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ESTRATIGRAFIA SECUENCIAL: PRINCIPIOS BASICOS Y SU RELACION A LA DISTRIBUCION DE LA MATERIA ORGANICA

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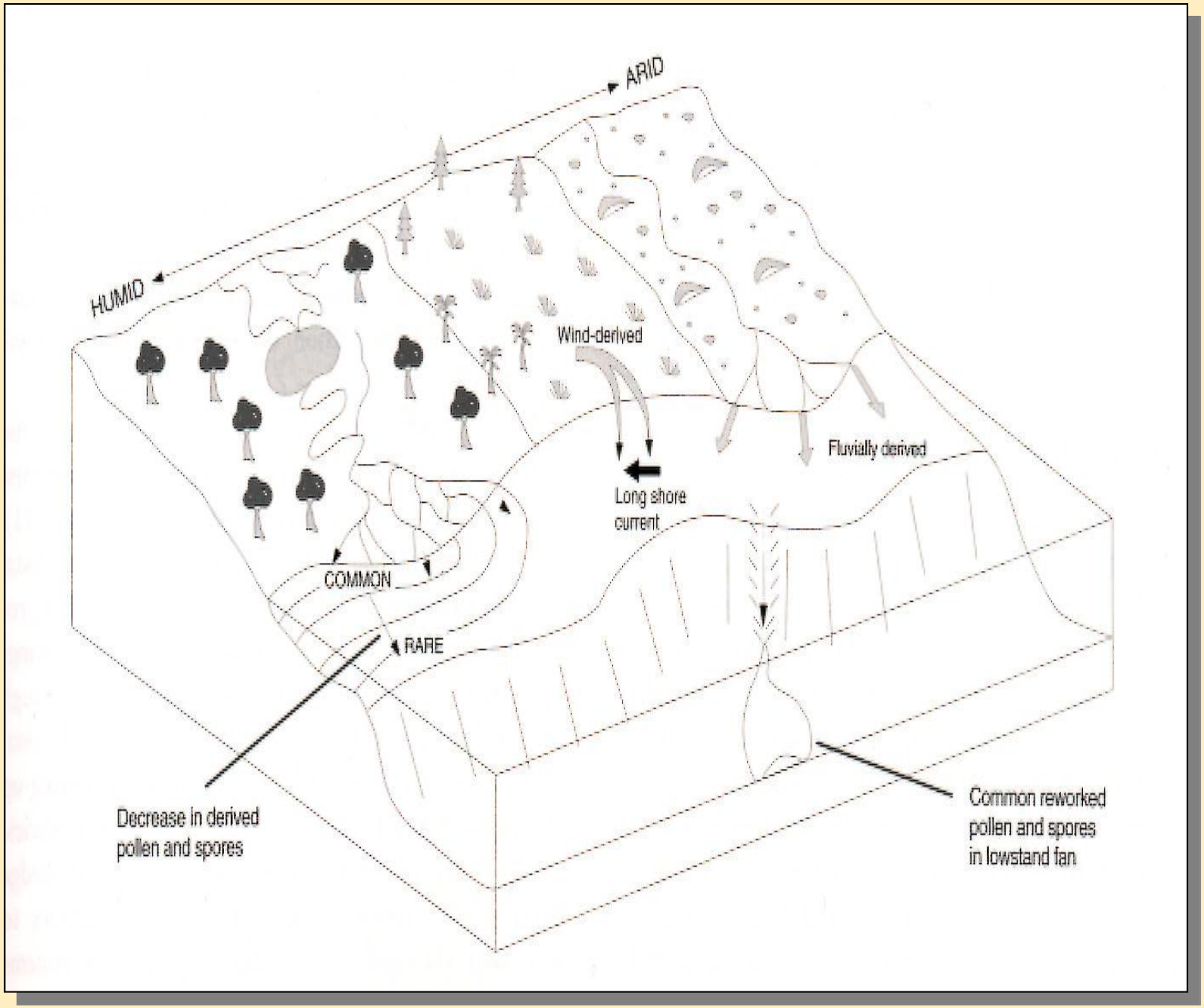
Fundamentos básicos

- Patrones cíclicos que se repiten en el tiempo geológico:

  - Secuencias de 1 er. Orden: 200-500 Ma
    (Ciclo global supercontinental: "rifting")
  - Secuencias de 2 do. Orden: 10-100 Ma
    (Cambios eustáticos, márgenes activos)
  - Secuencias de 3 er. Orden: 10.000 a-10 Ma
    (Cinemática de placa regional)
  - Secuencias de 4 to. Y - 5 to. Orden: 10.000 a-2 Ma
    (Ciclos de Milankovitch, Ciclotemas)

- Factores determinantes: Eustasia, Tectónica, Subsidencia, Clima


ARID
HUMID
Wind-derived
Fluvially derived
Long shore
current
COMMON
RARE
Decrease in derived
pollen and spores
Common reworked
pollen and spores
in lowstand fan

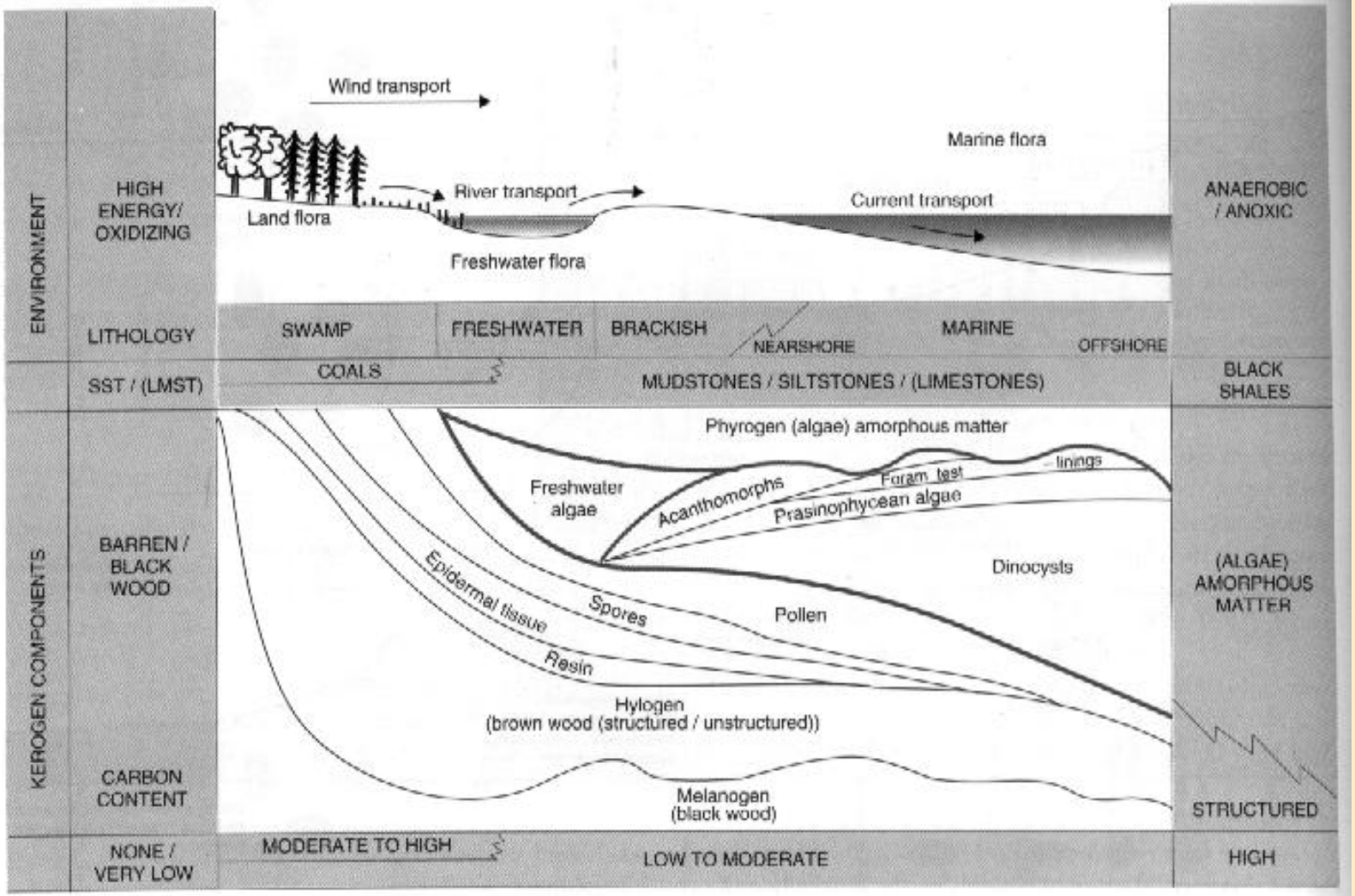


Fig. 6.5 Palynofacies: the distribution of palynological particle types in specific environments

