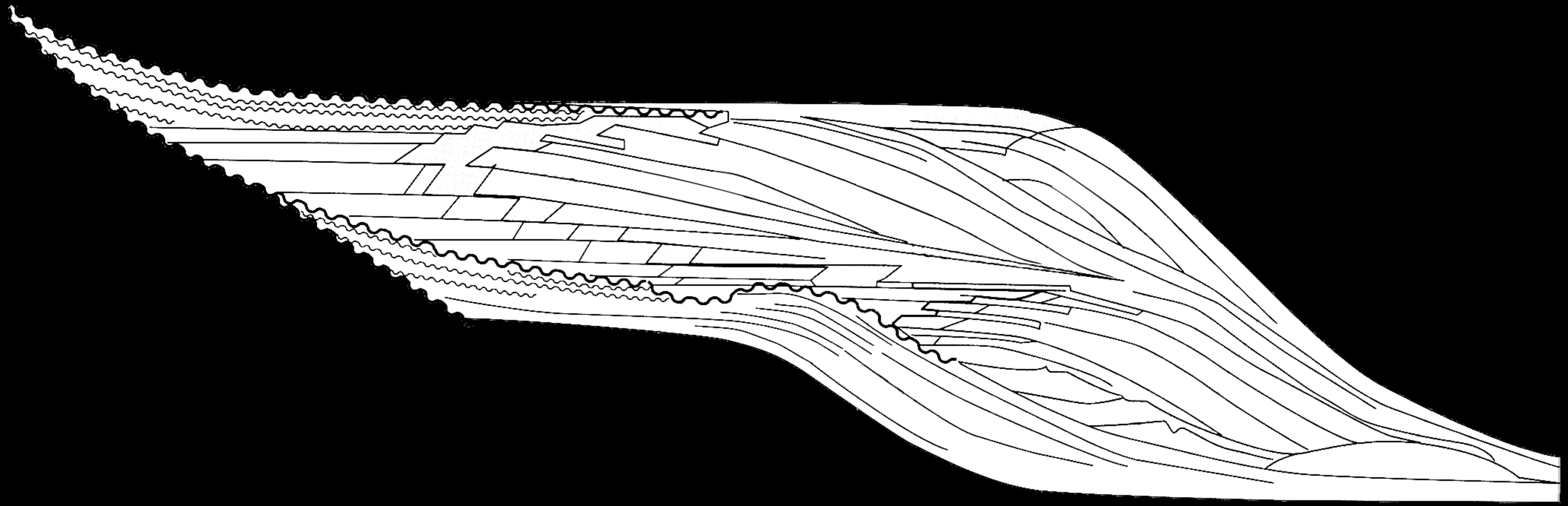
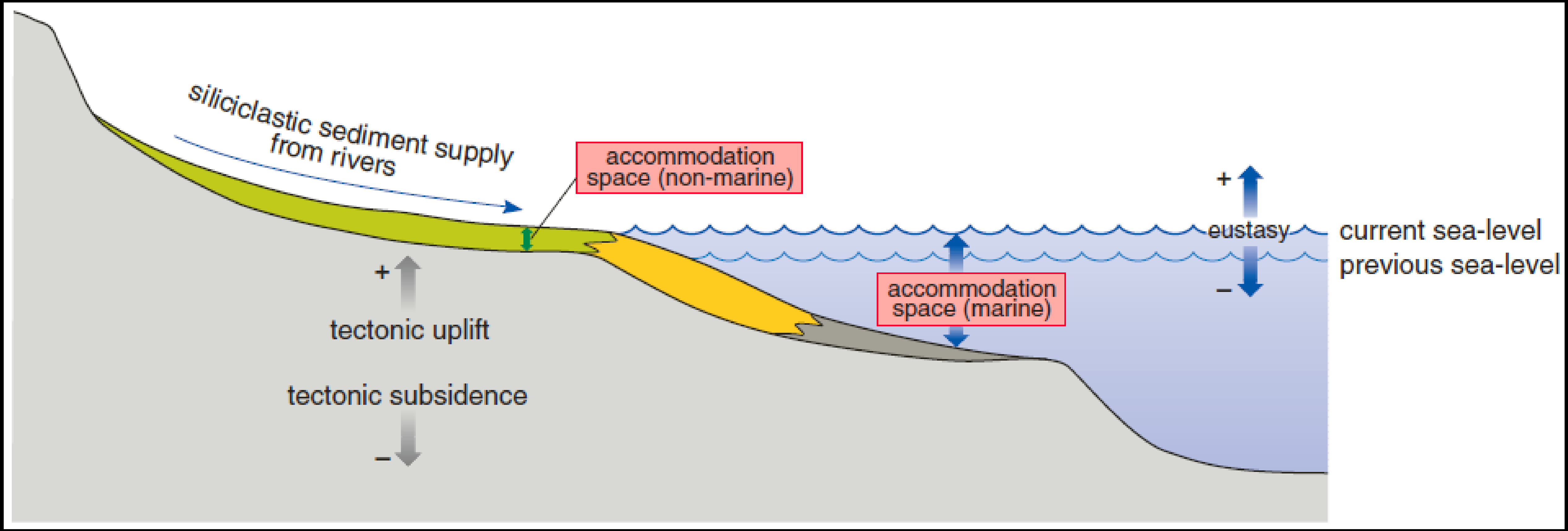
Elements of Sequence Stratigraphy

Sequence stratigraphy: an analysis of the sedimentary response to changes in relative sea level and depositional trends that emerge from the interplay of accomodation and sedimentation.



Elements of Sequence Stratigraphy

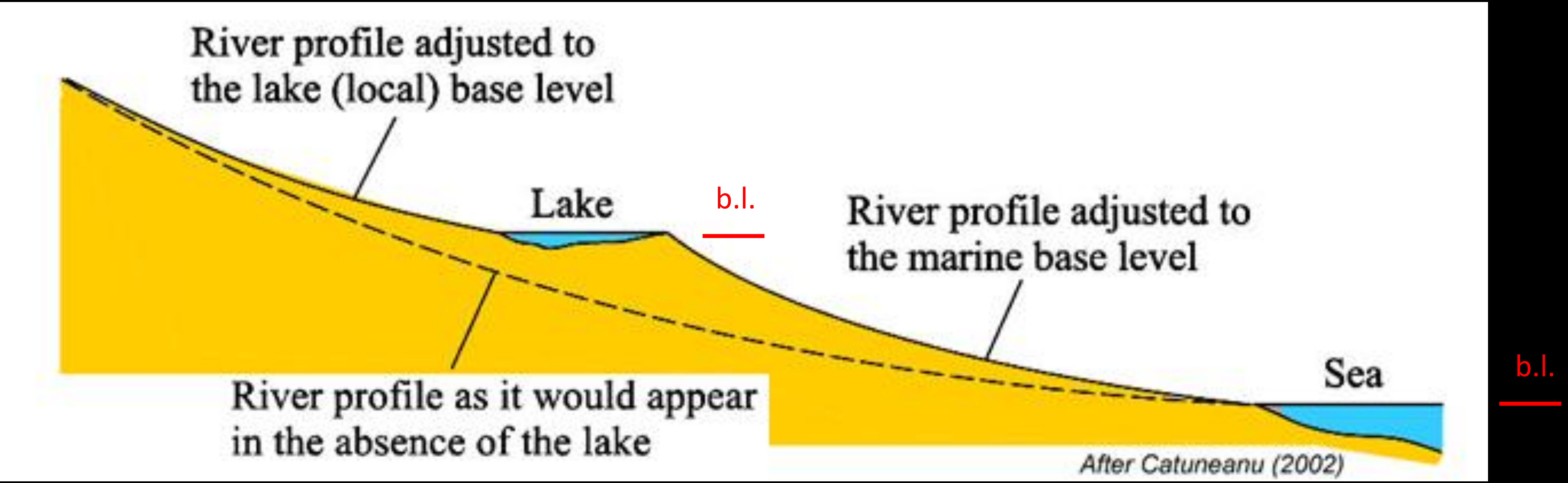
Accomodation: the space available to sediment to fill. Accomodation is created below base level



Miall, 2010

Base level

The base level is a surface that separates areas where erosion dominates from areas of sedimentation.



Base level

In marine environments, the base level approximately corresponds to sea level.

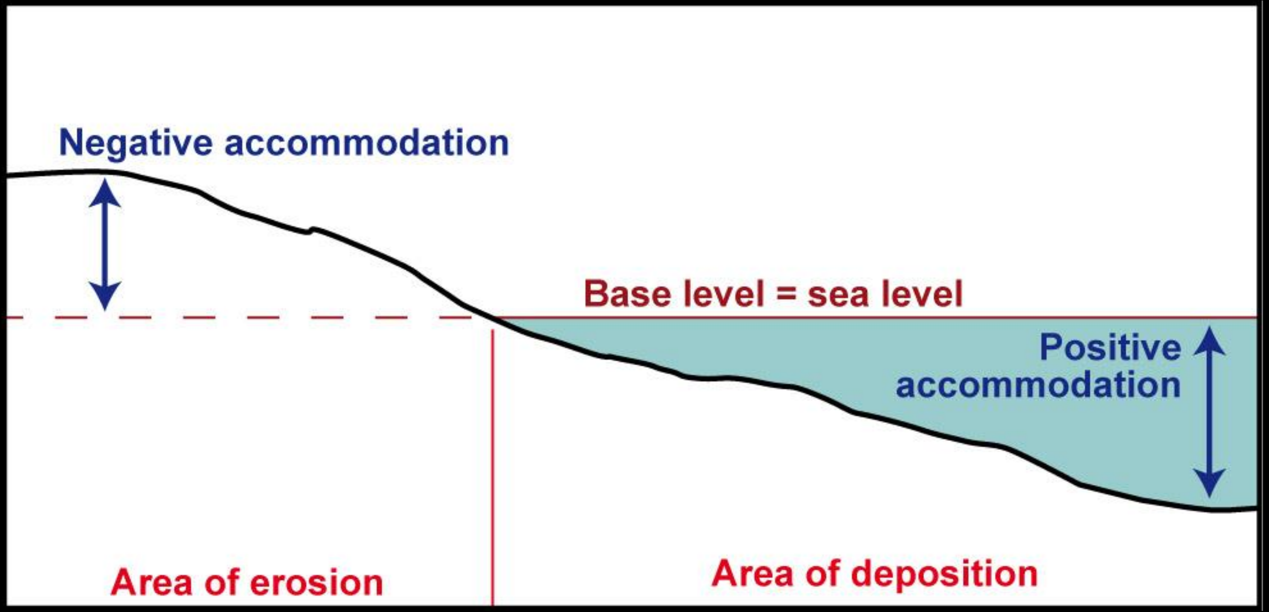
From now on, we will assume **sea level = base level**.

Elements of Sequence Stratigraphy

A cross-section of the coast (red line) highlights a relationship between sea level and accommodation:

Accommodation is available wherever the depositional surface is below sea level. Where the depositional surface is above sea level, we define a negative accommodation.

Negative accommodation means potential erosion.



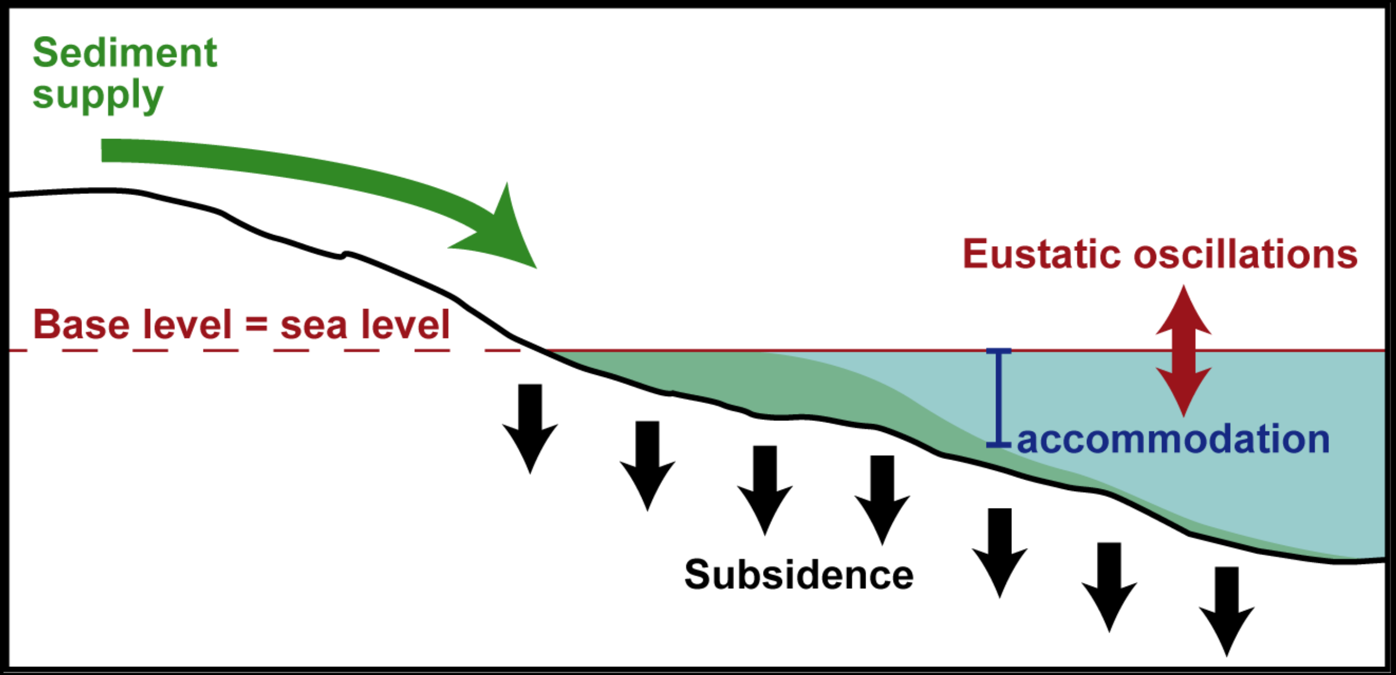
Elements of Sequence Stratigraphy

Sea level is influenced by two factors:

- **eustatic oscillations** (variations of the global sea level)
- **tectonics** (subsidence or uplift)

Accommodation depends on:

- sea level
- **sediment supply**



Elements of Sequence Stratigraphy

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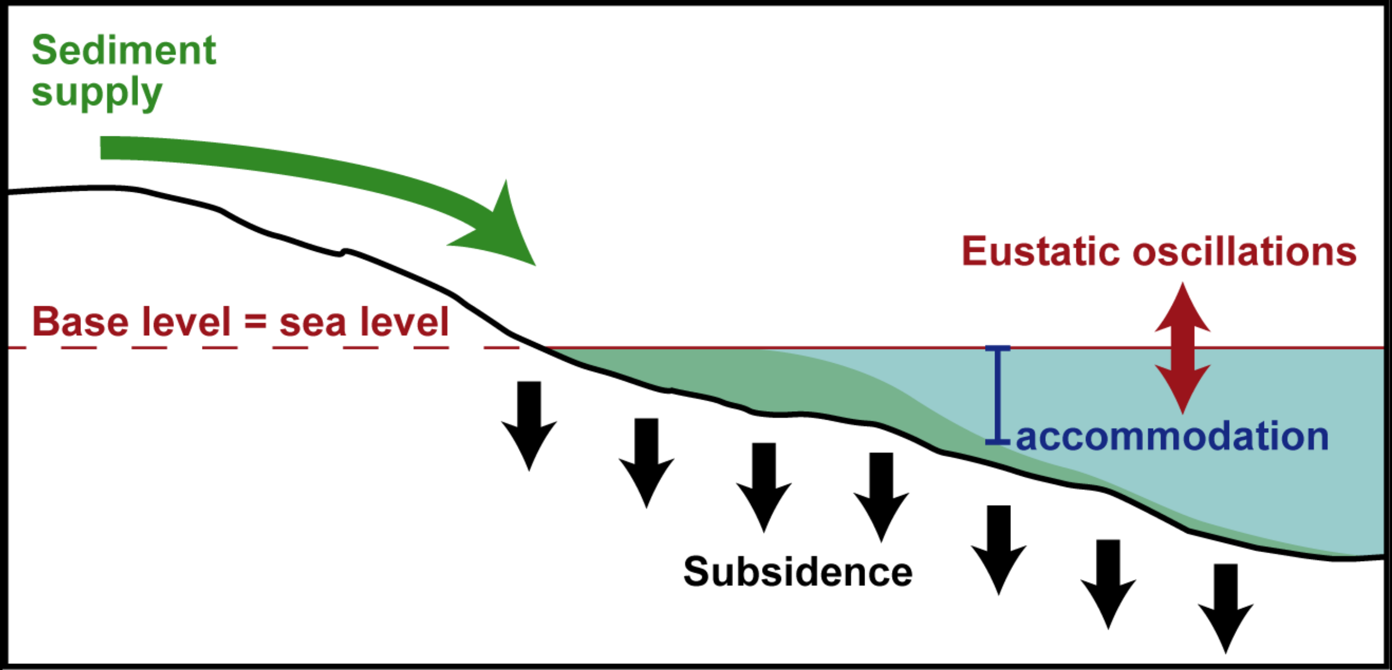
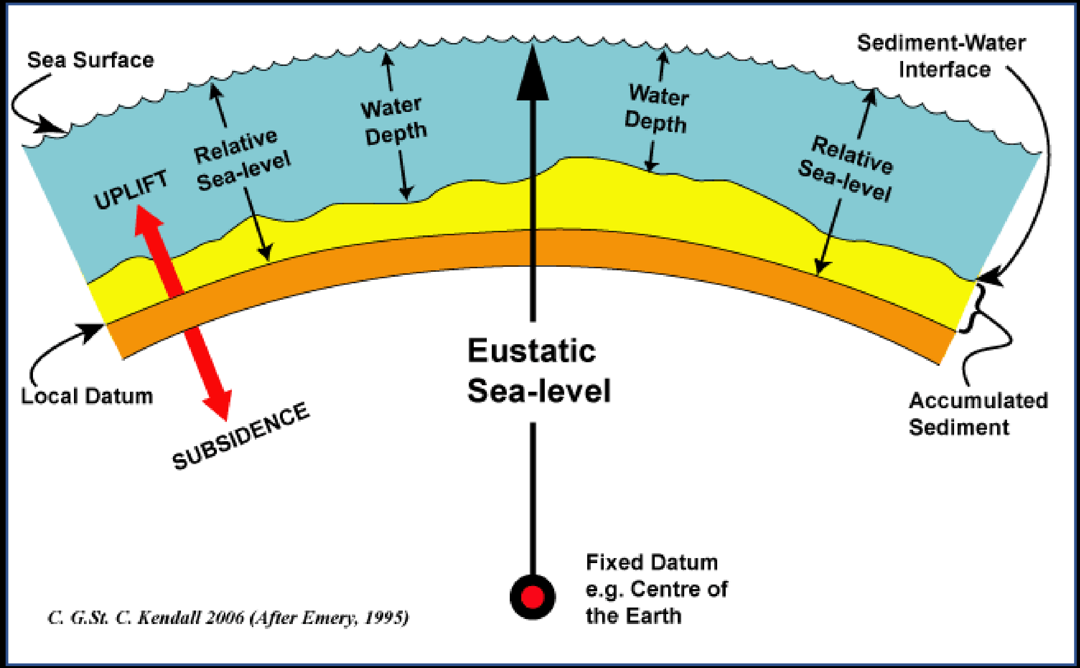
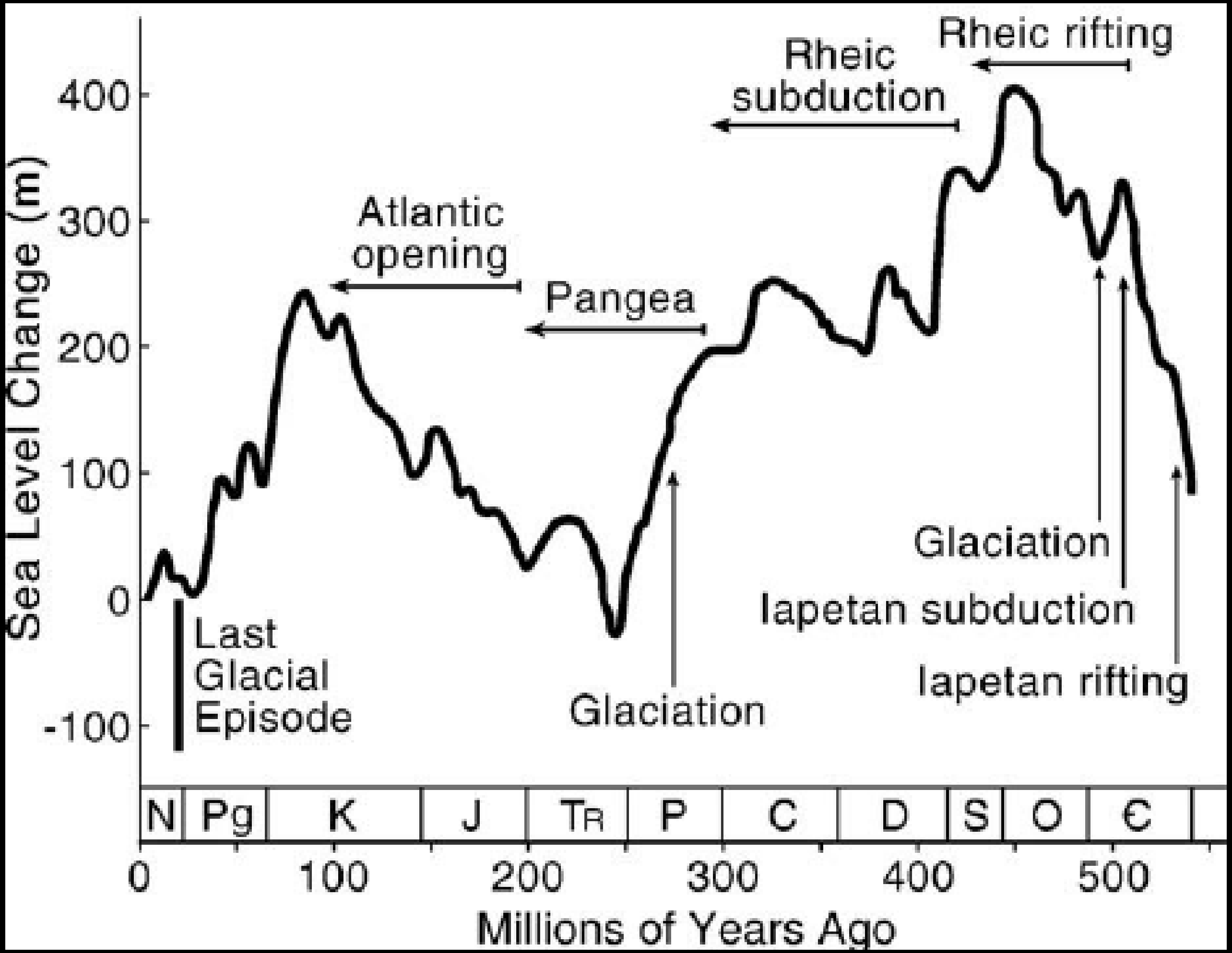




Elements of Sequence Stratigraphy



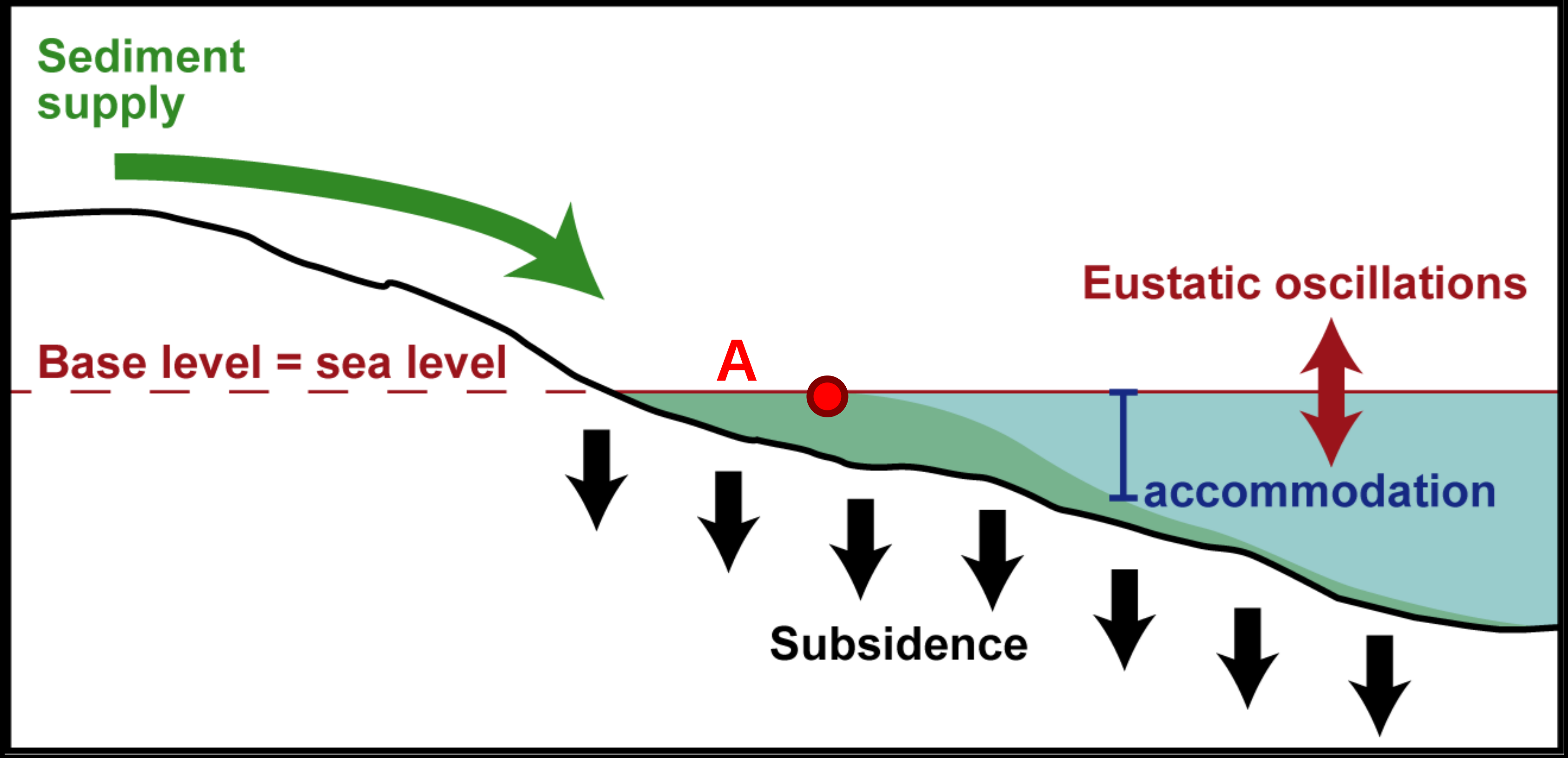
Global sea level curve for the Phanerozoic (after Hallam, 1992)

Elements of Sequence Stratigraphy

Let's put ourselves on an arbitrary point on the depositional surface, e.g., **A**.

What happens to accommodation under constant subsidence and oscillating eustatic sea level? Accommodation = 0 is sea level.

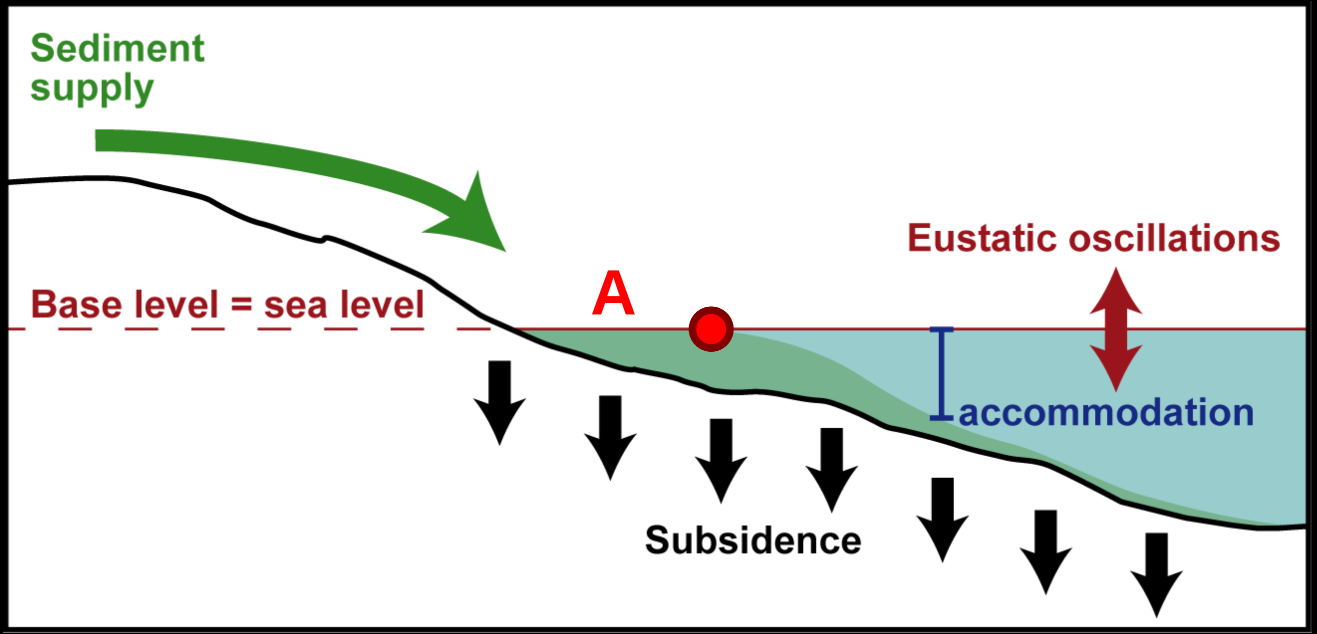
- Constant subsidence steadily adds accommodation
- Sea level rise adds accommodation, sea level fall reduces accommodation

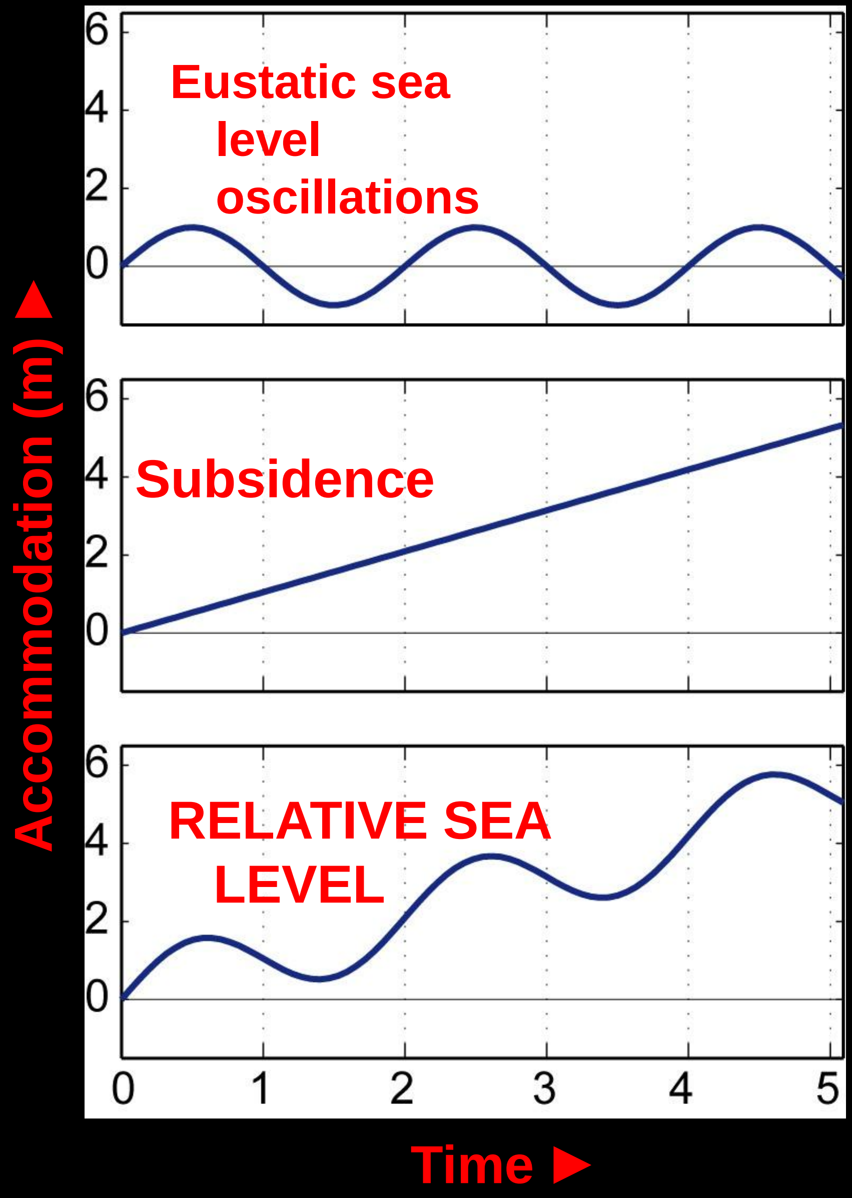


Elements of Sequence Stratigraphy

Eustatic sea level oscillations and subsidence sum up to give the **relative sea level** curve.

Depositional systems are sensitive to relative sea level changes. Only global scale correlations can tell whether the depositional sequences of a region record eustatic oscillations or local tectonics.





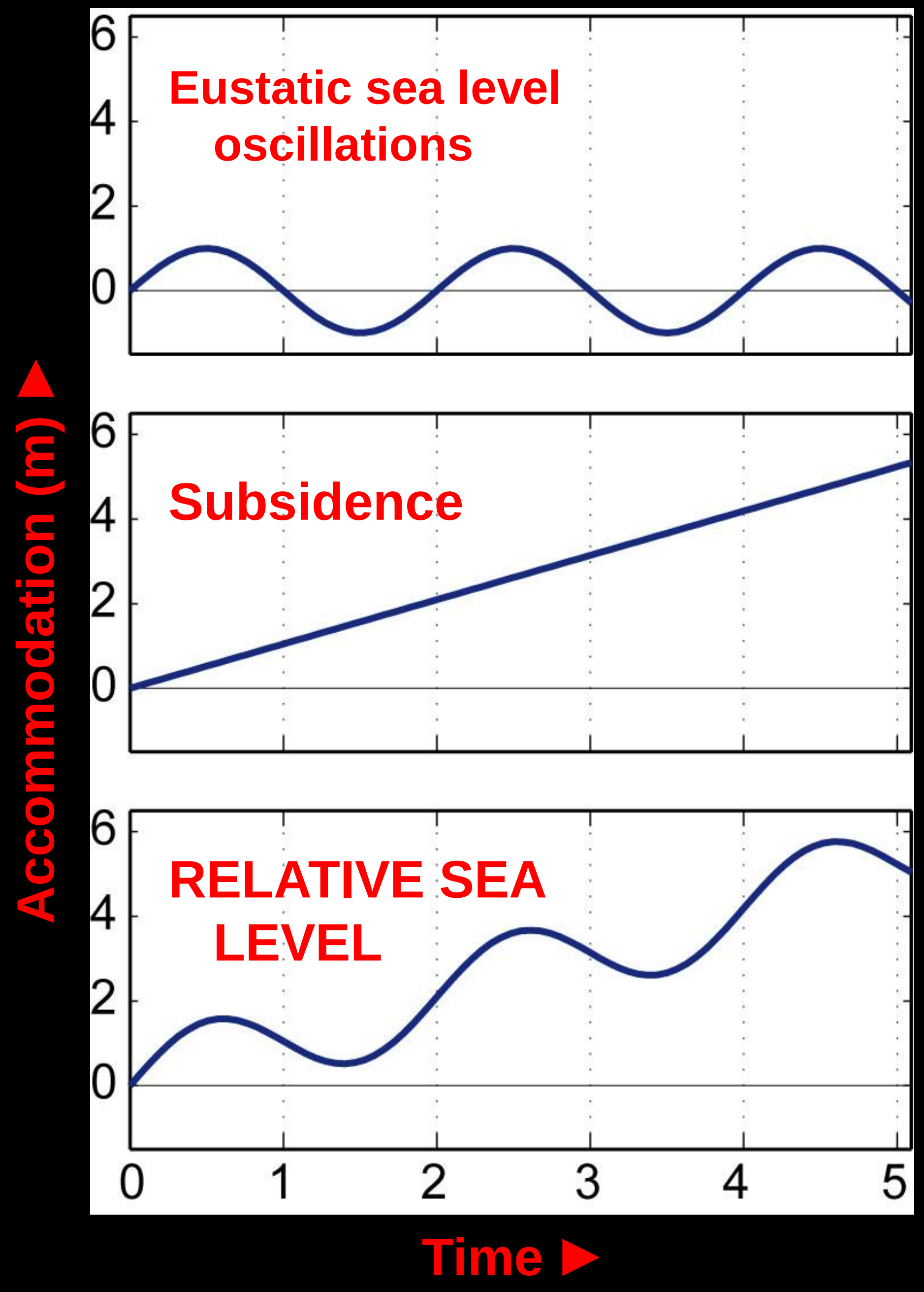
Elements of Sequence Stratigraphy

It is useful to take the first derivative of these curves:

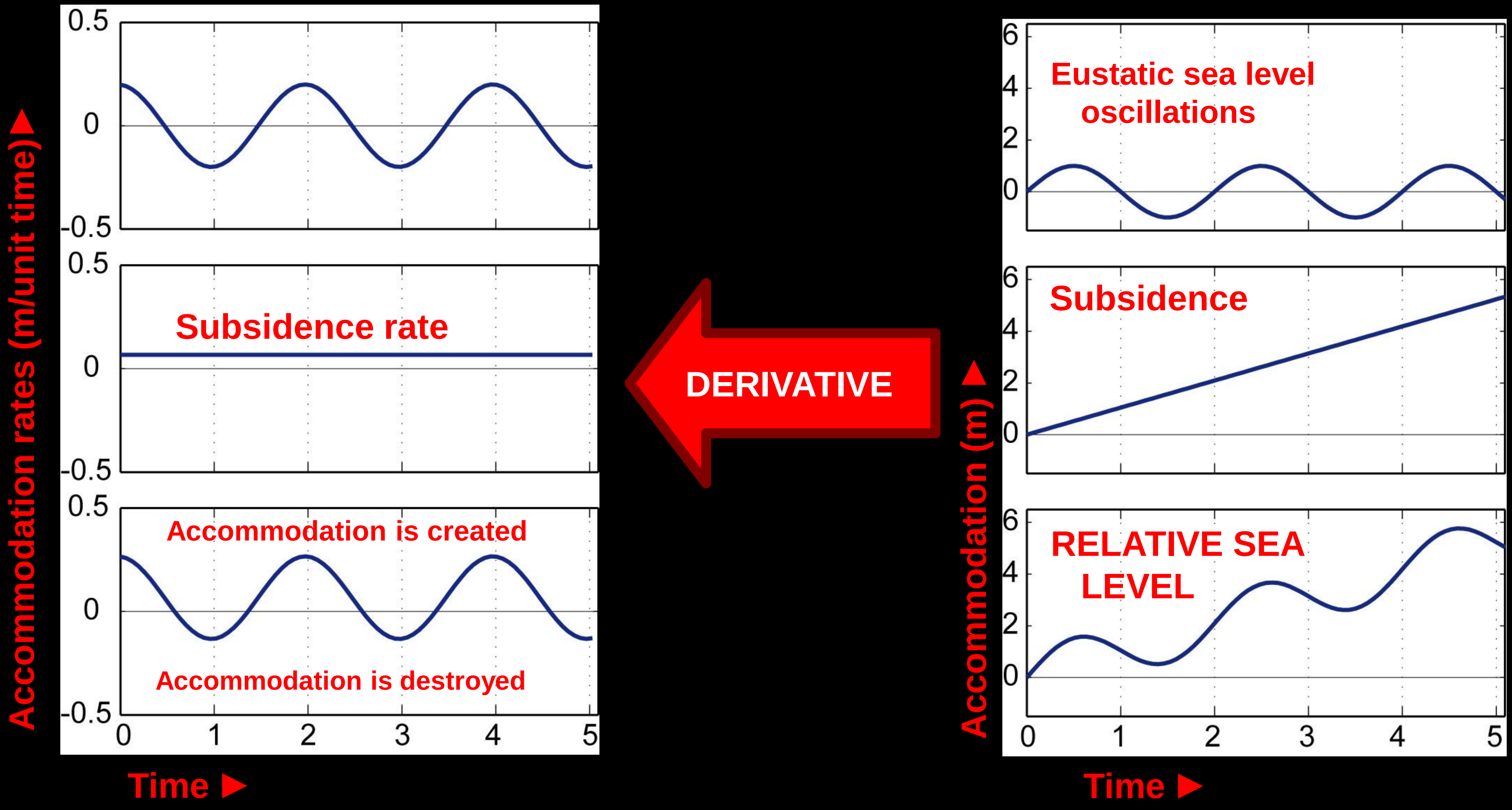
- Accommodation becomes accommodation rate

- Subsidence becomes subsidence rate

- At the end we get a rate of (relative) sea level change



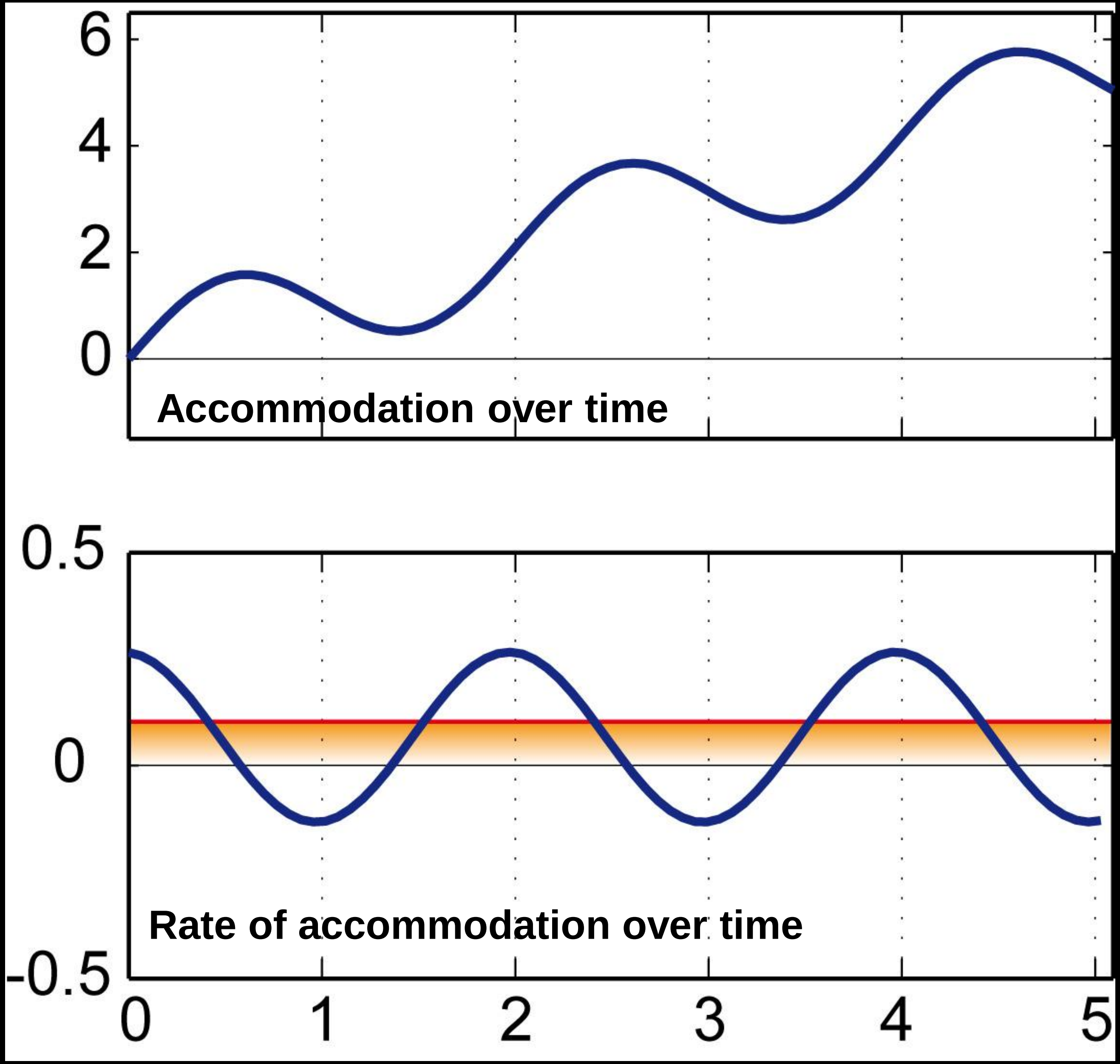
Elements of Sequence Stratigraphy



Elements of Sequence Stratigraphy

Let’s assume constant sedimentation rate. In the graph on the right it can be represented by a horizontal line in the positive domain of the y axis

Constant sedimentation rate ►



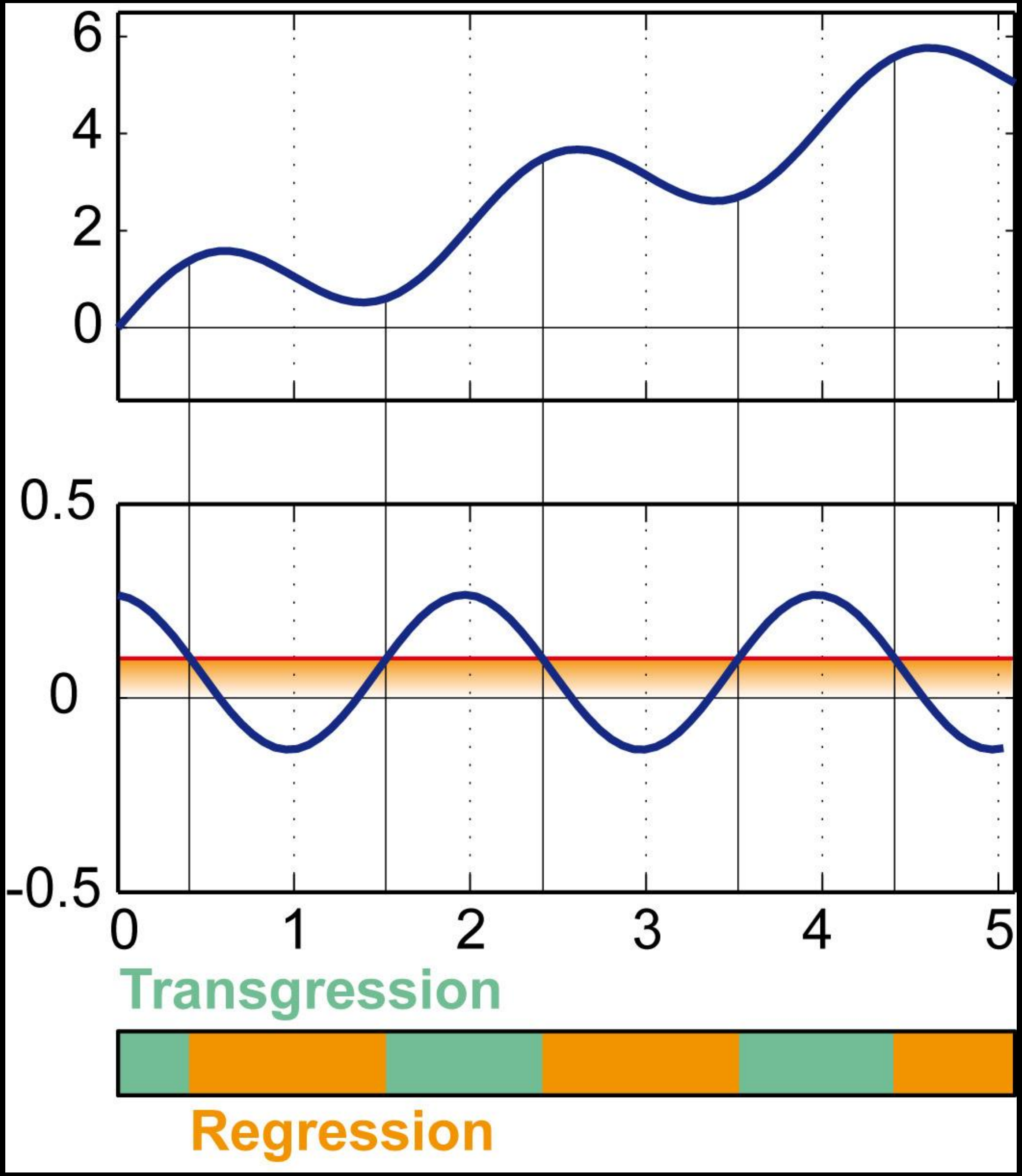
Elements of Sequence Stratigraphy

The stratigraphic record of the interplay between accommodation and sedimentation is regression and transgression

When sediment supply exceeds accommodation, we have **regression**;

when sediment supply is not sufficient to fill accommodation, then we have **transgression**.

