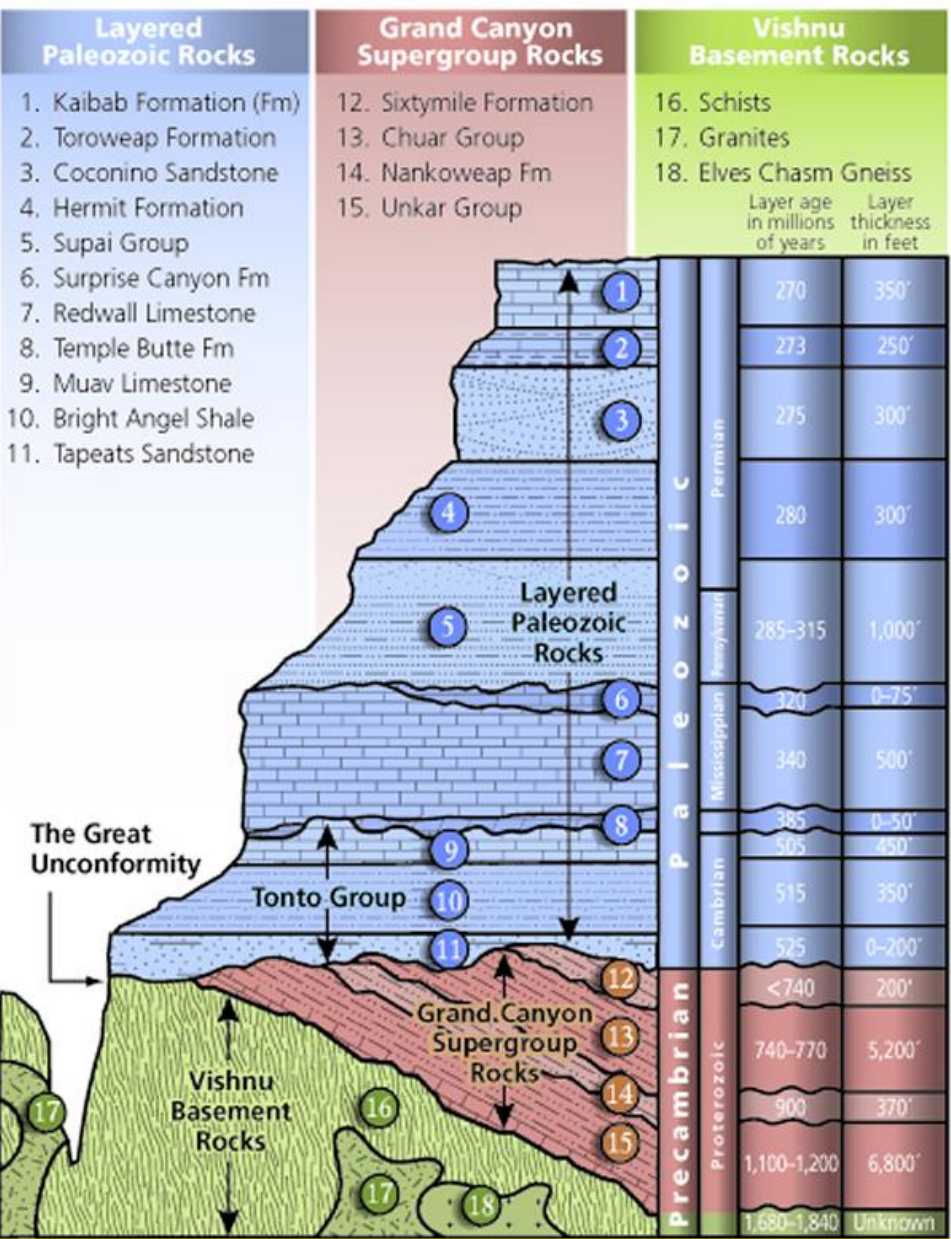
Grand Canyon  
Arizona



Grand Canyon  
Arizona



# Grand Canyon's Three Sets of Rocks



Grand Canyon Arizona





Mt. Grotto  
Canada

**Casera Poccis  
Alpi Carniche**



Costone Lambertenghi  
Alpi Carniche





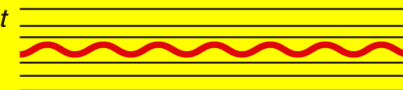
# Contatti stratigrafici

## A. **Unconformity** = significant hiatus ± erosion (usually with erosion)

*A substantial break or gap in the geological record ... It normally implies uplift and erosion with loss of the previously formed record. ... Relationship between rock strata in contact, characterized by a lack of continuity in deposition, and corresponding to a period of nondeposition, weathering, or esp. erosion (either subaerial or subaqueous) prior to the deposition of the younger beds.*