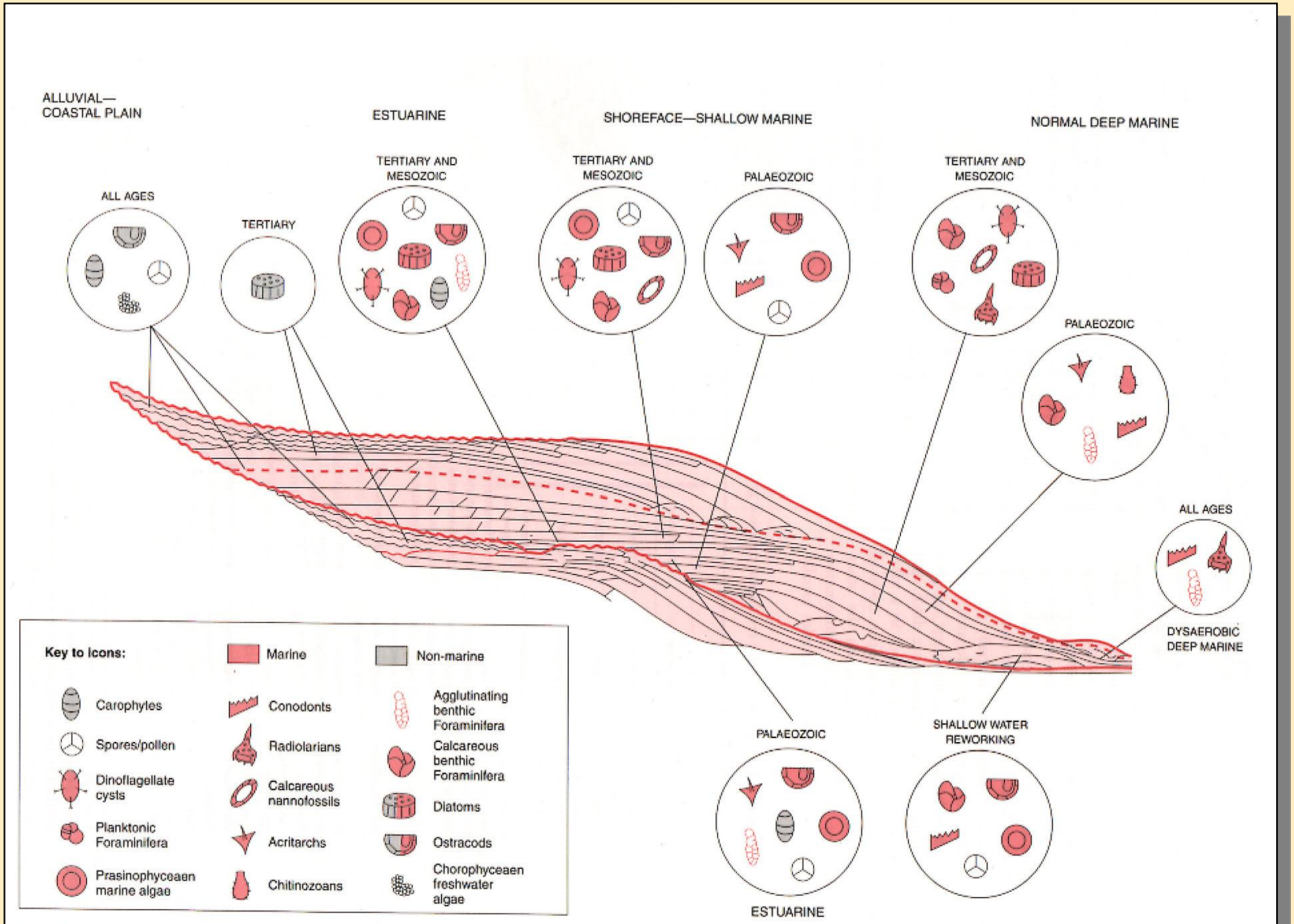


Fig. 6.2 Palaeoenvironmental distribution for some of the main microfossil groups

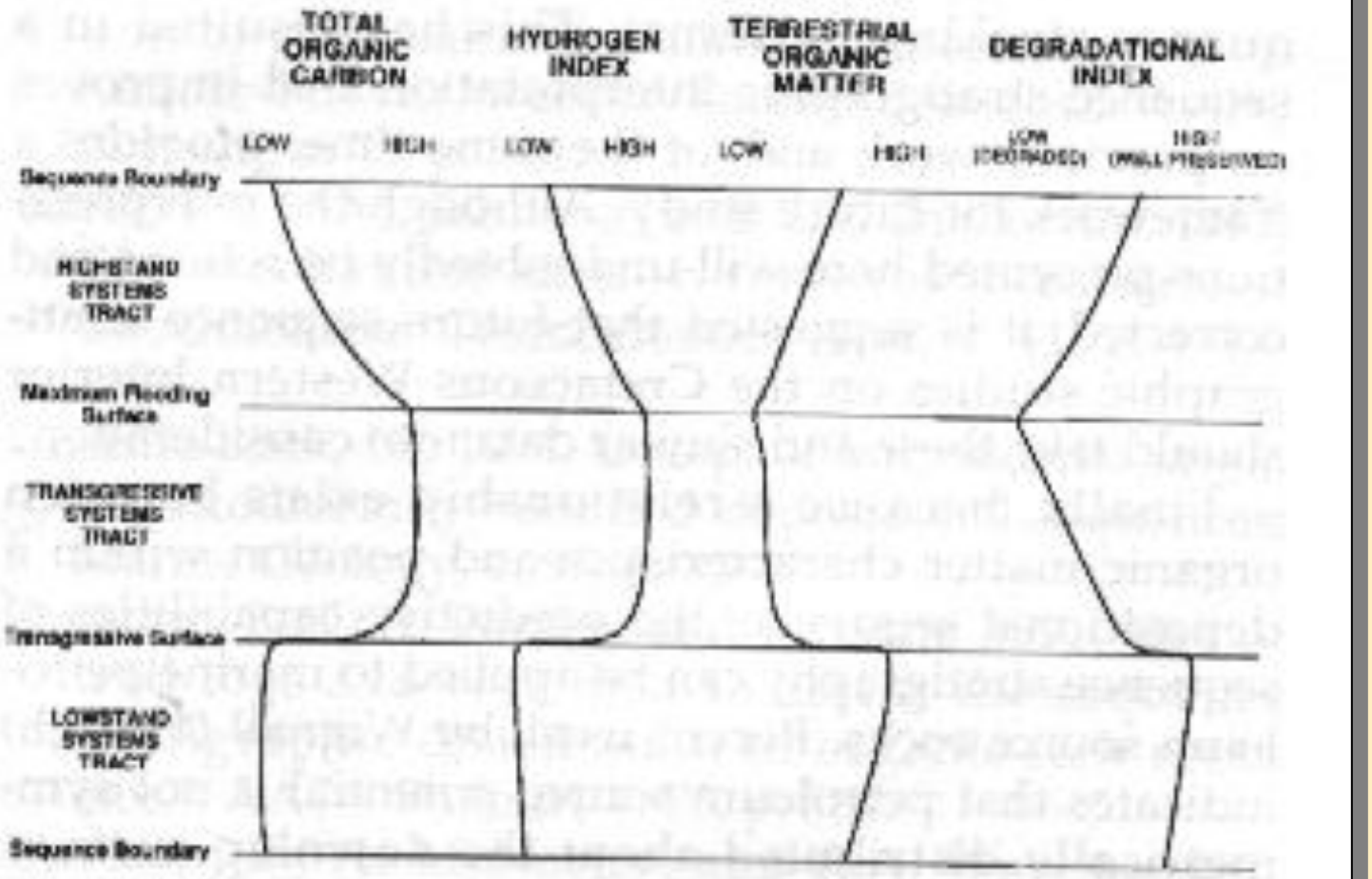
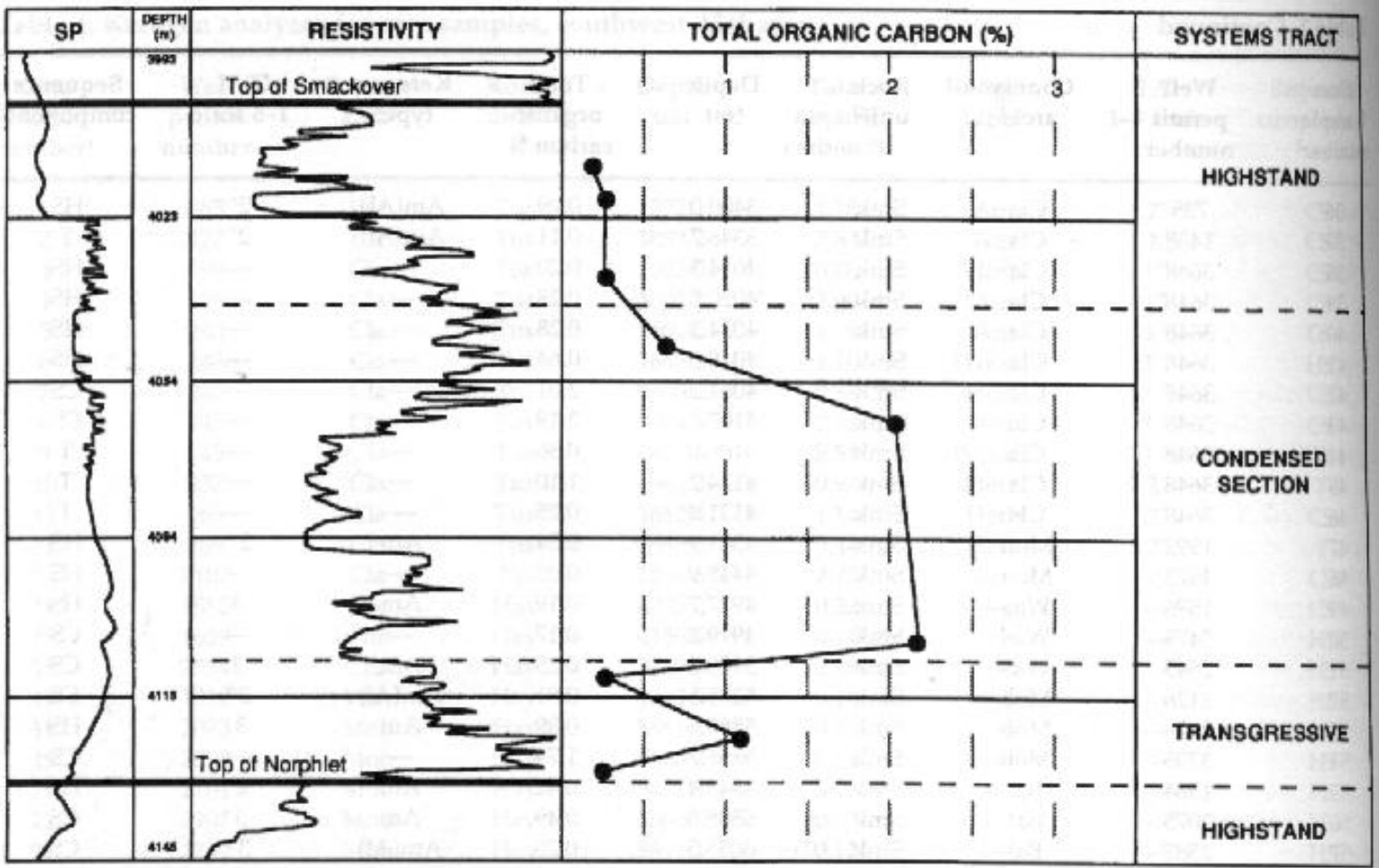