But there is something more here...

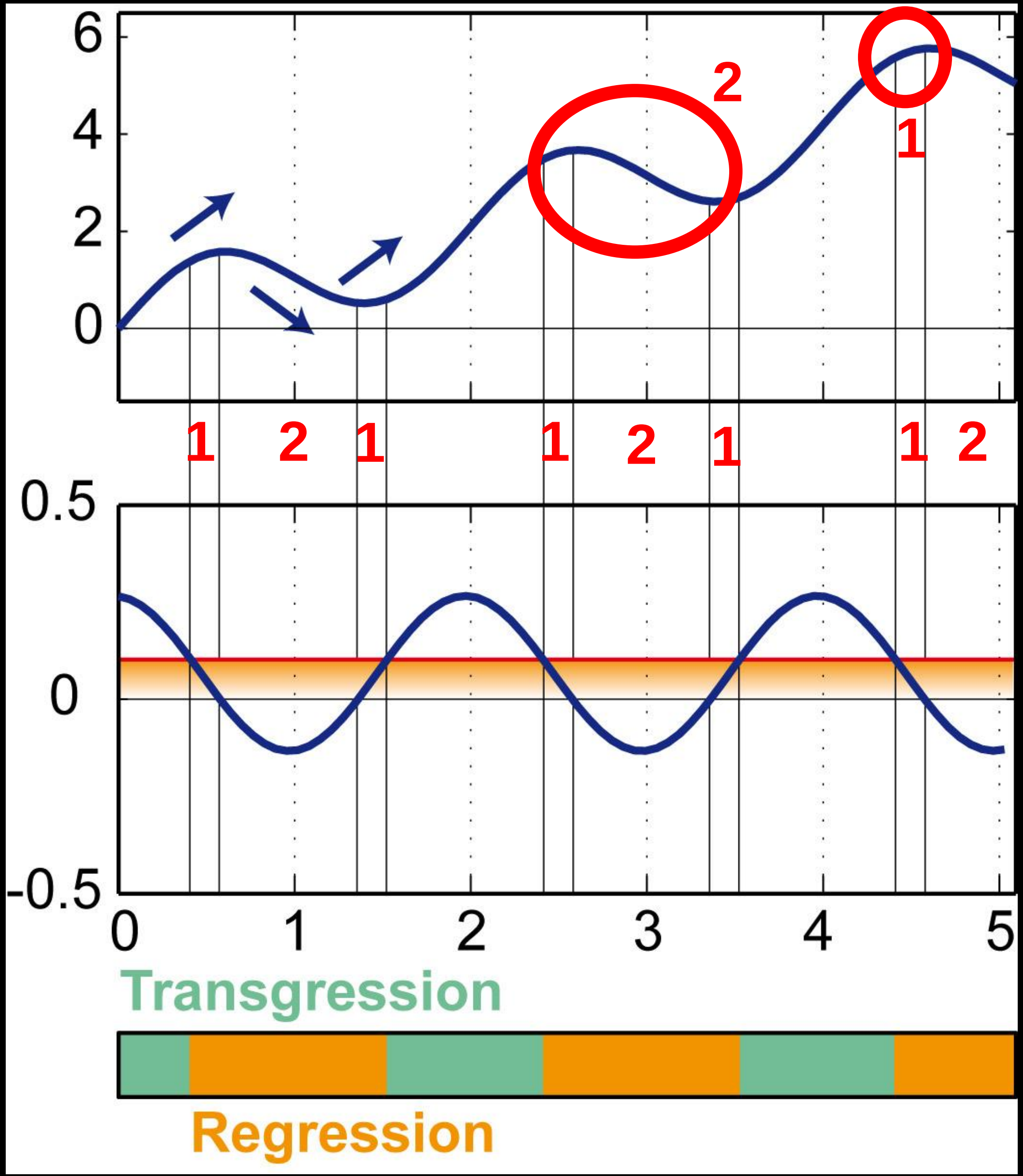


Elements of Sequence Stratigraphy

Not all regressions are the same.

We might have regression with rising (relative) sea level. This regression is due to sedimentation rate exceeding sea level rise. We call this **normal regression** (1).

We might have regression because sea level falls. It is a **forced regression** (2).



Elements of Sequence Stratigraphy

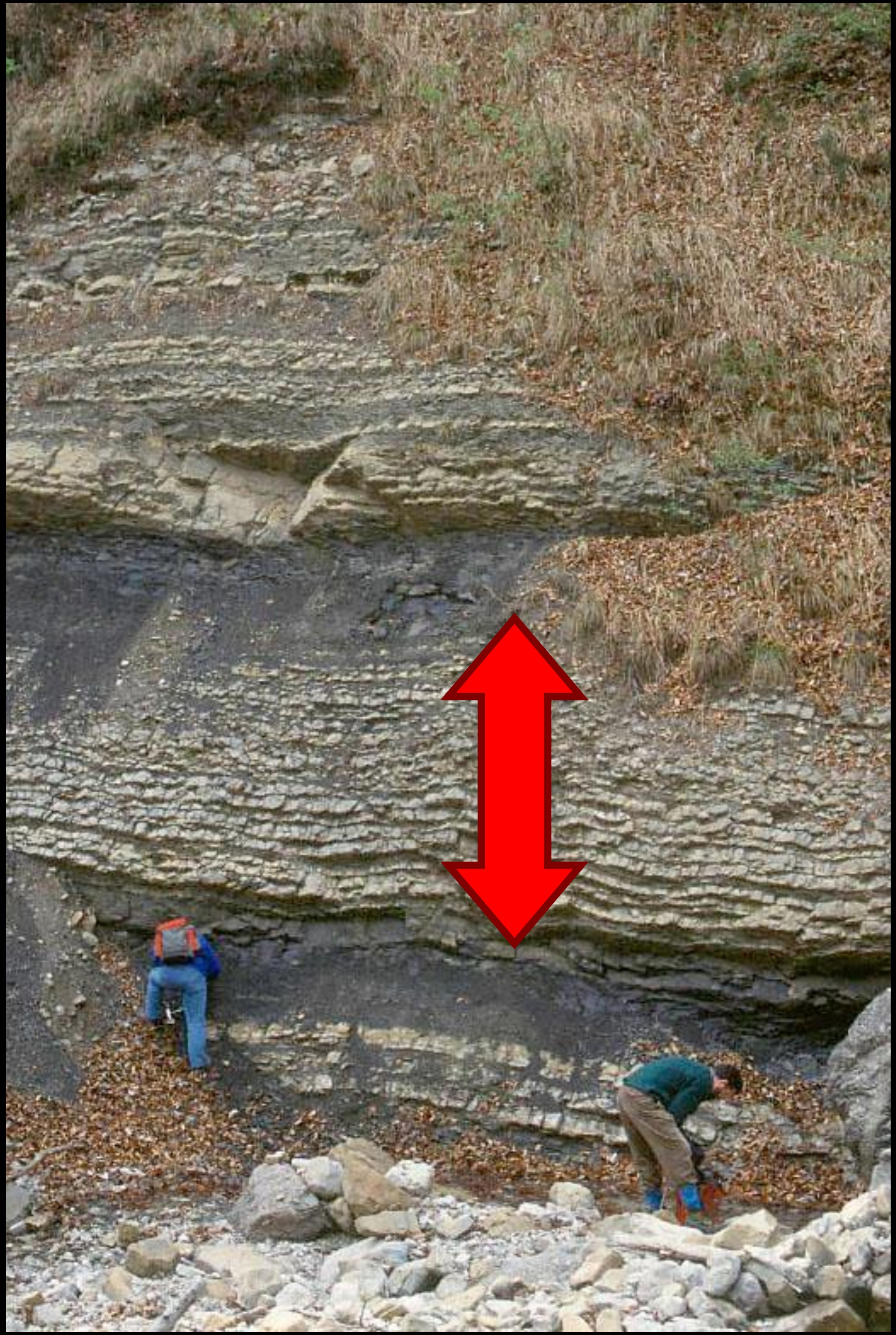
The sedimentary expression of a transgressive/regressive cycle is a **parasequence**:

a relatively conformable succession of genetically related beds or bedsets bounded by flooding surfaces (Catuneanu et al., 2009)

A **flooding surface** is defined as:

a surface across which there is an abrupt shift of facies that indicate a landward retreat of facies belts (transgression) (Catuneanu et al., 2009, modified)

NOTE: a parasequence is scale independent!

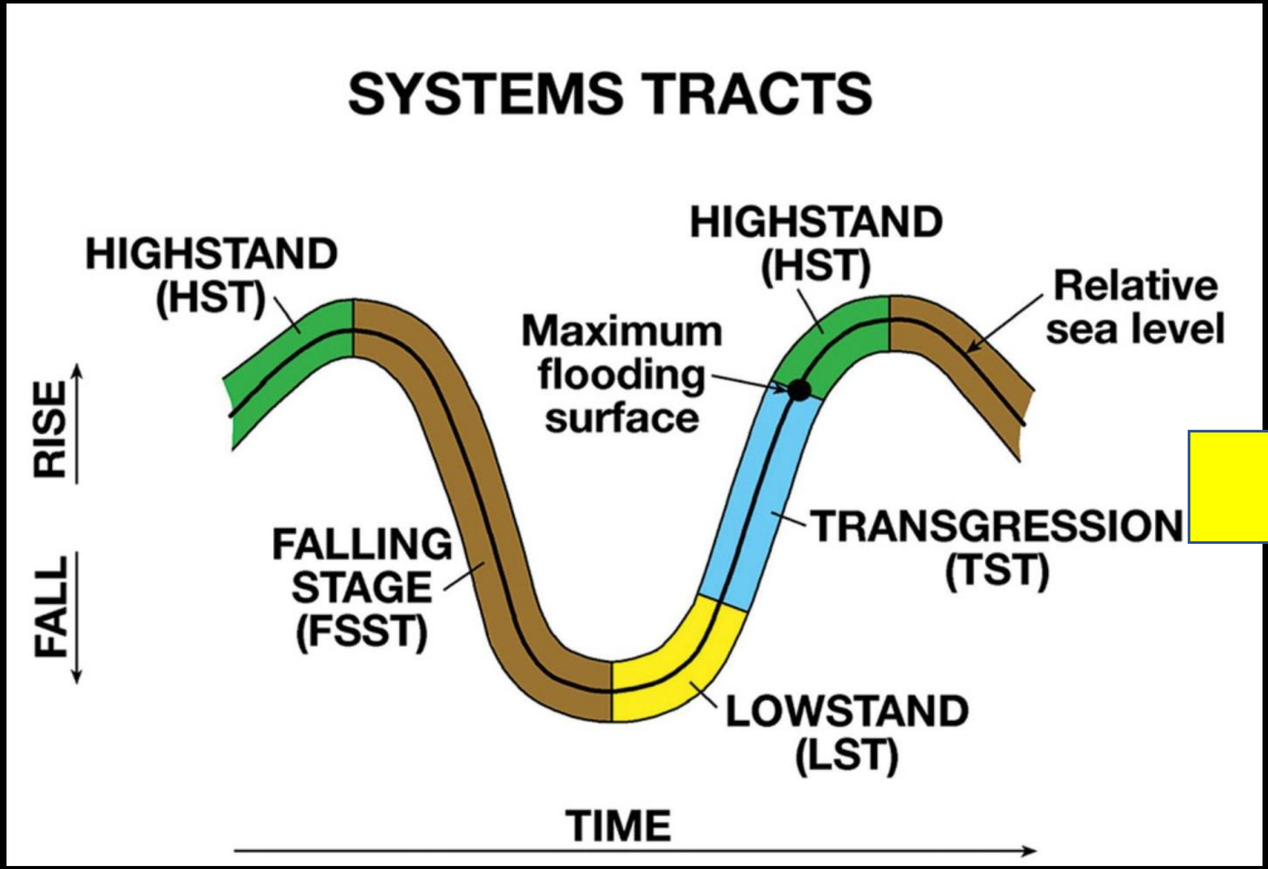


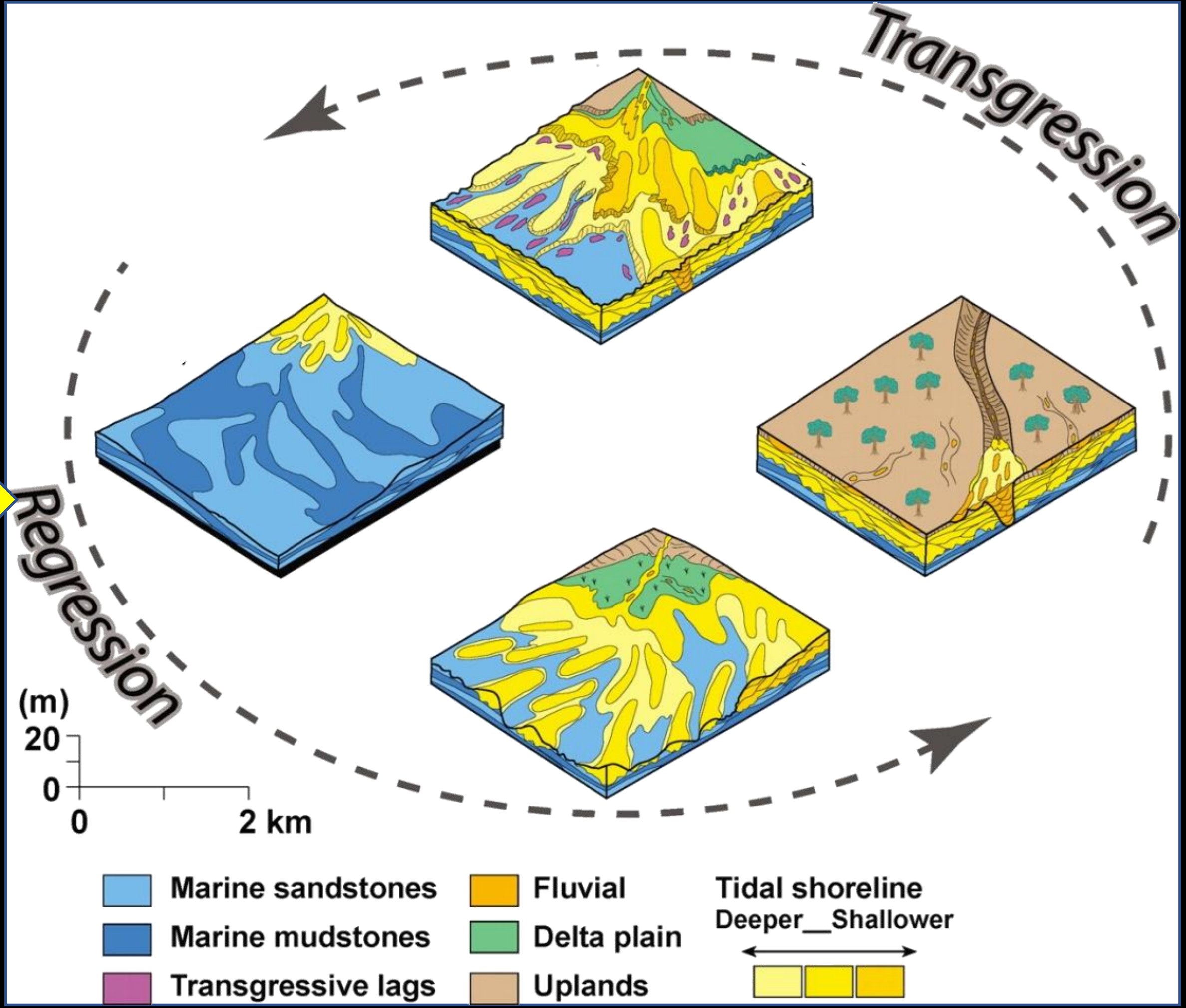
Elements of Sequence Stratigraphy

- Parasequences: the building blocks of depositional sequences
- Parasequences stack to form parasequence sets
- Progradation, aggradation, retrogradation (or backstepping)
- Normal regression and forced regression; transgression
- Stacking patterns define Systems tracts
- System tracts build Depositional sequences
- Development of a depositional sequence and sequence stratigraphic surfaces

Elements of Sequence Stratigraphy

A depositional sequence is the basic unit of sequence stratigraphy and is framed above and below by sequence boundaries.



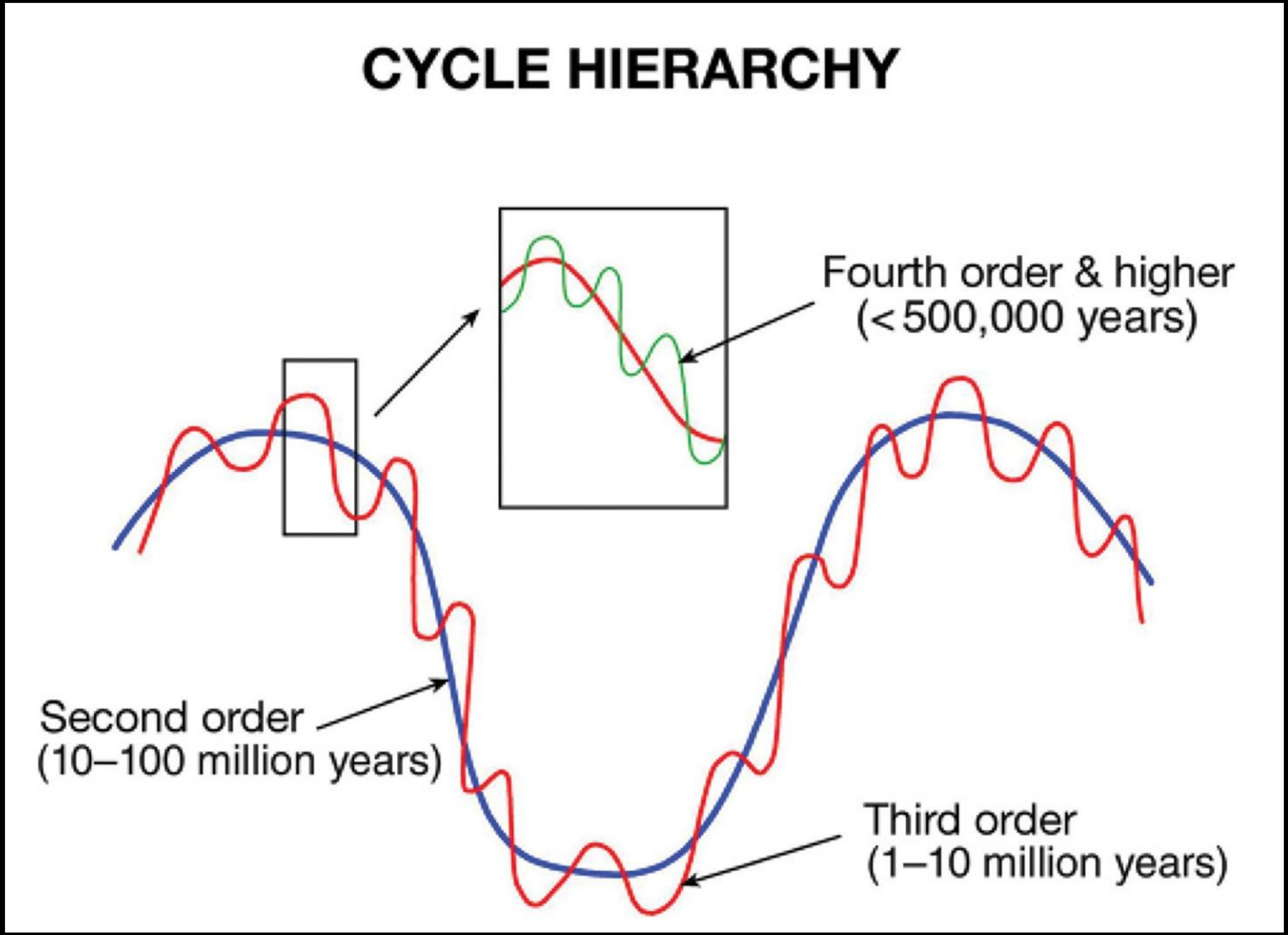


James and Jones, 2015

Elements of Sequence Stratigraphy

Depositional cycles can develop in different times. The time-scale of a depositional cycle defines its hierarchy.

2nd order: 10 – 100 Myr
3rd order: 1 – 10 Myr
4th order and higher: <500 Kyr



James and Jones, 2015

Elements of Sequence Stratigraphy

Parasequences are more commonly **asymmetrical** and **regressive**.

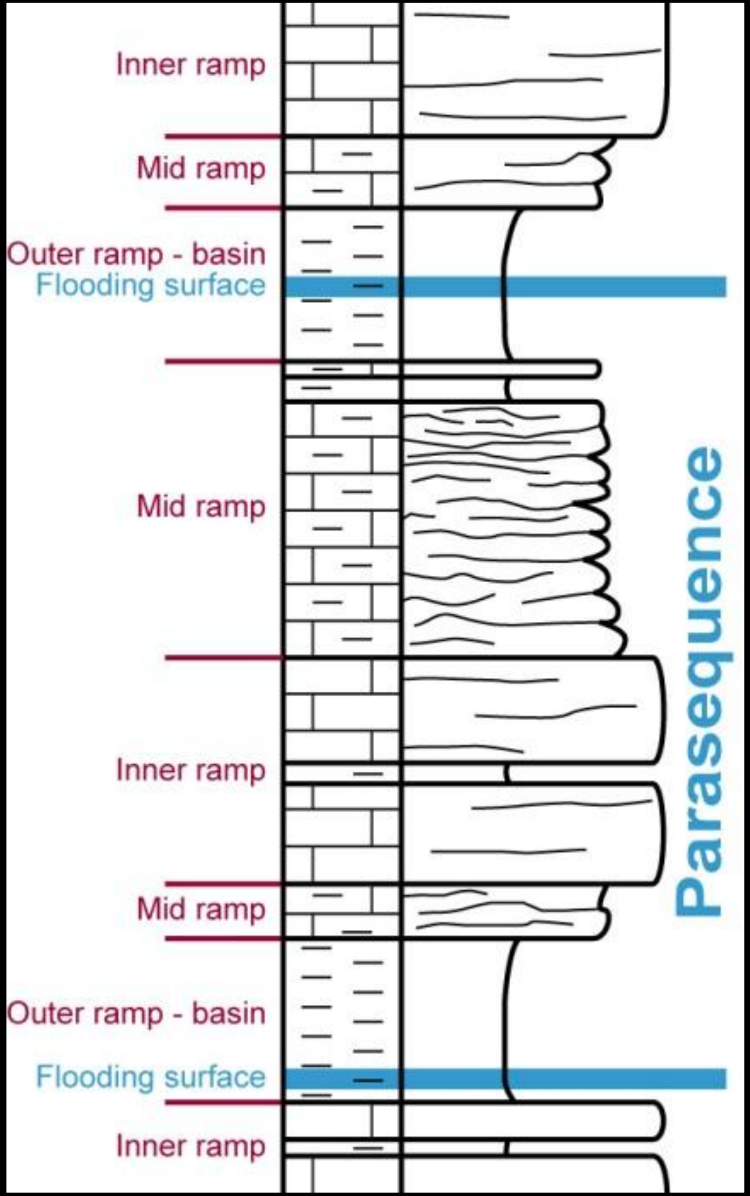
Asymmetrical regressive parasequence:

Elements of Sequence Stratigraphy

However, symmetrical parasequences do exist.

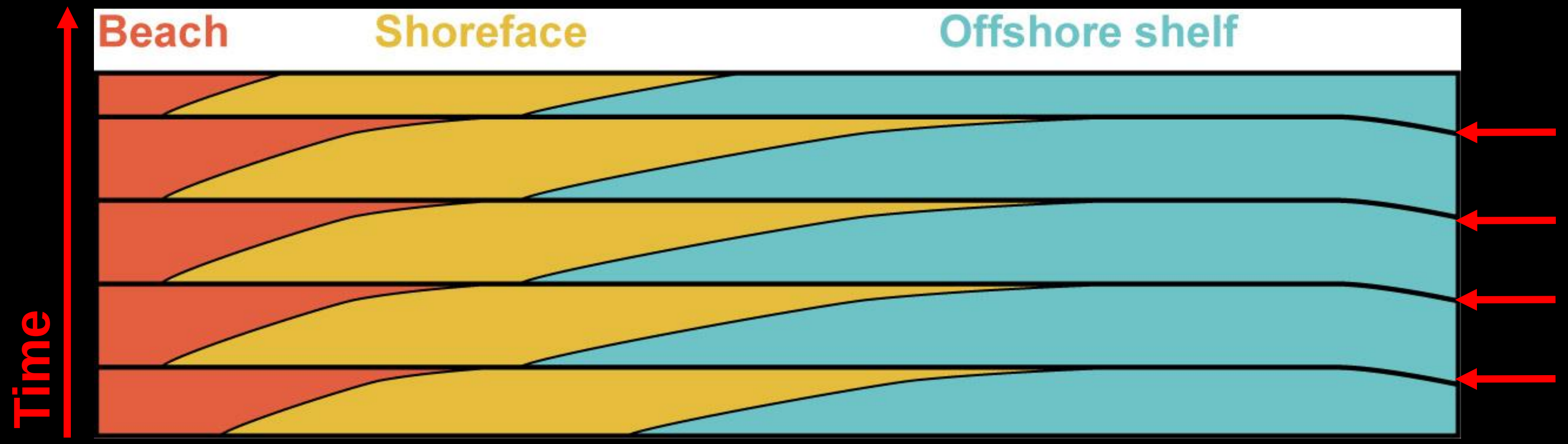
On the right we see an unusual symmetrical parasequence having a regressive-transgressive pattern.

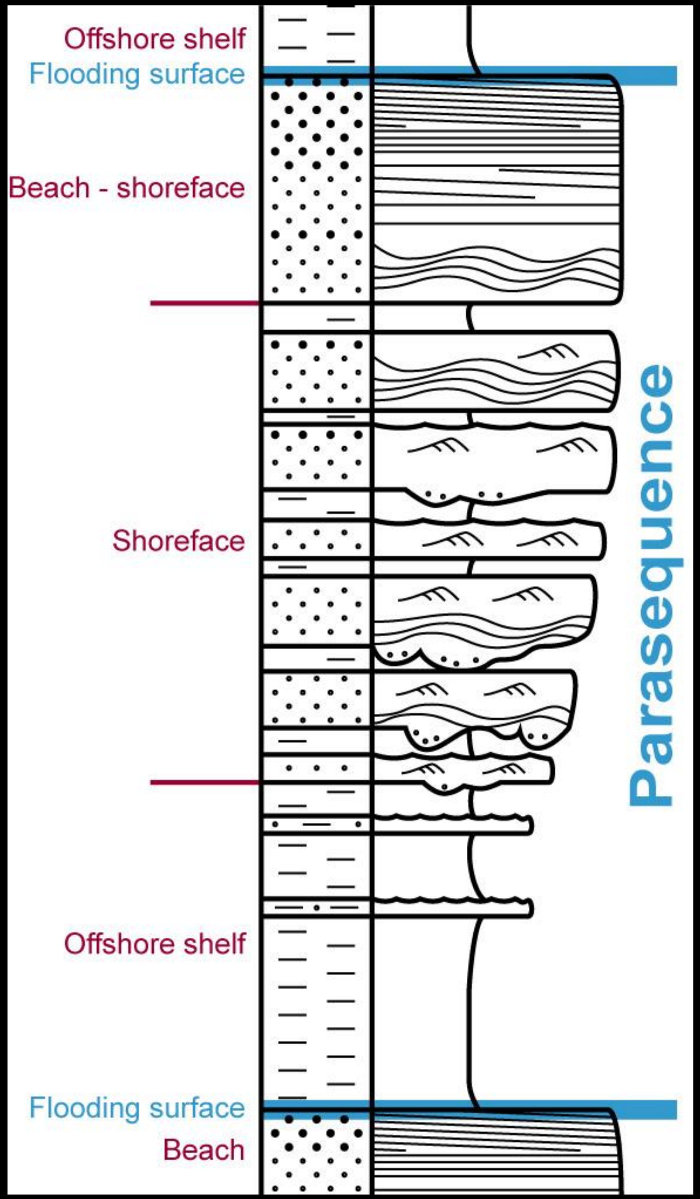
Symmetrical parasequence:



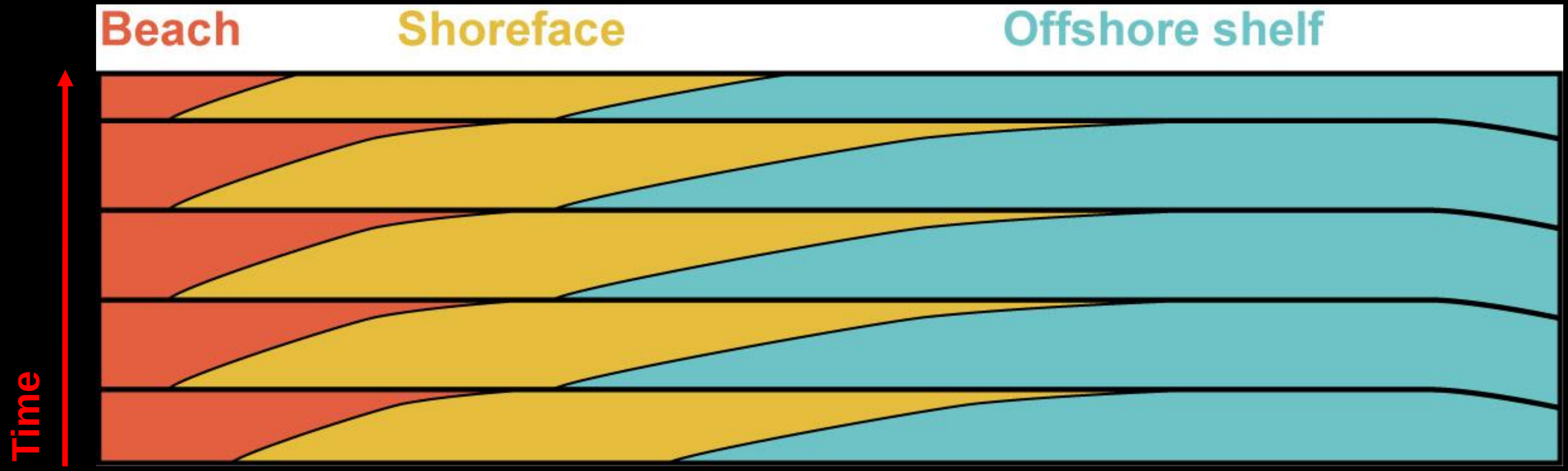
Elements of Sequence Stratigraphy

As parasequences are mostly asymmetrical and regressive, they are represented in idealized schemes with their facies belts (sedimentary environments) that migrate seawards.
We will also follow this standard.





The superposition of parasequences constitutes a parasequence set.
Parasequence sets can show characteristic trends that must be recognized...



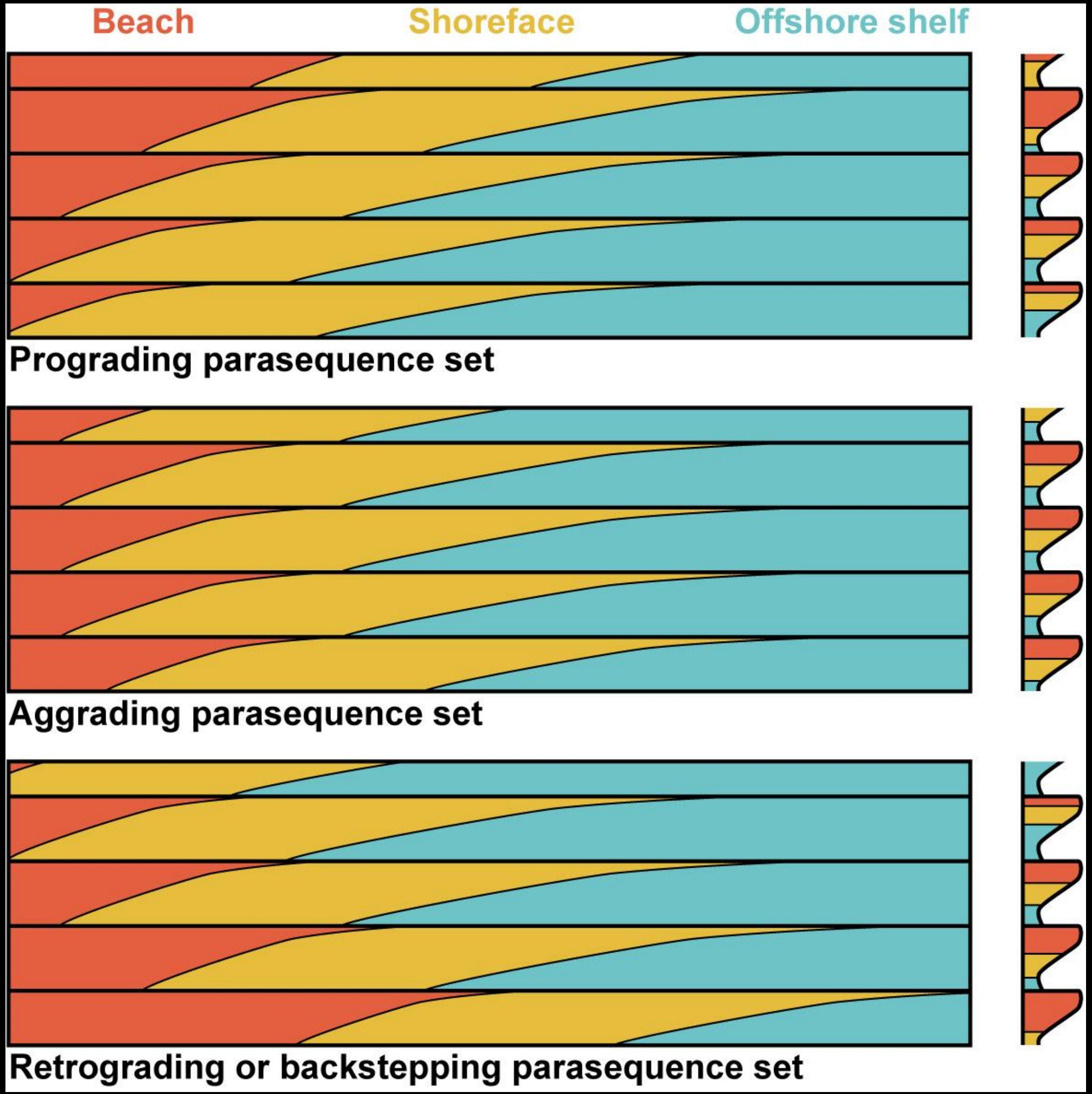
Elements of Sequence Stratigraphy

Intreplay of accommodation and sedimentation generates different stacking patterns of parasequences.

Parasequence sets are prograding when sediment supply exceeds accommodation;

are aggrading when sediment supply balances accommodation;

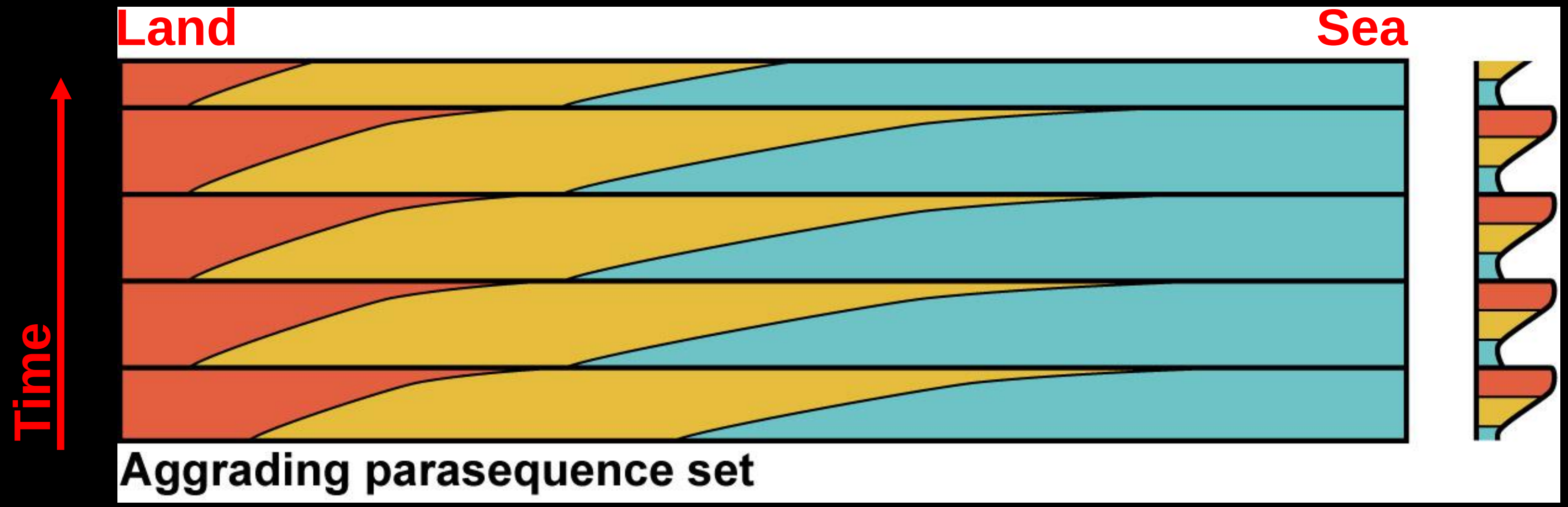
are retrograding, or backstepping, when sediment supply is not sufficient to fill accommodation.



Elements of Sequence Stratigraphy

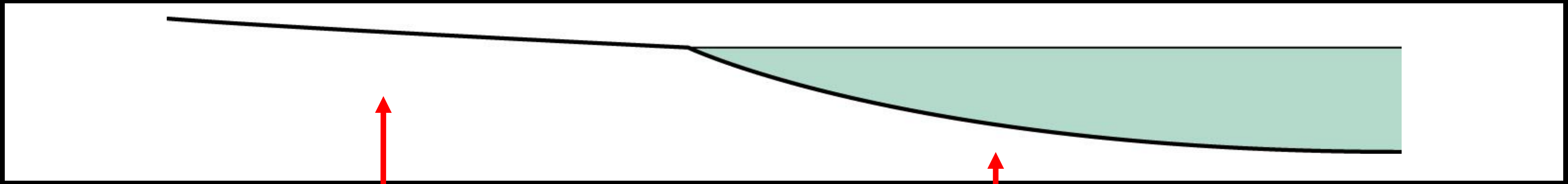
Thus far we have looked at chronostratigraphic schemes, i.e., schemes that have time (and not space, or stratigraphic thickness) on the Y axis.

In order to move to lithostratigraphic schemes, and thus to the geometry of sedimentary bodies, we need to better formalize a few concepts related to the geometry of sedimentation surfaces and their evolution.