### 1. **Disconformity** = hiatus + erosion

*An unconformity in which the bedding planes above and below the break are essentially parallel, indicating a significant interruption in the orderly sequence of sedimentary rocks, generally by a considerable interval of erosion ..., and usually marked by a visible and irregular or uneven erosion surface of appreciable relief.*



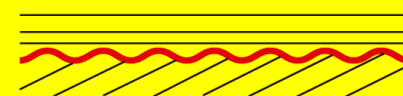
### 2. **Paraconformity** = hiatus ± erosion (no discernable erosion)

*An obscure or uncertain unconformity in which no erosion surface is discernable ..., and in which the beds above and below the break are parallel.*



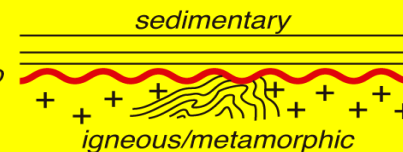
### 3. **Angular unconformity** = hiatus, erosion, and tilt

*An unconformity between two groups of rocks whose bedding planes are not parallel or in which the older, underlying rocks dip at a different angle (usually steeper) than the younger, overlying strata.*



### 4. **Nonconformity** = top of basement rocks

*An unconformity developed between sedimentary rocks and older igneous or metamorphic rocks that had been exposed to erosion before the overlying sediments covered them.*



## B. **Diastem** = short hiatus ± erosion (a minor paraconformity)

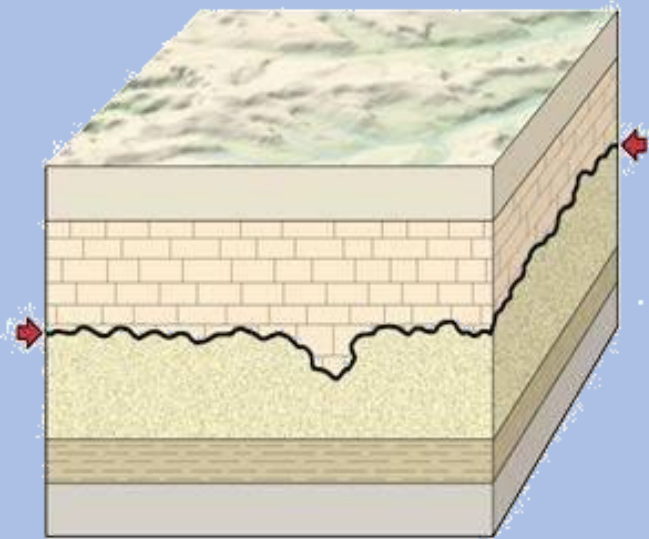
*A relatively short interruption in sedimentation, involving only a brief interval of time, with little or no erosion before deposition is resumed; a depositional break of lesser magnitude than a paraconformity, or a paraconformity of very small time value.*

## C. **Conformity** = no hiatus

*Undisturbed relationship between adjacent sedimentary strata that have been deposited in orderly sequence... True stratigraphic continuity in the sequence of beds.*