Figure 15. Schematic diagram showing relationship between organic matter characteristics and position with the depositional sequence.



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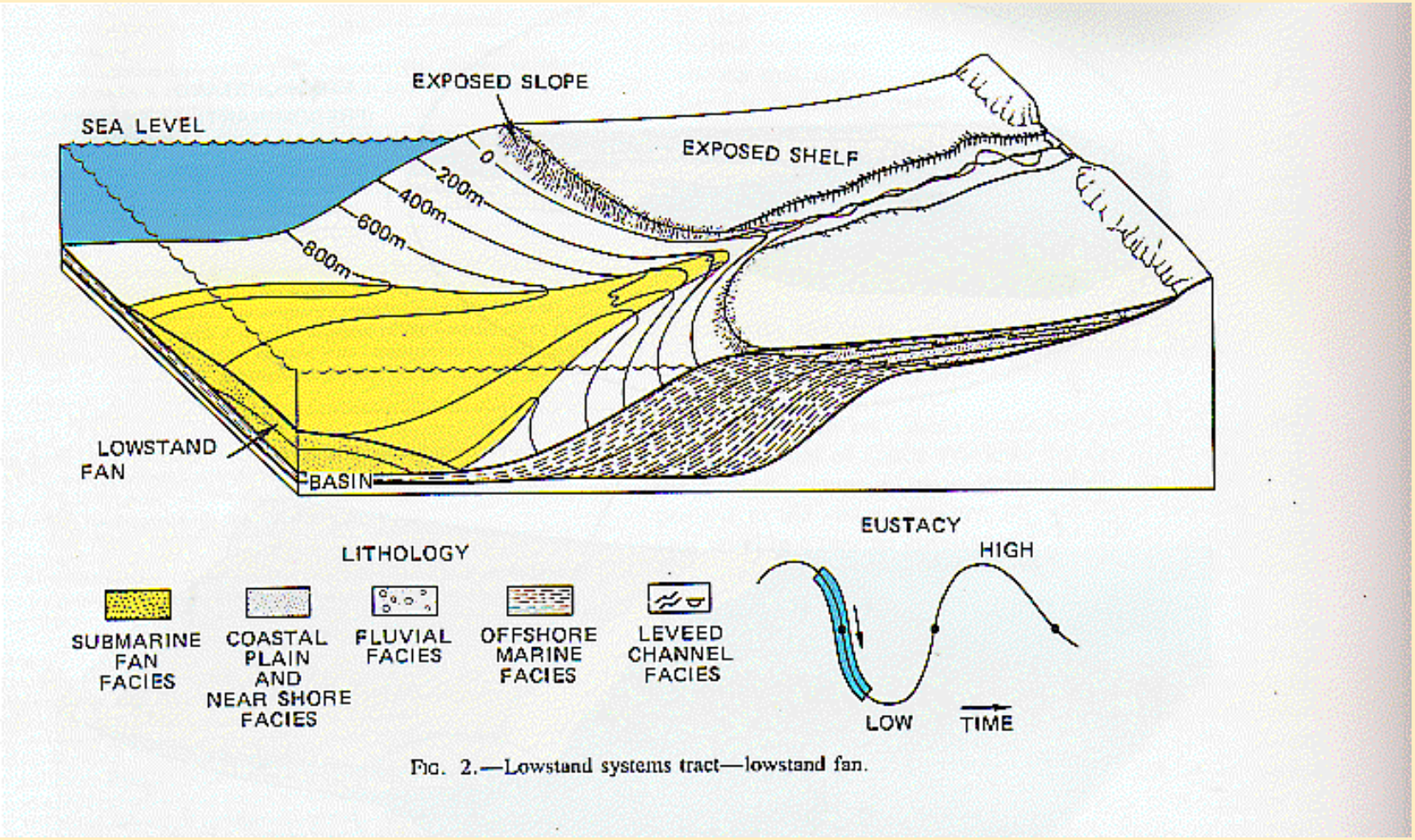

FIG. 2.—Lowstand systems tract—lowstand fan.

Sistema de Bajo Nivel (Lowstand)