Elements of Sequence Stratigraphy

Idealized equilibrium profile of a coast:



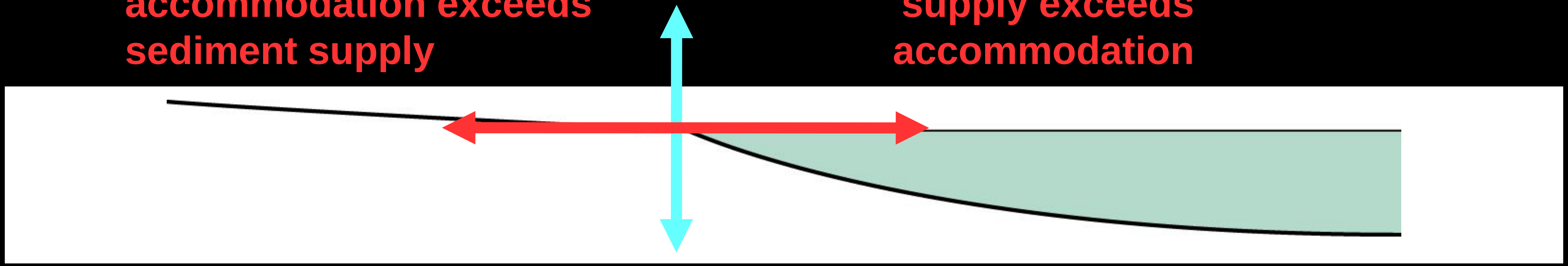
Lowermost part of river's equilibrium profile (almost flat)

A ca. exponential profile determined by wave energy waning seaward

Shoreline trajectory through time: controlling factors

Shoreline moves backward (transgression) if accommodation exceeds sediment supply

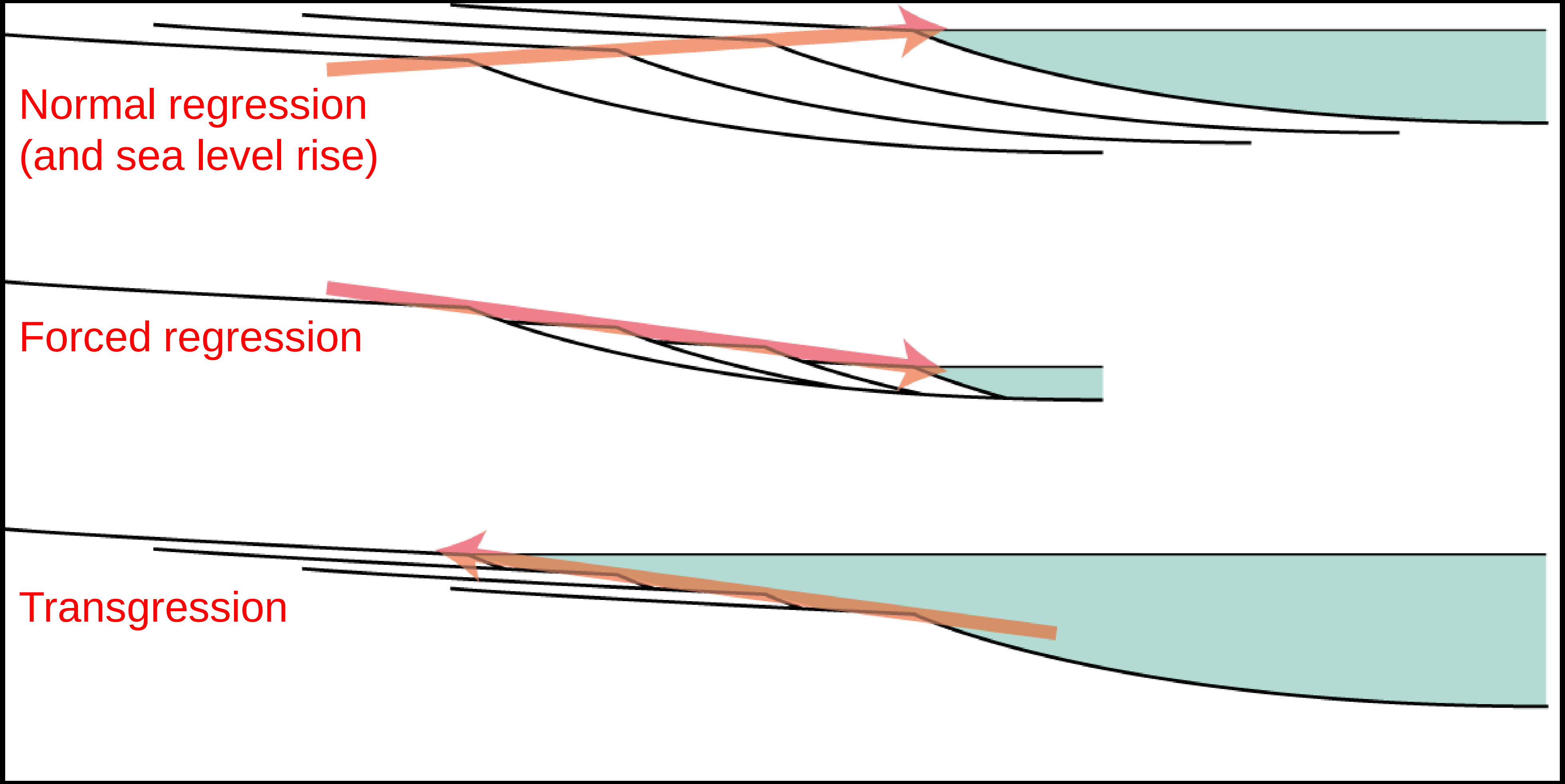
Shoreline moves forward (regression) if sediment supply exceeds accommodation



Shoreline moves up and down following relative sea level changes

Elements of Sequence Stratigraphy

Interplay with sedimentation and accommodation leatds to typical shoreline trajectories:

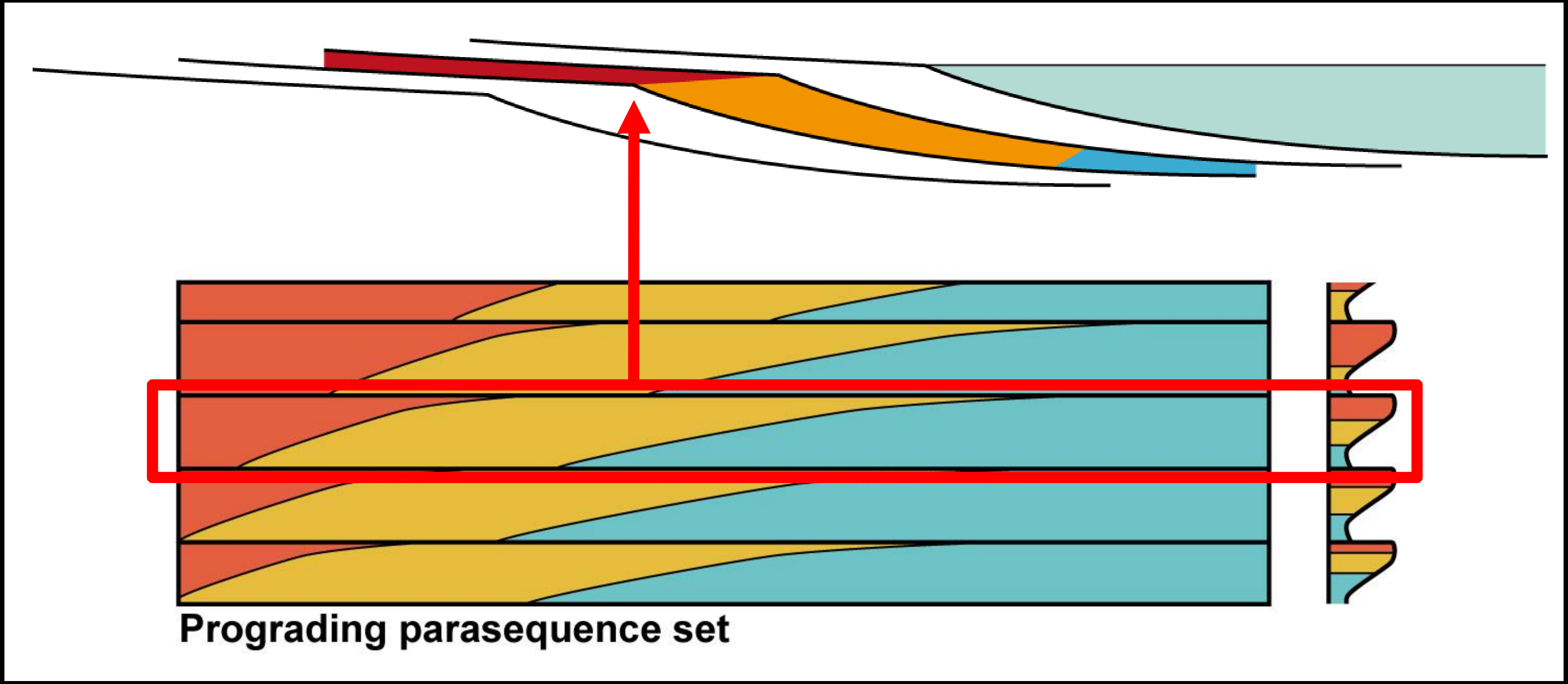


Elements of Sequence Stratigraphy

Note that in these lithostratigraphic schemes a parasequence is represented with its depositional geometries: in space instead of time.

space

time



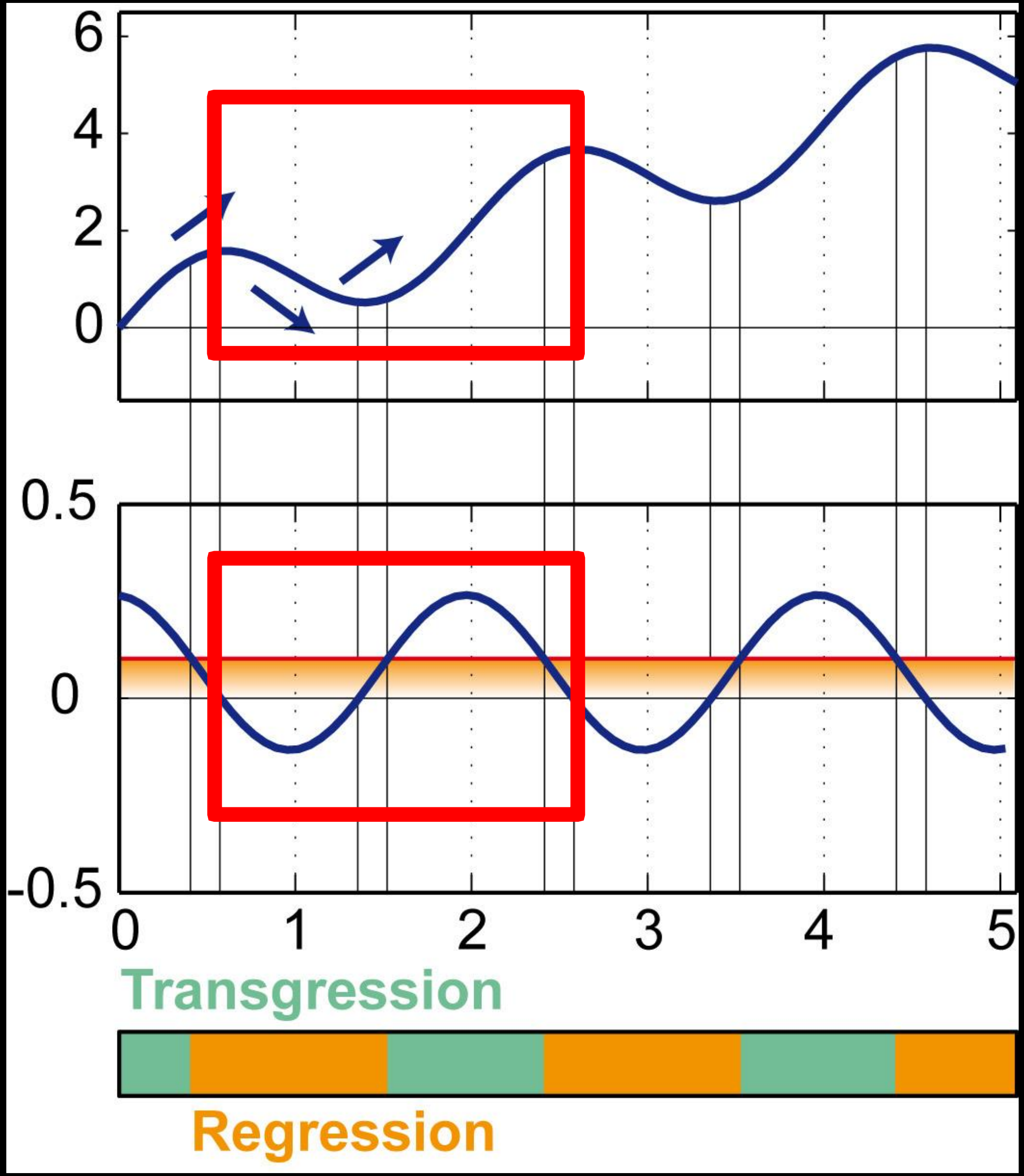
Elements of Sequence Stratigraphy

We will now analyze the response of a marginal sedimentary system to a full oscillation of relative sea level.

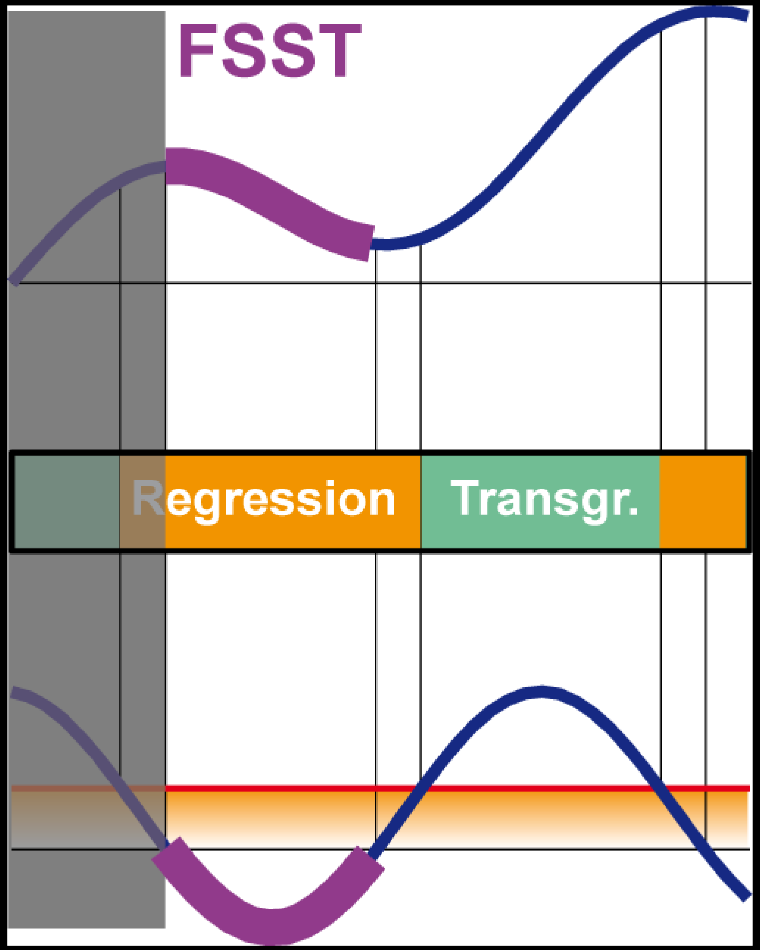
We will thus follow the **development of a depositional sequence**.

A **depositional sequence** is:

a relatively conformable succession of genetically related strata bounded by unconformities or their correlative conformities (Mitchum, 1977)



Elements of Sequence Stratigraphy

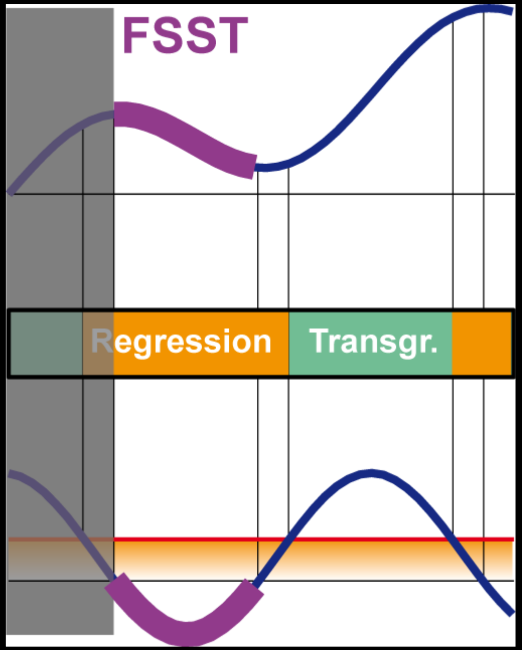


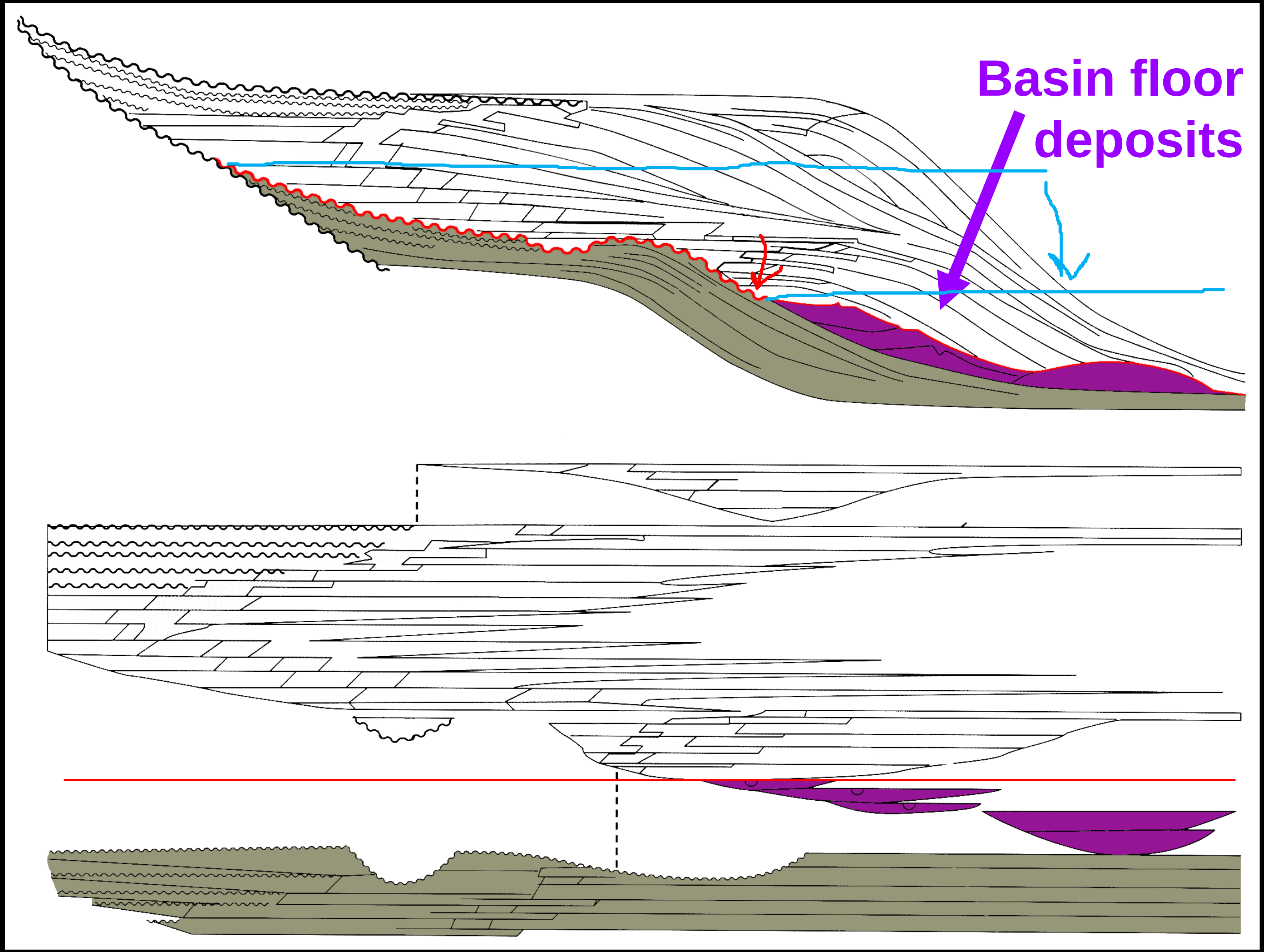
As the relative sea level starts to fall, the highest parts in a depositional profile undergo subaerial exposure, and the products of erosion are deposited on the basin floor.

A forced regression parasequence set may form which has low preservation potential.

These sedimentary bodies (basin floor deposits and forced regression parasequence set, if present) are the
Falling Stage Systems Tract (FSST)

Elements of Sequence Stratigraphy

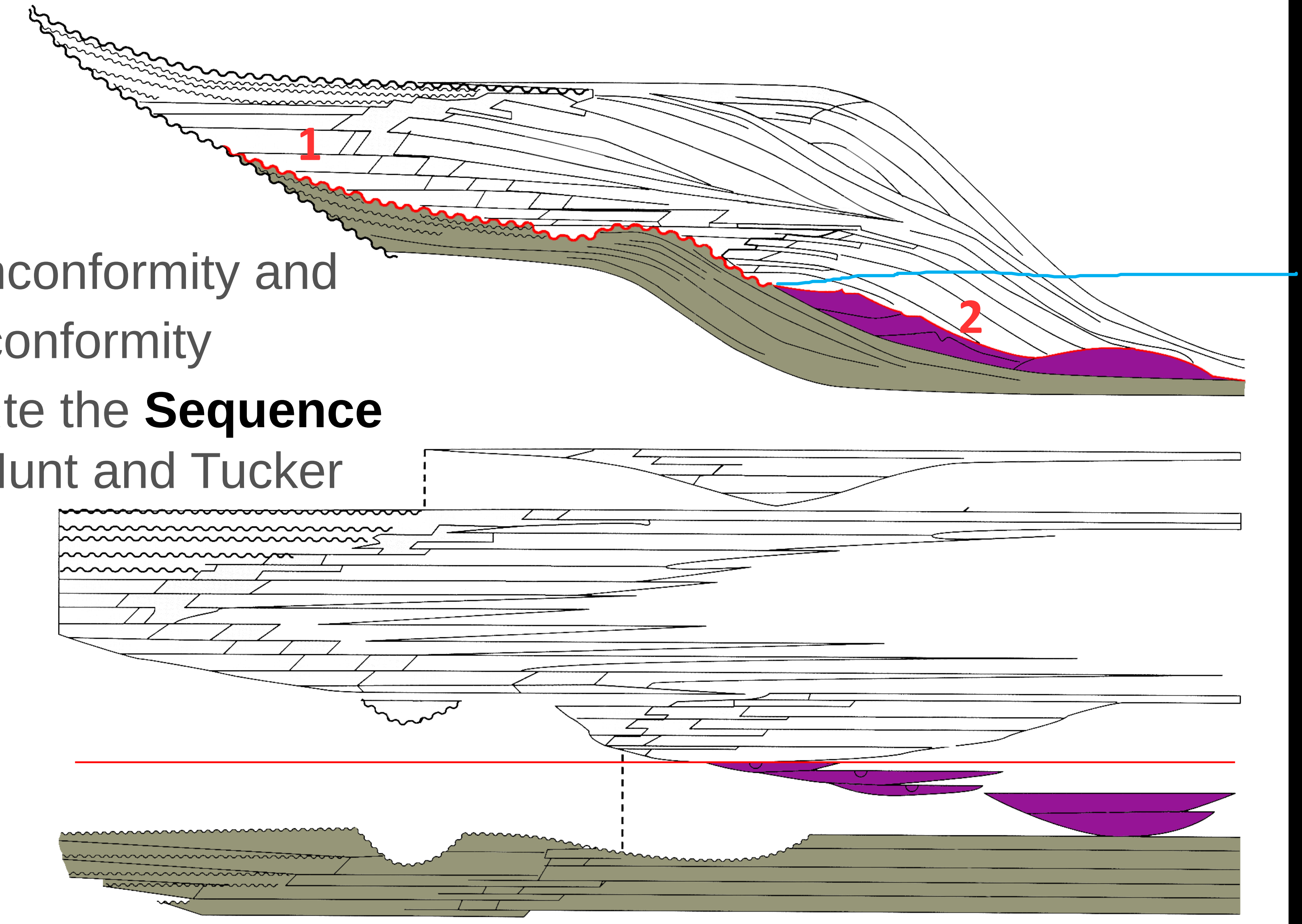




Falling Stage Systems Tract
(FSST)

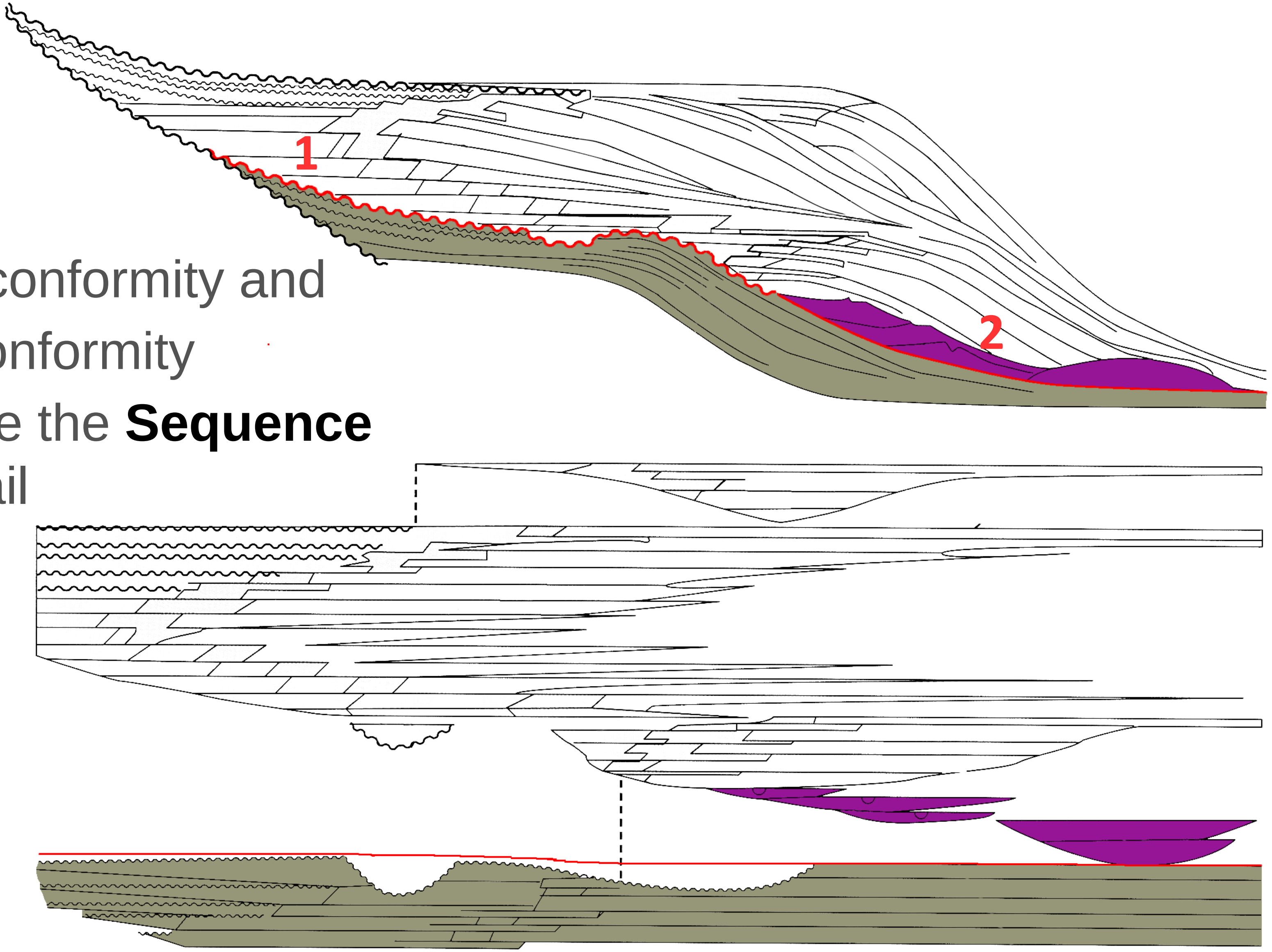
Modified from Vail et al., 1991; Schlager, 2005

Elements of Sequence Stratigraphy



1) a subaerial unconformity and
2) a correlative conformity
together constitute the **Sequence Boundary** of Hunt and Tucker (1992)

Elements of Sequence Stratigraphy

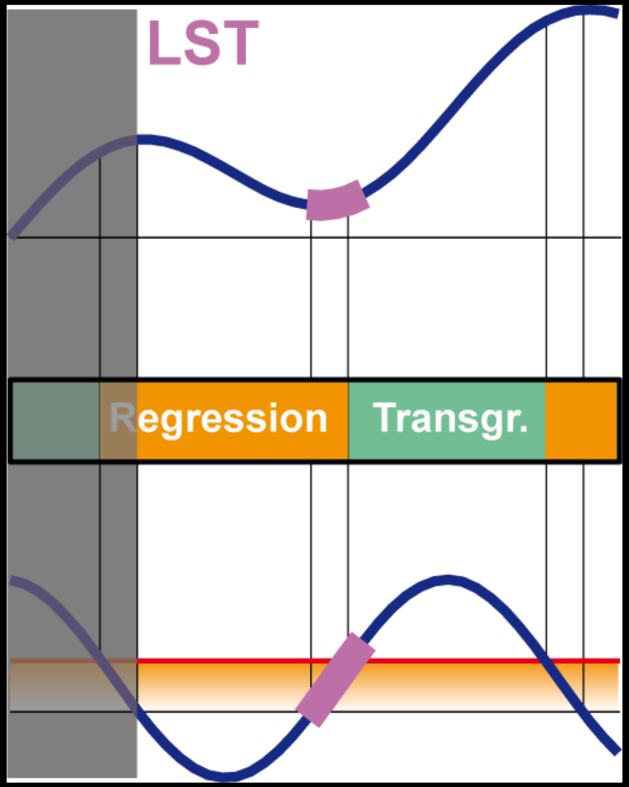


1) a subaerial unconformity and

2) a correlative conformity

together constitute the **Sequence Boundary** of Vail

Elements of Sequence Stratigraphy

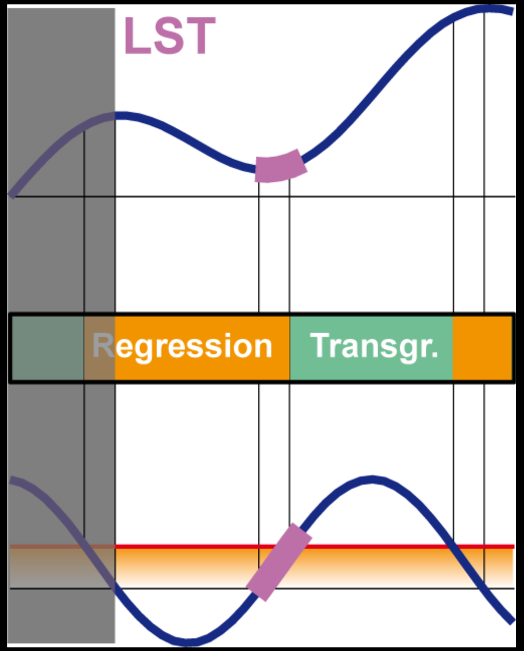


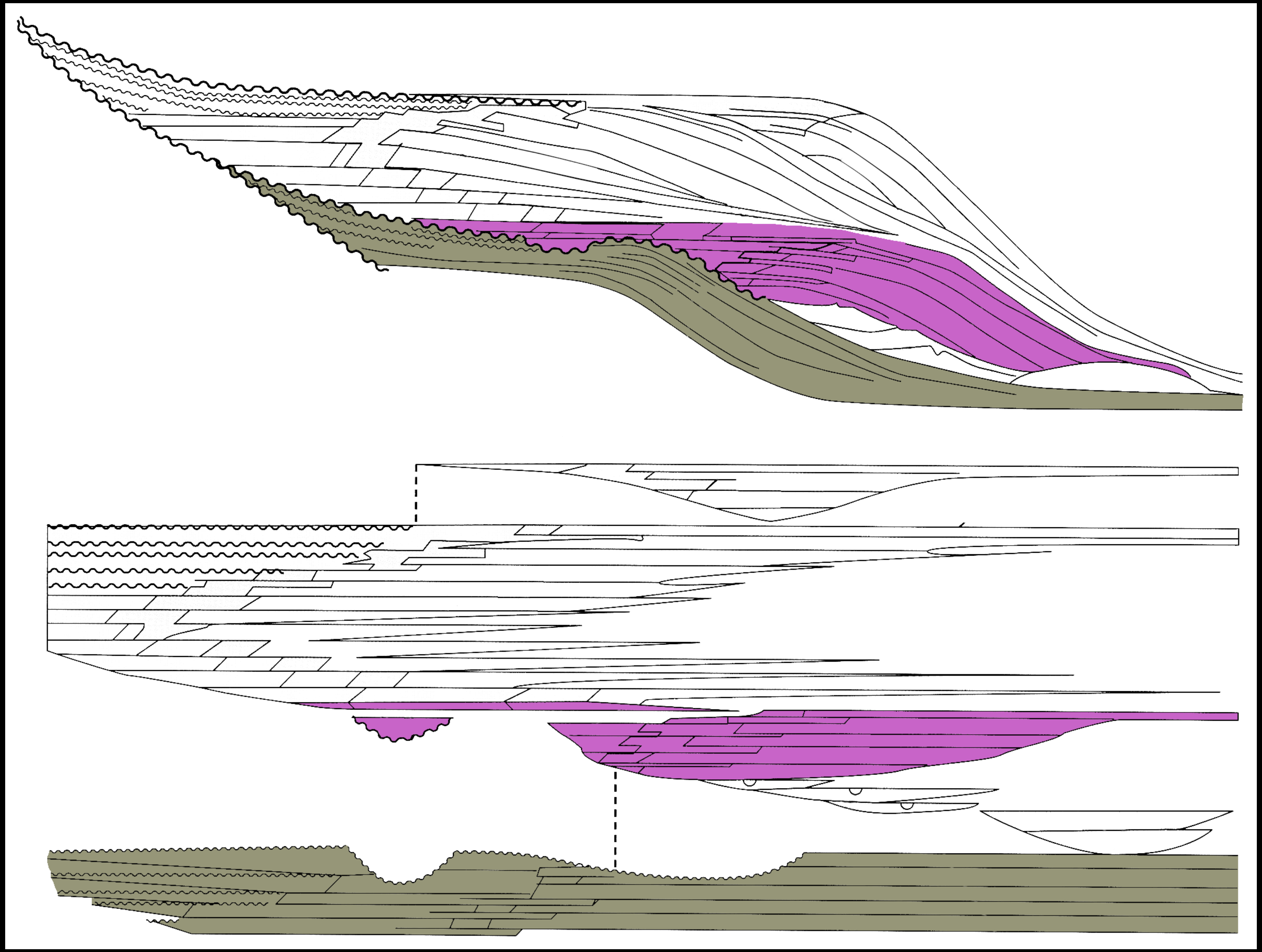
With relative sea level reaching a low and starting to rise again, a normal regression sedimentary body forms that onlaps the subaerially exposed slope. This constitutes the

Lowstand Systems Tract (LST)

The LST is bounded upward by the **maximum regressive surface**, representing the ideal surface at which regression switches to transgression. This surface is difficult to track in seismic lines and to pin down in stratigraphic successions, thus, we won't discuss it here.

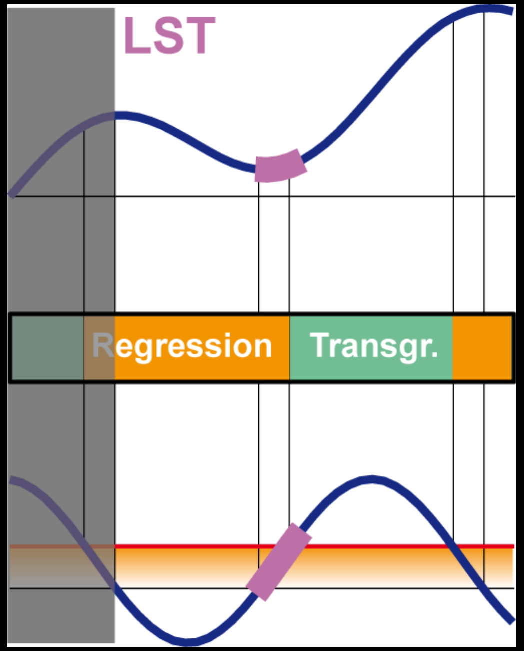
Elements of Sequence Stratigraphy

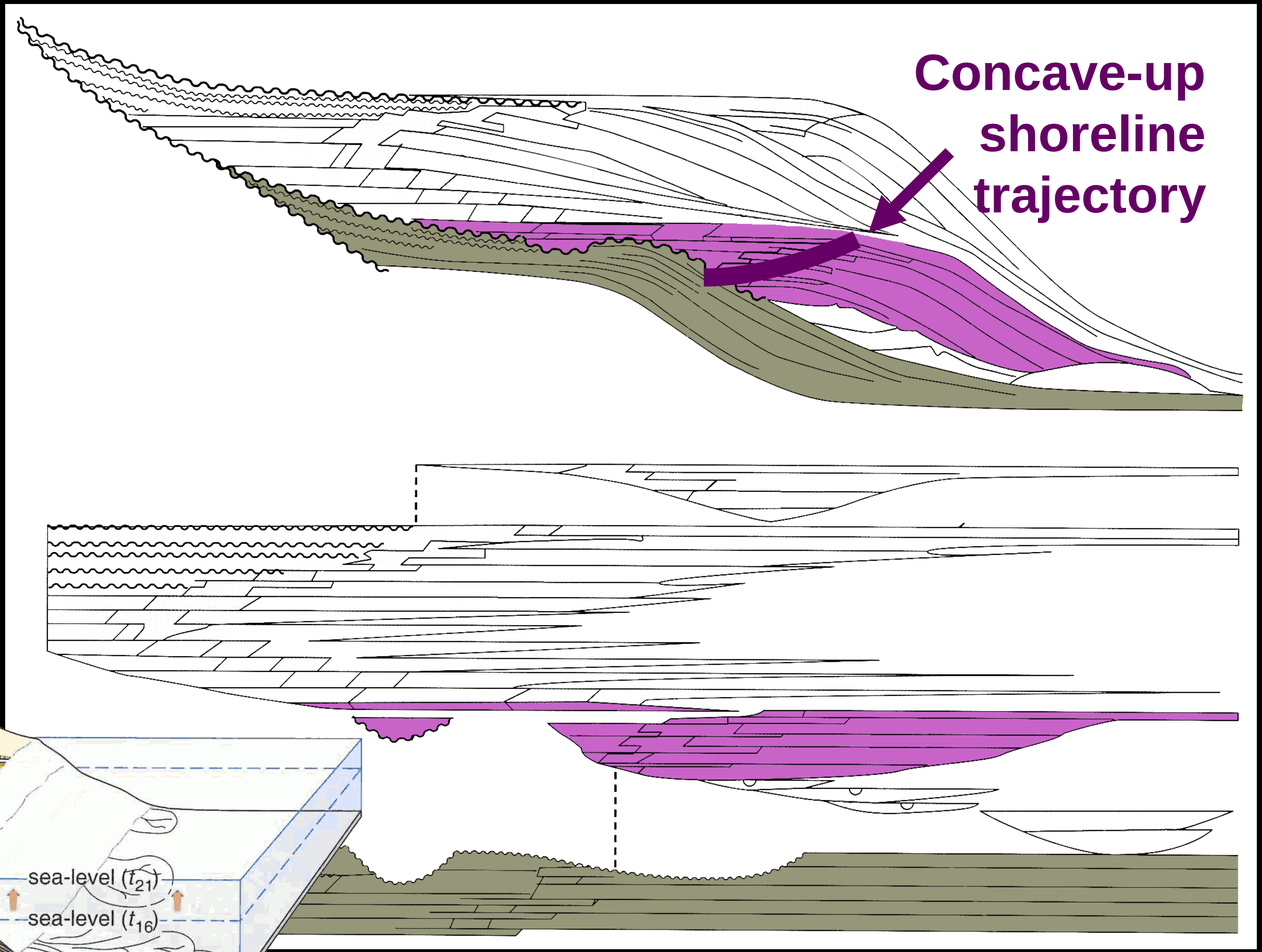


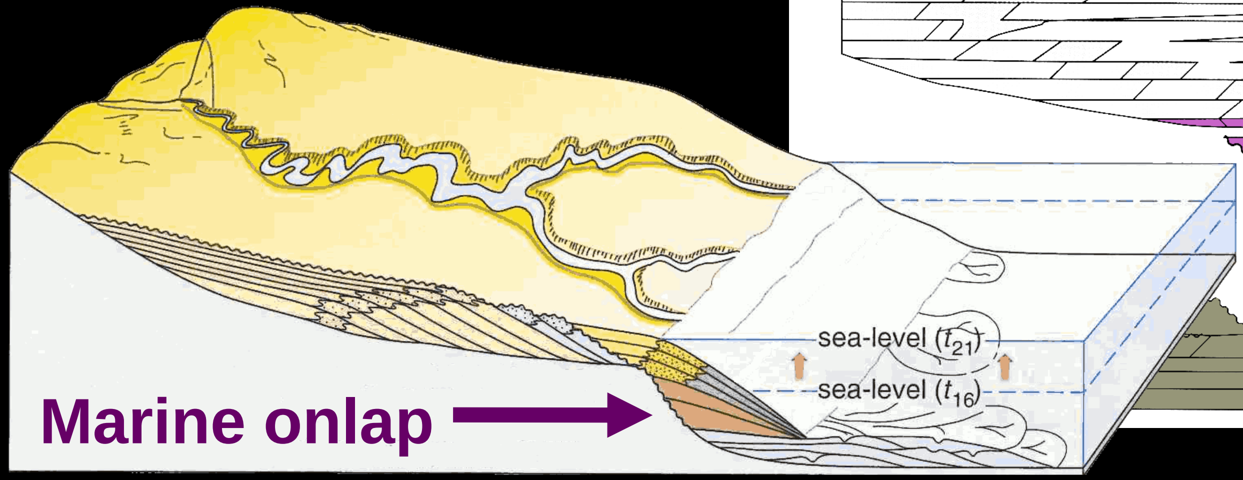


Low Stand Systems Tract
(FSST)

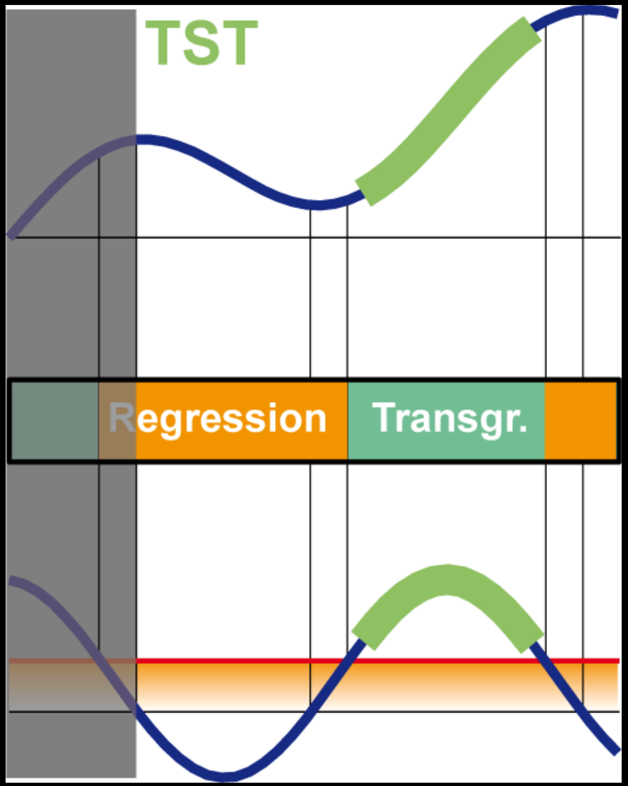
Elements of Sequence Stratigraphy







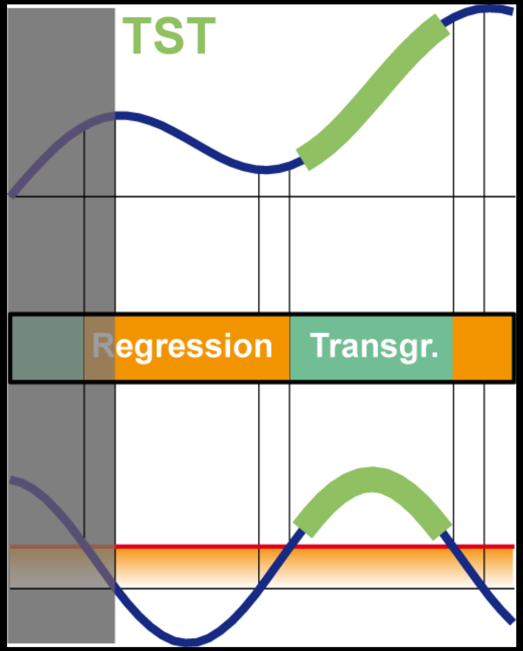
Elements of Sequence Stratigraphy

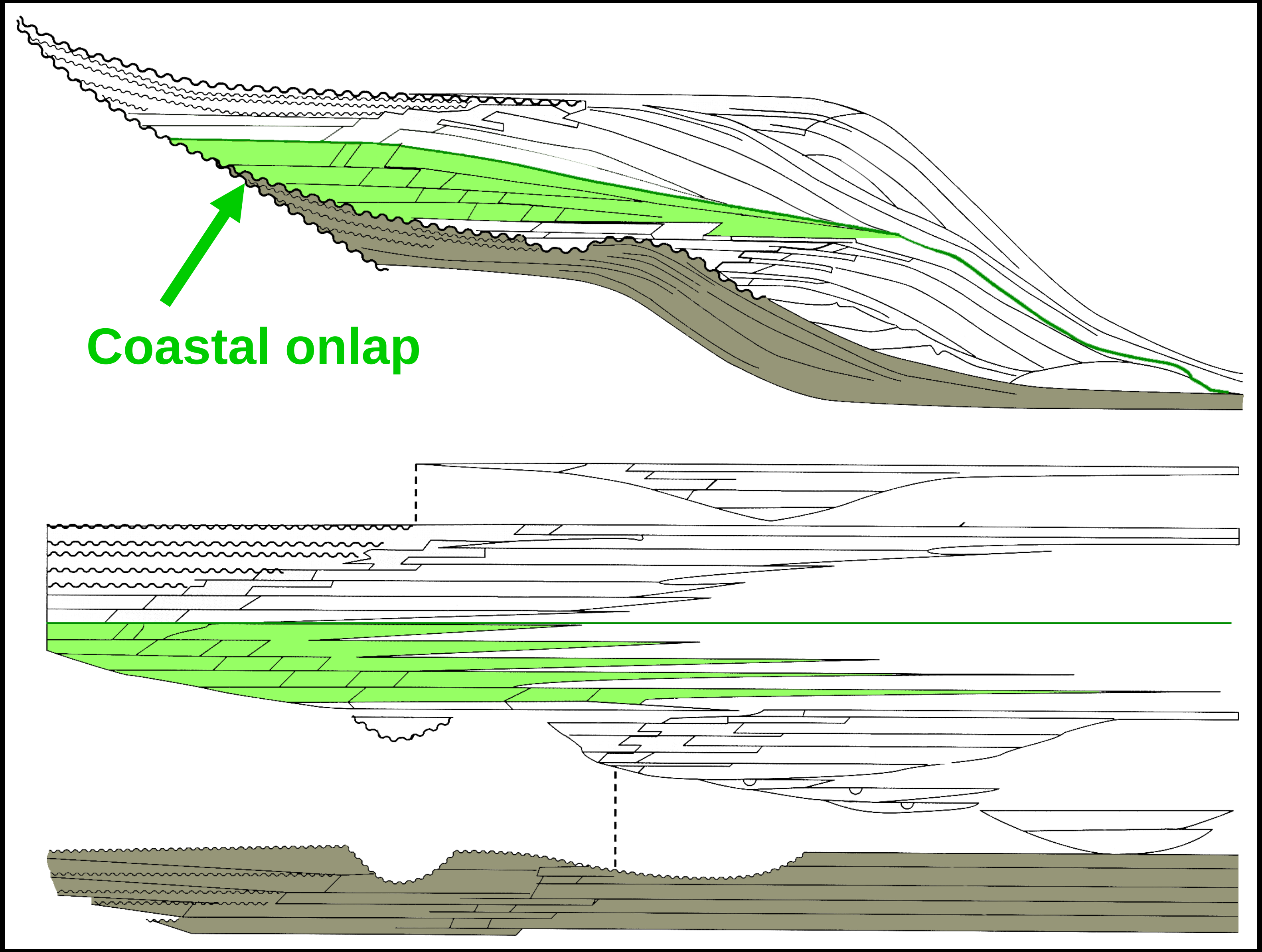


As soon as the rate of sea level rise outpaces sedimentation rate, parasequence sets switch from prograding to backstepping, and the shoreline trajectory becomes transgressive.