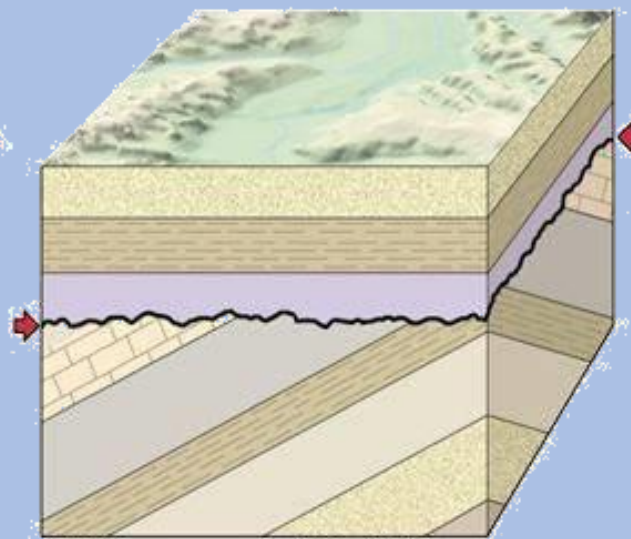
# Contatti stratigrafici

**Discordanza**



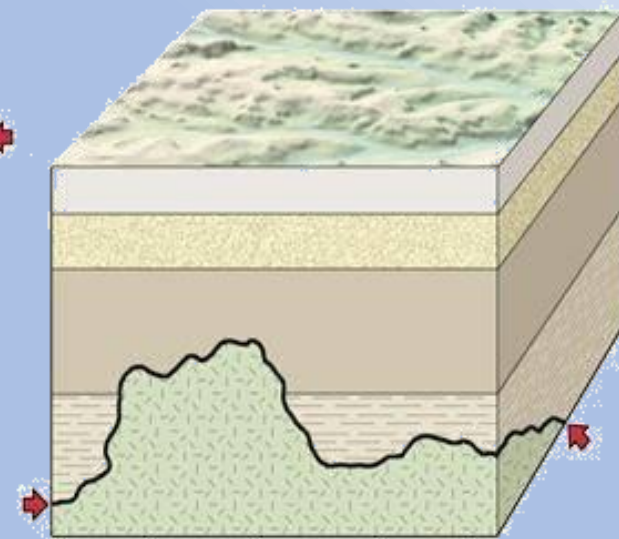
Disconformity

**Discordanza angolare**



Angular unconformity

**Non concordanza**



Nonconformity