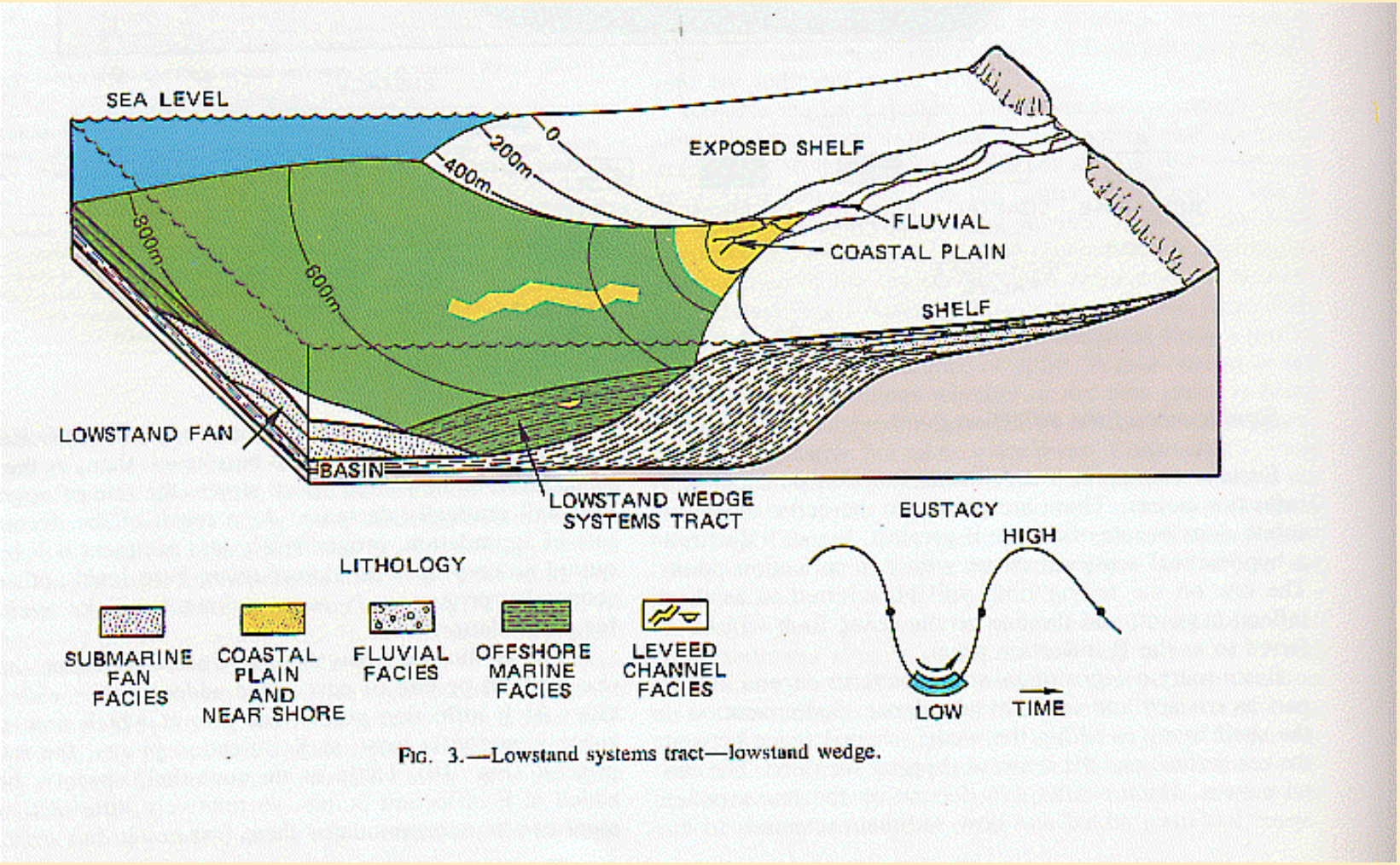

FIG. 3.—Lowstand systems tract—lowstand wedge.

Sistema de Bajo Nivel (Lowstand)

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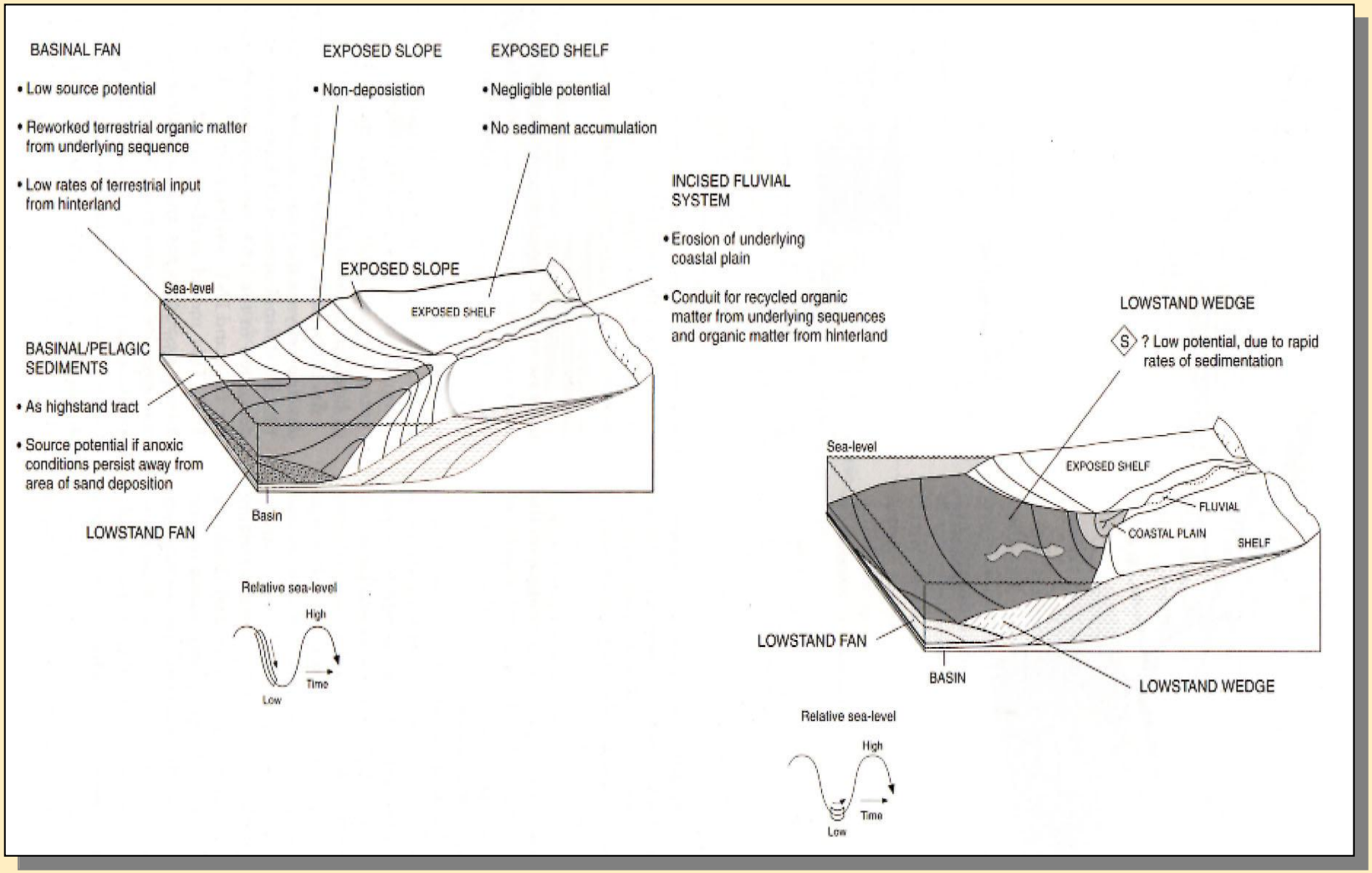