Backstepping parasequence sets constitute the **Transgressive Systems Tract** (TST)

Elements of Sequence Stratigraphy

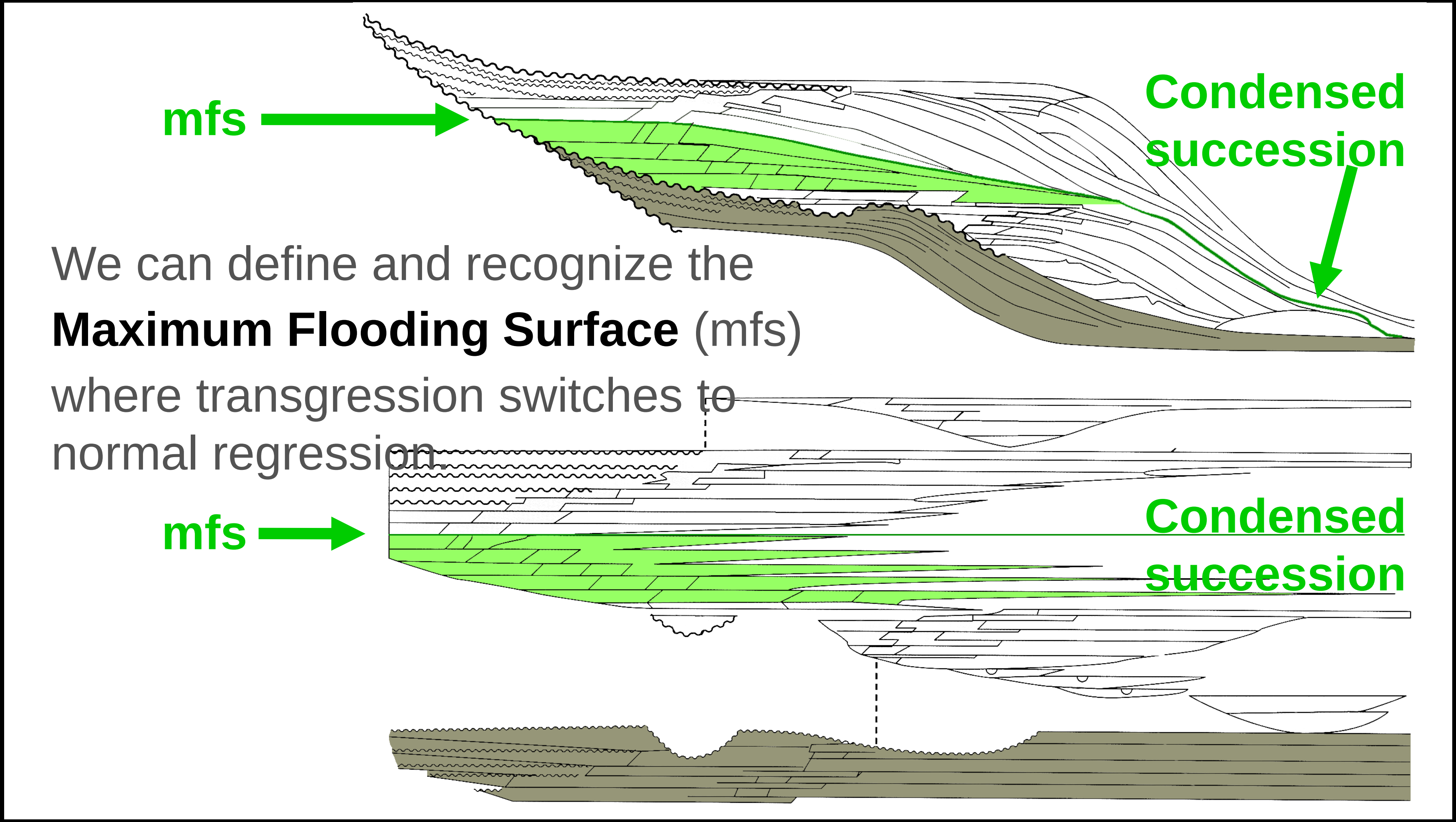




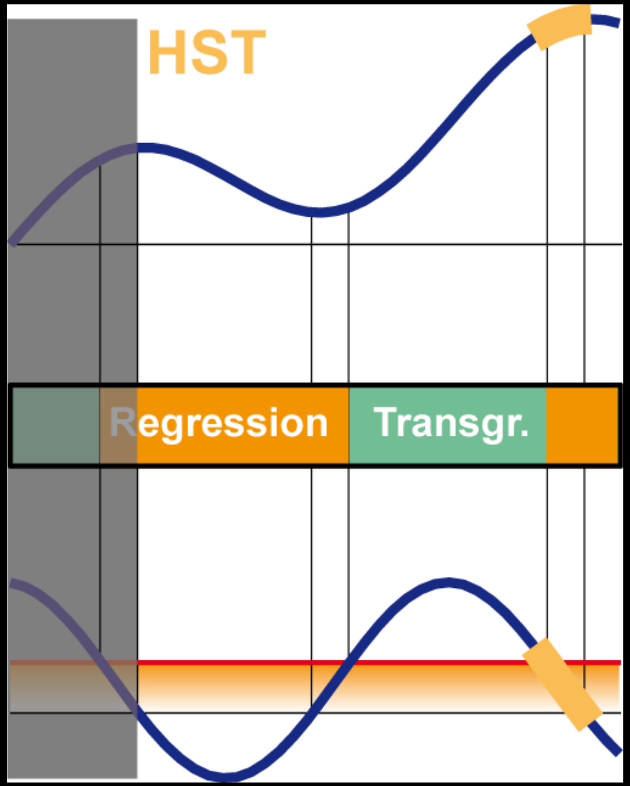
TransgressiveSystems Tract
(FSST)

Elements of Sequence Stratigraphy

The mfs is a substantially sinchronous surface and might correspond to **condensed successions** offshore. These successions exist in outcrop but not in seismic lines.



Elements of Sequence Stratigraphy

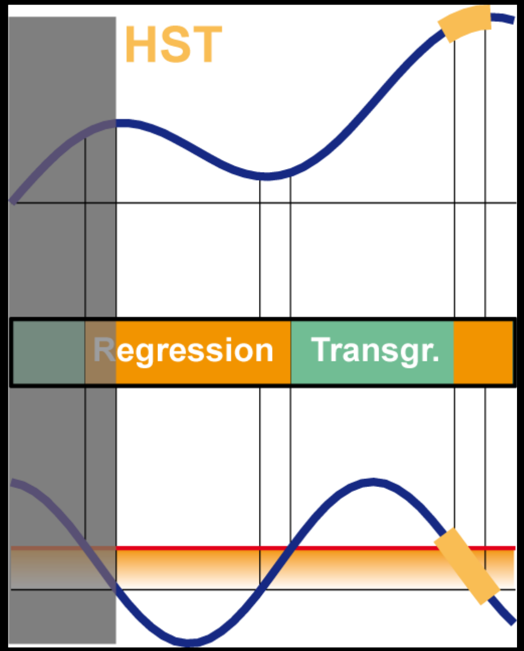


In the last stages of sea level rise, sedimentation rate outpaces the rate of accommodation creation, and thus we have a second interval of normal regression, the:

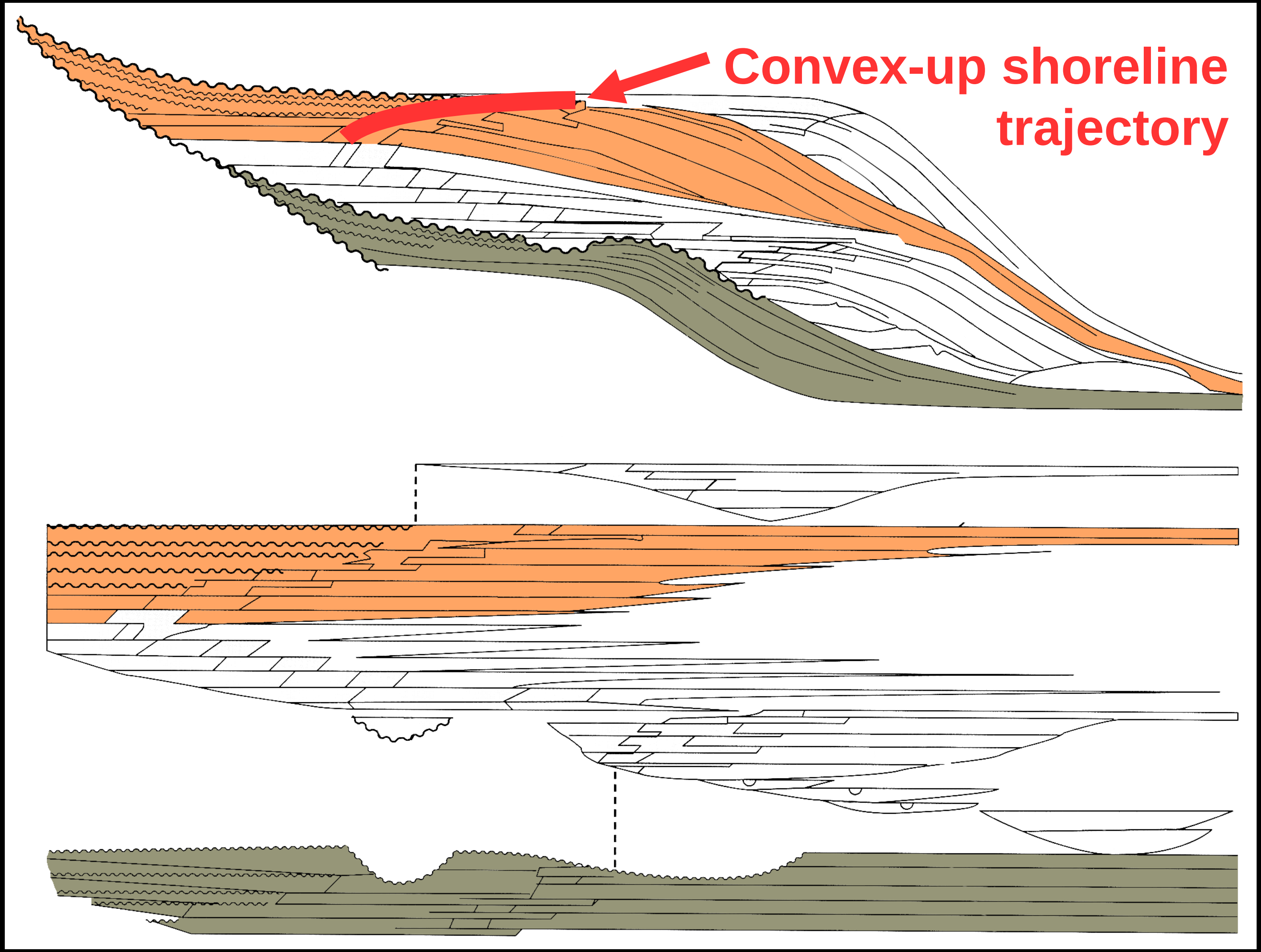
Highstand Systems Tract (HST)

In the old schemes (Mitchum 1977, Vail et al., 1991...) the HST is followed by the Sequence Boundary. After the recognition of the existence of the FSST, the sequence boundary is not anymore univocally positioned.

Elements of Sequence Stratigraphy



High Stand Systems Tract
(HSST)

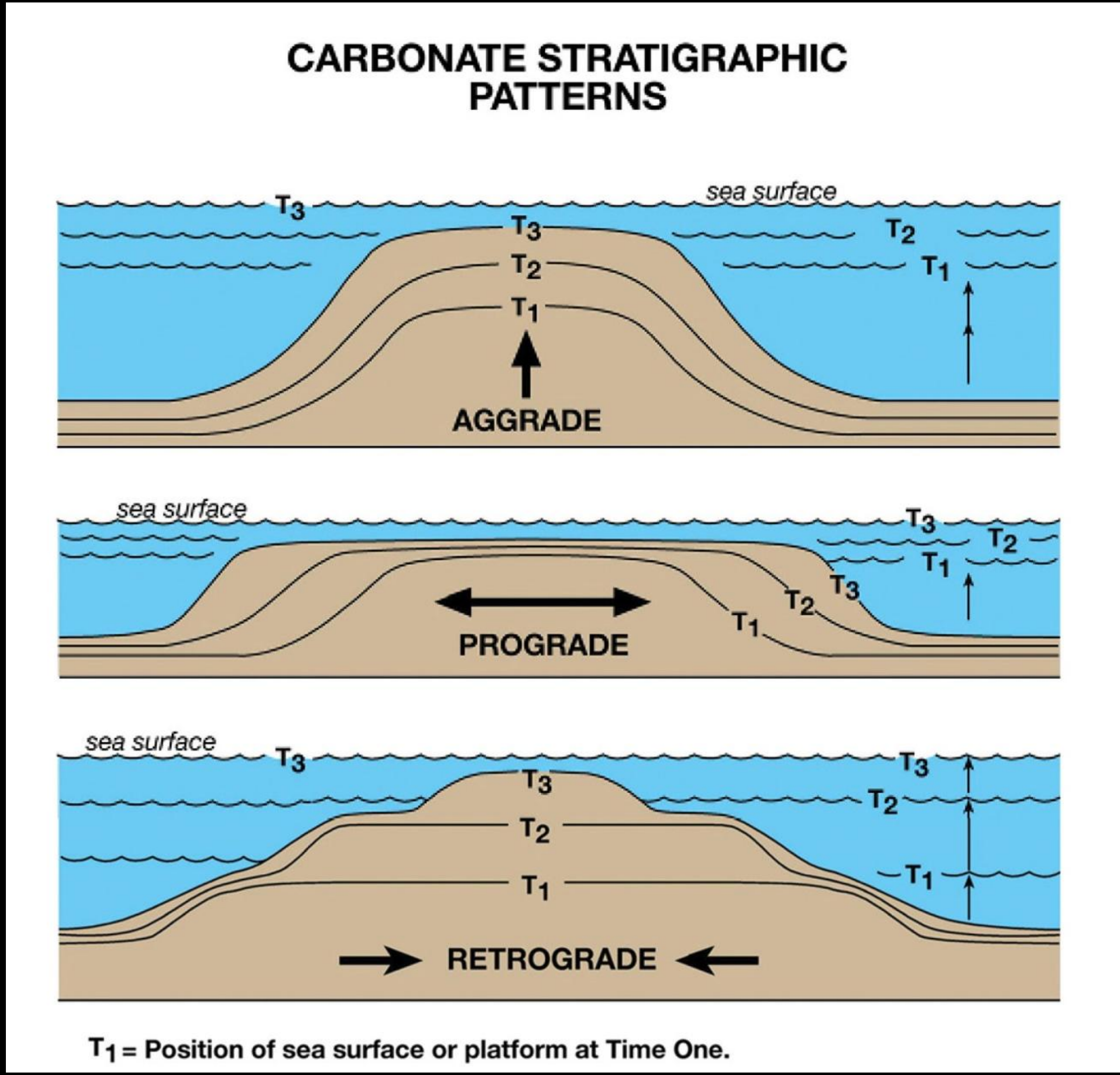


Sequence Stratigraphy of carbonate systems

What we have seen works in general both for siliciclastic and carbonate systems, however, sequence stratigraphy in carbonates does have some peculiarities

- Different response to variations in base level
- Sediment produced *in situ*
- Carbonates undergo diagenesis

This may bring to a different architecture of system tracts

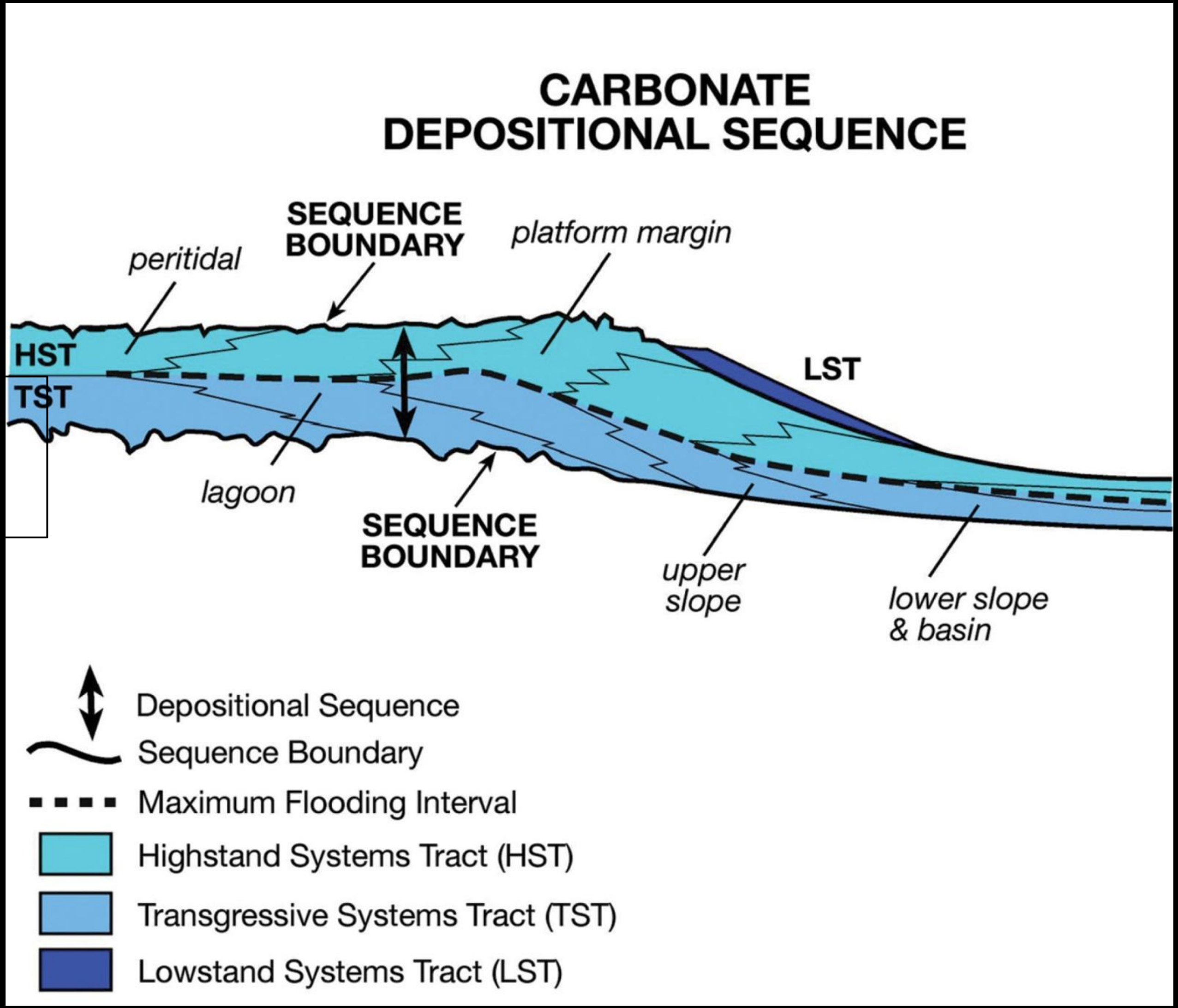


Sequence Stratigraphy of carbonate systems

Sequence boundaries in carbonate systems are mainly of two types

- Subaerial exposure unconformities
- Drowning unconformities

The carbonate depositional unit is bounded by unconformities



Sequence Stratigraphy of carbonate systems

Factors that are especially important for the development of carbonate systems are climate, in situ carbonate production, presence/absence of a reef and shelf margin cementation.

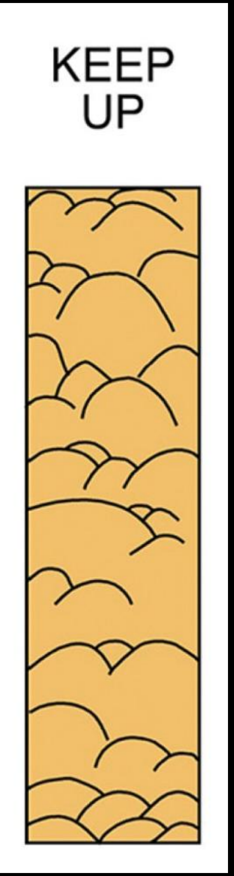
In carbonate systems accommodation can be considered of two types

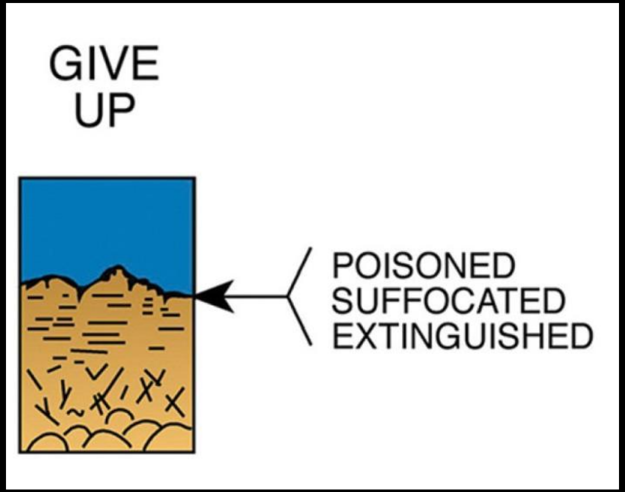
- Physical accommodation. It that that forms when the system is dominated by hydrodynamic processes. In this case sediment is redistributed every time it accumulates above base level.

- Ecological accommodation. Occurs because in carbonate systems, thanks to the action of organisms that build wave-resistant structures, there can be accumulation above base level. This implies that in carbonate systems production can be so high that accumulation can basically build up to sea level

Sequence Stratigraphy of carbonate systems

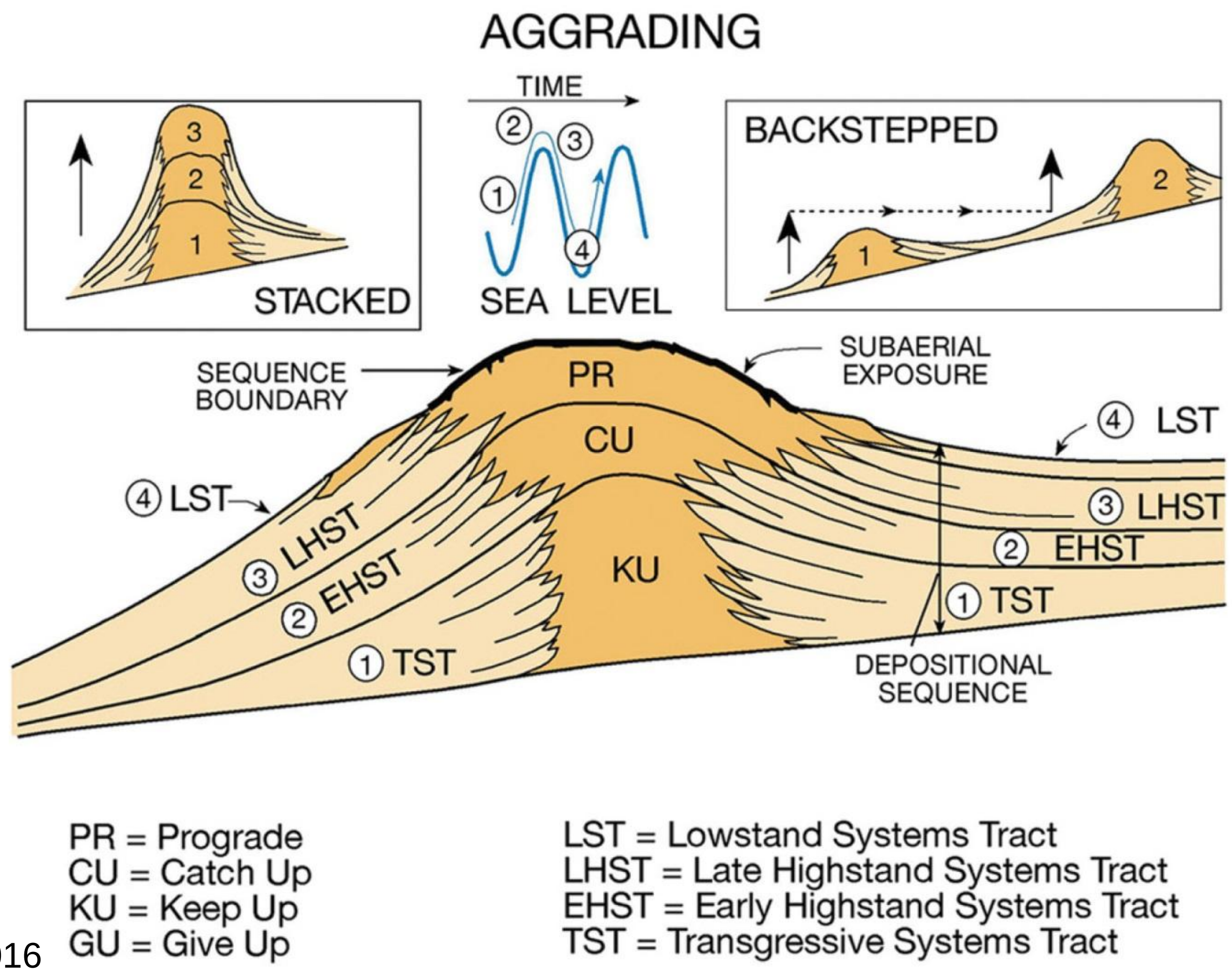
Different depositional trends can develop in function of the capability of the system (of of part of it) to keep up with rising sea level.





Sequence Stratigraphy of carbonate systems

Since carbonate production, unlike siliciclastic systems, can occur also far from areas of input of terrigenous sediment, carbonate depositional sequences can develop peculiar geometries.



James and Jones, 2016

Strongly aggrading systems may develop when sea level rise is fast and of short period and carbonate production can barely match the rate at which accommodation is created.

TST reefs in this case can display keep up depositional trend, EHST system tract are catch-up, LHST may catch up and then display limited progradation when sea level rise slows down and then a new fall starts.

Sequence Stratigraphy of carbonate systems

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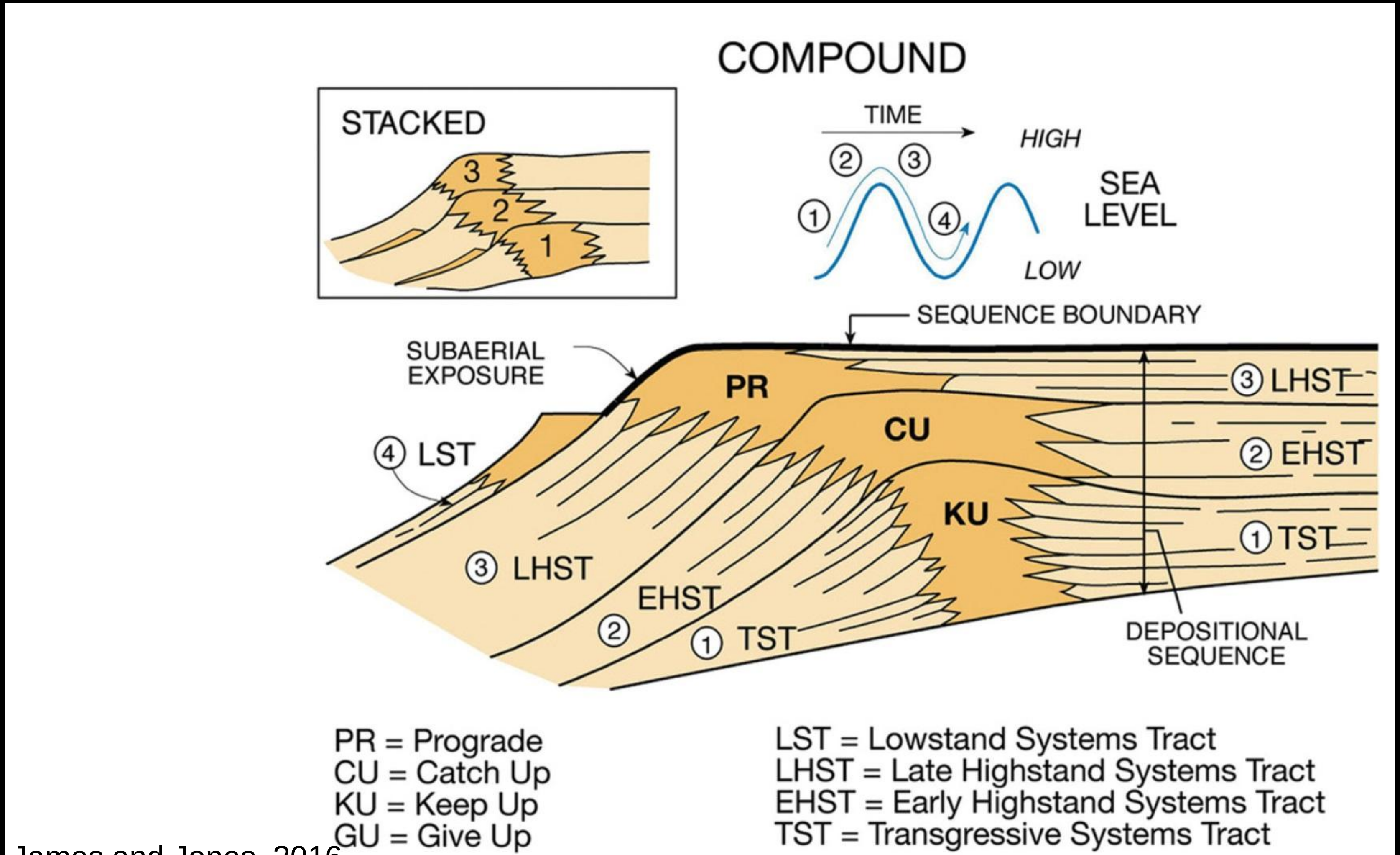
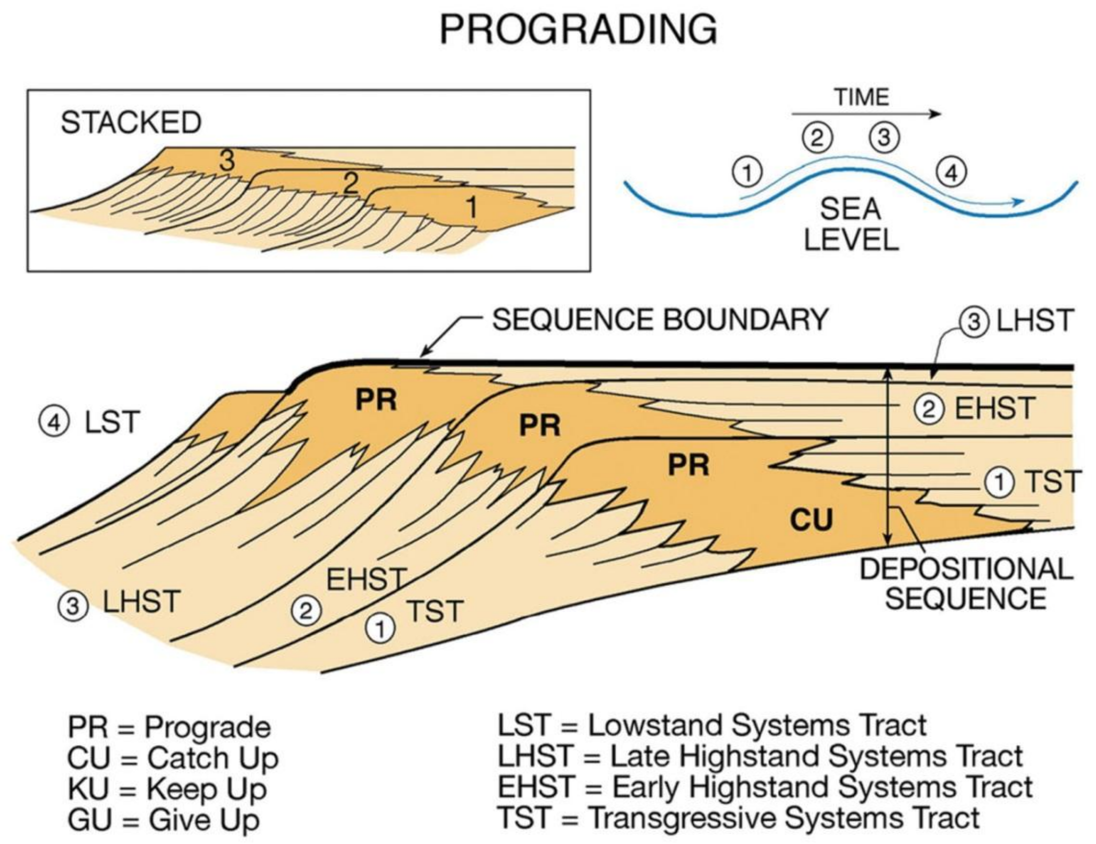


James and Jones, 2016

Compound carbonate depositional sequences can develop when amplitude and period of sea level fluctuations are moderate and the system was able to easily match sea level rise. In EHST phase the system quickly catches up and then strongly progrades.

Sequence Stratigraphy of carbonate systems

Since carbonate production, unlike siliciclastic systems, can occur also far from areas of input of terrigenous sediment, carbonate depositional sequences can develop peculiar geometries.

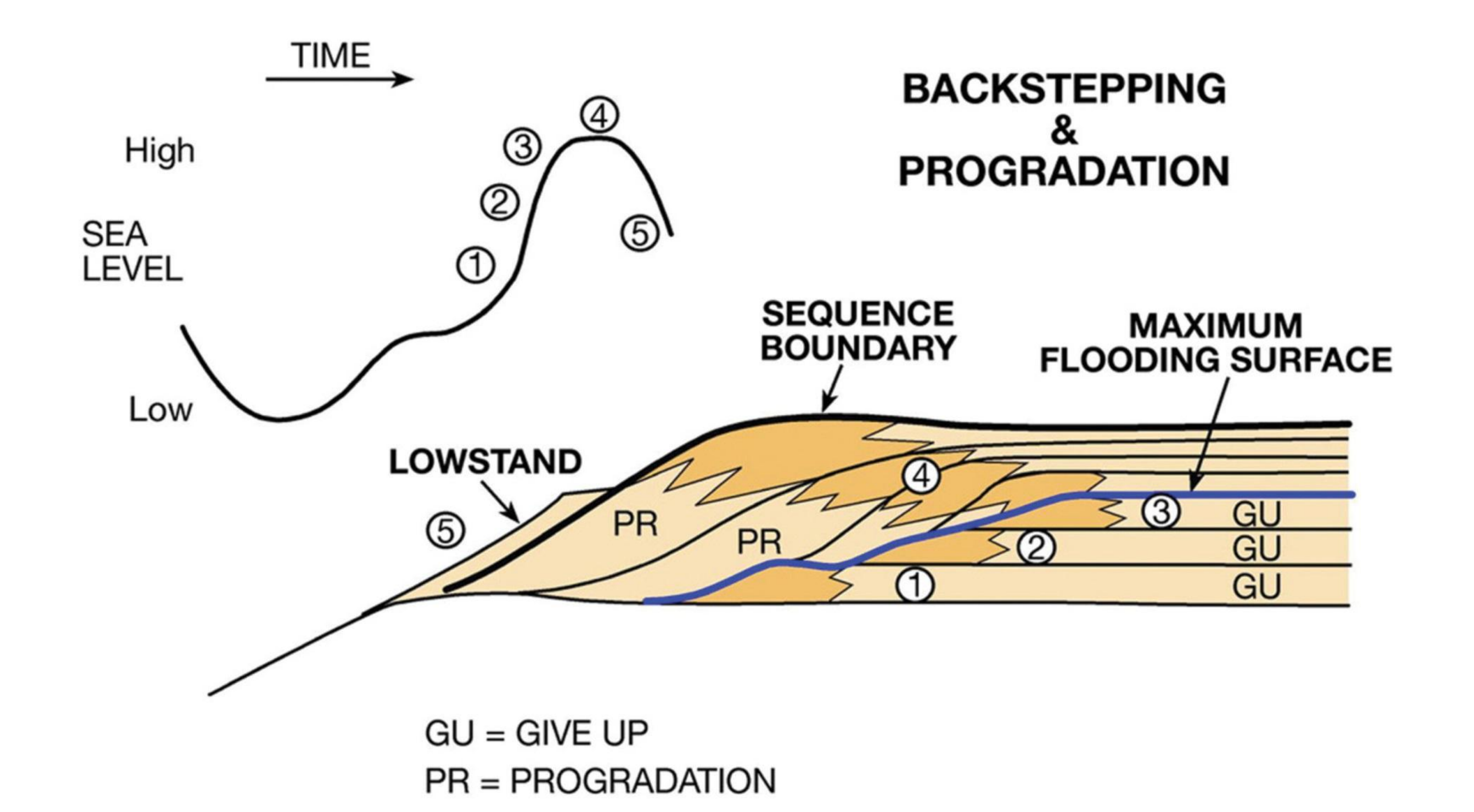


James and Jones, 2015

Strongly progradring carbonate depositiona sequences develop when rate of sealevel rise are low and accommodation is limited. A first phase of catch-up type evolution is quickly followed by strong progradation

Sequence Stratigraphy of carbonate systems

Since carbonate production, unlike siliciclastic systems, can occur also far from areas of input of terrigenous sediment, carbonate depositional sequences can develop peculiar geometries.