# Non concordanza (Non conformity)

Shoshone Canyon  
Wyoming

Cambrian Flathead Sandstone

Precambrian Granite Gneiss and Schist

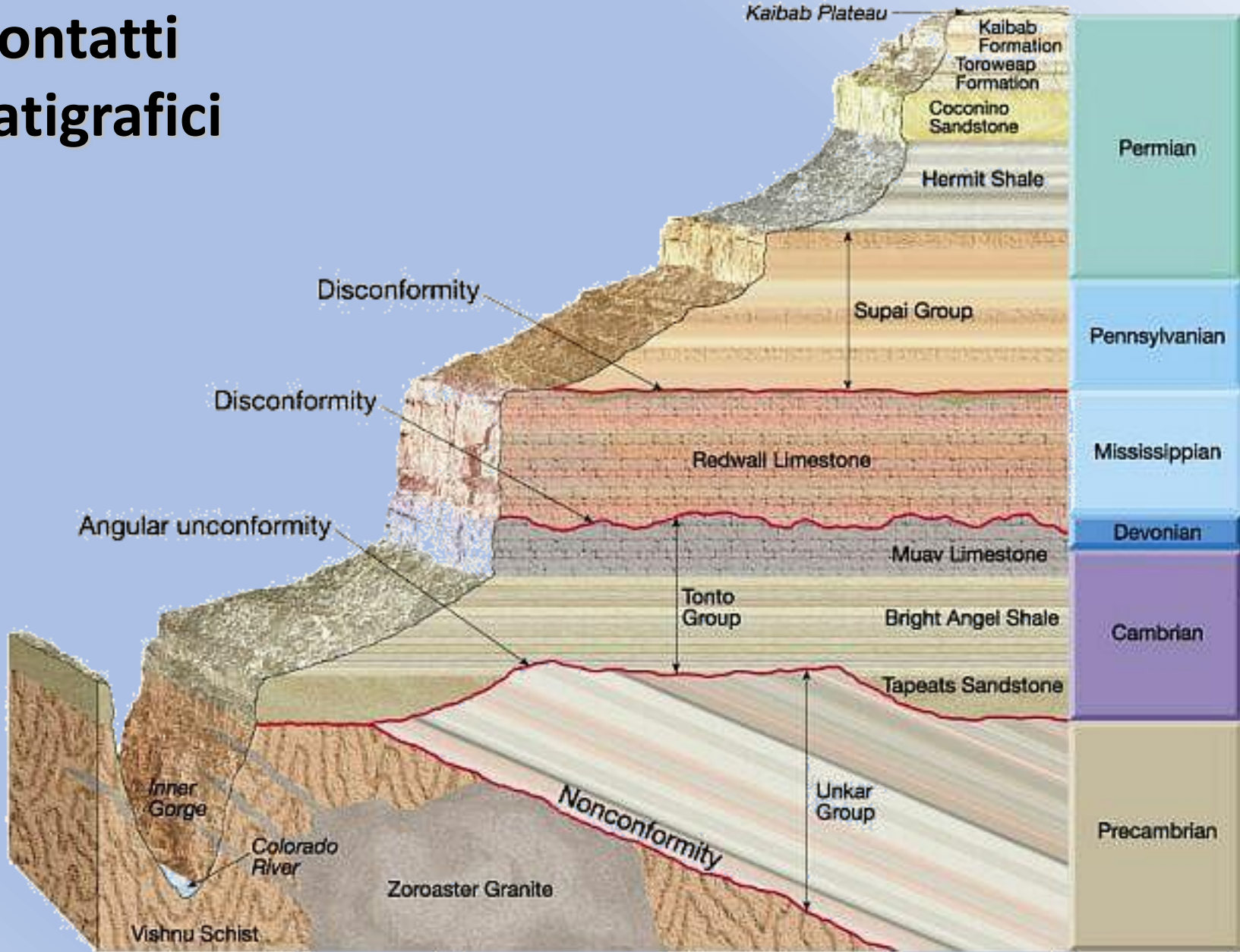


# Paraconcordanza (Paraconformity)

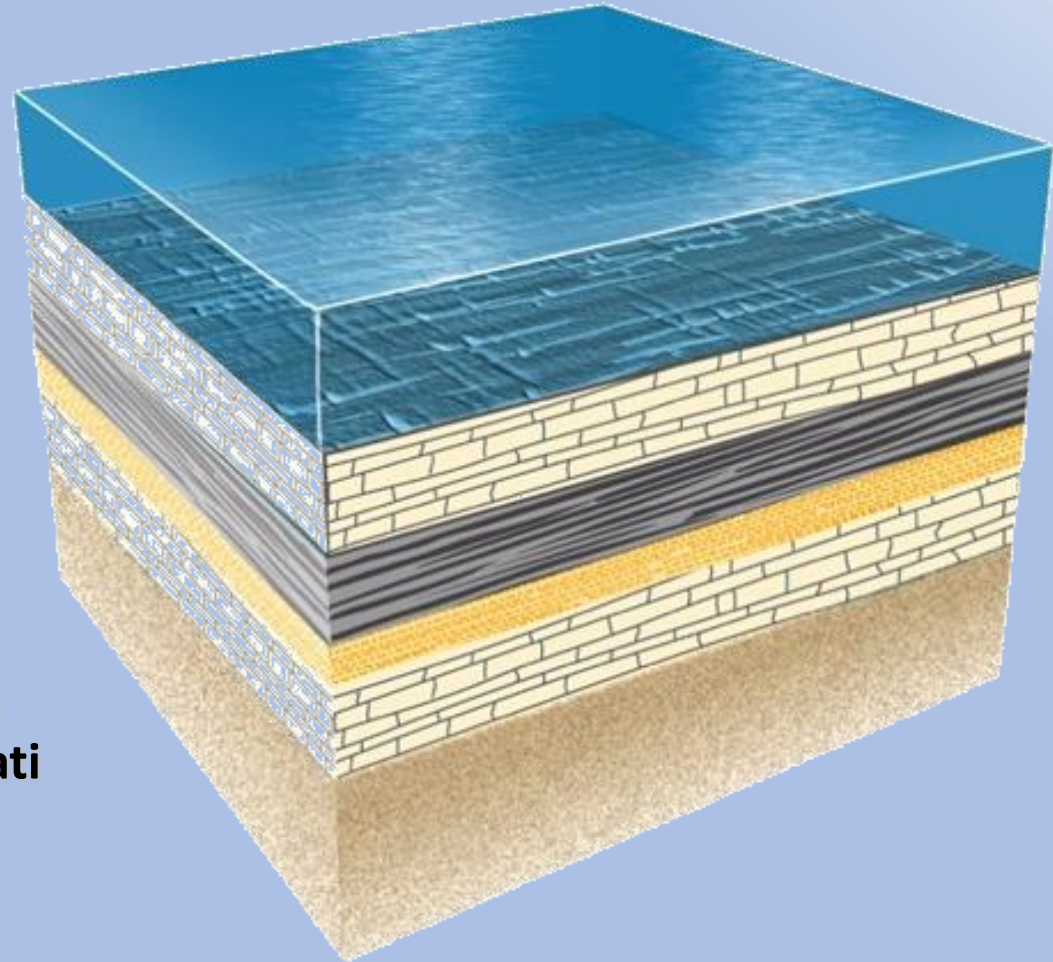