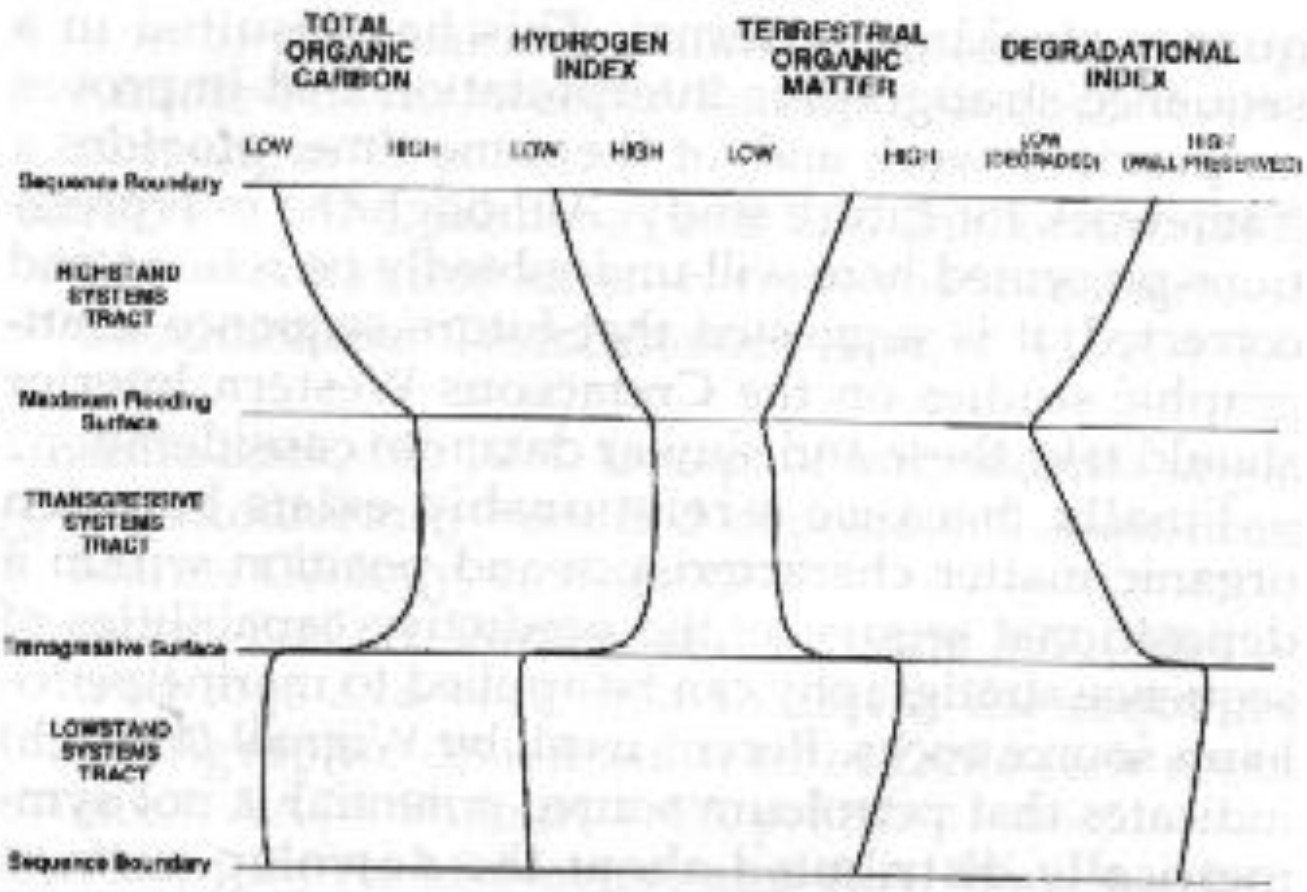

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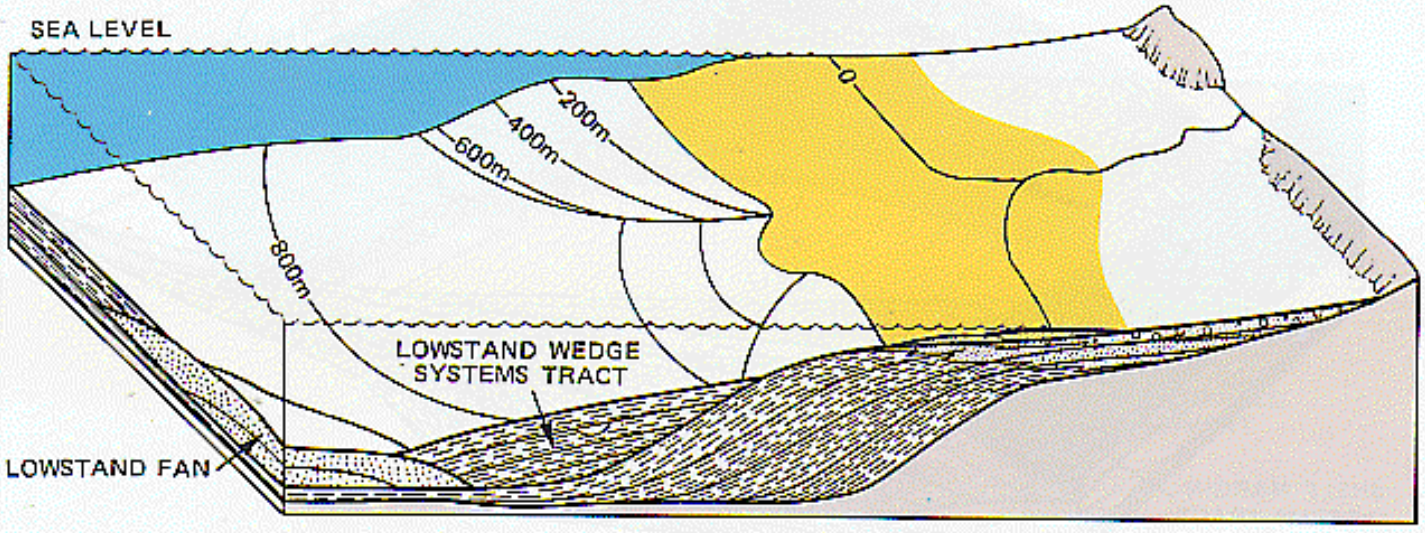
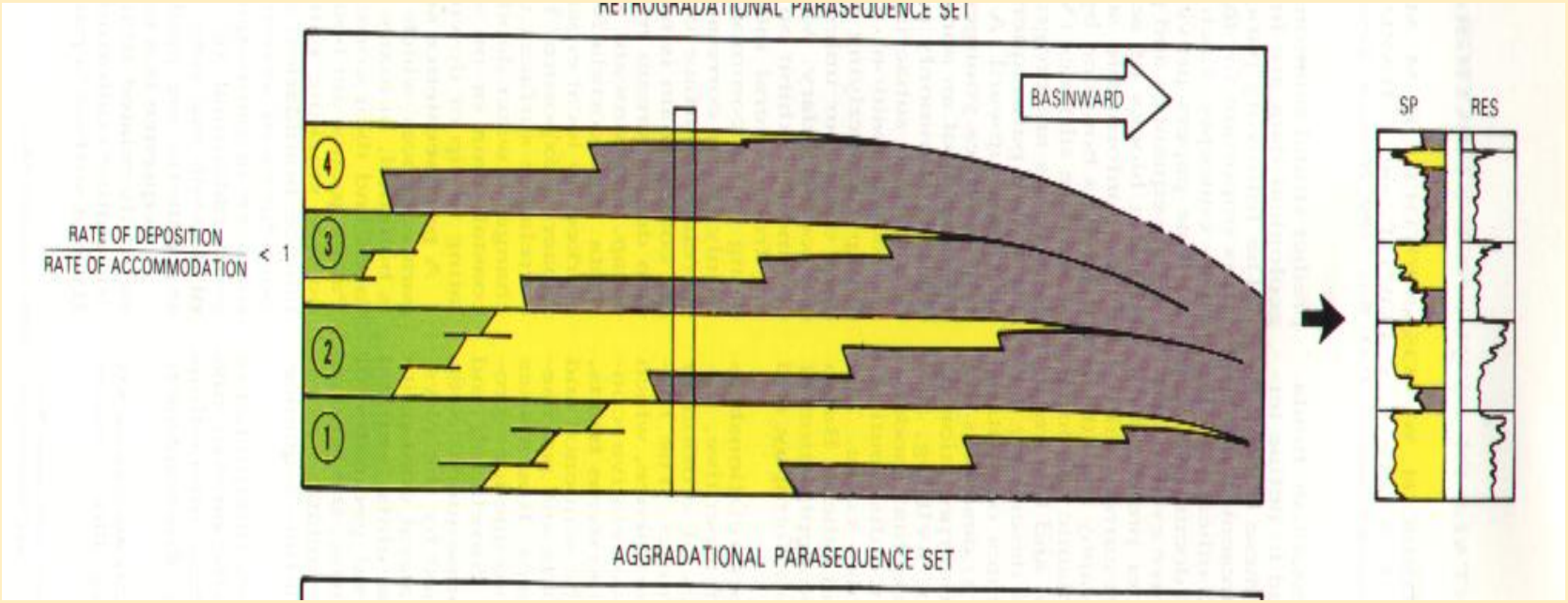


FIG. 4.—Transgressive-systems tract.