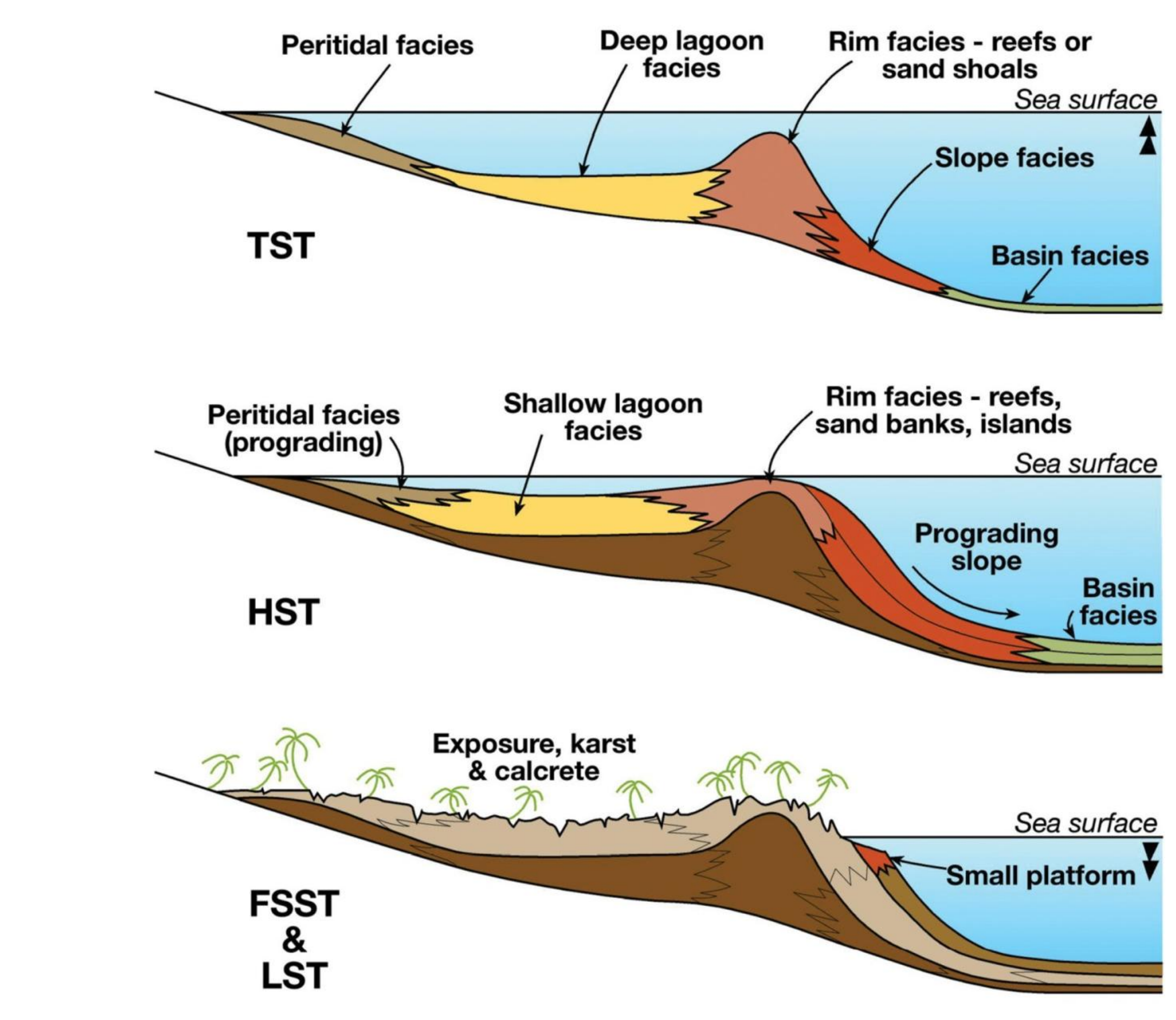


Retrogradational sequences develop when rate of sea level rise outpaces the capability of the carbonate system to match it.

The system backsteps. If in the HST phase production is able to catch-up strong progradation may then occur.

Sequence Stratigraphy of carbonate systems

Photozoan carbonate factories (T-type)



James and Jones, 2016

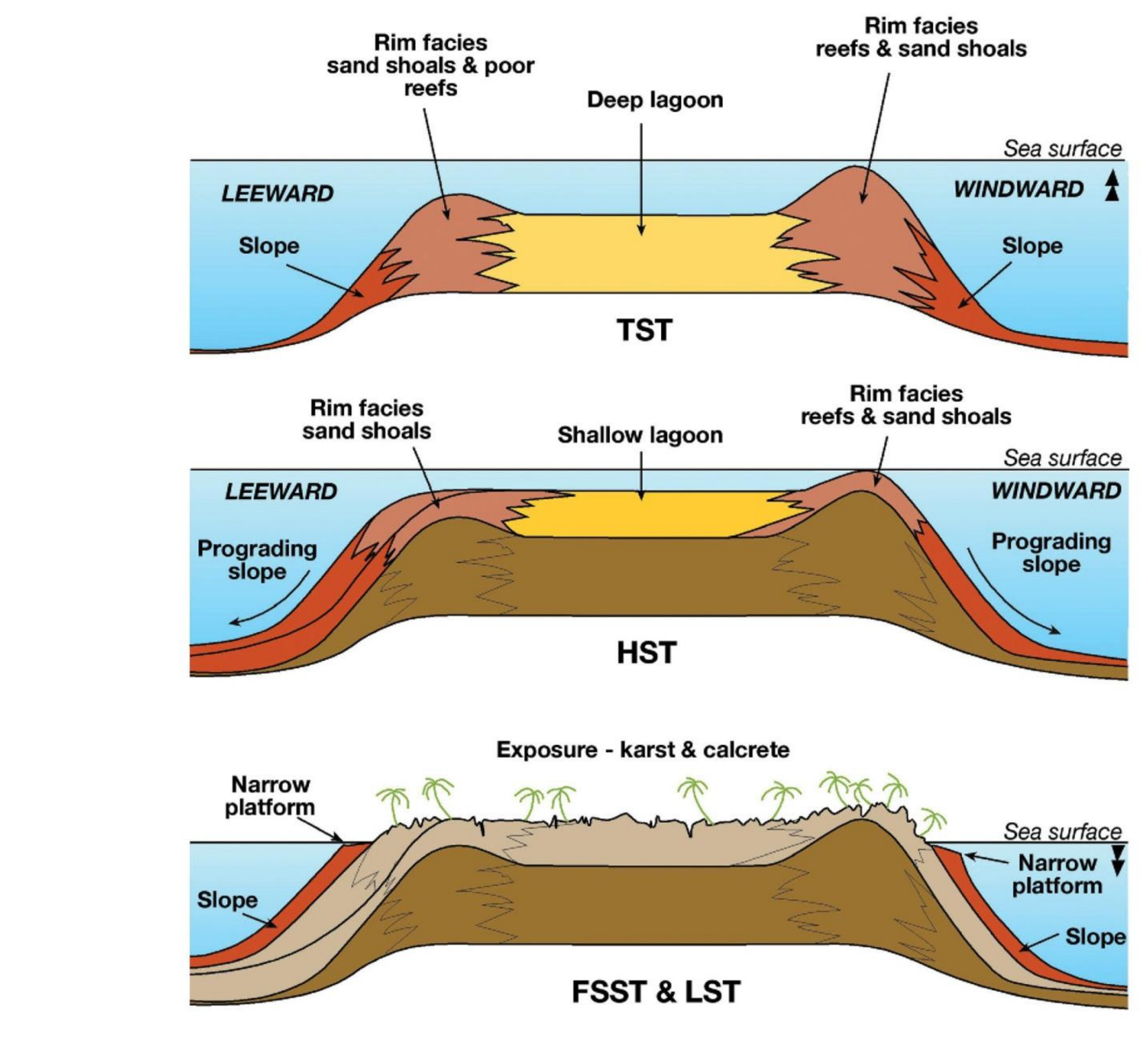
T-factories-dominated platforms typically have a narrow reef area that can produce carbonate sediment at a pace much greater than the adjacent lagoon.

In these platforms, during TST the lagoon can become deeper and only the margin keeps up with sea level rise. This can induce water stratification in the lagoon. Slope sedimentation is not abundant in this phase.

Things change during HST, when carbonate production matches sea level rise rate. The lagoon becomes shallower and water circulation restricted. Strong carbonate production on the margin induces also greater export (highstand shedding) accumulation on slopes that tend to prograde.

Sequence Stratigraphy of carbonate systems

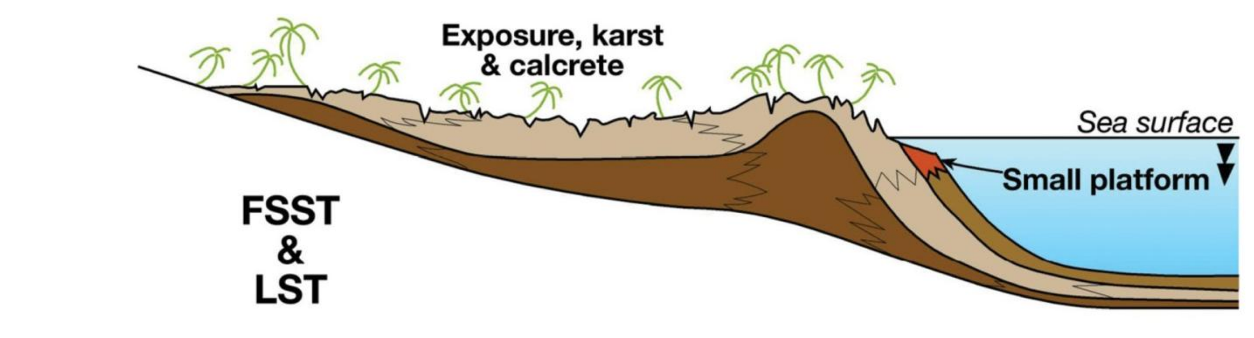
Photozoan carbonate factories (T-type) – off shore bank

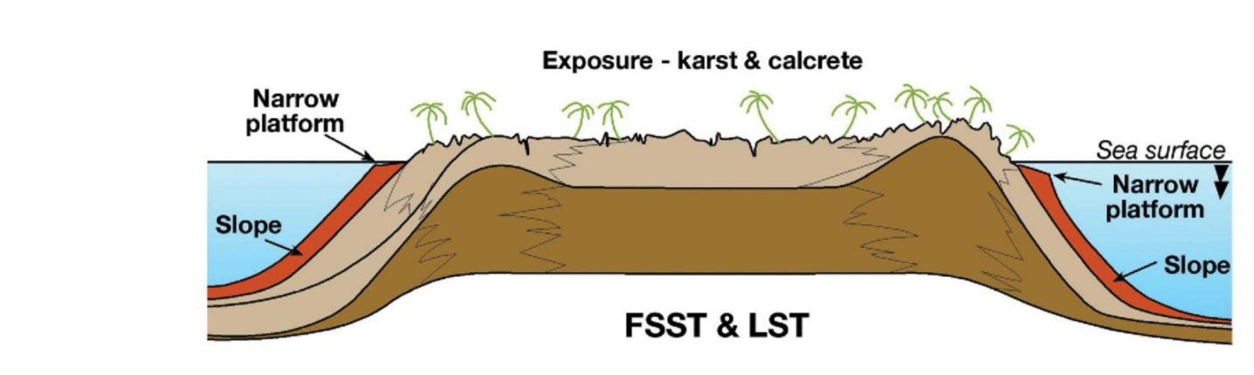


James and Jones, 2016

T-type off shore banks are typical example of the depositional sequences carbonate systems can develop even far from the coastline.

Sequence Stratigraphy of carbonate systems





Before the advent of pelagic production these times could be characterized by very low periplatform sedimentation (starved basins)

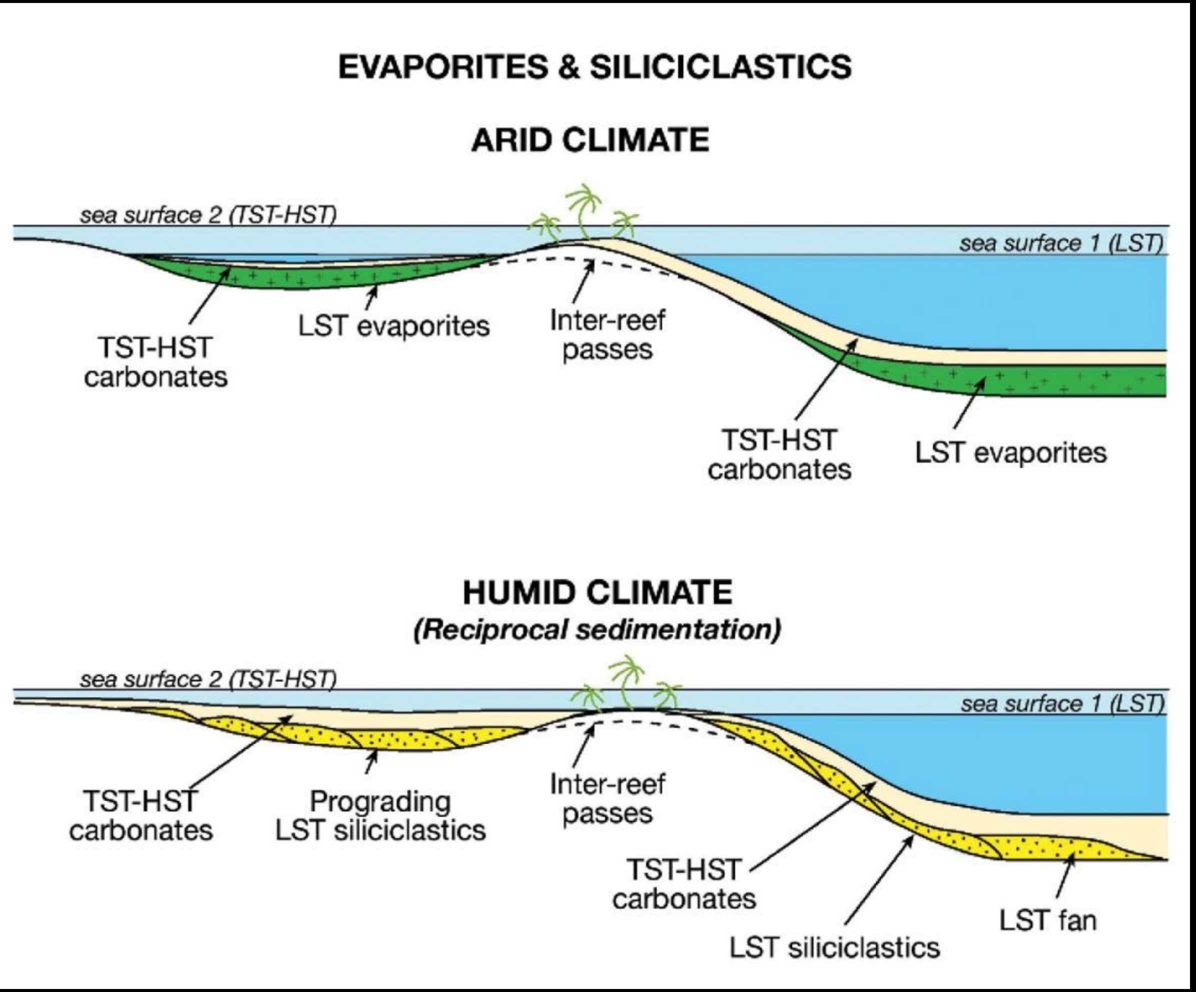
Sea level fall has profound effects on T-type carbonate systems because it brings to the exposure of much of the platform top.

Carbonate production continues only on a narrow rim on the slopes of the platform where conditions are suitable.

Unlike what happens in siliciclastic systems, a sea level fall in carbonates systems does not induce mobilization of great amounts of sediments because carbonate is dissolved rather than eroded and transported.

Platform-derived sedimentation in the basin is therefore limited.

Sequence Stratigraphy of carbonate systems



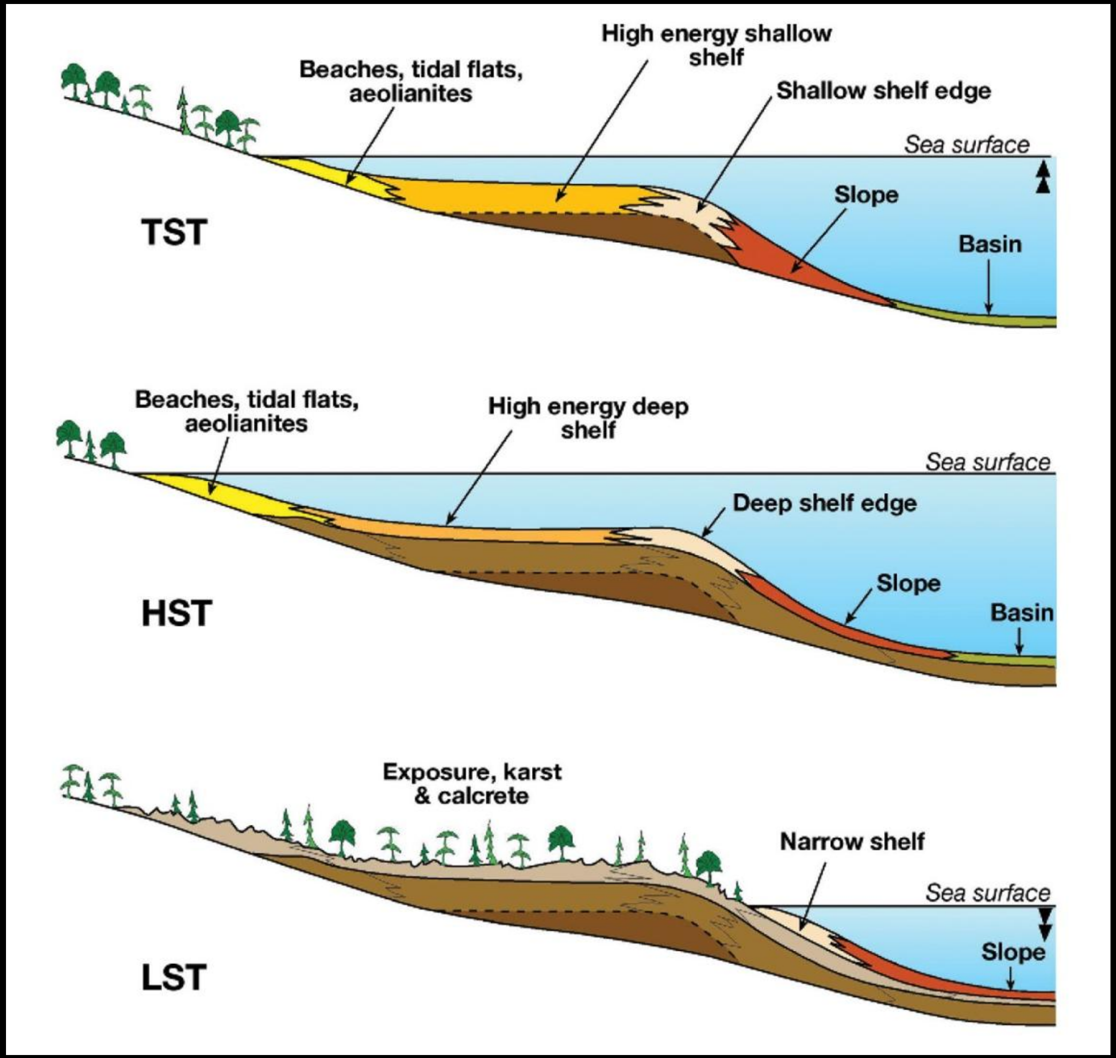
A rimmed attached carbonate platform system can develop depositional sequences in which there are both carbonates and evaporities and siliciclastics.

The depositional architecture can be significantly influenced by (and, in turn, reflect) climate conditions.

Arid conditions favor evaportie depostition on the platfrom, during lowstands while carbonat deposition returns when the platform is submerged.

Humid conditions favor runoff and siliciclastic input on the platform, especially during lowstands, while, again, carbonates prevail during transgression and highstands.

Sequence Stratigraphy of carbonate systems



In an un-rimmed attached carbonate platform system the a proper lagoon is absent. The architecture of the depositional sequence can be strongly influenced by the carbonate factory.

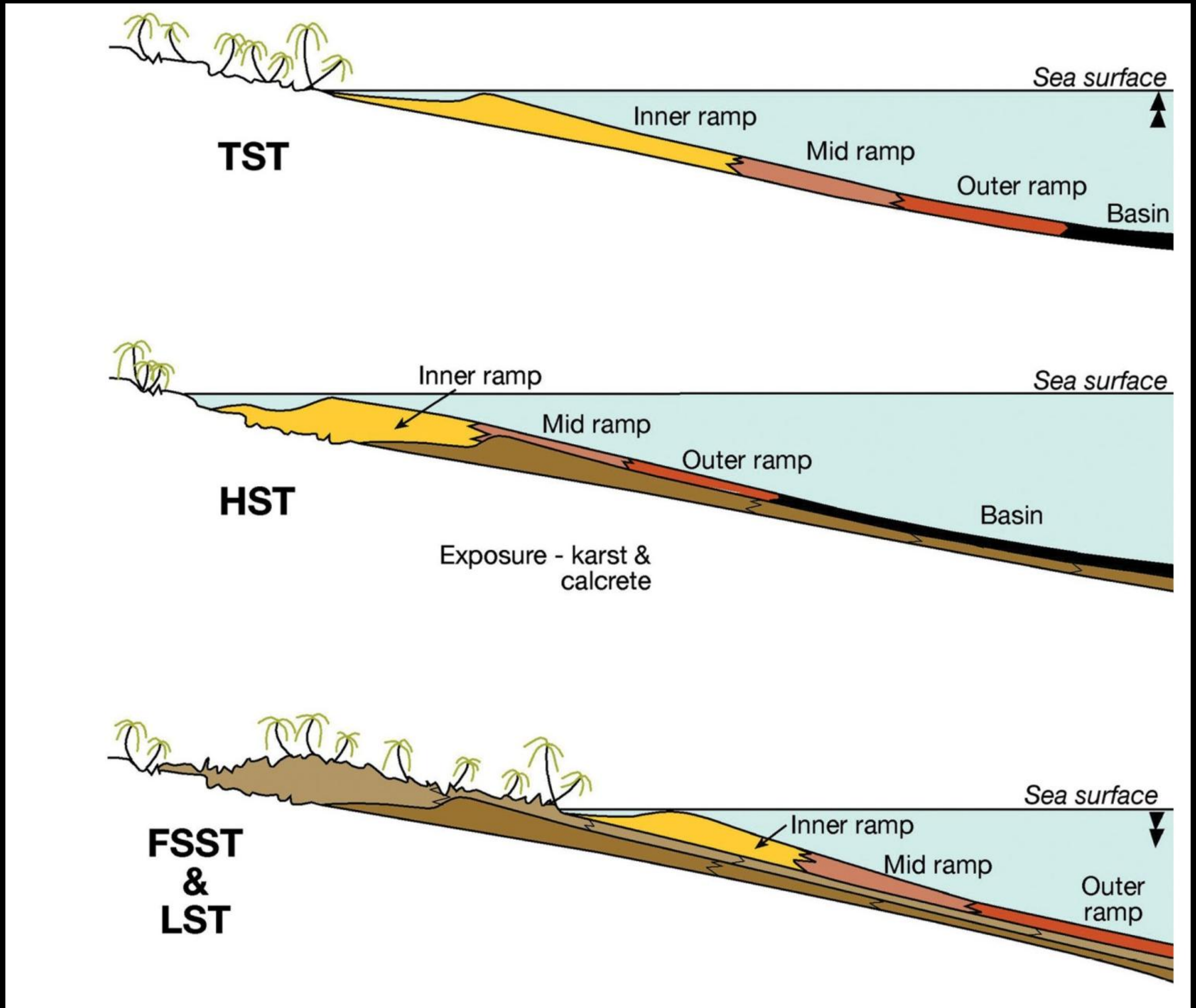
In C-type carbonate platform most of the carbonate is biofragmental and there is little early cementation and redistribution of sediment is high. Production rates are lower with respect to other types of carbonate factories and therefore aggradation is limited.

During transgressions the lack of cementation can cause strong revorking of older sediments.

Sea level variations control landward or basinward shifting of facies belts.

Remember that things can be different if the carbonate factory is of M-type.

Sequence Stratigraphy of carbonate systems



In carbonate ramps facies migrate following sea level. A certain facies belt stays always in the same range of water depth.

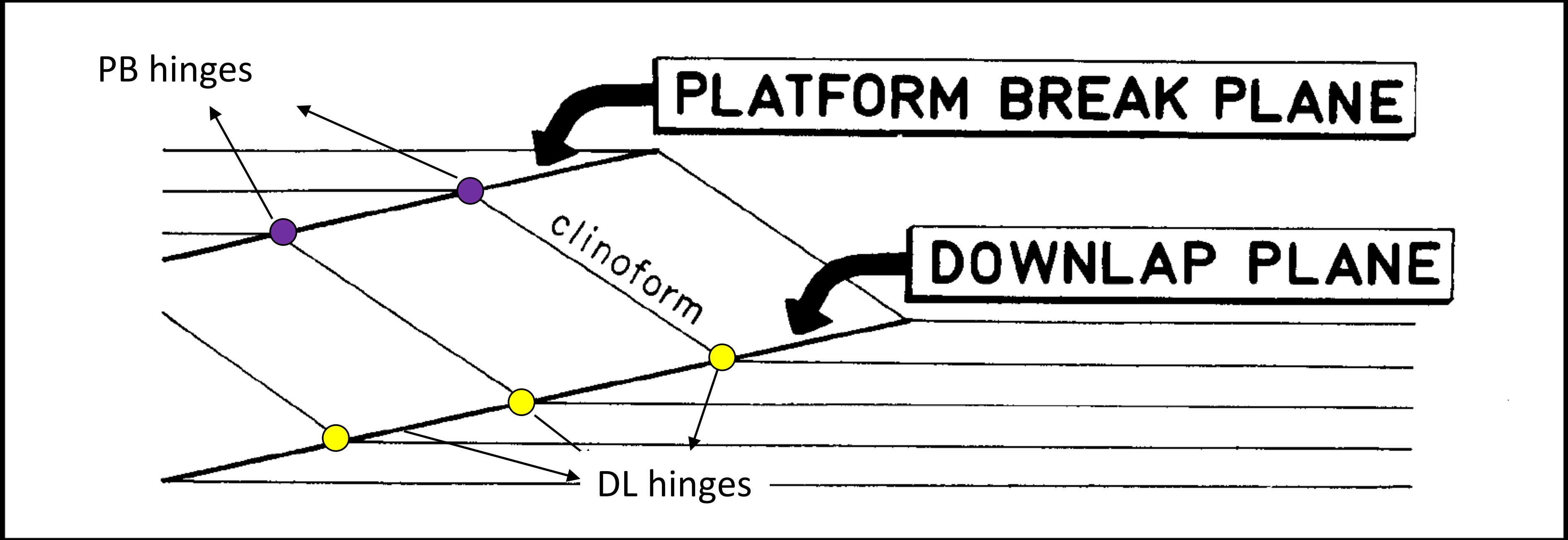
During a relative sea level rise, shallow ramp facies will overlap the unconformity at the top of the underlying sequence.

In arid climate, hypersaline waters can be present in the upper part of the depositional profile.

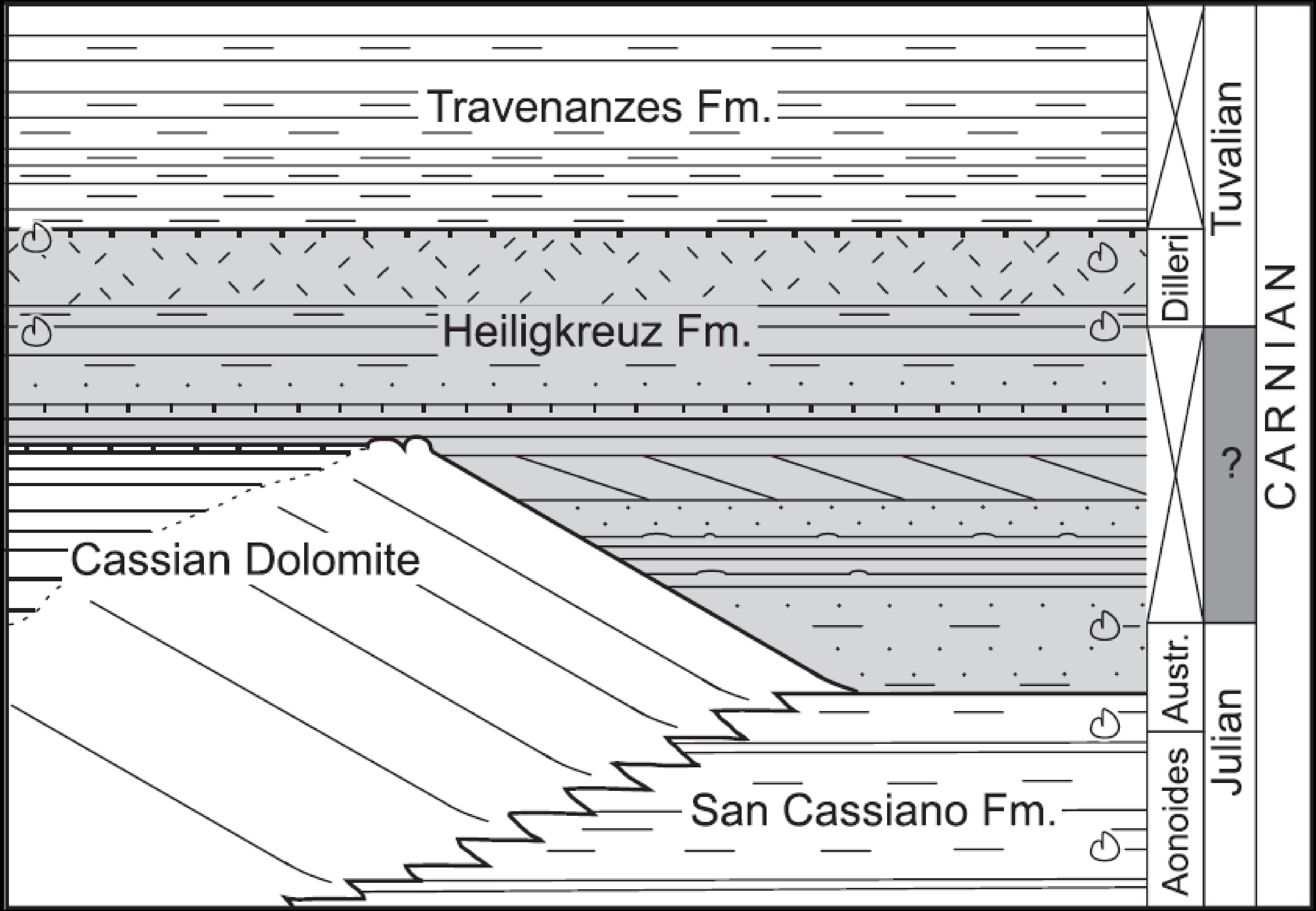
This can promote water stratification and favor deposition of organic rich sediments.

Platform geometries and basin evolution

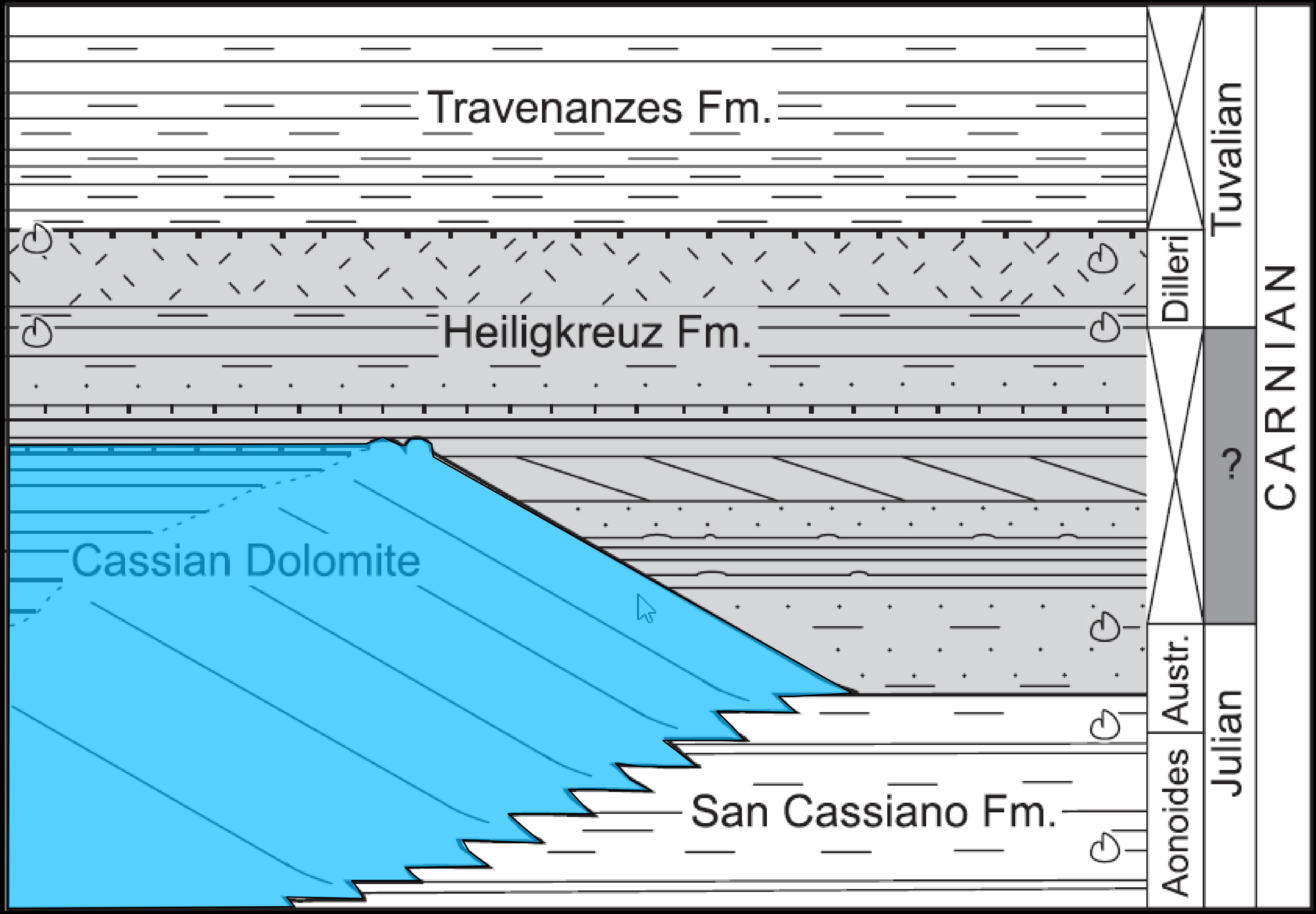
- platform break plane : plane that connects all platform break hinges
- Platform downlap plane: plane that connects all downlap hinges