Cellon section  
Carnic Alps

# Contatti stratigrafici



# Relazioni di cross cutting

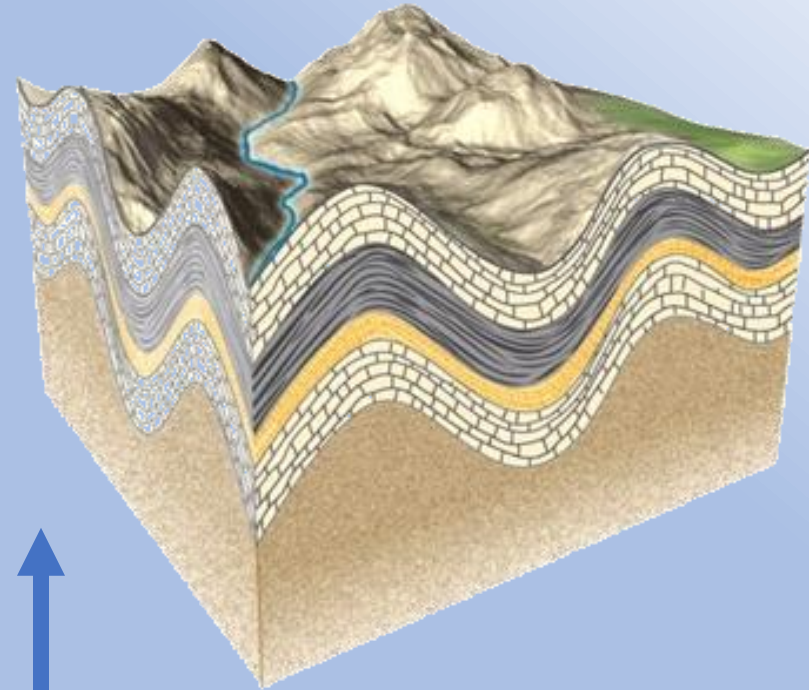


## TEMPO 1

Su un fondale marino  
si depositano vari strati  
di roccia.