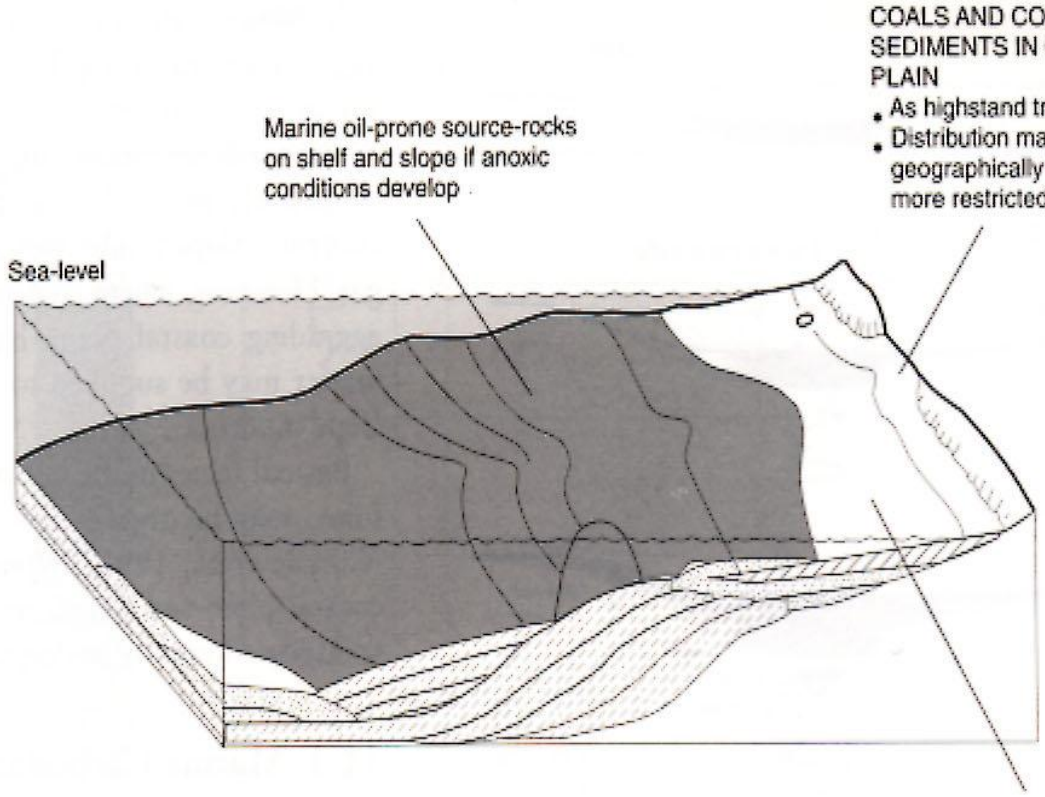
Sistema Transgresivo

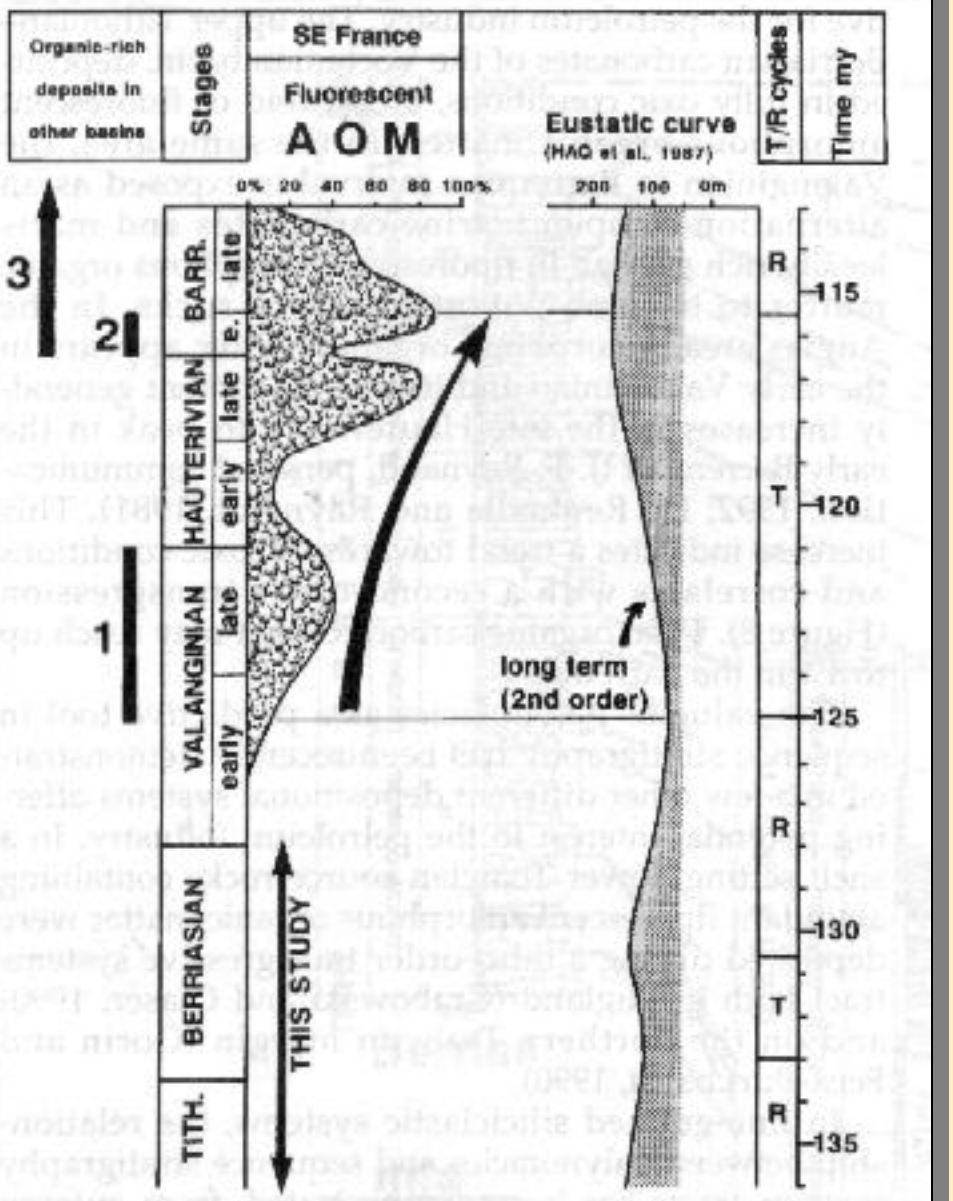


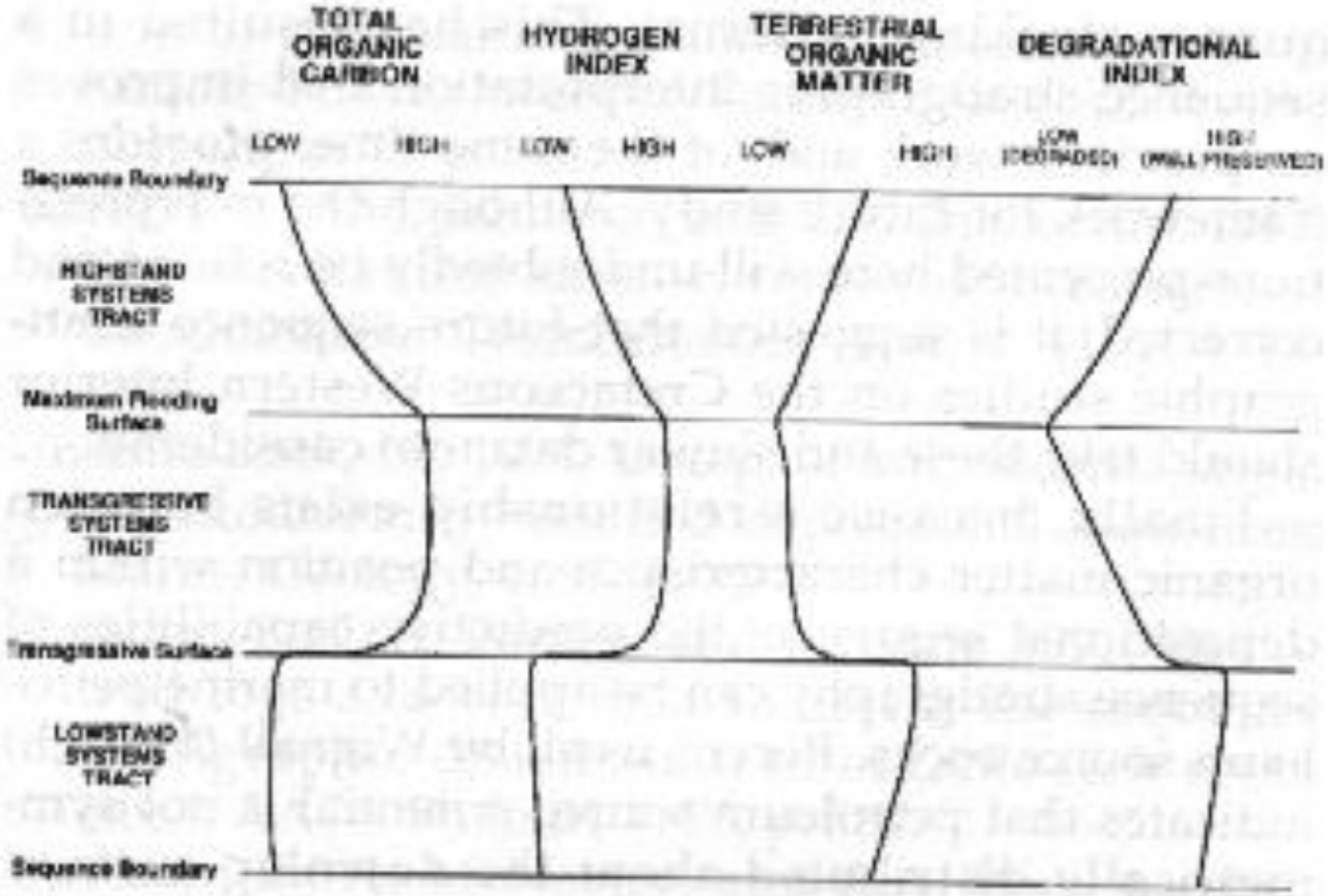
Sistema Transgresivo

General features

- Shelf submerged
- Reduced clastic input to shelf/slope and terrestrial o.m. supply
- High productivity and shallow water depth on shelf may result in anoxic conditions if sediment–water interface is below the surface mixing layer
- Marine oil-prone source-rocks will only be deposited if anoxic conditions develop—not all transgressions give source-rocks




Organic-rich deposits in other basins
Stages
SE France
Fluorescent AOM
Eustatic curve
(HAQ et al., 1987)
T/R cycles
Time my
0% 20 40 60 80 100%
200 100 0m
3
2
1
BARR.
late
e.
HAUTERIVIAN
late
early
VALANGINIAN
late
early
BERRIASIAN
TITH.
THIS STUDY
long term
(2nd order)
R
T
R
T
R
115
120
125
130
135