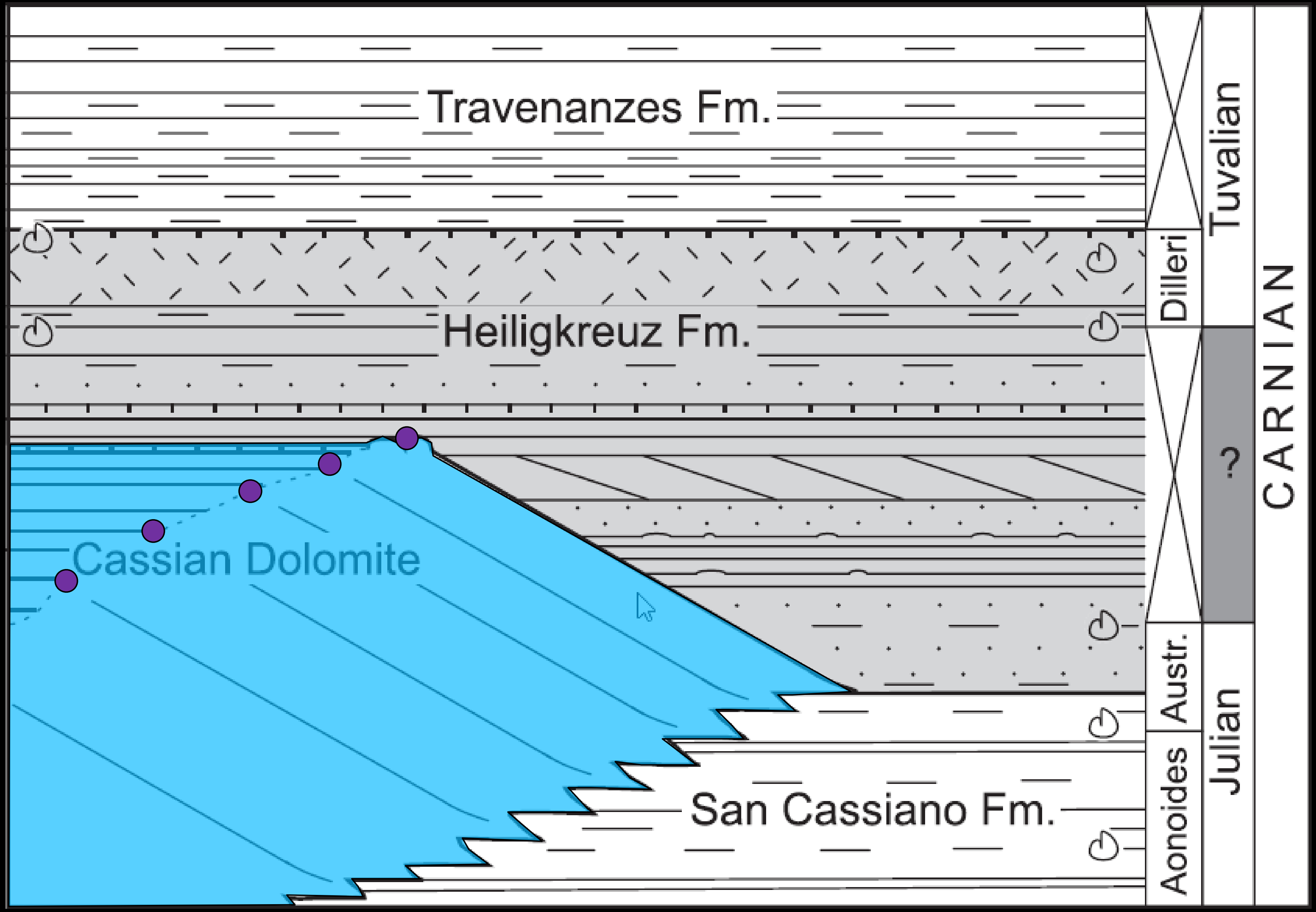
Platform geometries and basin evolution



Platform geometries and basin evolution

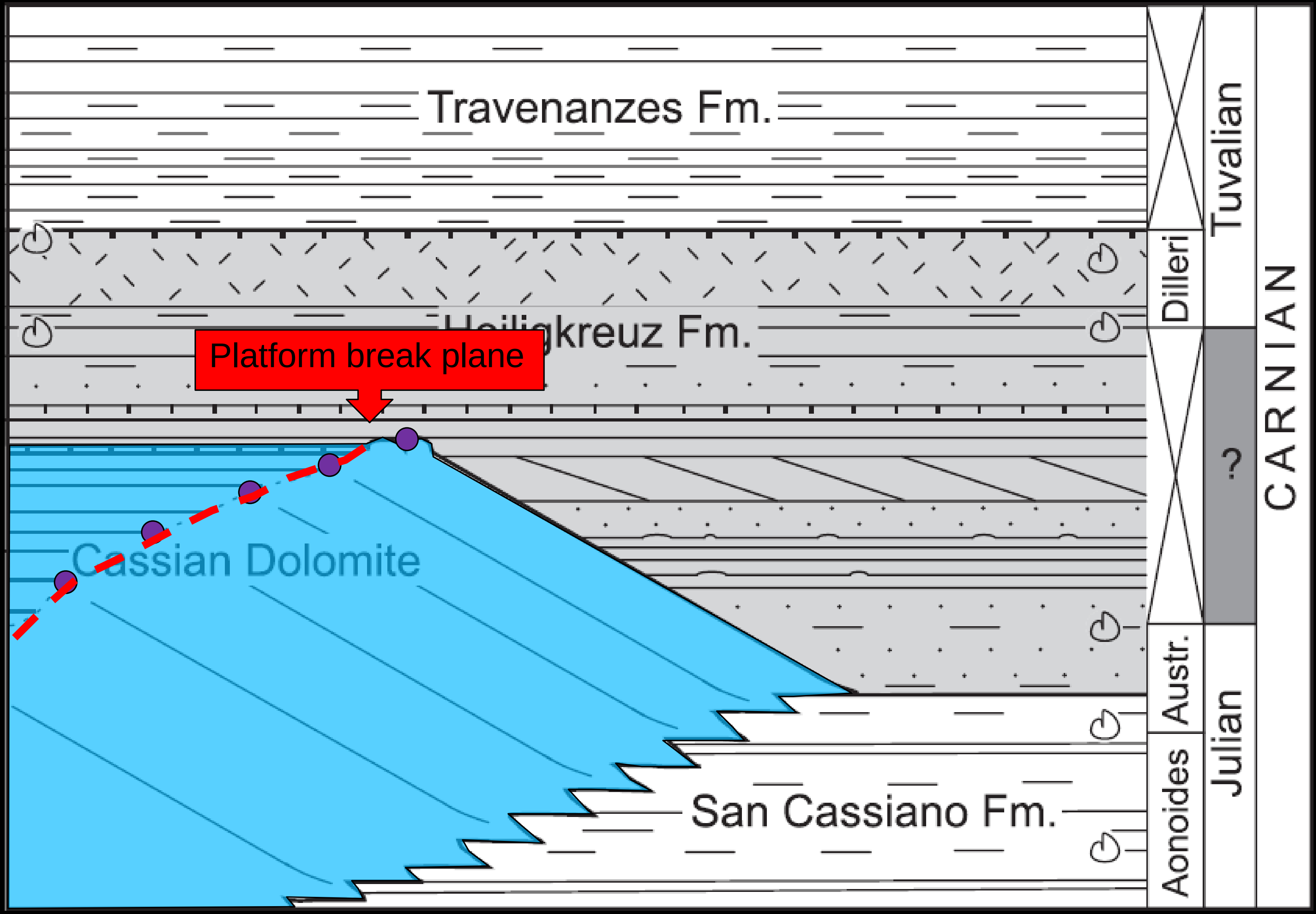


Platform geometries and basin evolution

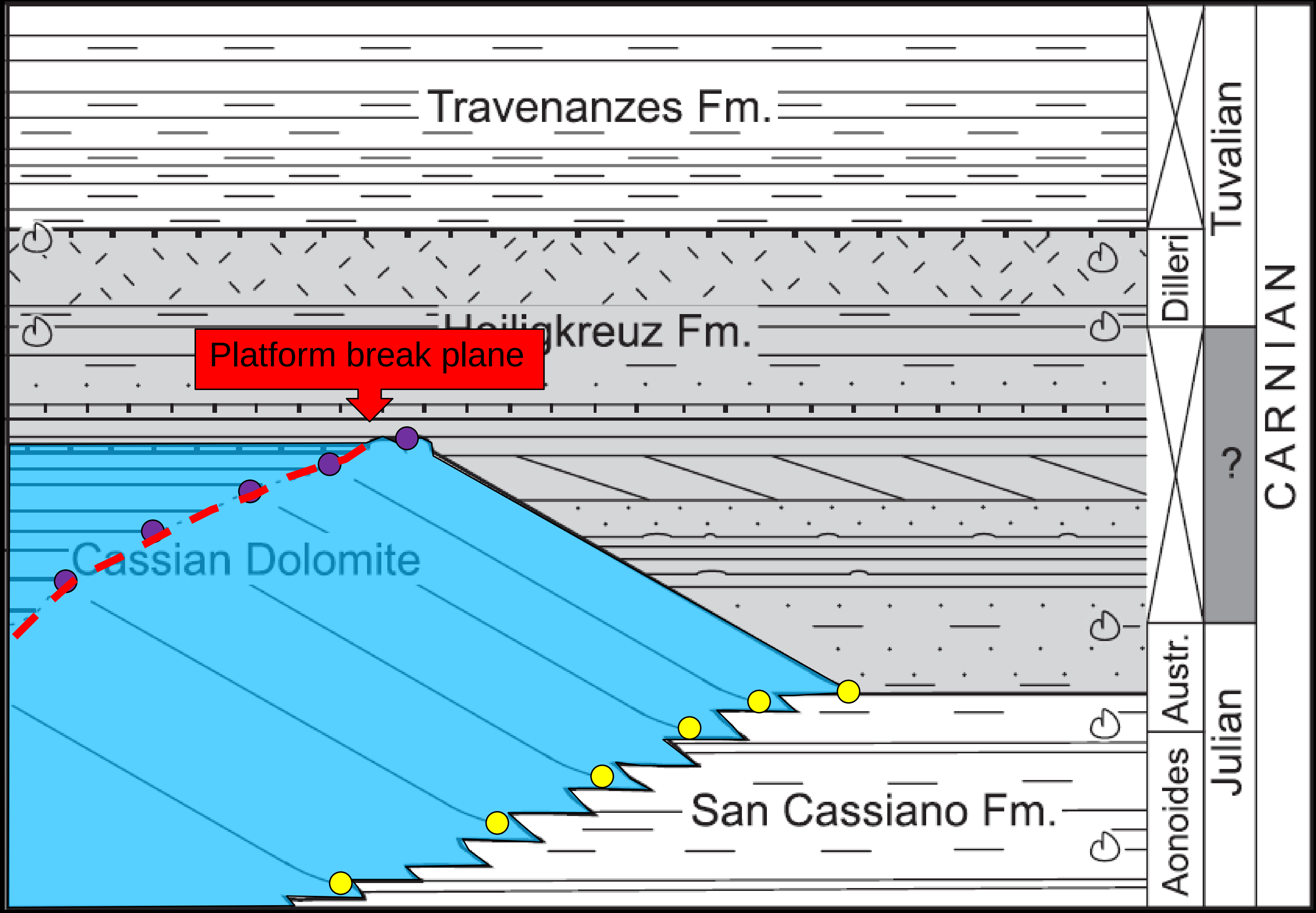


CARBONATE SEDIMENTOLOGY

Platform geometries and basin evolution

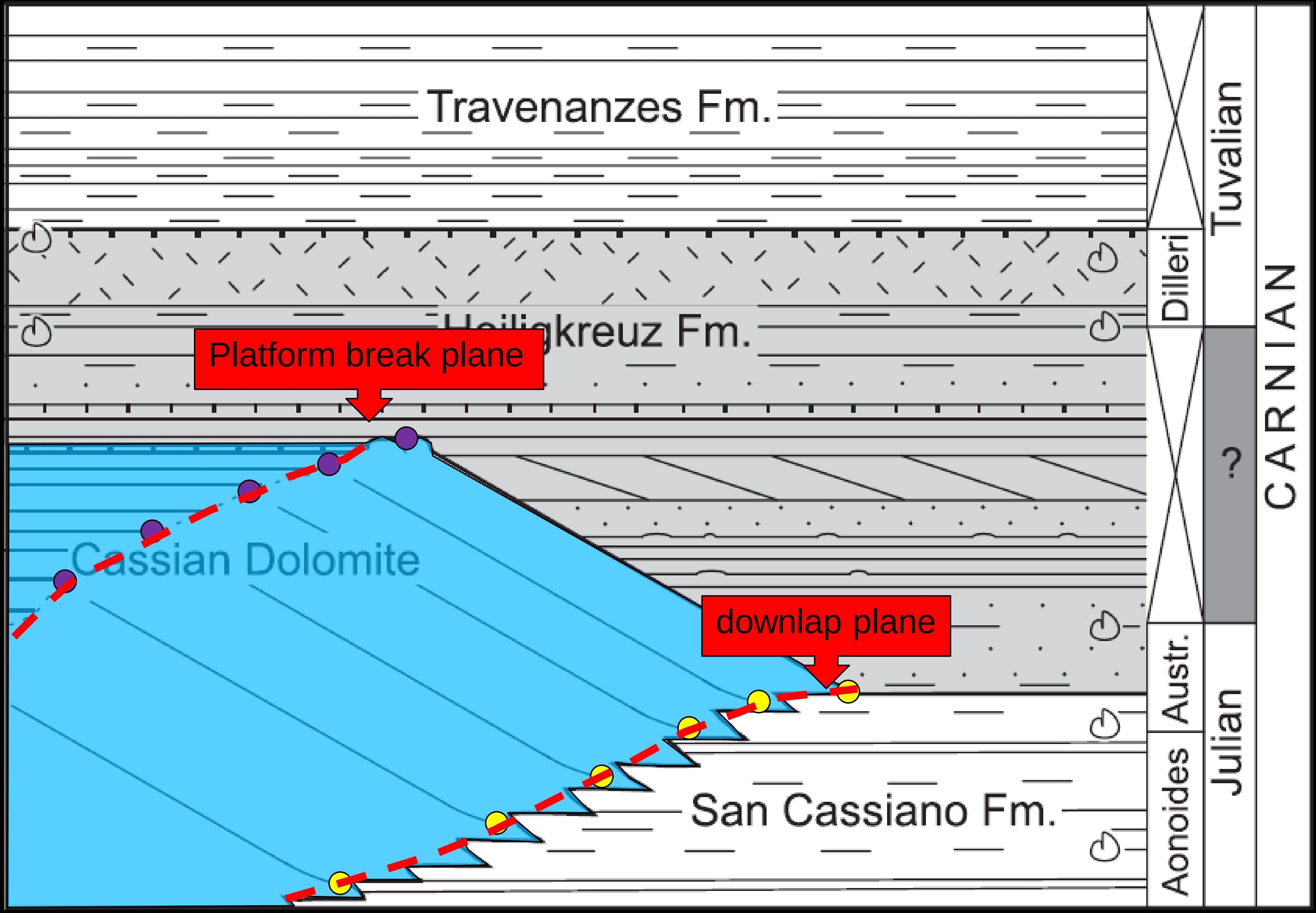


Platform geometries and basin evolution



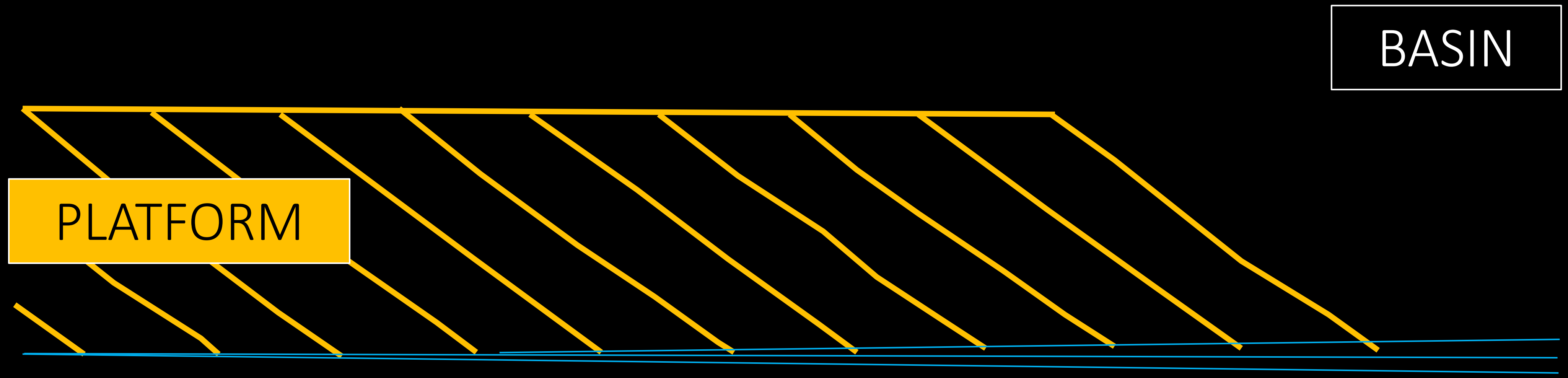
CARBONATE SEDIMENTOLOGY

Platform geometries and basin evolution



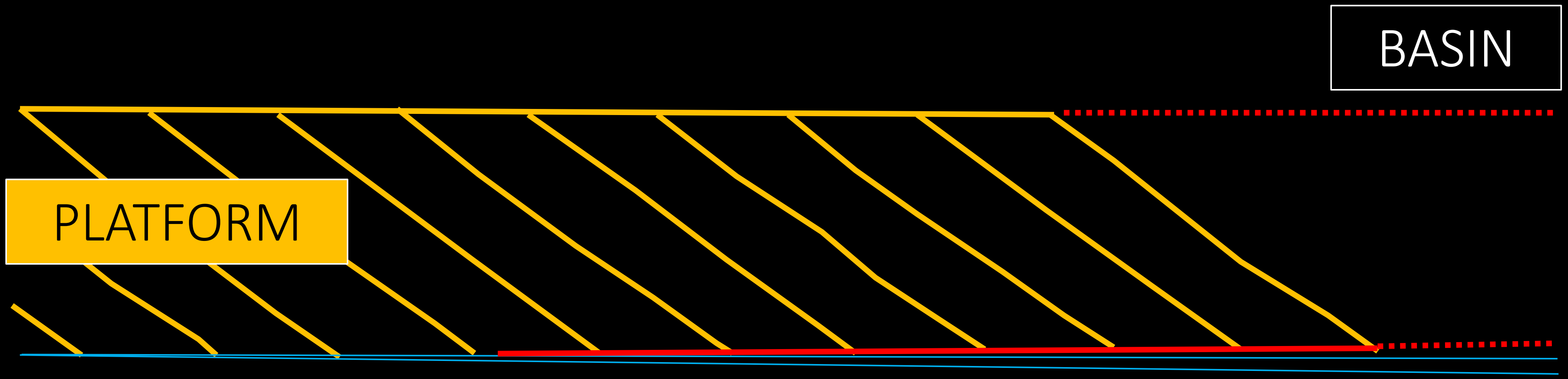
Platform geometries and basin evolution

Platform break – downlap relationships



Platform geometries and basin evolution

Platform break – downlap relationships



Platform geometries and basin evolution

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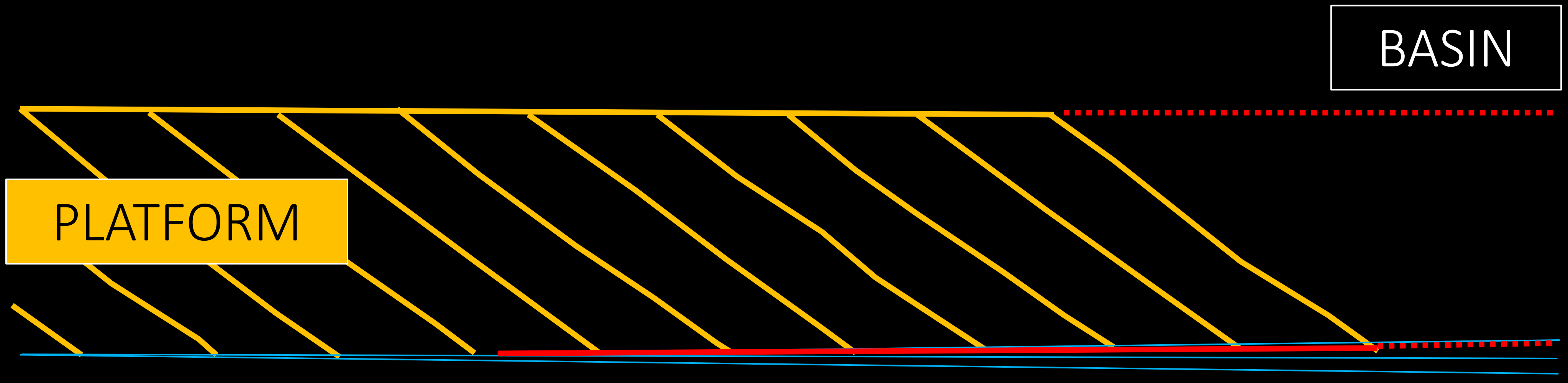
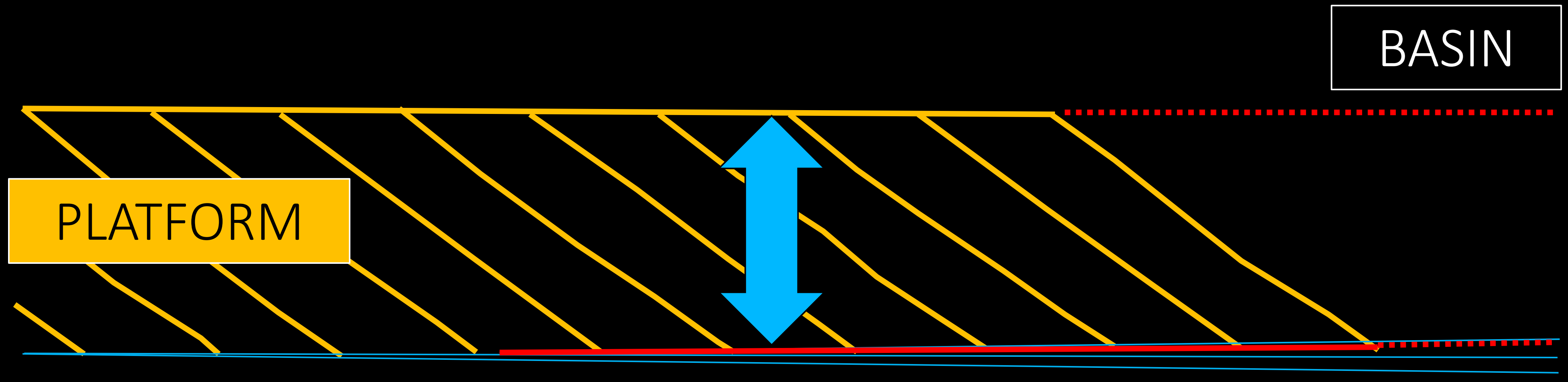


~ PARALLEL

Platform geometries and basin evolution

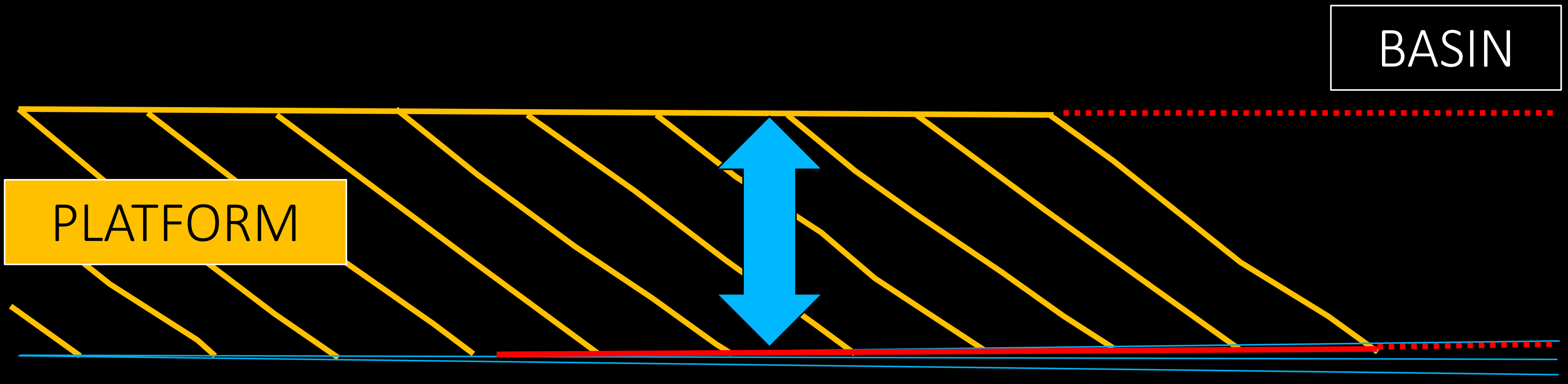
Platform break – downlap relationships



~ PARALLEL

Platform geometries and basin evolution

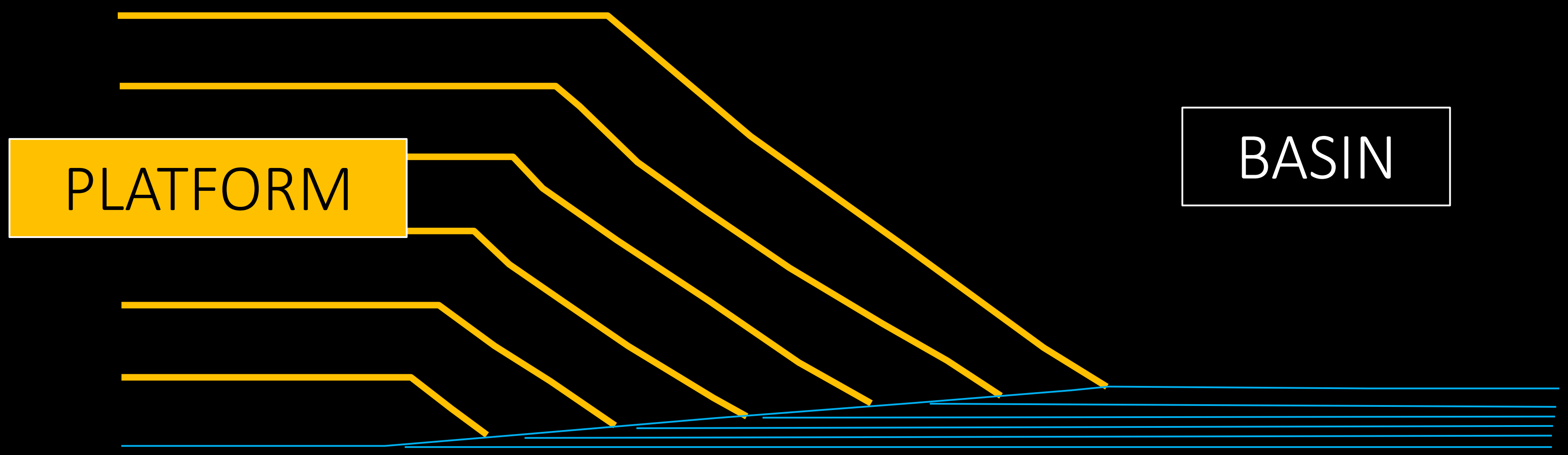
Platform break – downlap relationships



~ PARALLEL → STILL STAND (constant bathymetry)

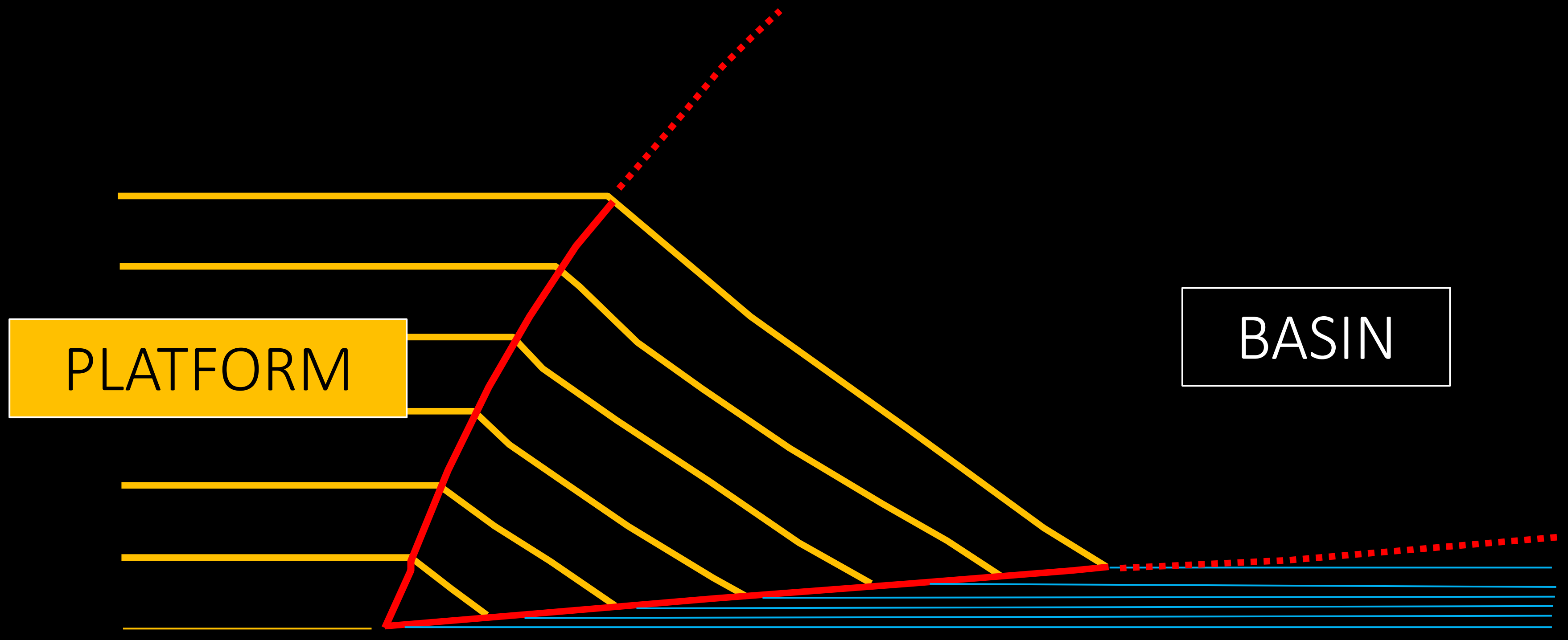
Platform geometries and basin evolution

Platform break – downlap relationships

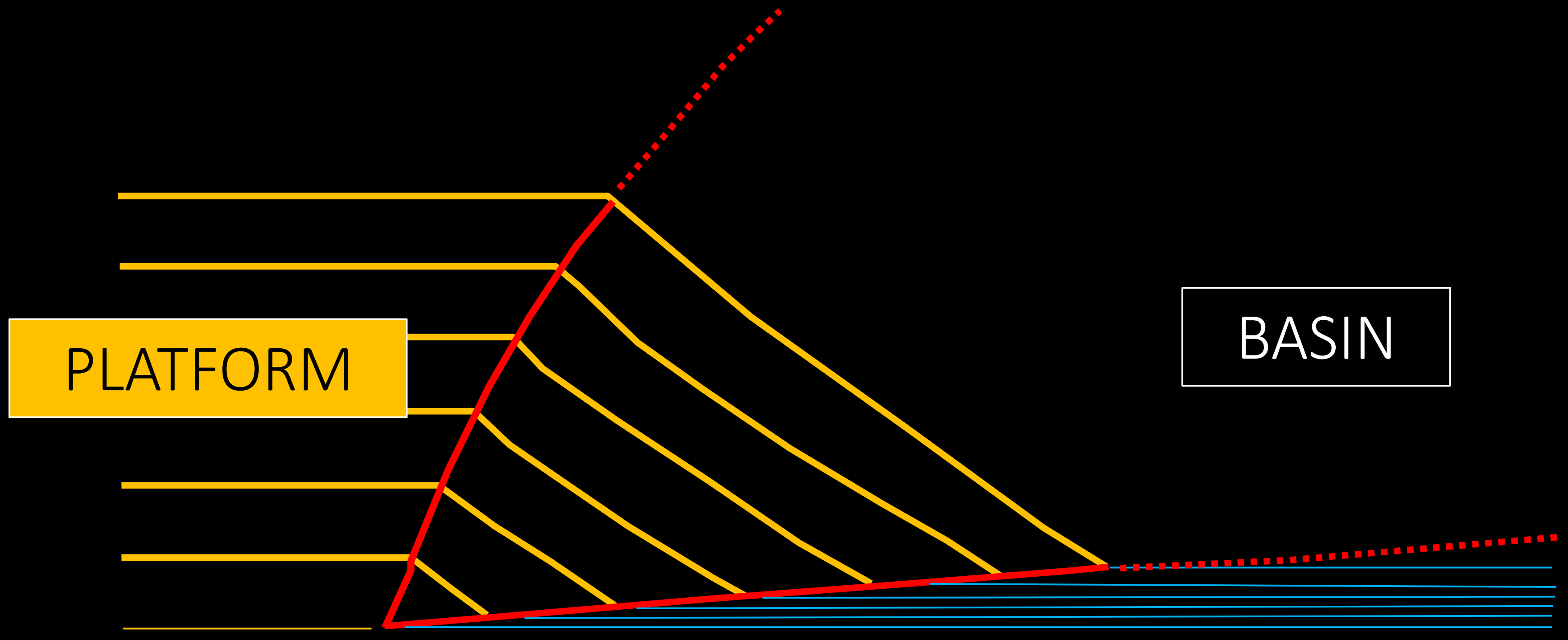


Platform geometries and basin evolution

Platform break – downlap relationships

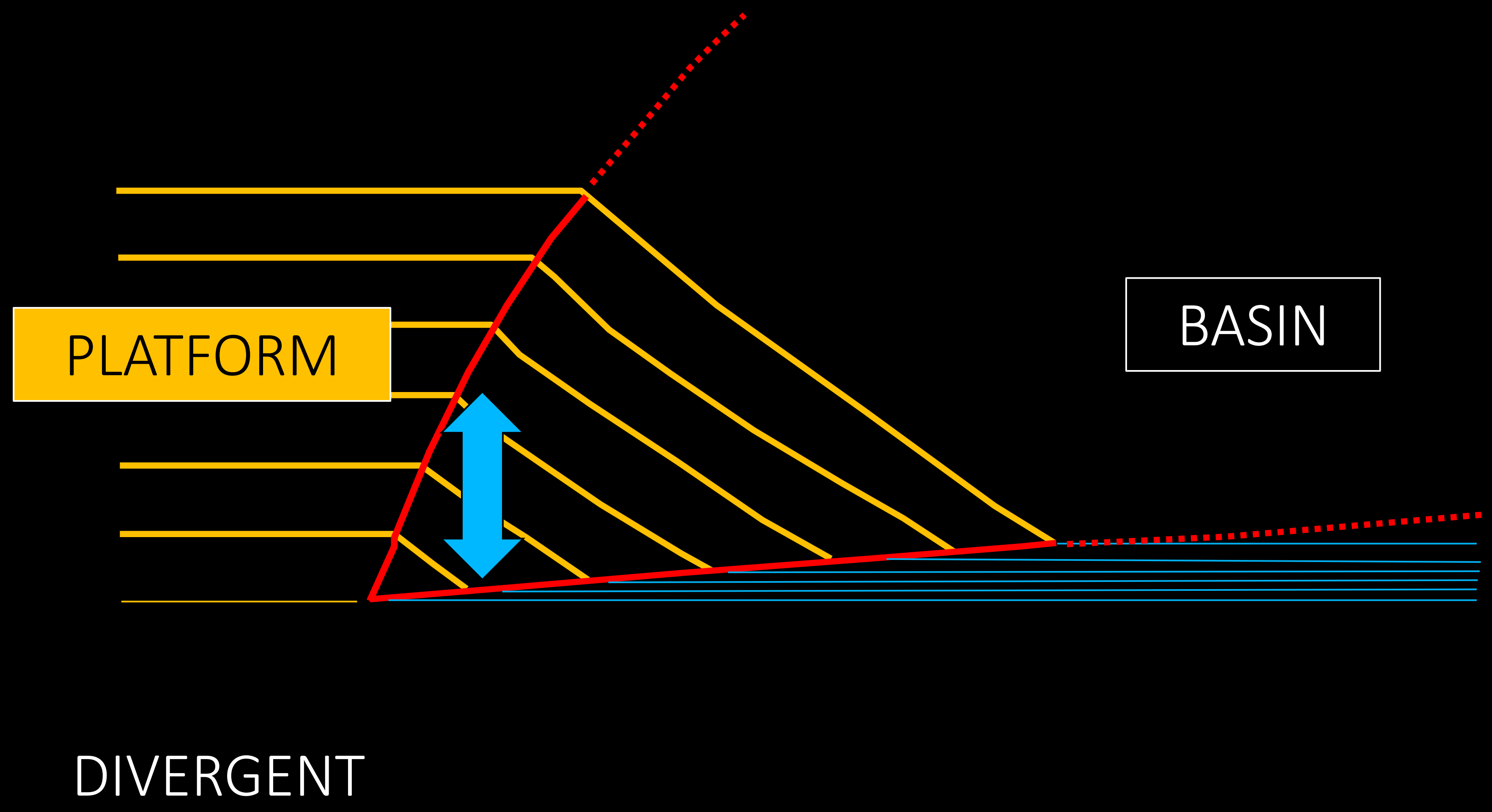


Platform break – downlap relationships



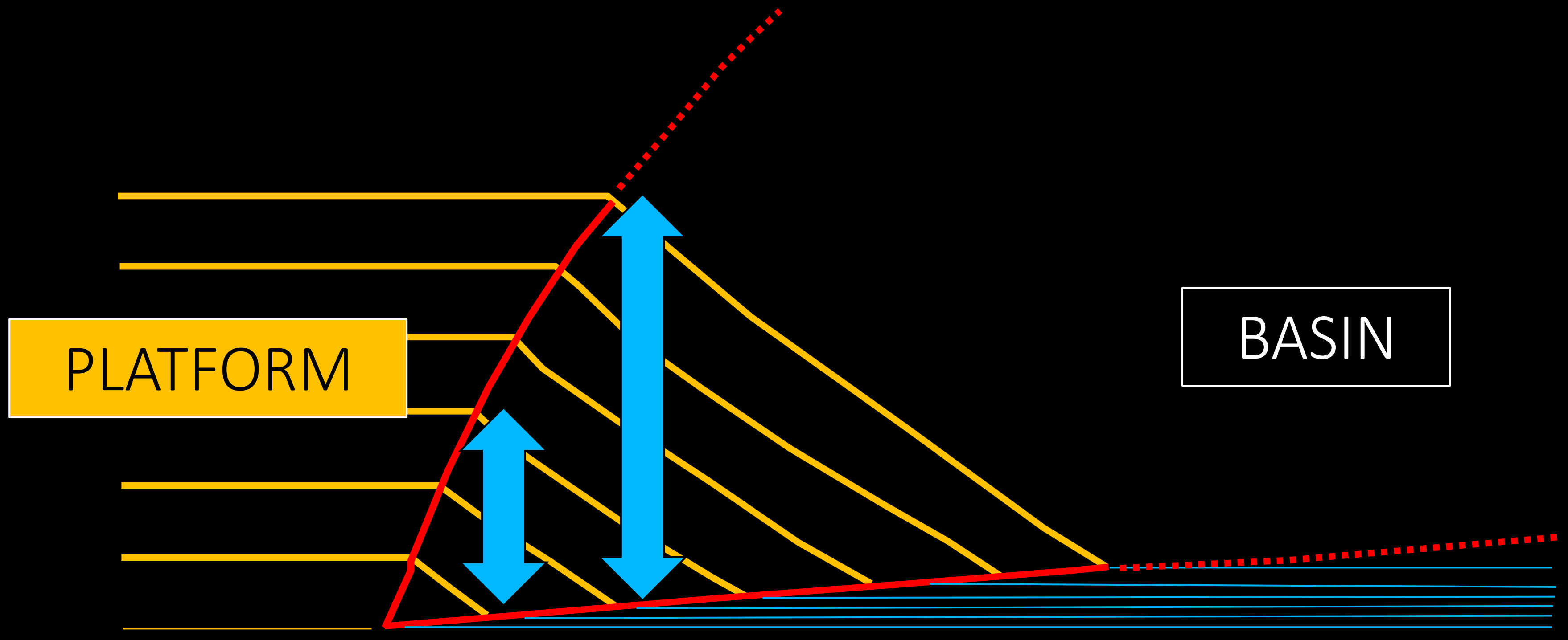
Platform geometries and basin evolution

Platform break – downlap relationships



Platform geometries and basin evolution

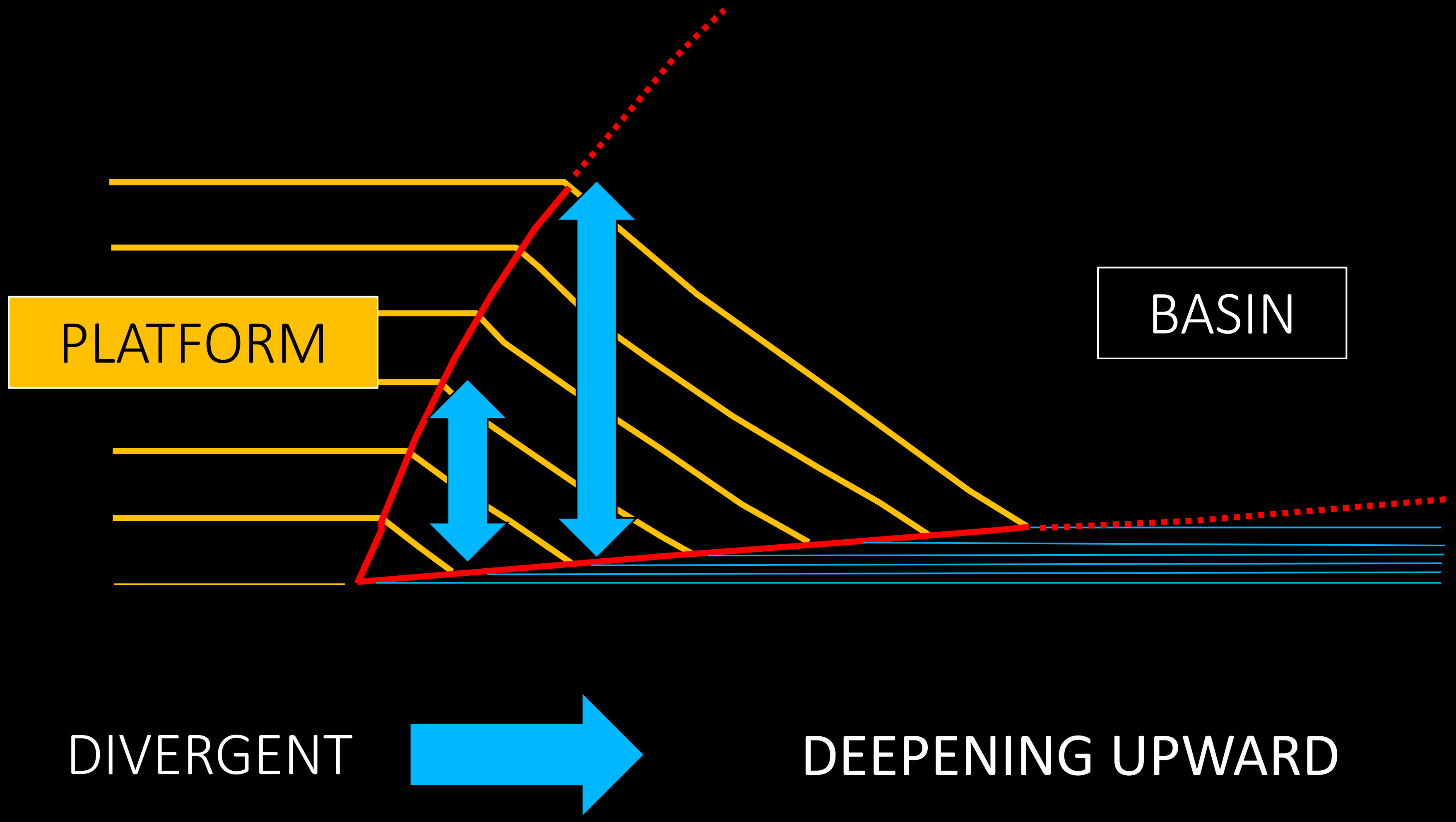
Platform break – downlap relationships



DIVERGENT

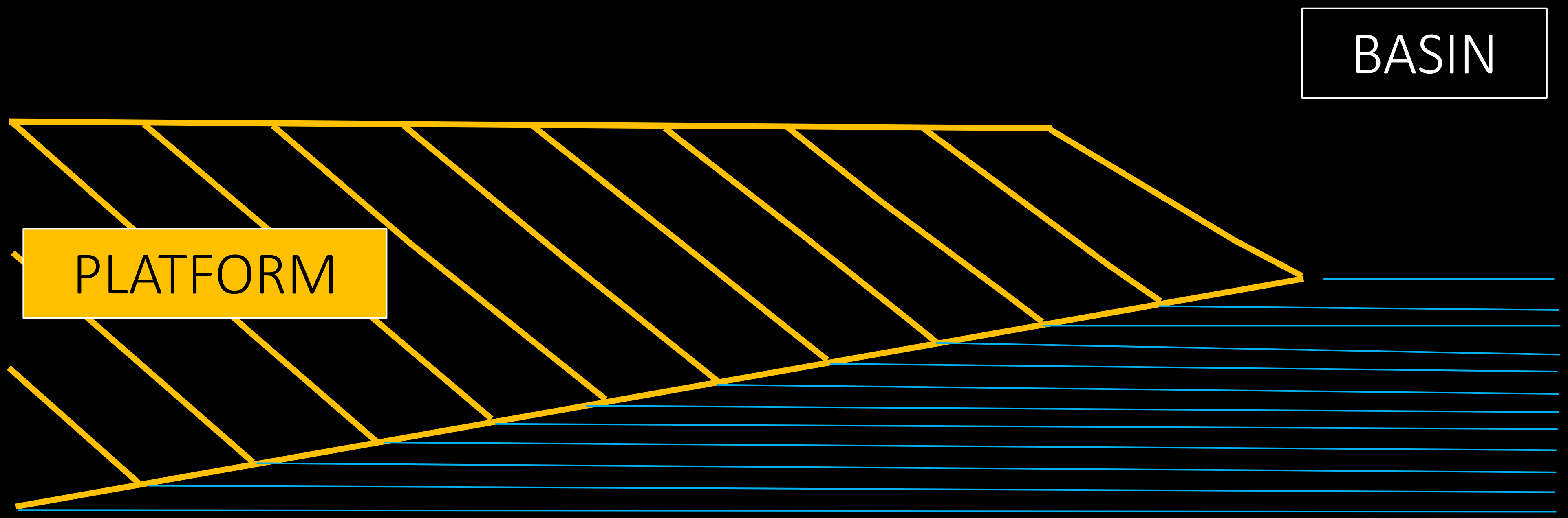
Platform geometries and basin evolution

Platform break – downlap relationships



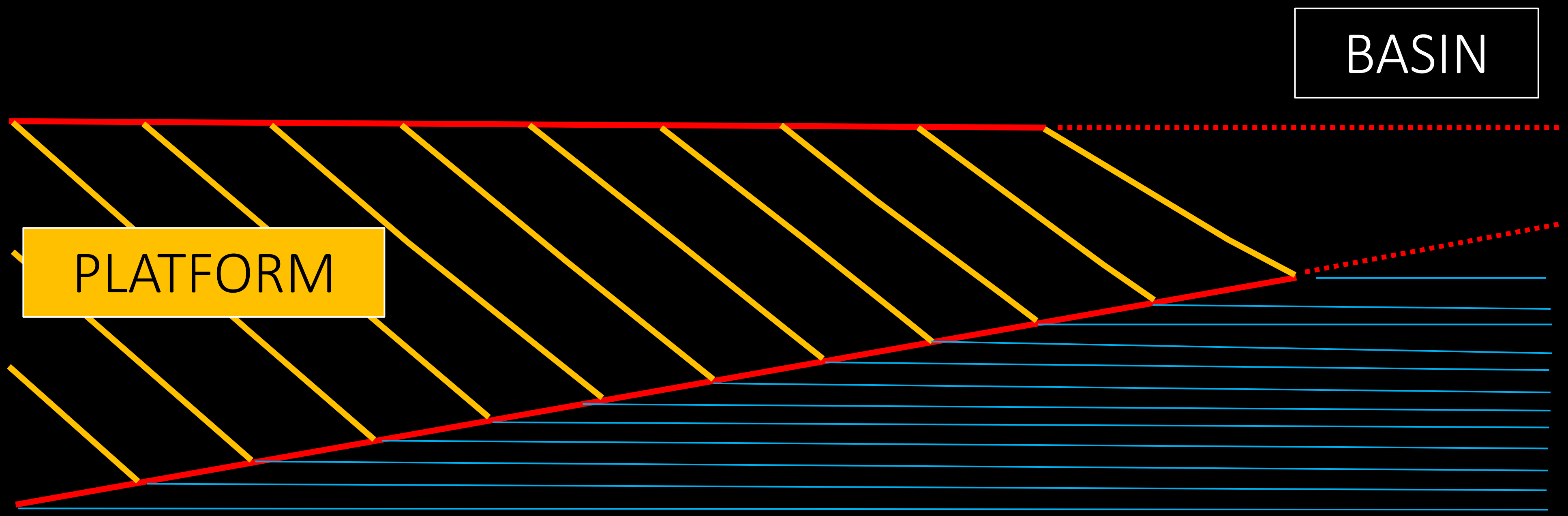
Platform geometries and basin evolution

Platform break – downlap relationships



Platform geometries and basin evolution

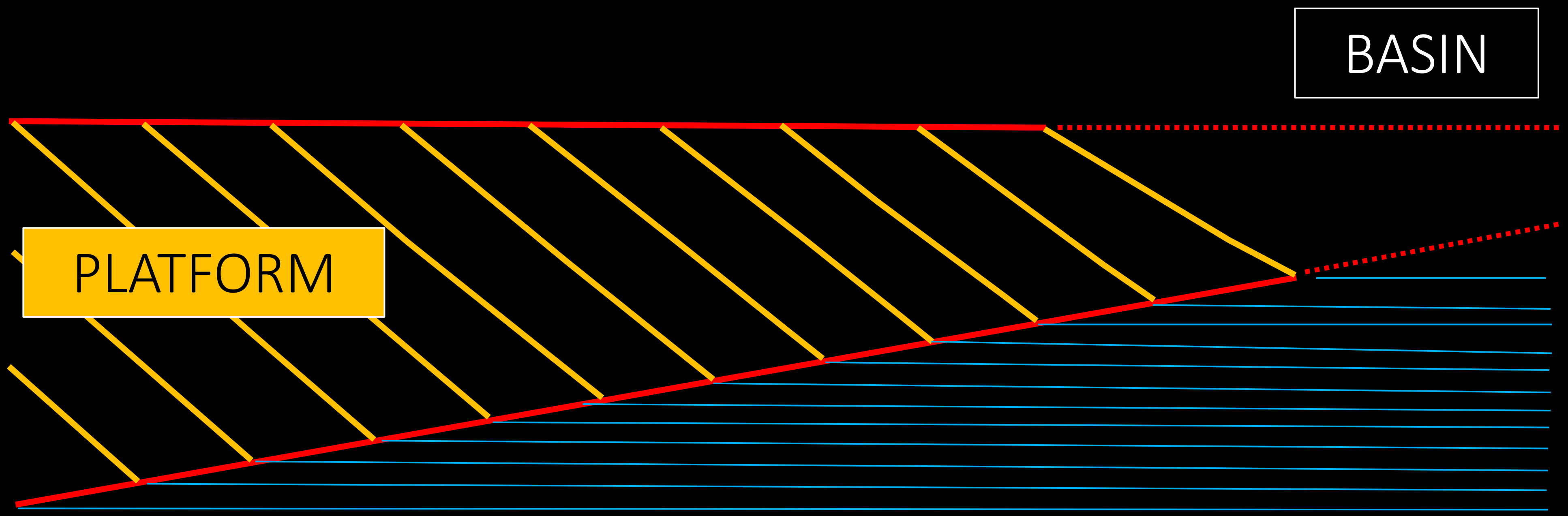
Platform break – downlap relationships



CONVERGENT

Platform geometries and basin evolution

Platform break – downlap relationships



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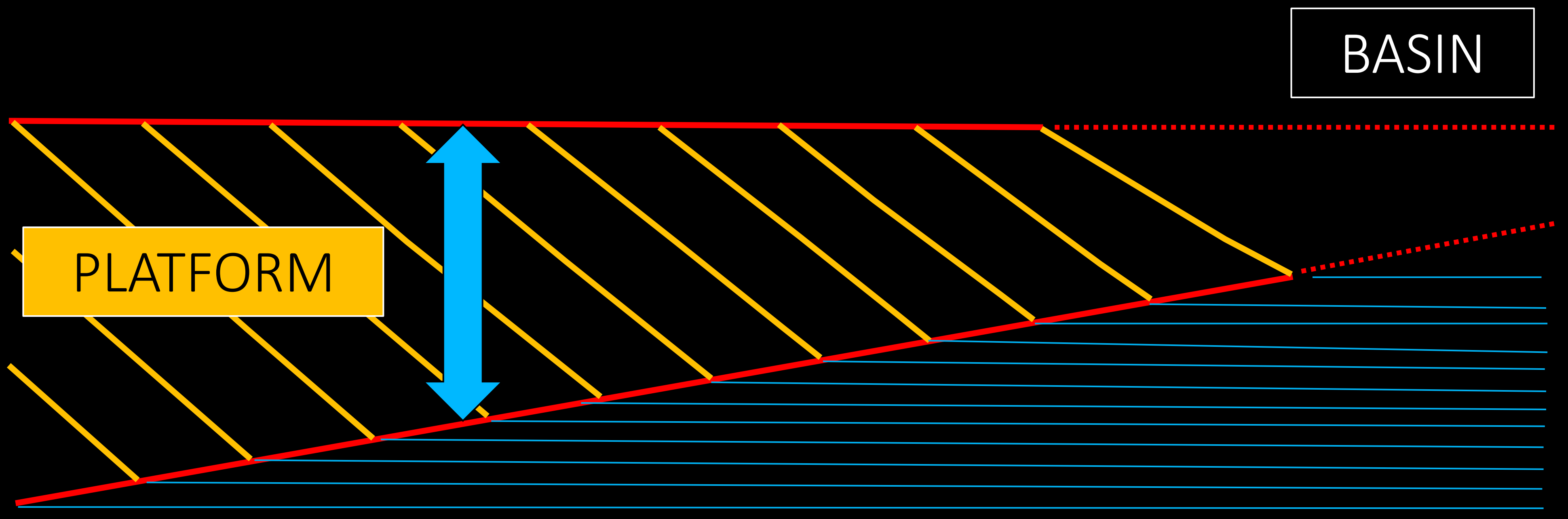
Platform geometries and basin evolution