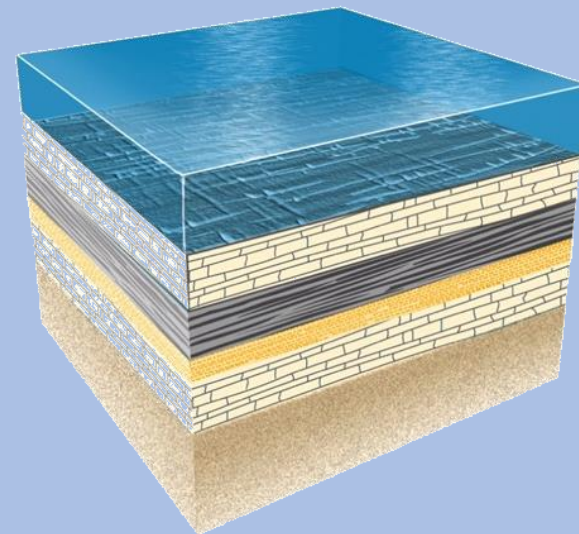
**TEMPO 2**

**Successivamente le forze tettoniche causano l'emersione degli strati e la loro deformazione**



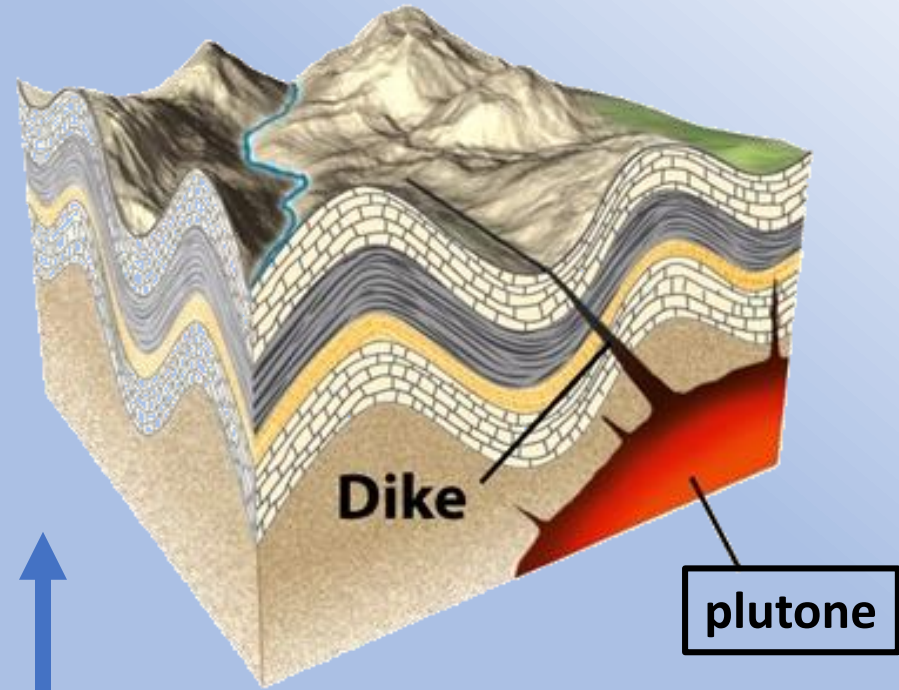
**TEMPO 1**

**Su un fondale marino si depositano i livelli A-D.**



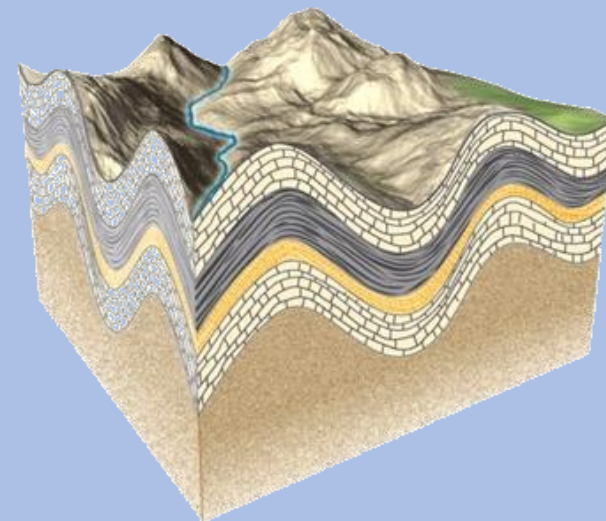
**TEMPO 3**

**Un dicco intrude gli strati piegati, intersecandoli. Dato che il dicco attraversa gli strati, e chiaro che l'intrusione sia successiva alla sedimentazione e al piegamento**



**TEMPO 2**

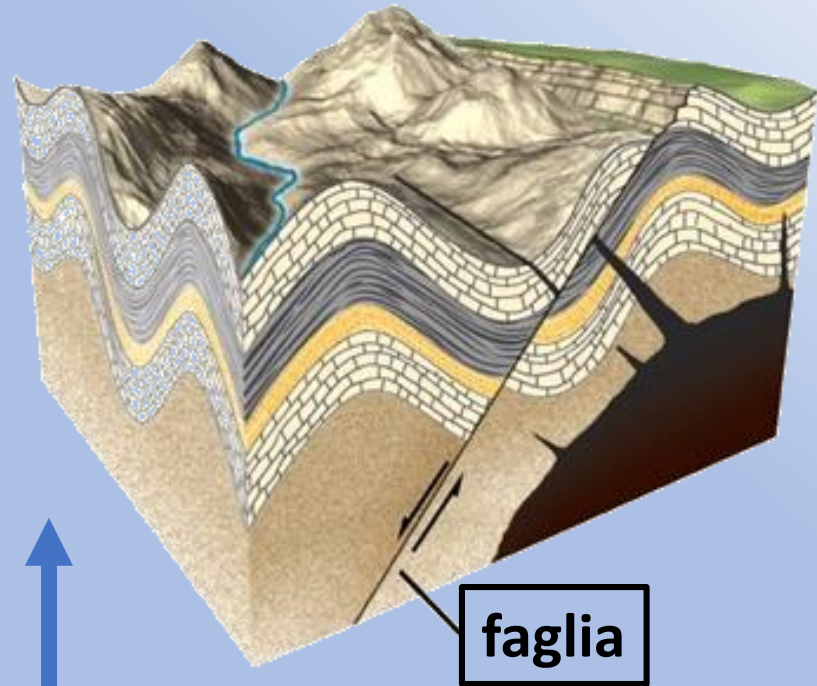
**Successivamente le forze tettoniche causano l'emersione degli strati e la loro deformazione**