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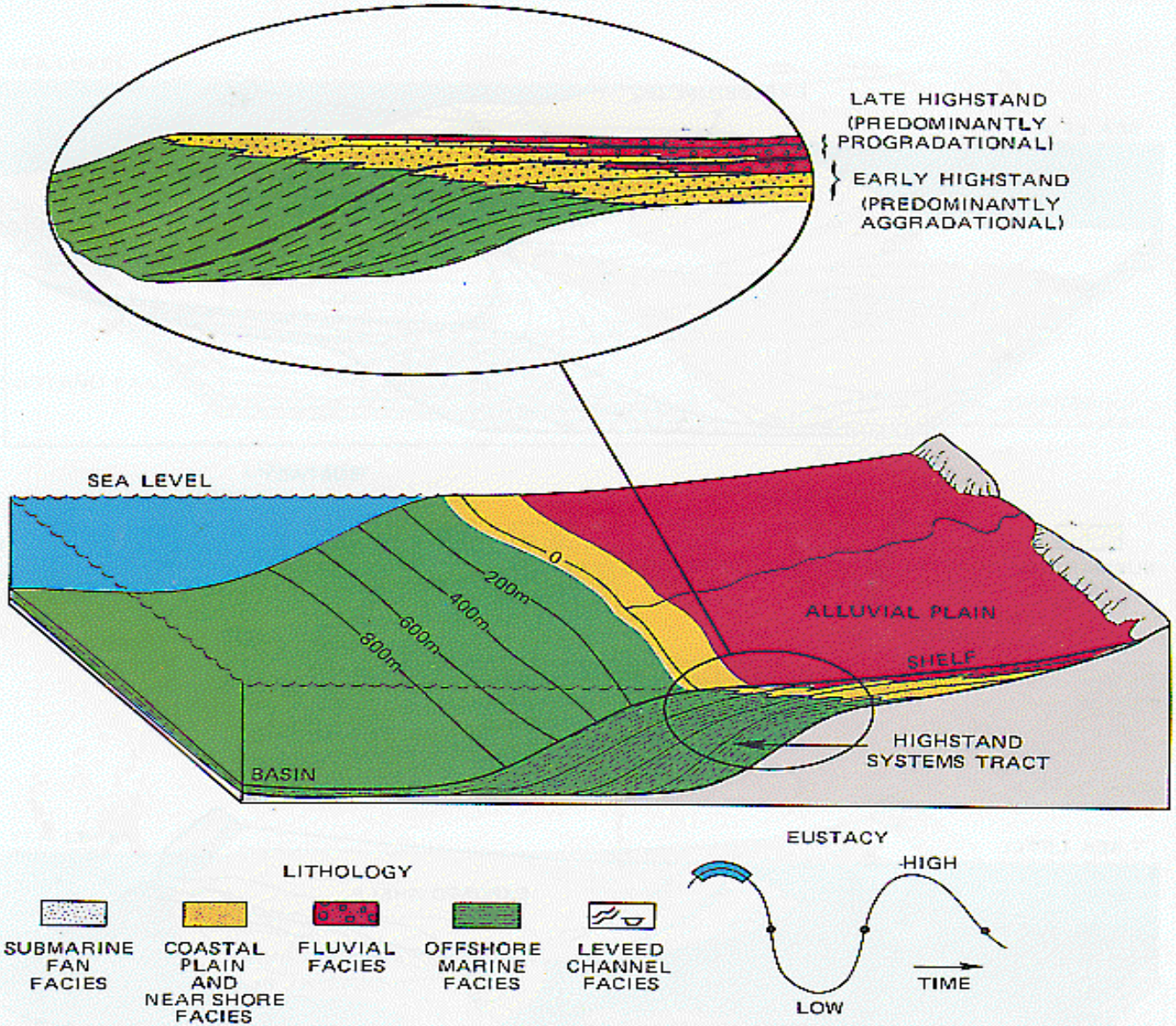
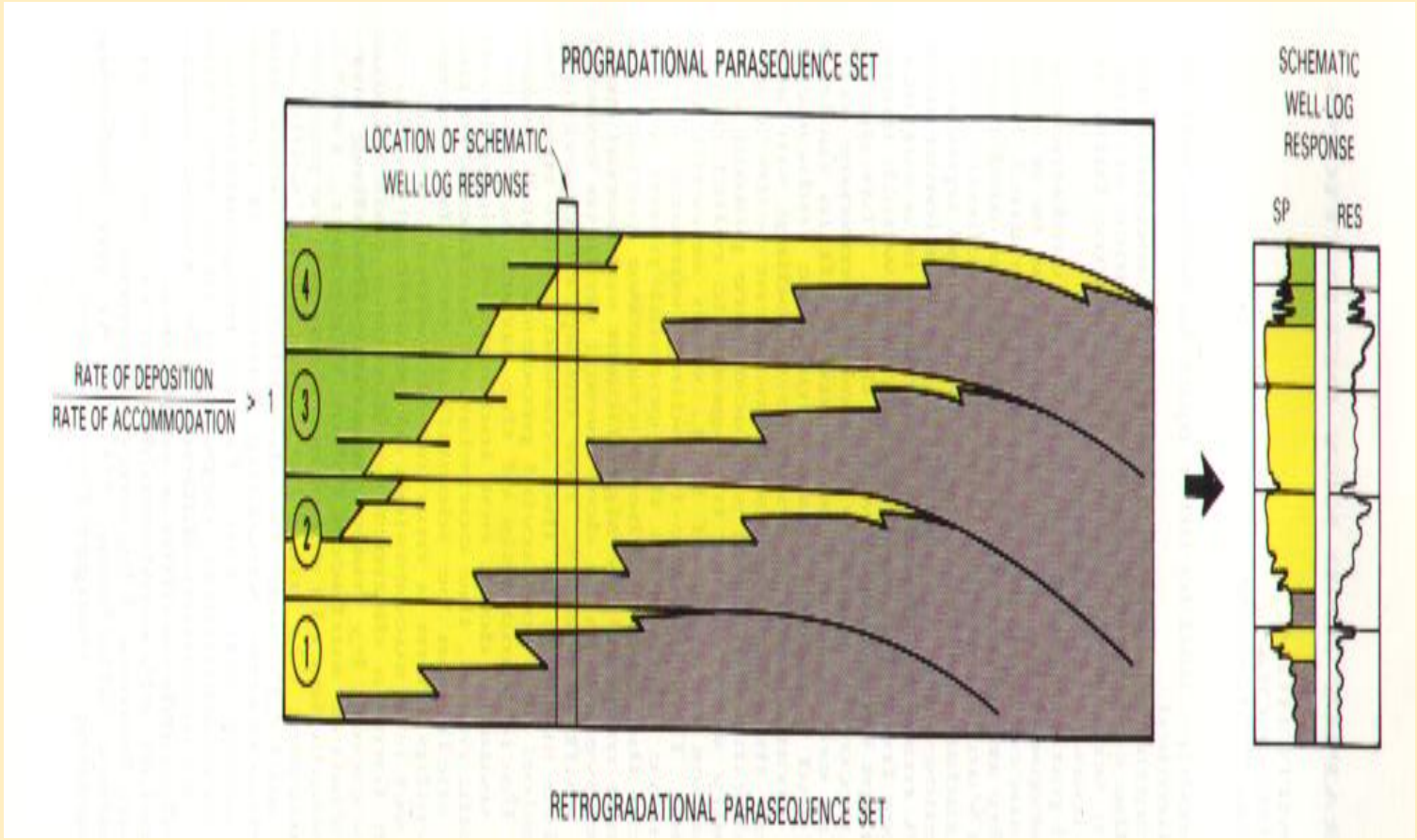


FIG. 1.—Highstand systems tract, I.

Sistema de Alto Nivel (Highstand)



Sistema de Alto Nivel (Highstand)

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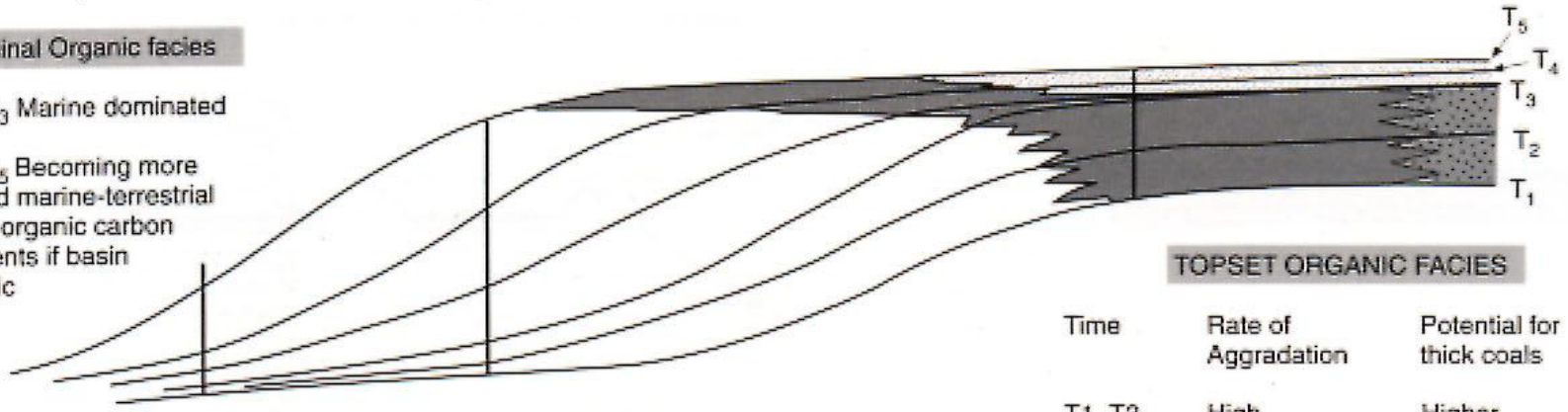
Highstand Systems Tract