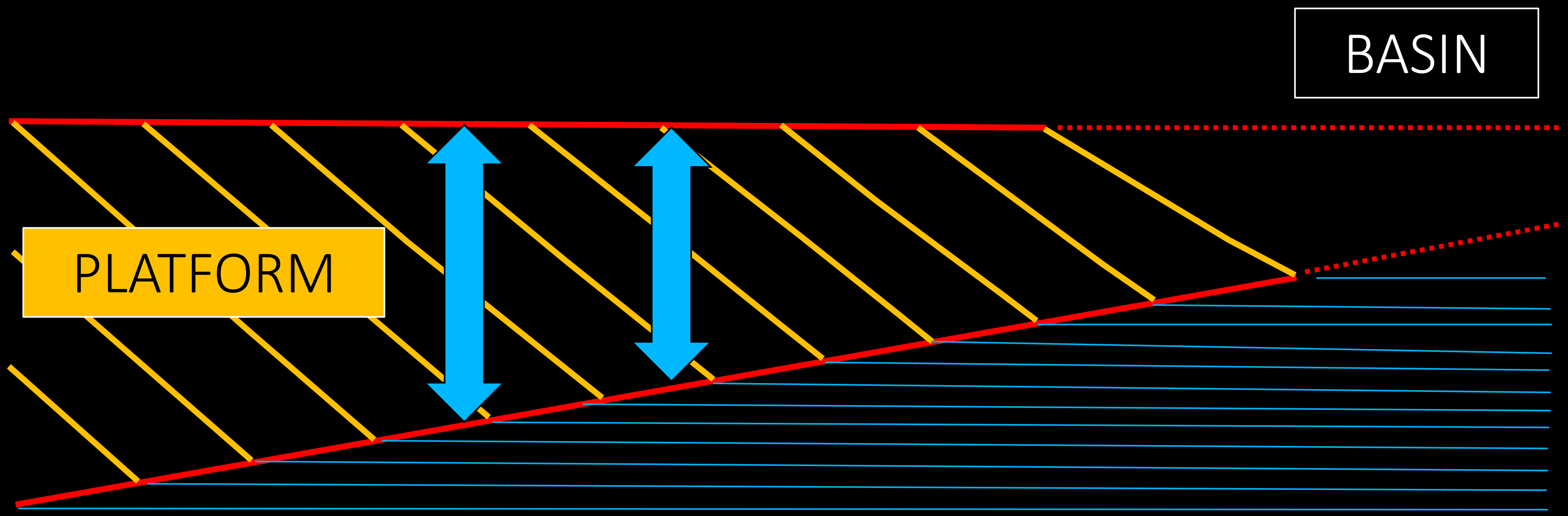
Platform break – downlap relationships



CONVERGENT

Platform geometries and basin evolution

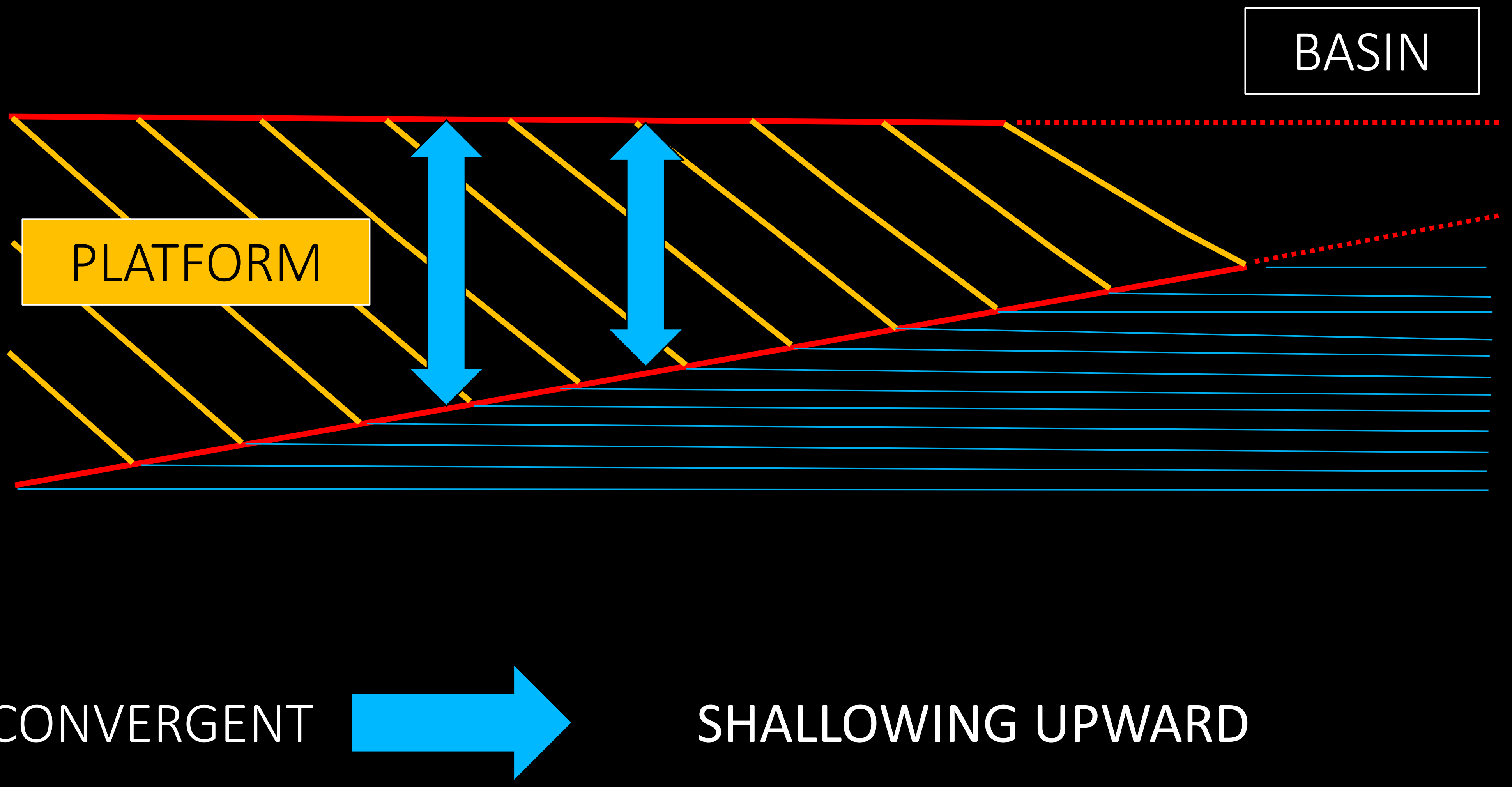
Platform break – downlap relationships

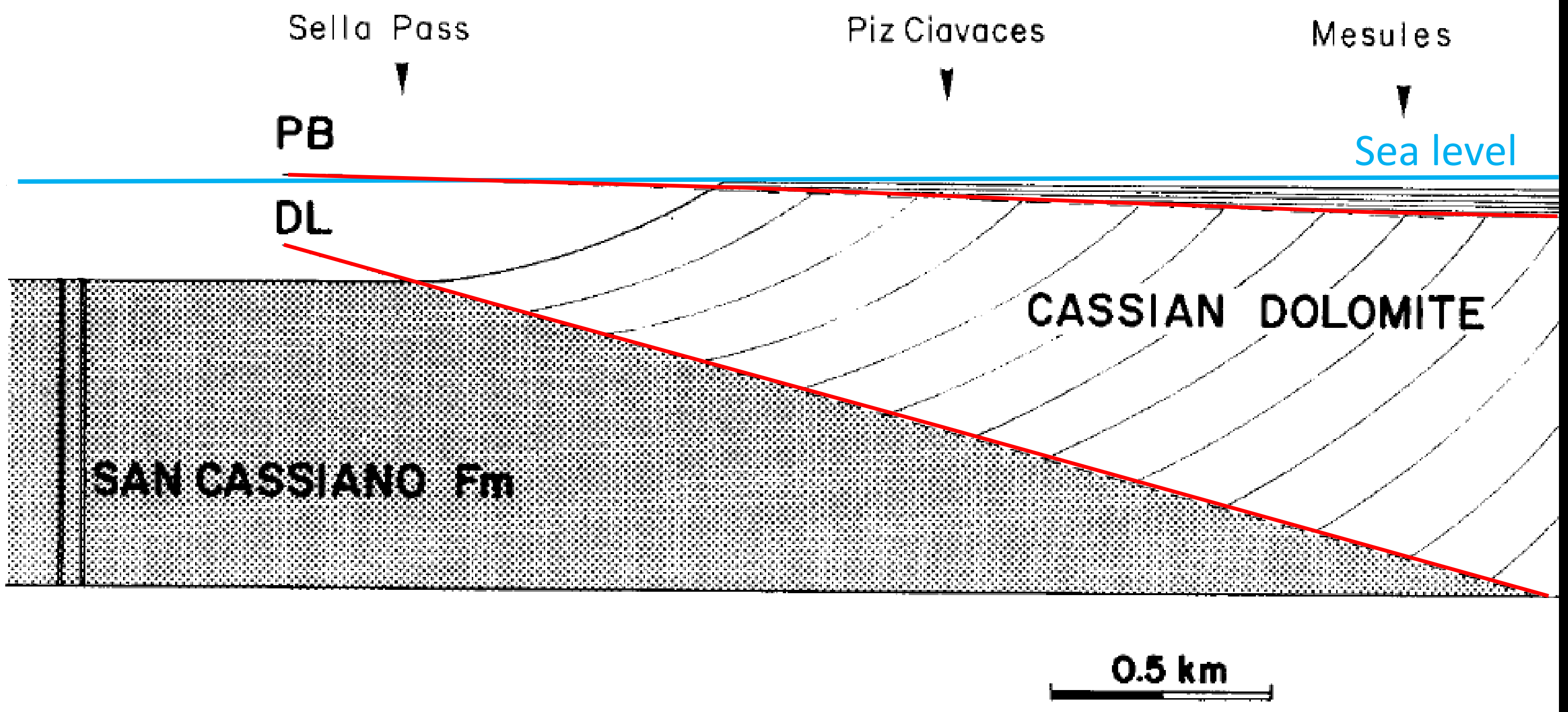


CONVERGENT

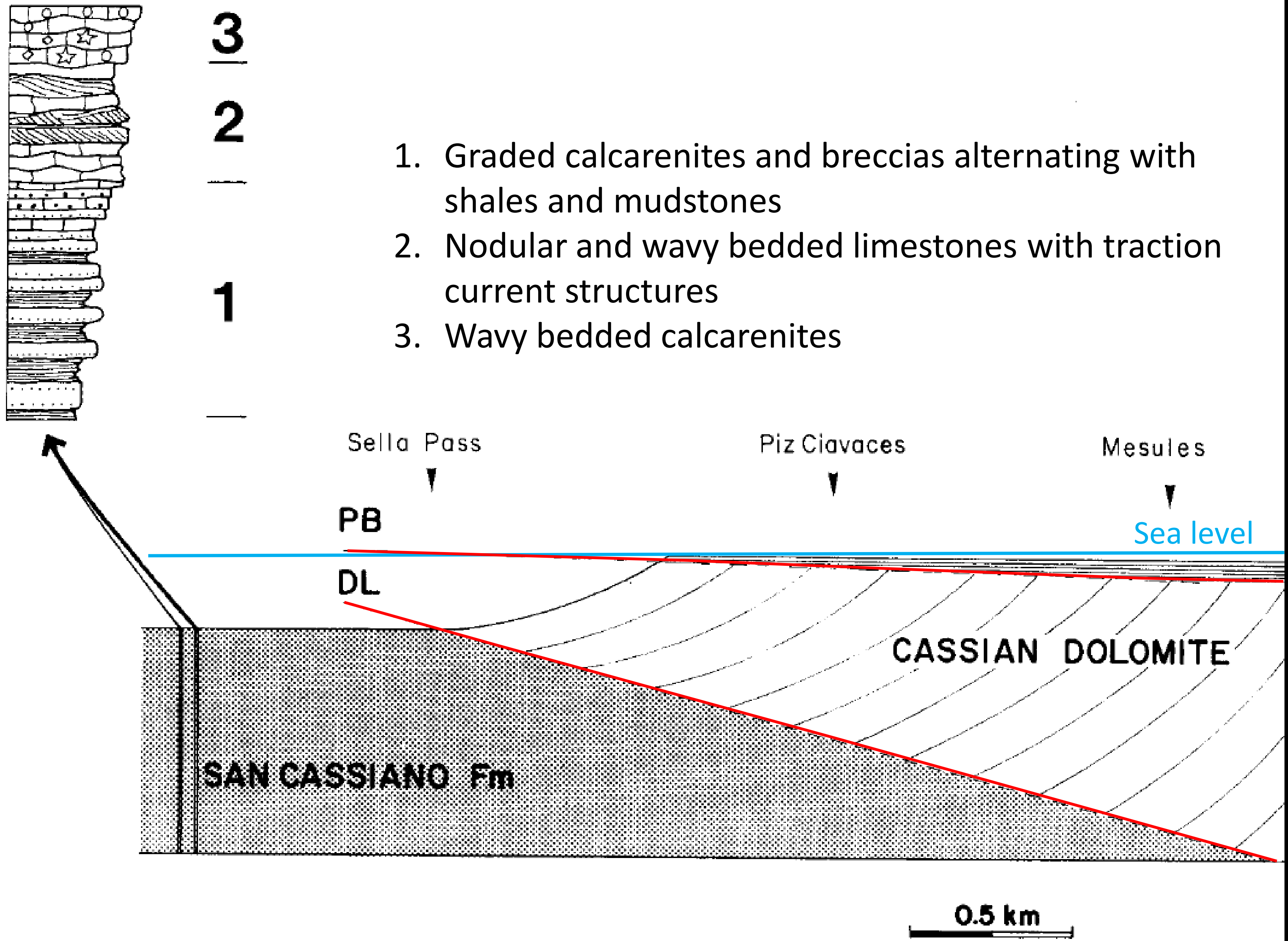
Platform geometries and basin evolution

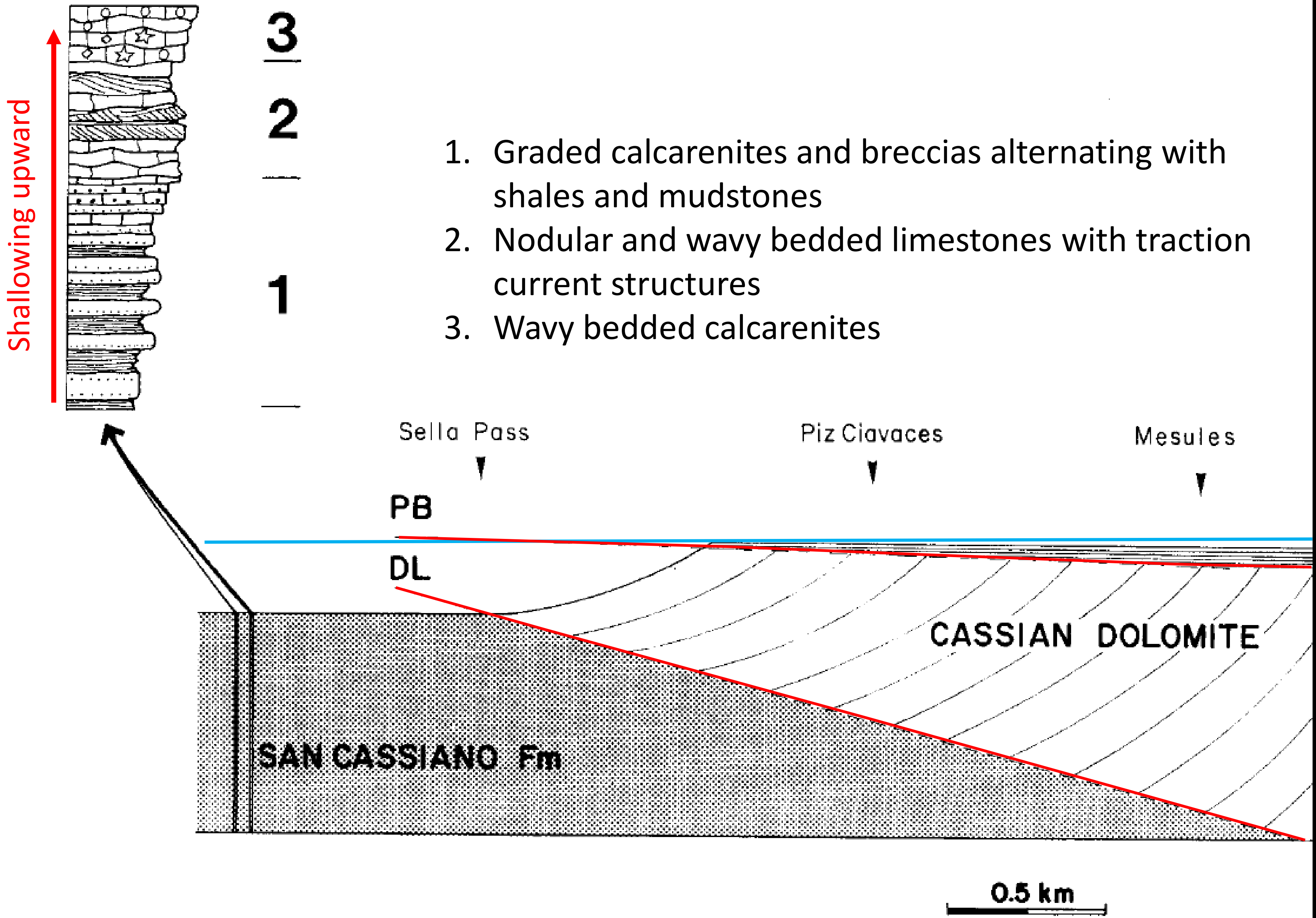
Platform break – downlap relationships




Sella Pass
Piz Ciavaces
Mesules
PB
Sea level
DL
CASSIAN DOLOMITE
SAN CASSIANO Fm
0.5 km

1. Graded calcarenites and breccias alternating with shales and mudstones
2. Nodular and wavy bedded limestones with traction current structures
3. Wavy bedded calcarenites





1. Graded calcarenites and breccias alternating with shales and mudstones
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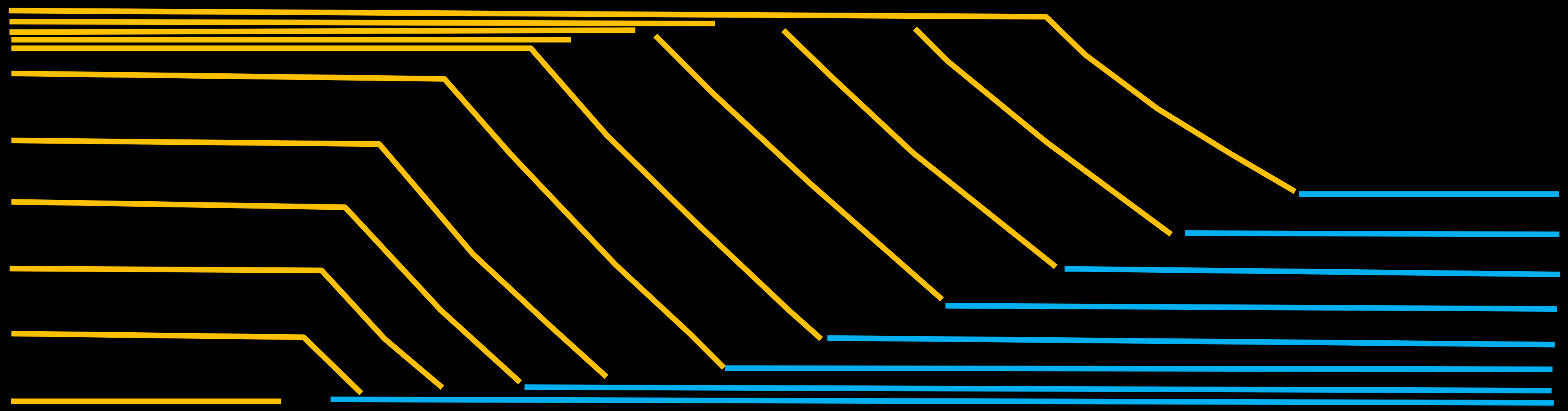
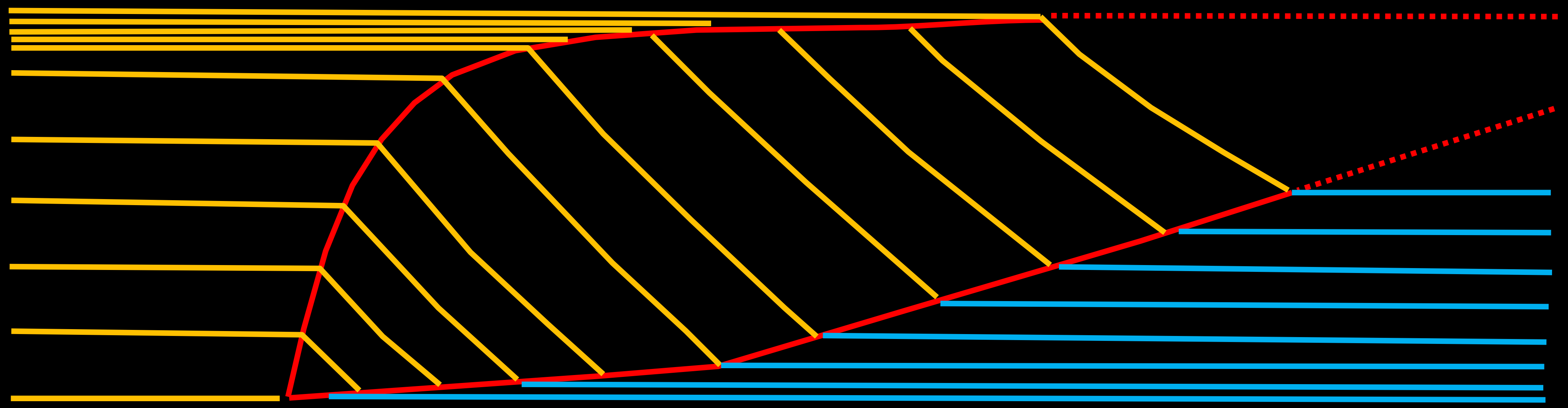
3. Wavy bedded calcarenites

Platform geometries and basin evolution



Platform geometries and basin evolution



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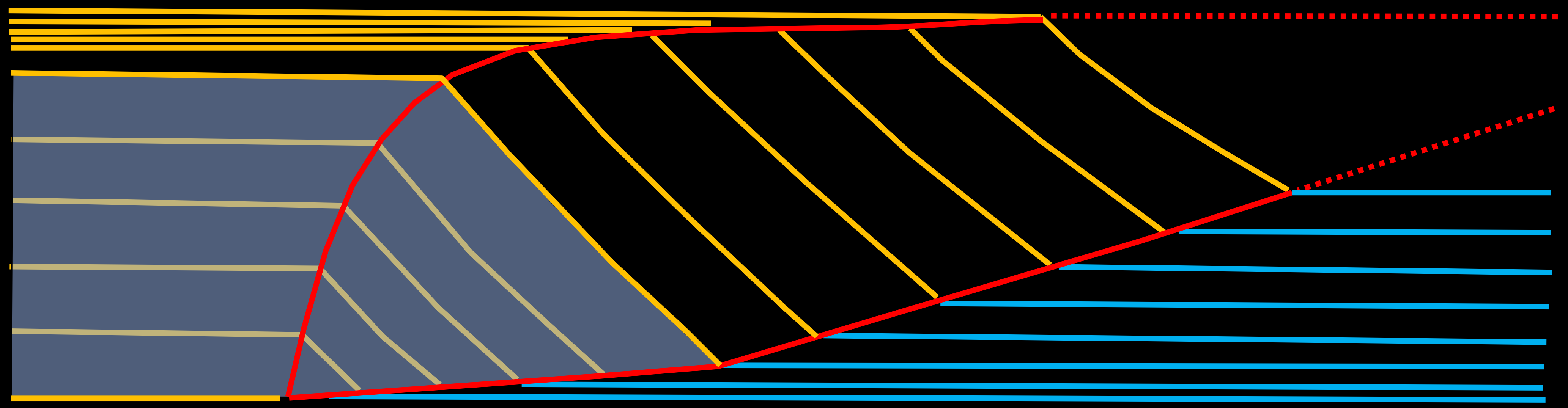
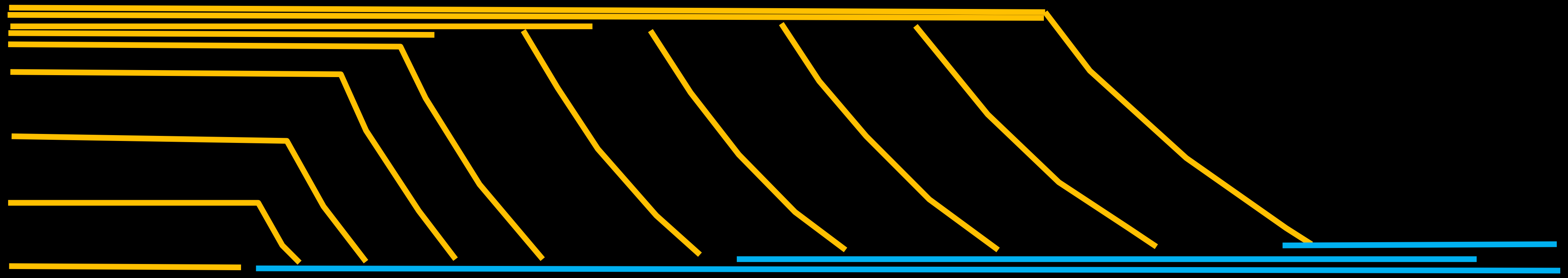
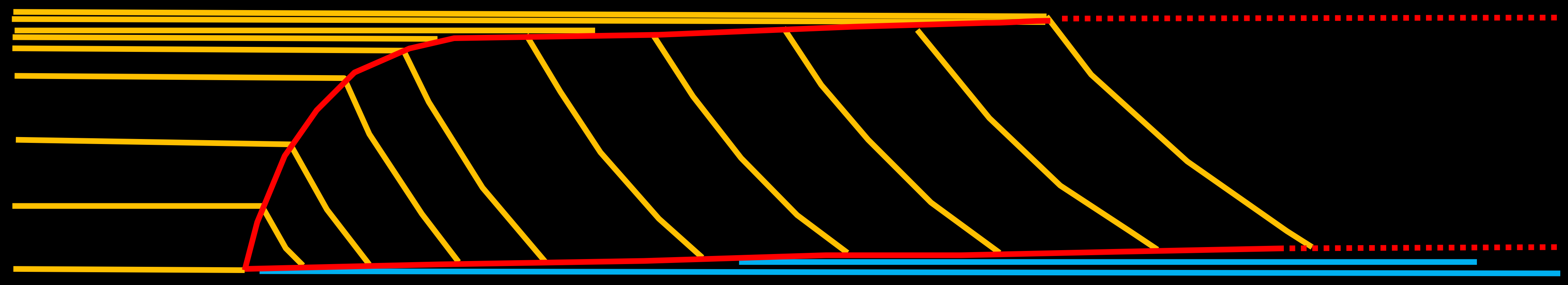


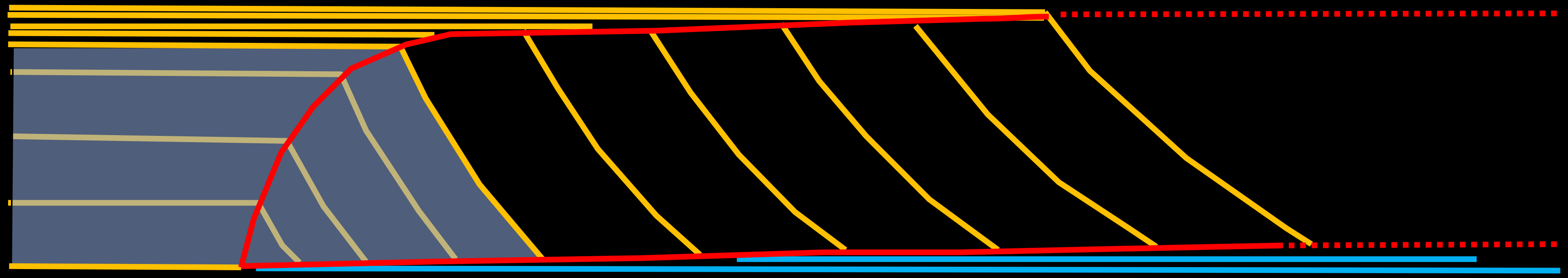
Platform geometries and basin evolution

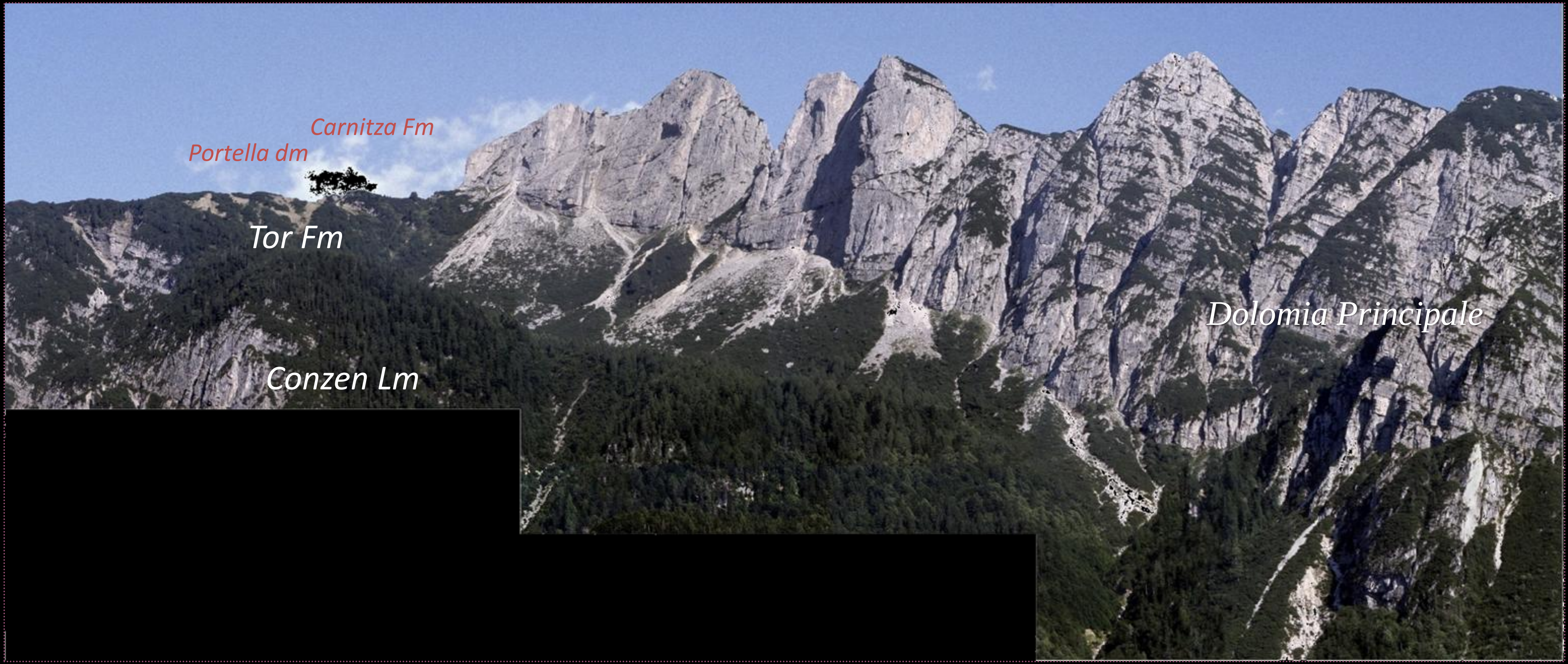


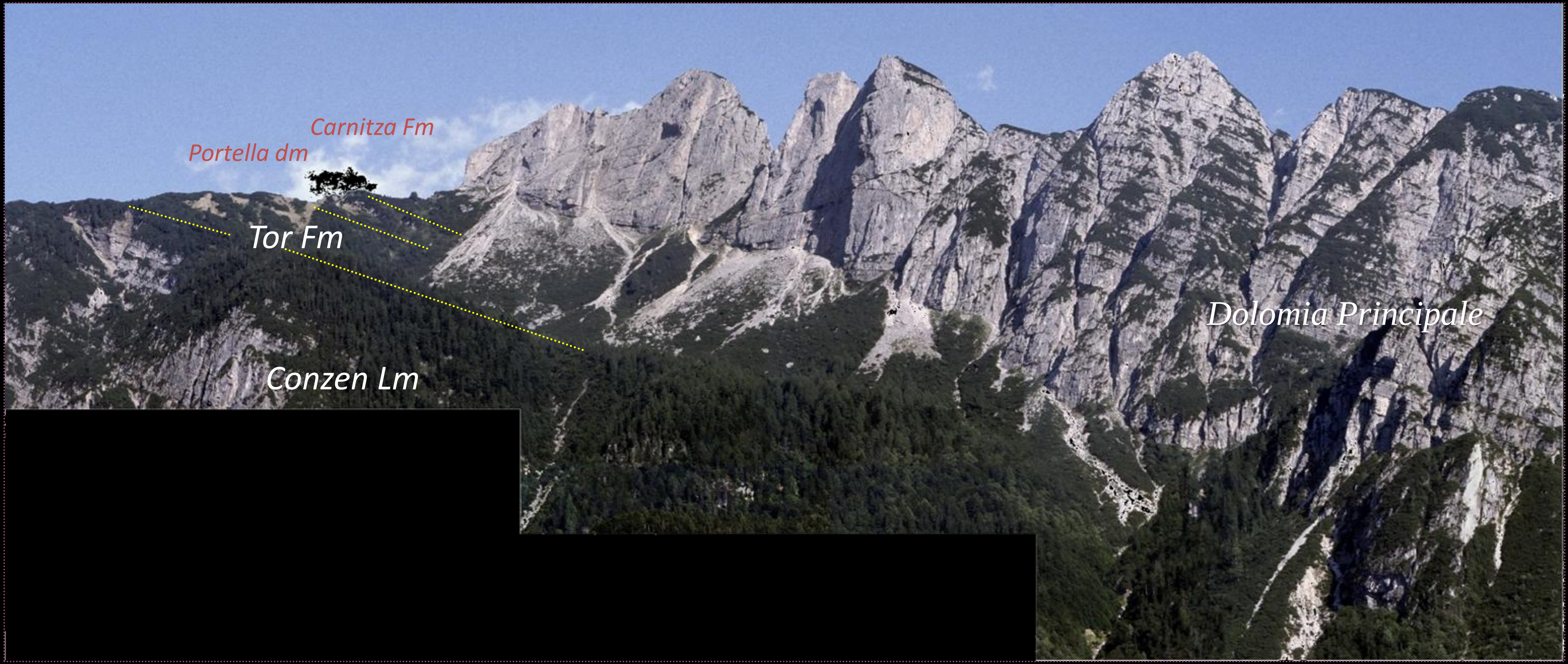
Platform geometries and basin evolution

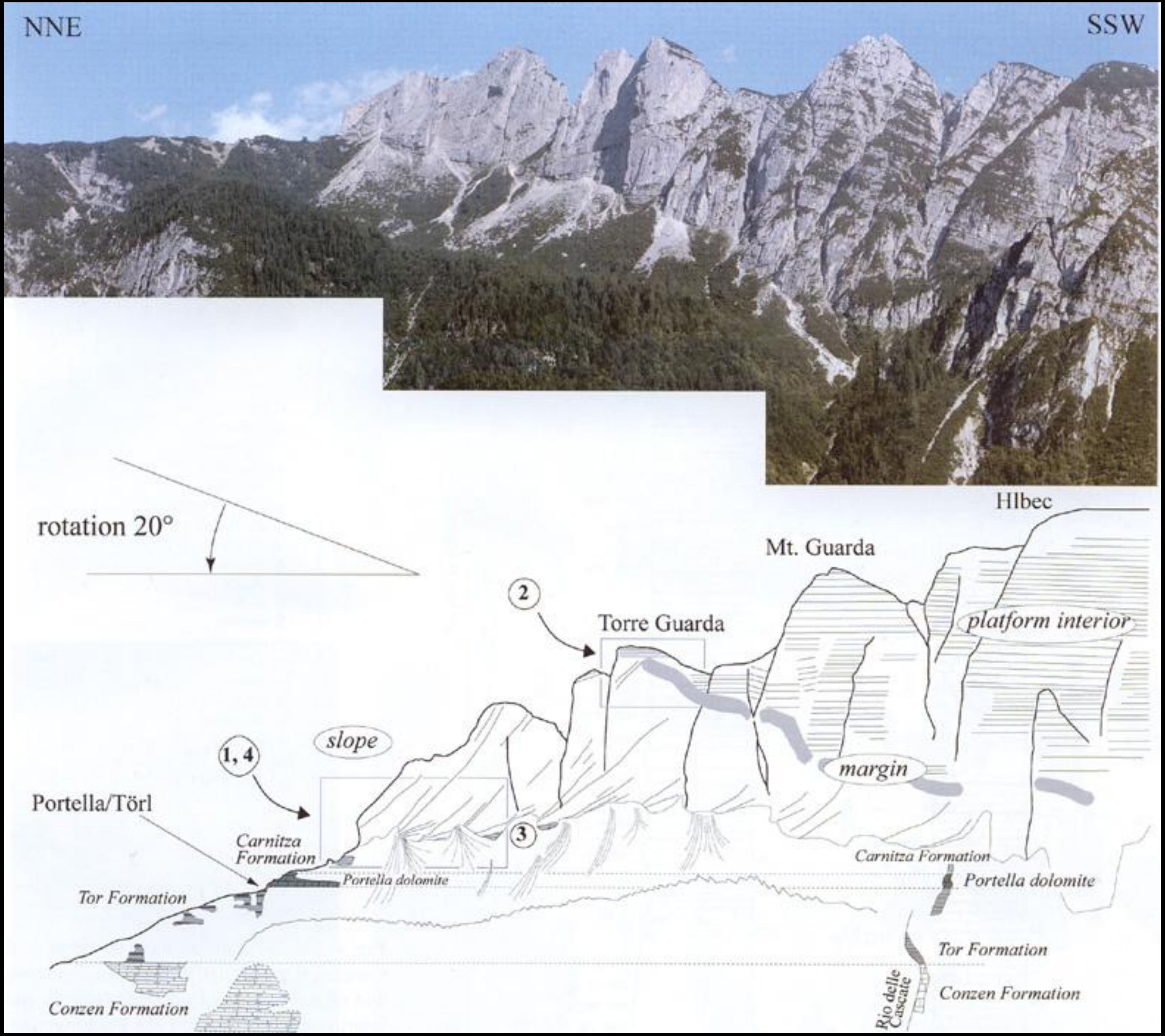


Platform geometries and basin evolution

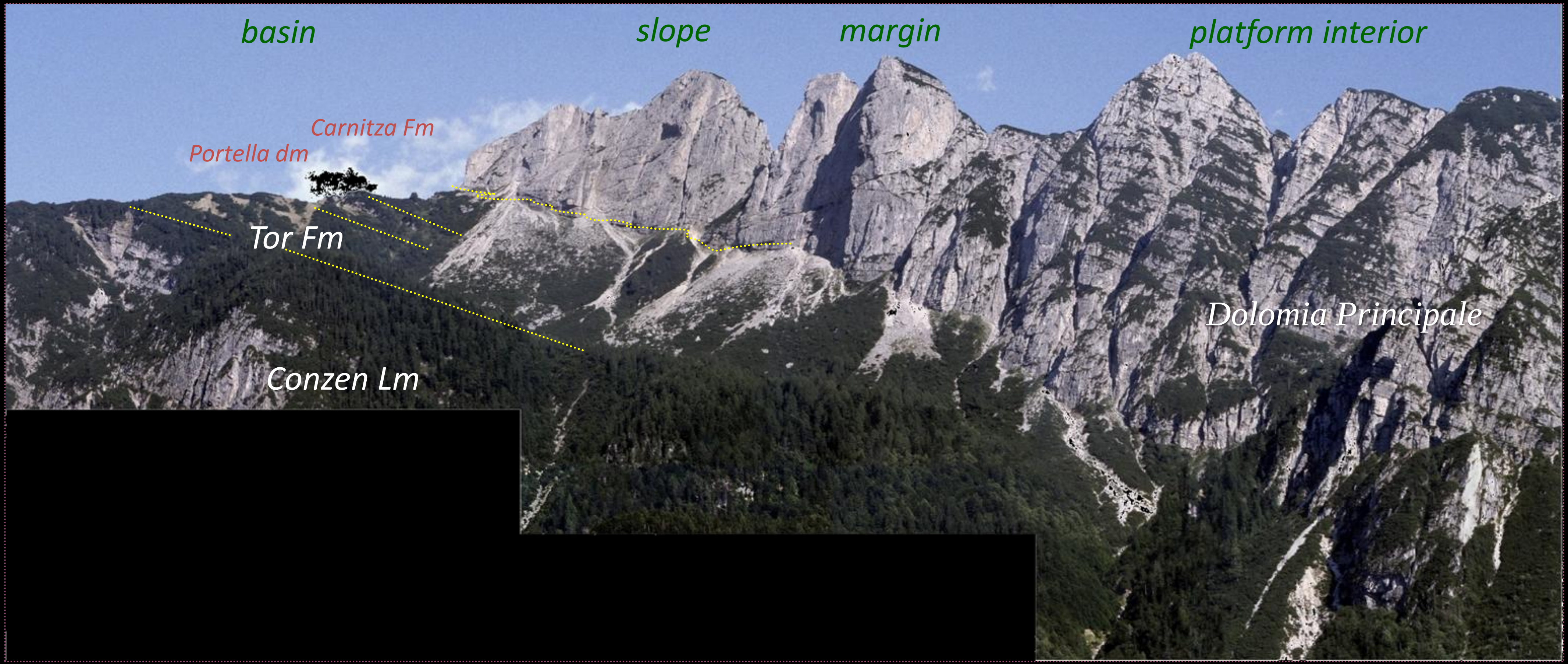


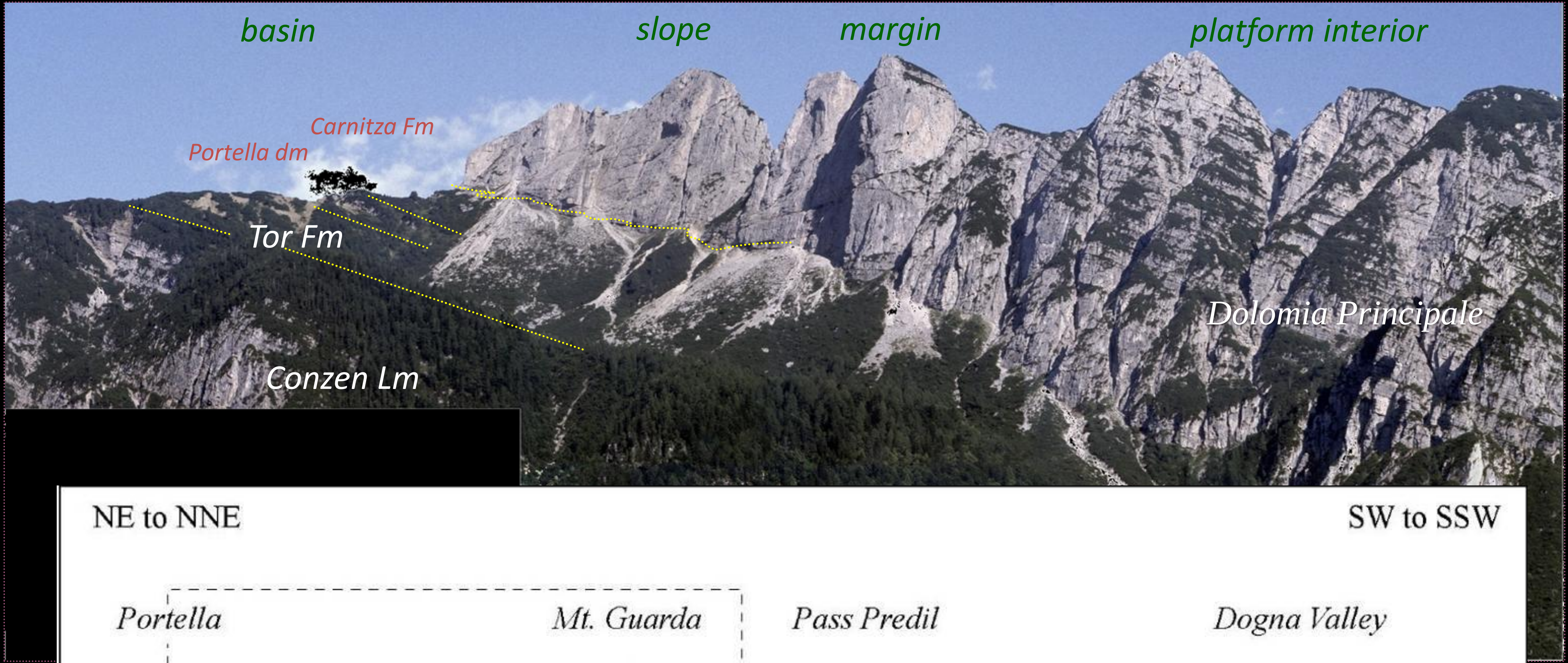

Carnitza Fm
Portella dm
Tor Fm
Conzen Lm
Dolomia Principale


Carnitza Fm
Portella dm
Tor Fm
Conzen Lm
Dolomia Principale

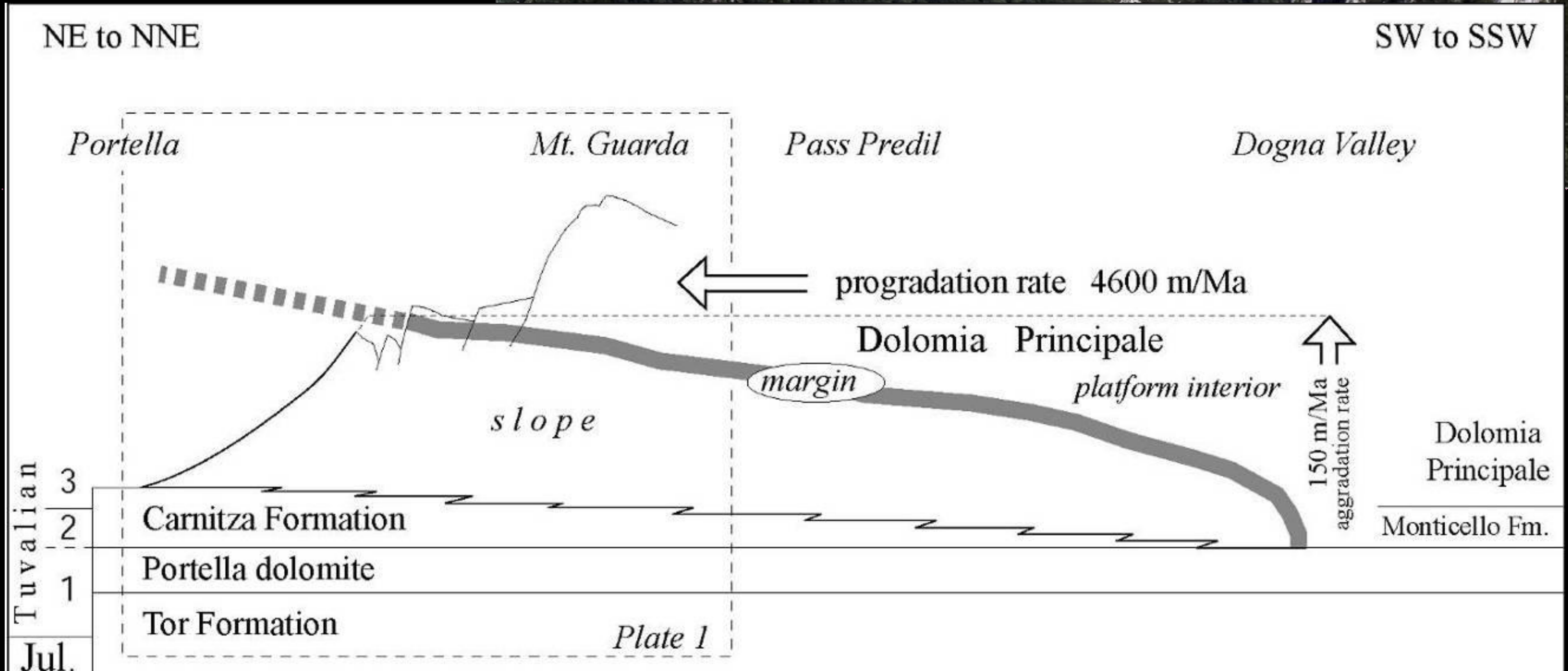


NNE
SSW
rotation 20°
Hlbec
Mt. Guarda
2
Torre Guarda
platform interior
slope
1, 4
margin
Portella/Törl
Carnitza Formation
3
Carnitza Formation
Portella dolomite
Portella dolomite
Tor Formation
Tor Formation
Conzen Formation
Rio delle Cascate
Conzen Formation


basin
slope
margin
platform interior
Carnitza Fm
Portella dm
Tor Fm
Conzen Lm
Dolomia Principale



basin
slope
margin
platform interior
Carnitza Fm
Portella dm
Tor Fm
Conzen Lm
Dolomia Principale