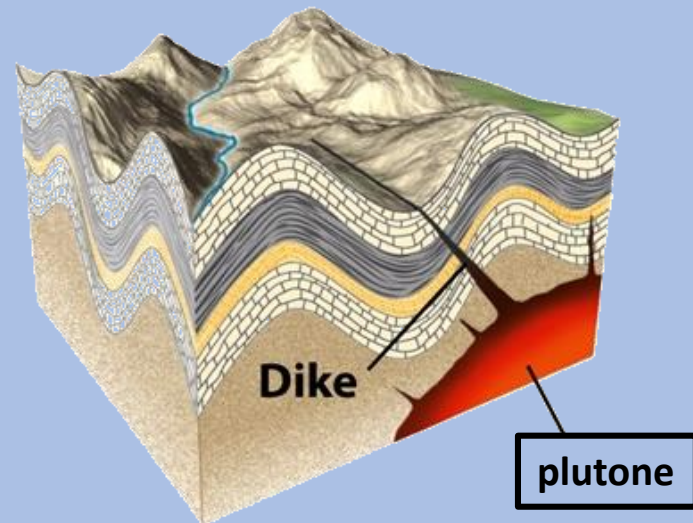
**TEMPO 4**

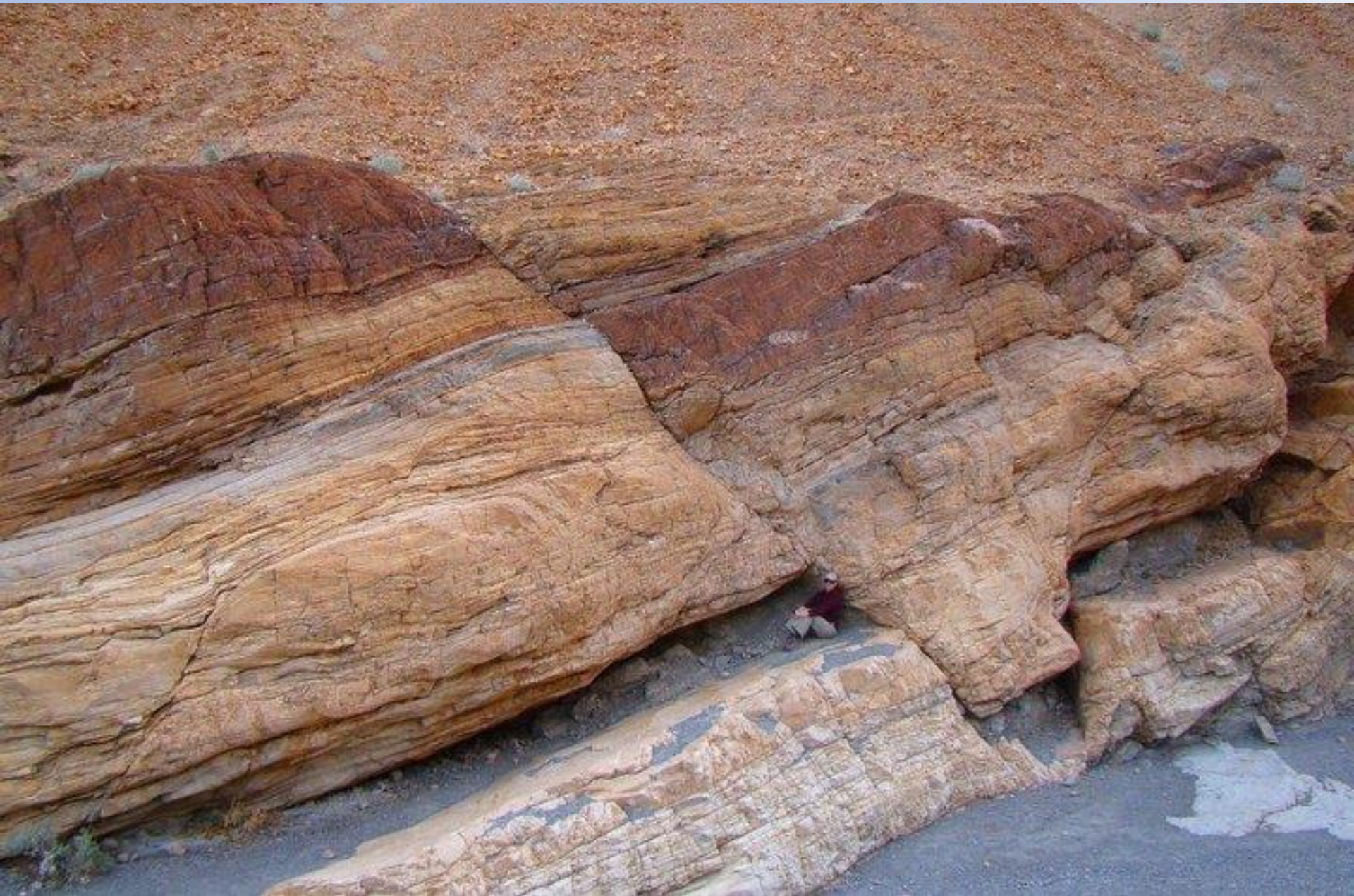
Una faglia disloca gli strati e il dicco.  
Dato che entrambi sono interessati dalla faglia, questa ha agito dopo la loro formazione.