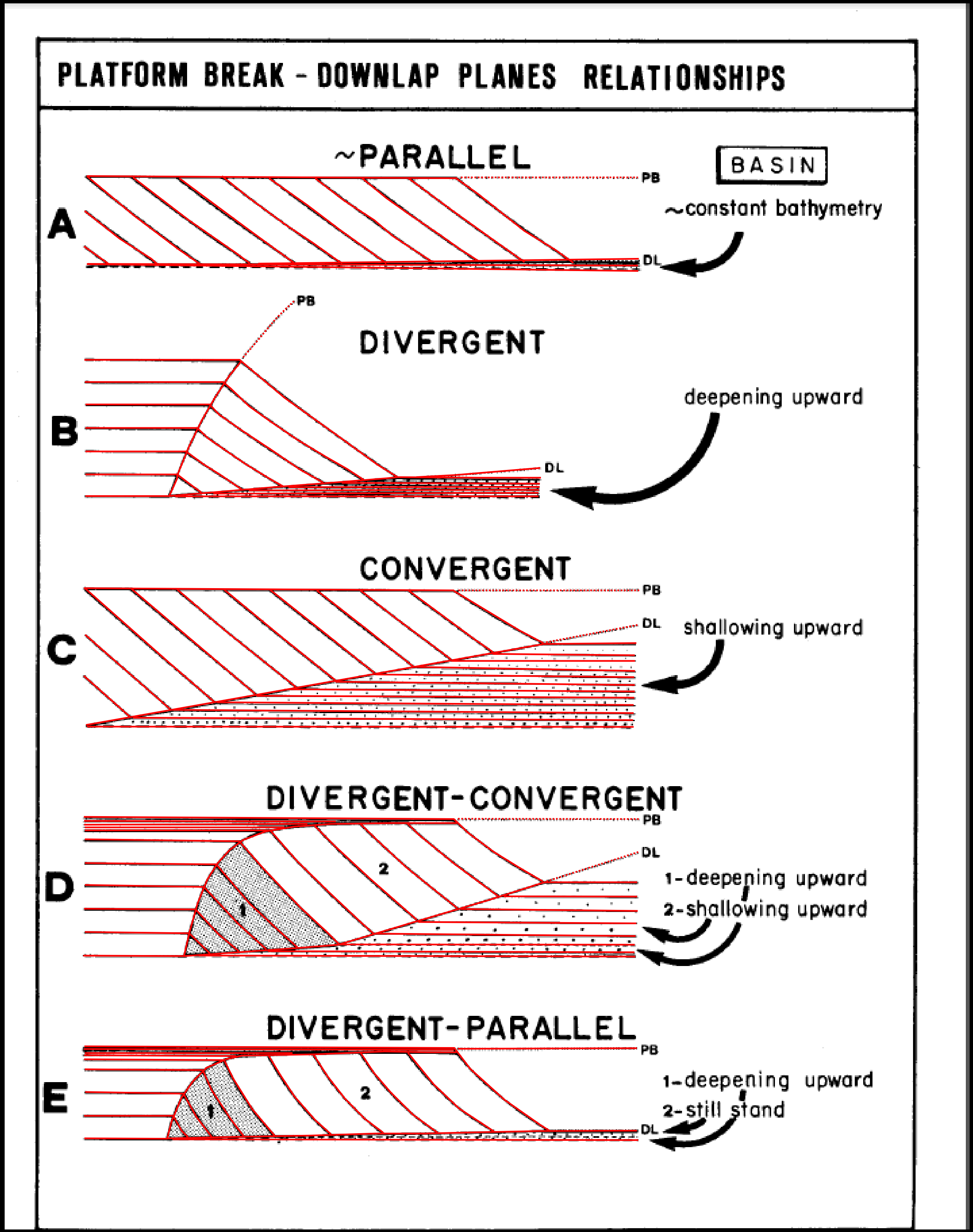


NE to NNE
SW to SSW
Portella
Mt. Guarda
Pass Predil
Dogna Valley
progradation rate 4600 m/Ma
Dolomia Principale
margin
platform interior
slope
150 m/Ma
aggradation rate
Dolomia Principale
Monticello Fm.
Tuvalian
3
2
1
Jul.
Carnitza Formation
Portella dolomite
Tor Formation
Plate 1

- Carbonate platform geometry is the results of the interplay between carbonate sediment production and relative sea level variations

- Platform break (PB) and downlap plane (DP) are two notable surfaces that can help characterizing carbonate platform growth

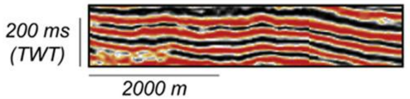
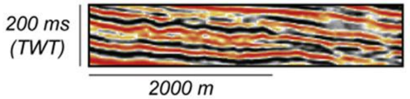
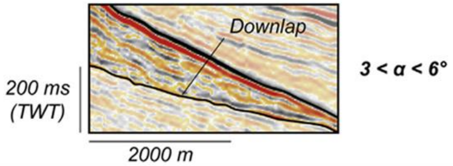
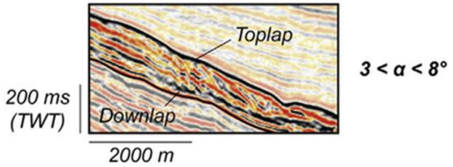
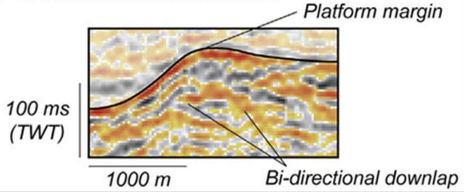
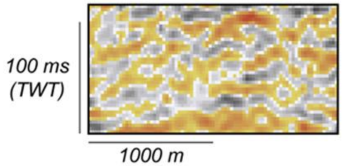
- PB – DP relationships can be parallel, divergent or convergent, or complex (a mix of the first three types)



Seismic expression of carbonate platforms

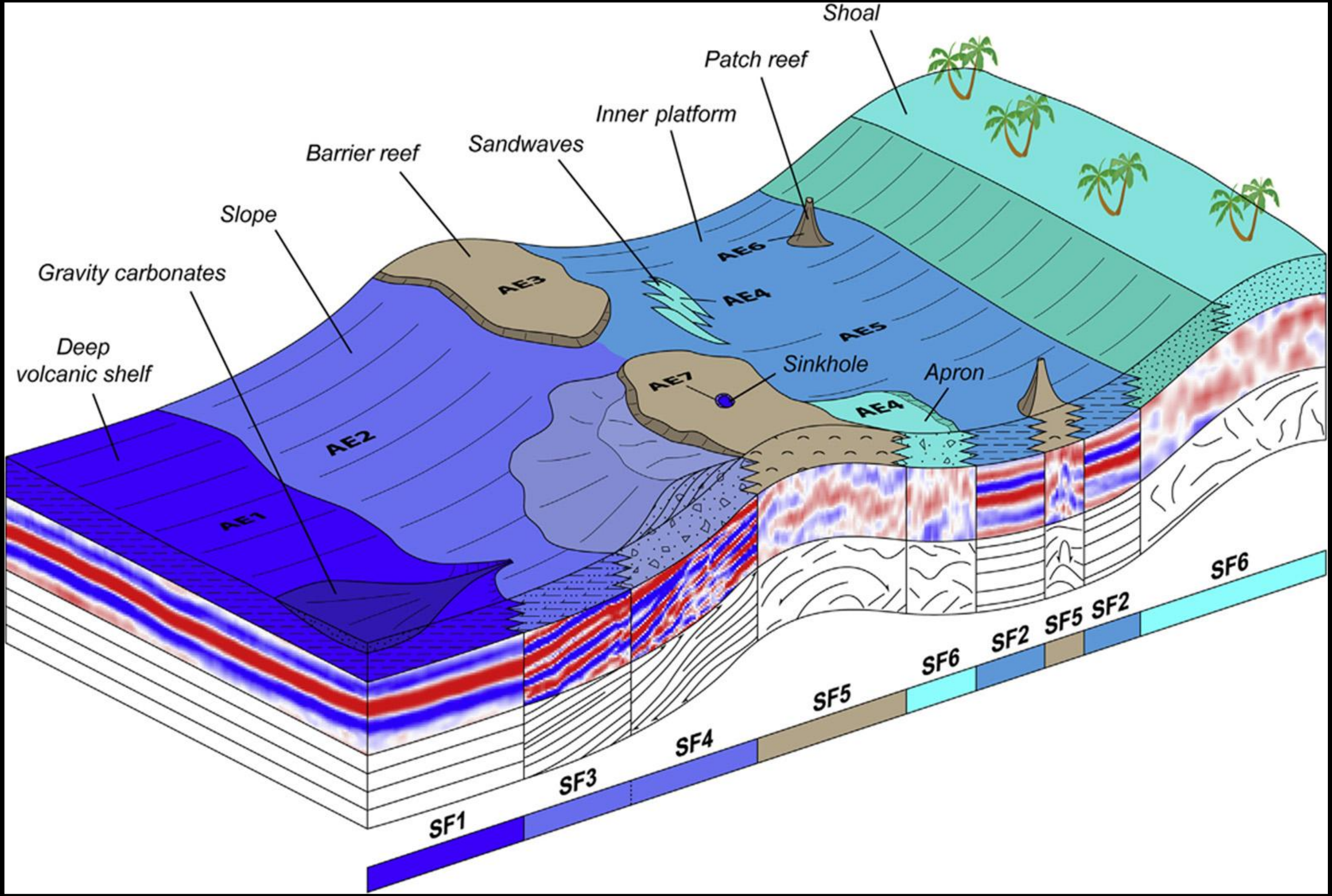
Geological knowledge of carbonate systems, how they are deposited and modified, and how they develop characteristic geometries with distinct rock properties (geobodies) is critically important for making robust and reliable seismic facies interpretations.

To the right, an example of seismic facies that can be characteristics of different carbonate platform depositional environments.

Seismic facies	Reflection characteristics	Interpretation(s)
SF1 - Parallel seismic reflectors (Basin) 	*Subhorizontal to horizontal parallel reflections* *Continuous* *High amplitude*	***Deep volcanic shelf*** *(Peri-platform carbonates)*
SF2 - Parallel seismic reflectors (Platform) 	*Wavy to horizontal parallel reflections* *Continuous* *High amplitude*	***Lagoon*** *(Platform rimmed by barrier reef)* ***Inner-platform*** *(Open platform)*
SF3 - High-angle clinoforms (oblique parallel) 	*Downlap of lower reflection terminations* *Oblique parallel clinoforms* *Semi-continuous to continuous* *Moderate to high amplitude*	***Slope*** *(Carbonate shedding)*
SF4 - High-angle clinoforms (sigmoid) 	*Downlap and toplap of reflection terminations* *Sigmoidal clinoforms* *Semi-continuous* *Moderate to high amplitude*	***Slope*** *(Carbonate progradation)*
SF5 - Mounded seismic reflectors 	*Bi-directional downlap of reflection terminations* *Mound shape (convex-up)* *Discontinuous to semi-continuous* *Low to moderate amplitude*	***Barrier reef*** *(Platform margin)* ***Patch reef*** *(Platform interior)*
SF6 - Chaotic seismic reflectors 	*Chaotic to wavy reflections* *Discontinuous (highly disrupted)* *Low amplitude*	***Shoal*** *(Platform margin)* ***Apron*** *(Platform interior)*

Hendry et al., 2021

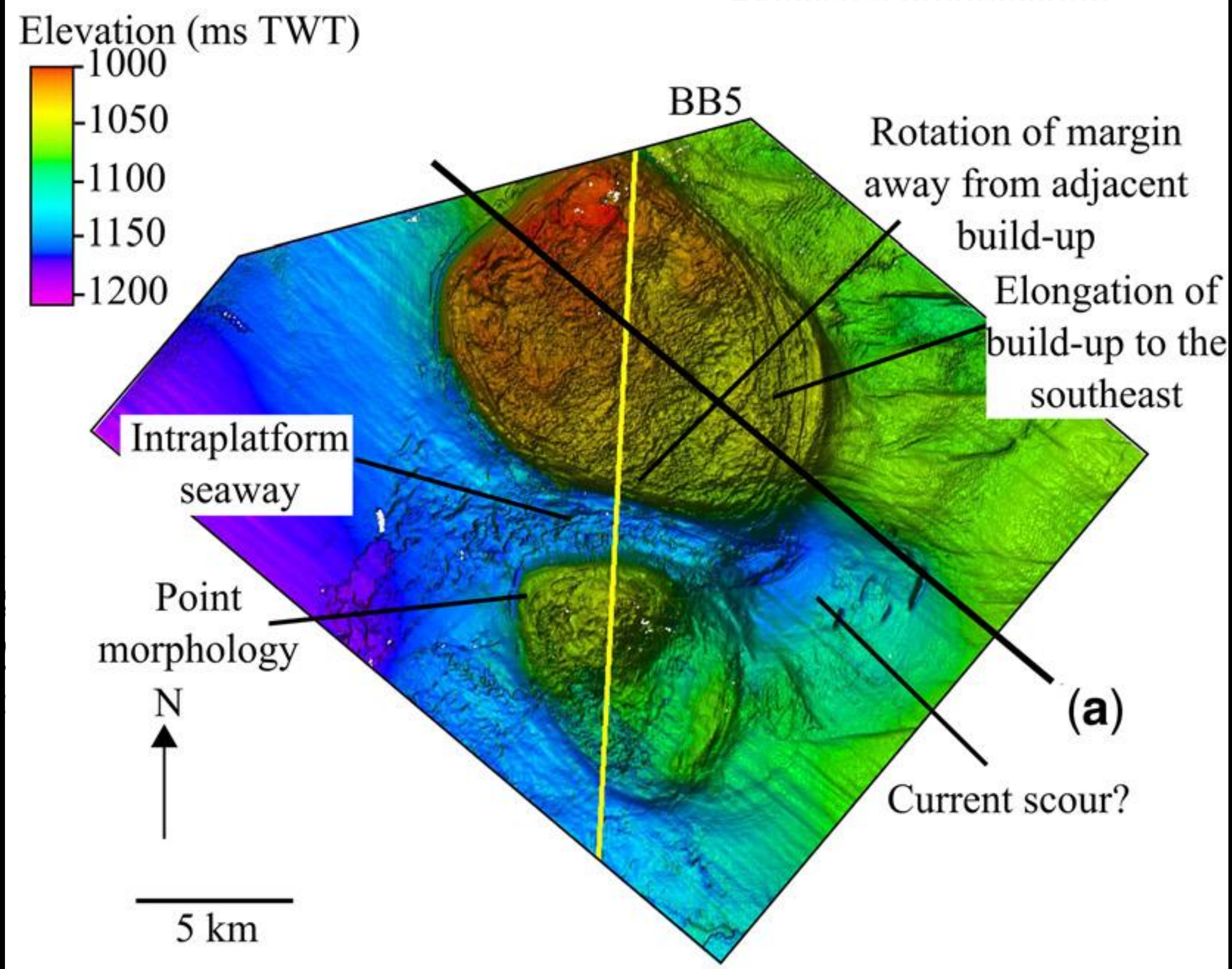
Seismic expression of carbonate platforms



Paumard et al., 2017

Seismic expression of carbonate platforms

Example of sophisticated interpretations of carbonate platform architecture, depositional processes and history, sequence and sequence stratigraphy that are possible with high-quality 3D seismic data

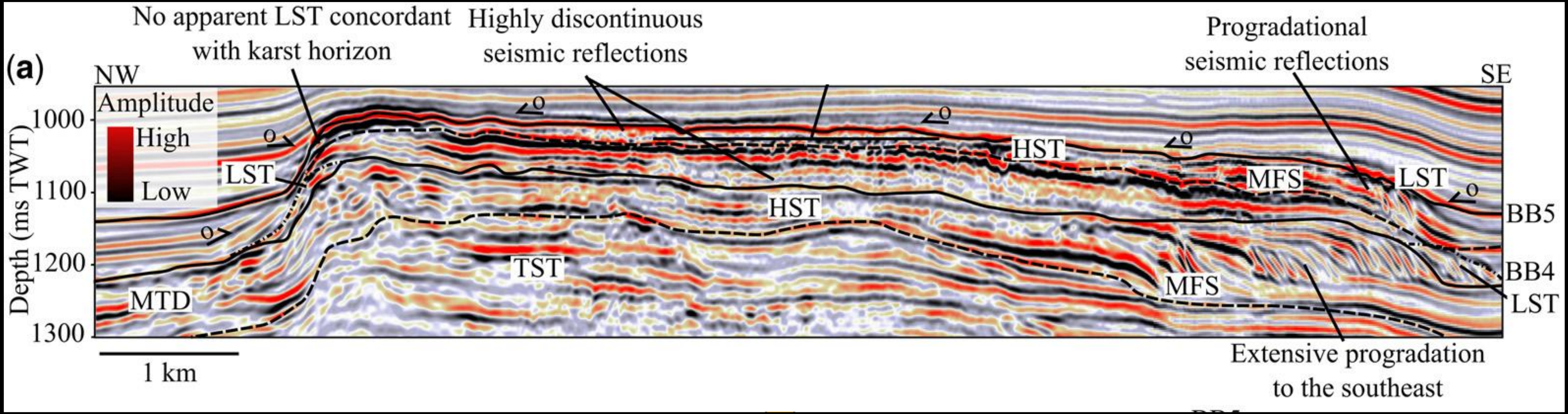


Two-way time (TWT) structure map of BB5 platform (Miocene isolated platform from the Browse Basin, offshore NW Australia. NW Australia) revealing northeast-southwest elongation of final phase carbonate build-ups. An intraplatform seaway is observed between the two build-ups, with a topographic depression observed where the intraplatform seaway exits the two build-ups. Carbonate build-up margins show evidence for rotation

away from one another due to currents

Hendry et al., 2021

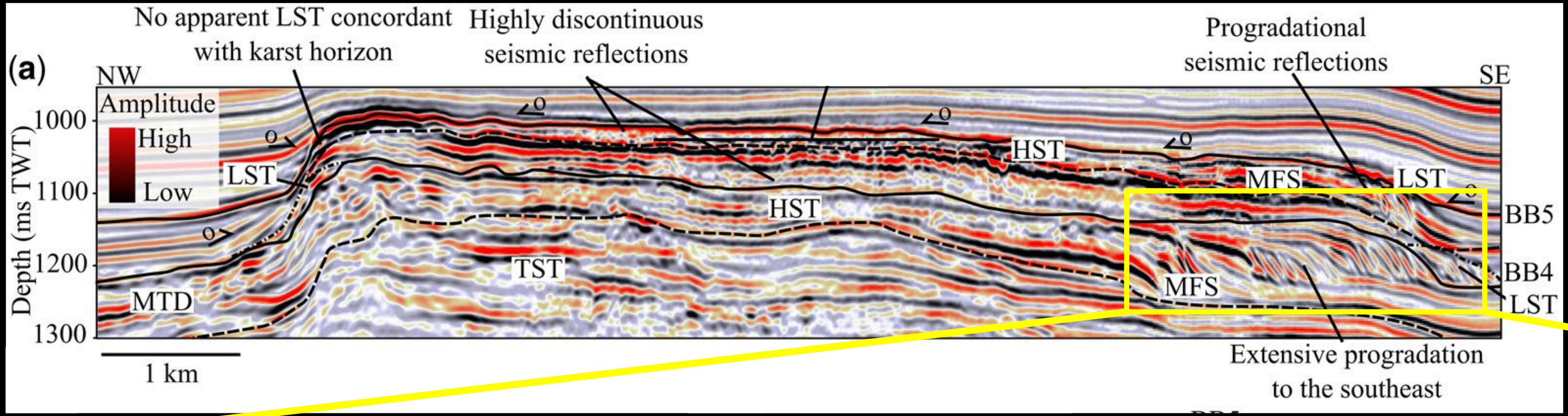
Seismic expression of carbonate platforms



Hendry et al., 2021

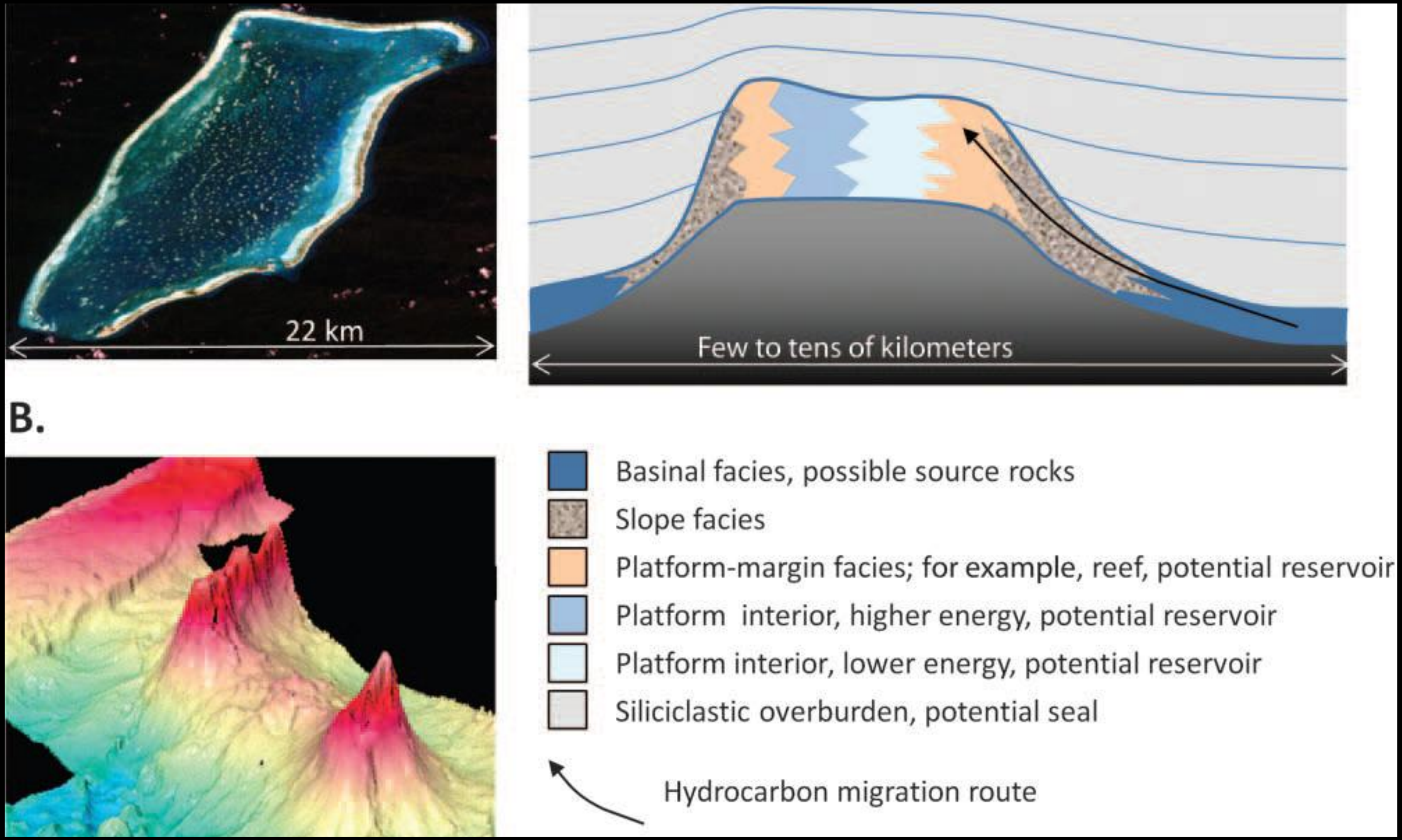
Interpreted 2D seismic section (a in previous slide)

Seismic expression of carbonate platforms



Seismic expression of carbonate platforms

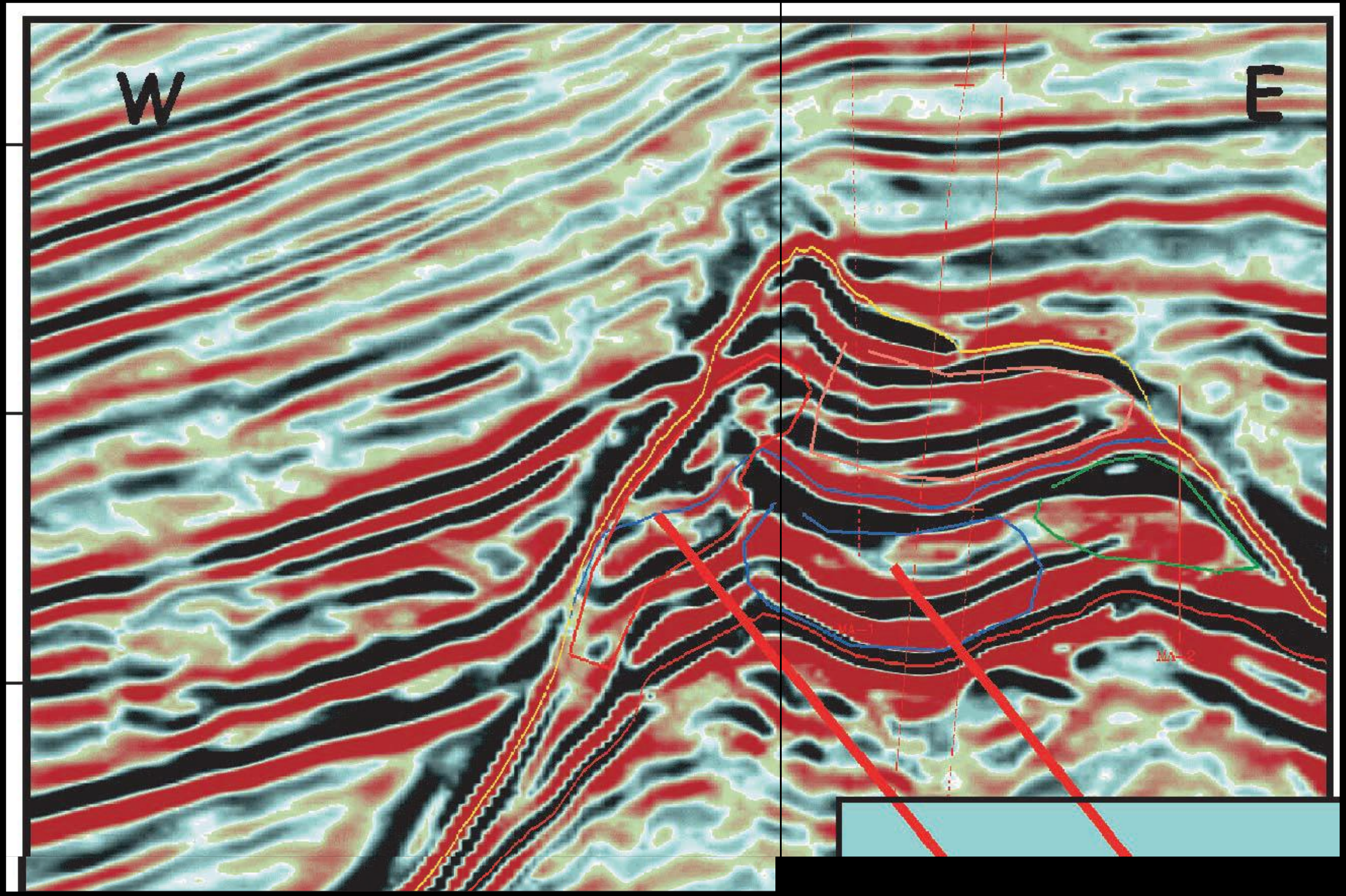
An isolated carbonate platform can be a significant reservoir.



Burgess et al., 2013

Seismic expression of carbonate platforms

Identification of carbonate platform in seismic can be challenging because in some cases there are other objects whose expression in seismic can be very close to that of carbonate bodies. An example are volcanoes that in seismic can be easily misinterpreted as isolated carbonate buildups and vice versa.



Example of seismic imaging of an isolated carbonate platform (Oligocene – Miocene, Malaysia)

From Eberli et al., 2004

Seismic expression of carbonate platforms

Some criteria has been proposed to help in the identification of an isolated carbonate platform. There are four main constraint types

Regional and stratigraphic constraints (e.g. timing? What types of reef builders were characteristics?)

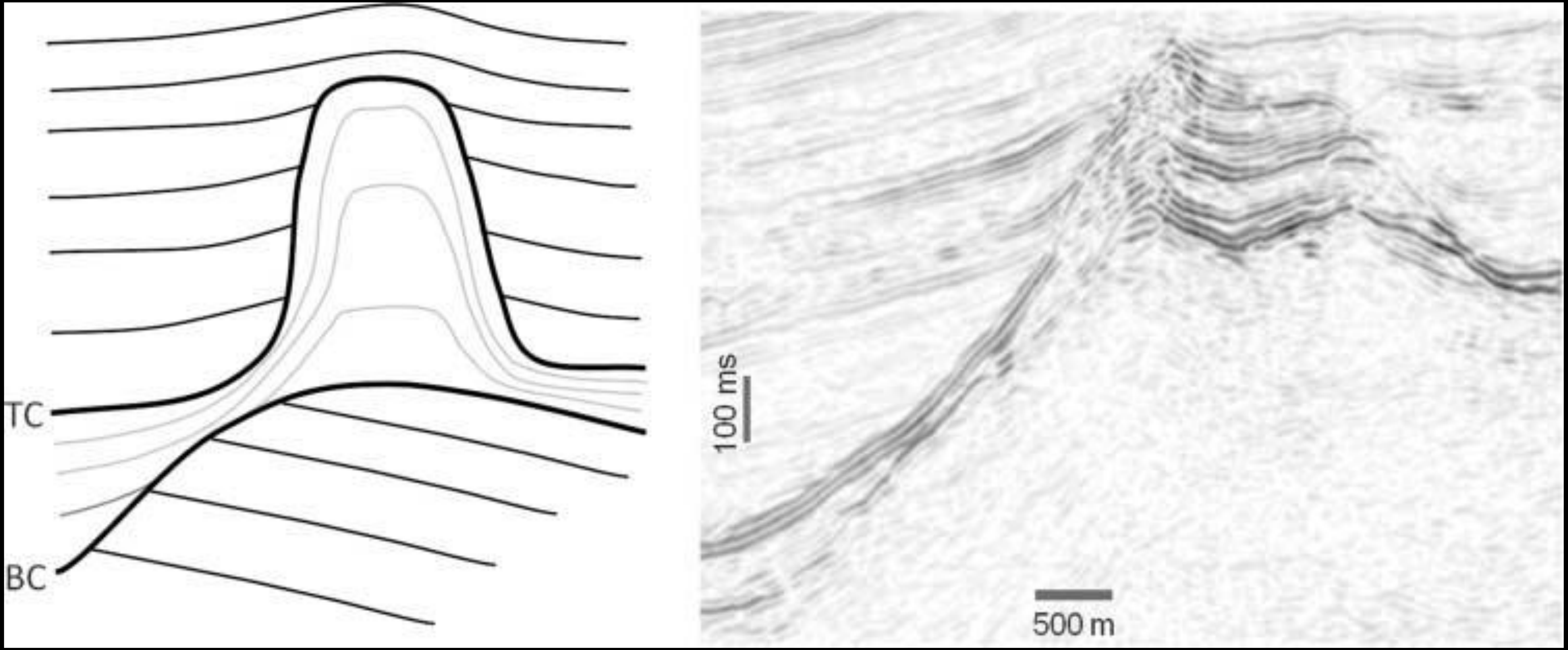
Large-scale seismic morphology and basin geometries (e.g. high-angle isolated carbonate buildup margins; Positive antecedent topography, presence of paleohighs. Significant localized thickening, aggradational/progradational platform margin trajectory)

Geophysical characteristics (e.g. absence of gravity and magnetic anomalies)

Finer-scale seismic geometries (e.g. Appropriate interior seismic character)

Seismic expression of carbonate platforms

Large-scale seismic morphology and basin geometries
Example of positive antecedent topgraphy

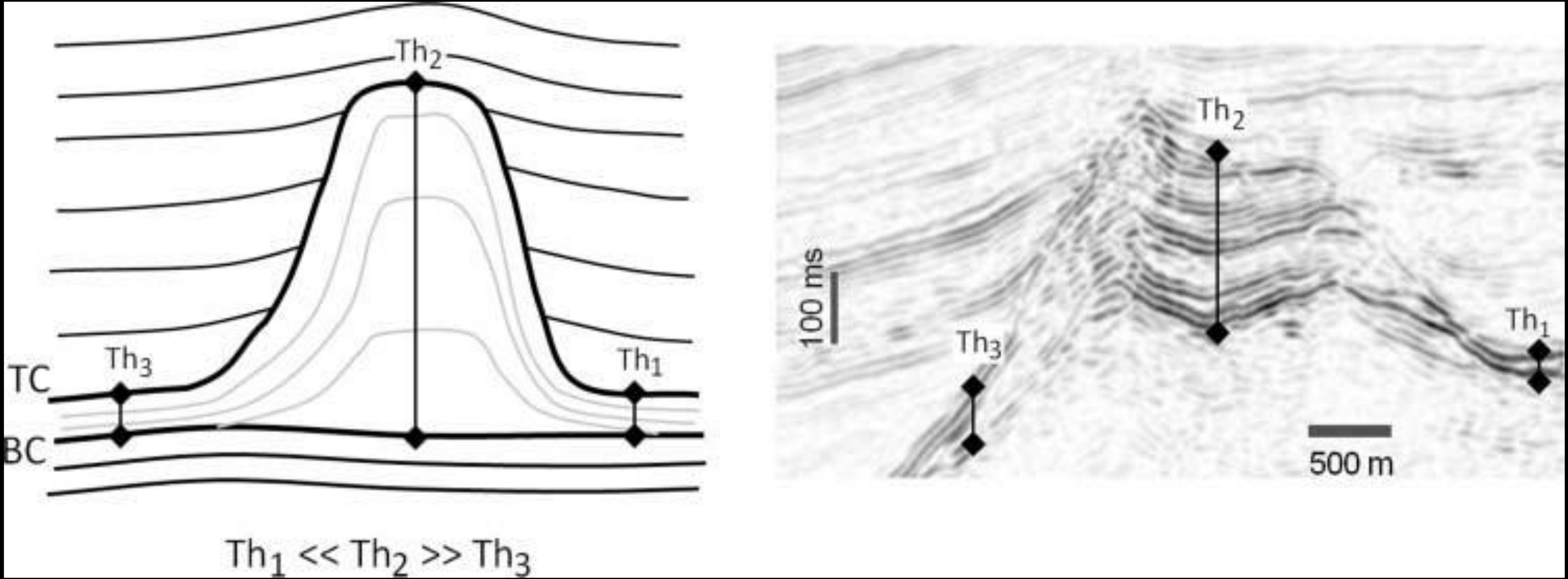


Burgess et al., 2013

Seismic expression of carbonate platforms

Large-scale seismic morphology and basin geometries

Example of significant localized thickening

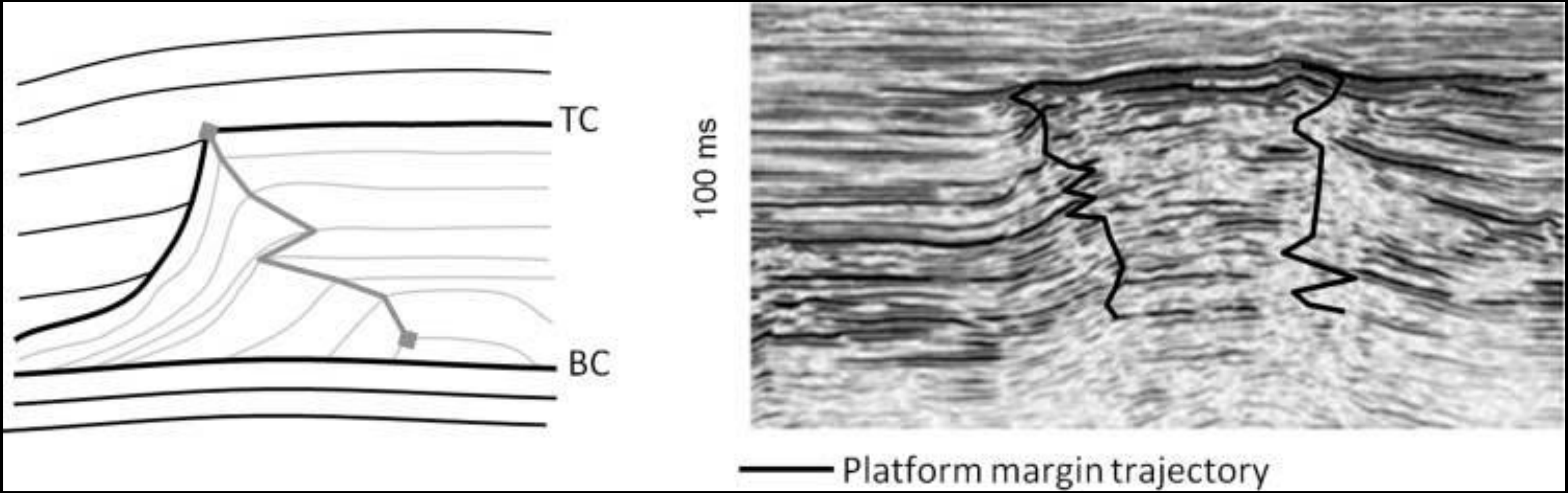


Burgess et al., 2013

Seismic expression of carbonate platforms

Large-scale seismic morphology and basin geometries

Example of aggradational/progradational/retrogradational platform marging trajectory



Burgess et al., 2013