**TEMPO 3**

Un dicco intrude gli strati piegati, intersecandoli.





Jasper area  
Canada



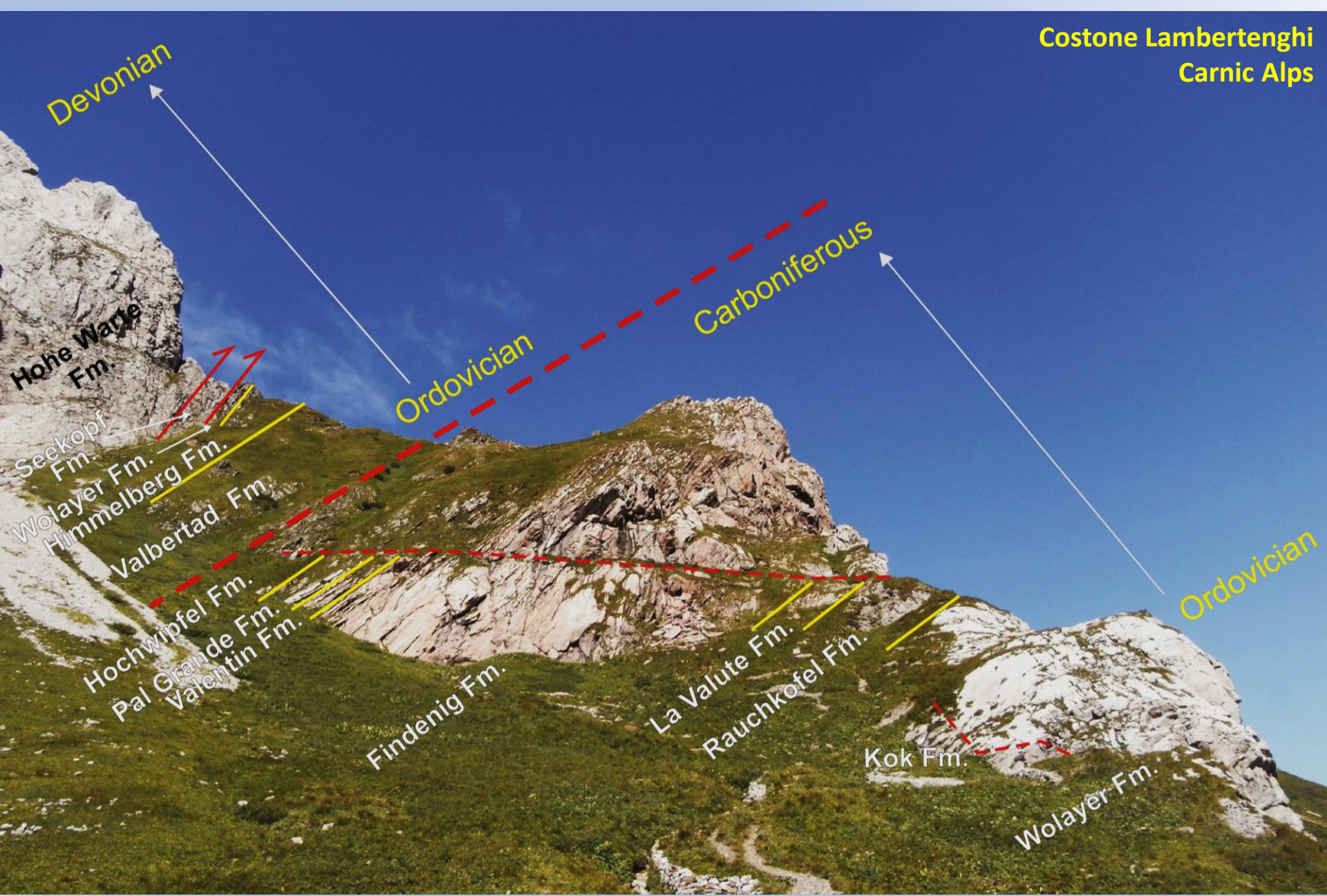
Costone Lambertenghi  
Carnic Alps



Costone Lambertenghi  
Carnic Alps



Costone Lambertenghi  
Carnic Alps



Devonian

Carboniferous

Ordovician

Ordovician

Hohe Warte Fm.

Seekopf Fm.

Wolayer Fm.

Himmelberg Fm.

Valbertad Fm.

Hochwipfel Fm.

Pal Grande Fm.

Valentin Fm.

Findenig Fm.

La Valute Fm.

Rauchkofel Fm.

Kok Fm.

Wolayer Fm.