Basinal Organic facies

T_1–T_3 Marine dominated

T_3–T_5 Becoming more mixed marine-terrestrial High organic carbon contents if basin anoxic



TOPSET ORGANIC FACIES

Time	Rate of Aggradation	Potential for thick coals	Organic facies
T1–T3	High	Higher	See Fig. 11
T3–T5	Low	Lower	"

FORESET/SLOPE ORGANIC FACIES

Time	Rate of progradation/ Clastic dilution	Potential for high organic carbon content	Organic facies
T1–T3	Lower	Higher	Mixed terrestrial/ marine
T3–T5	Higher	Lower	Terrestrial dominated

Key:

- Lower coastal plain
- Upper coastal plain
- Slope

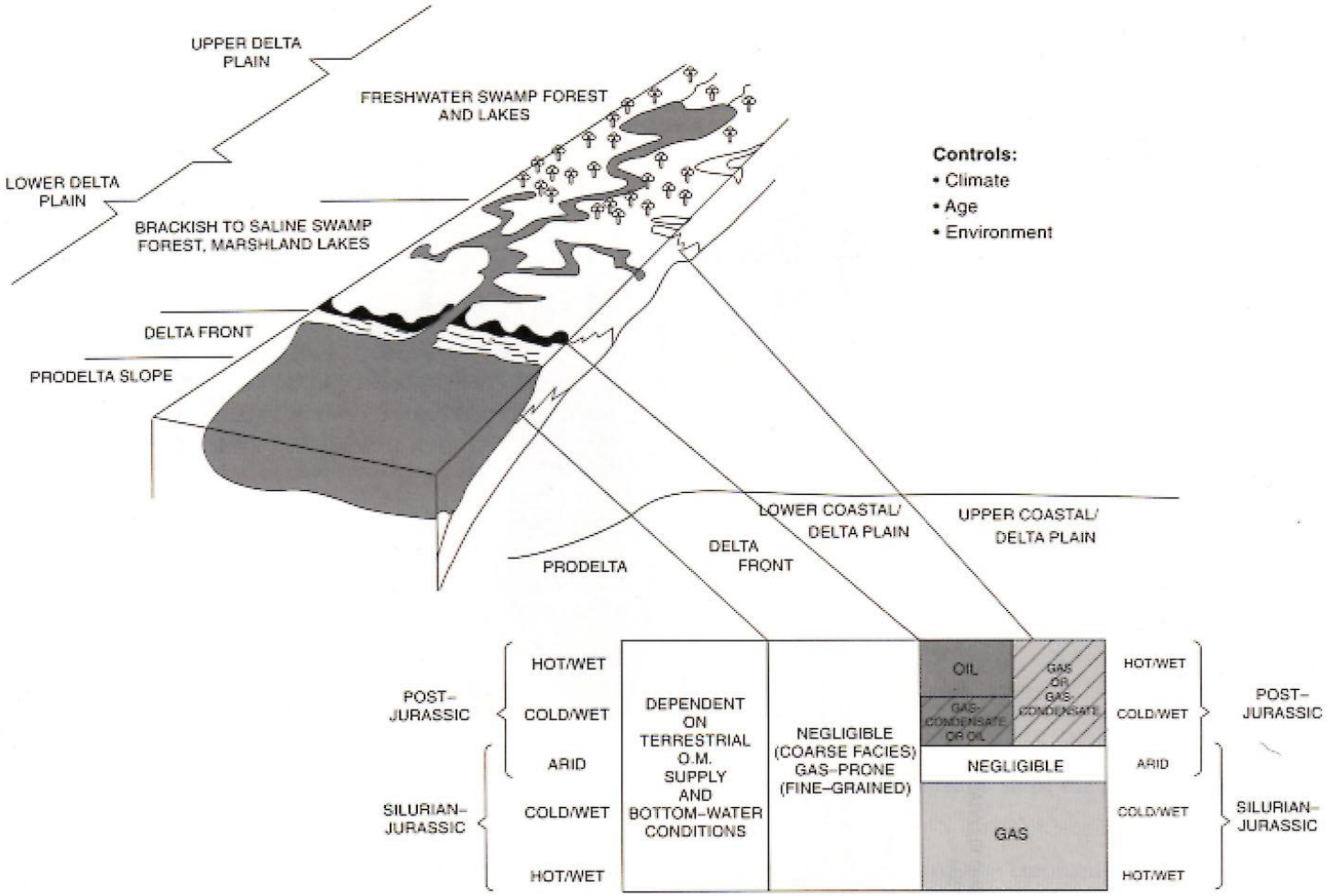
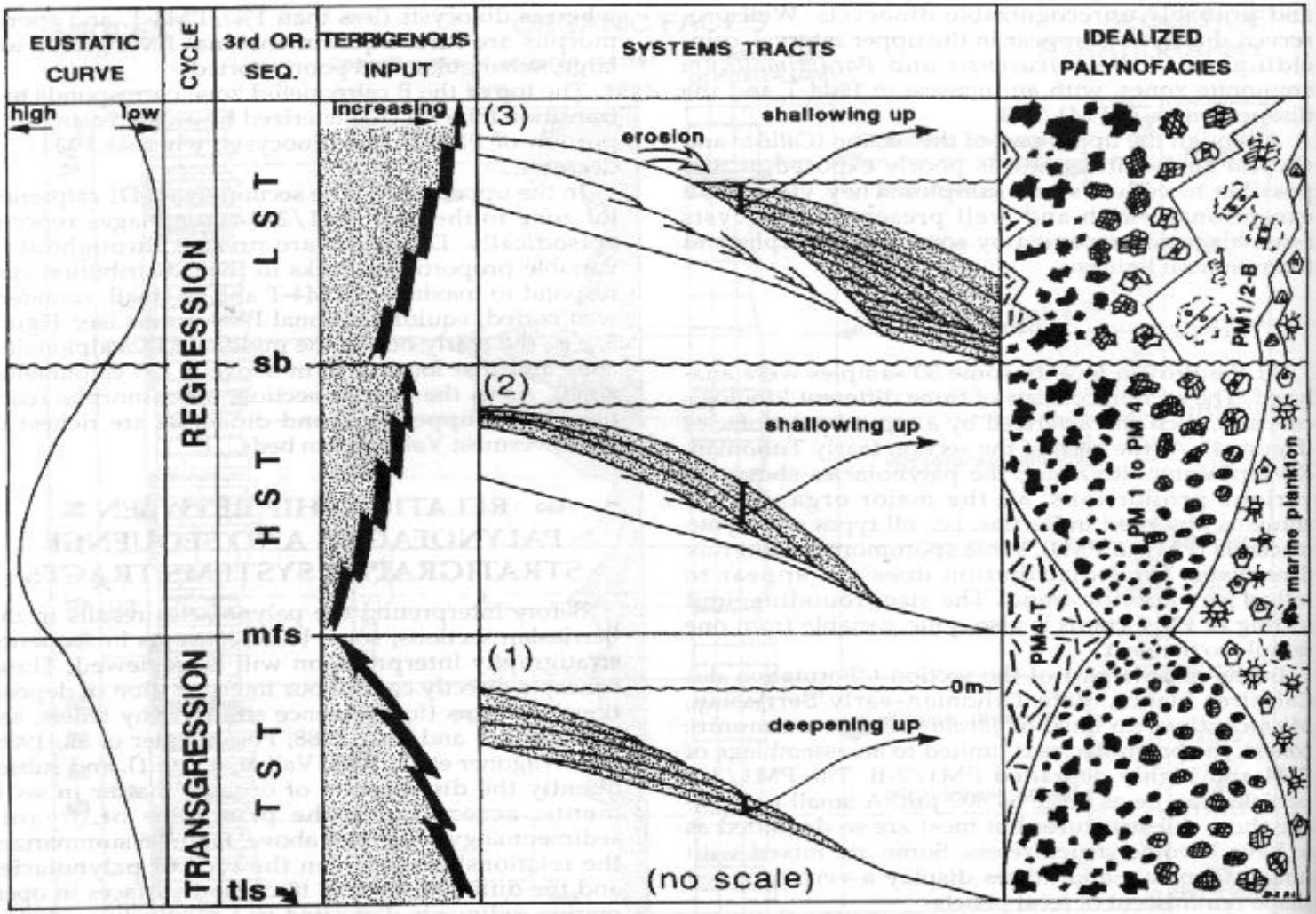
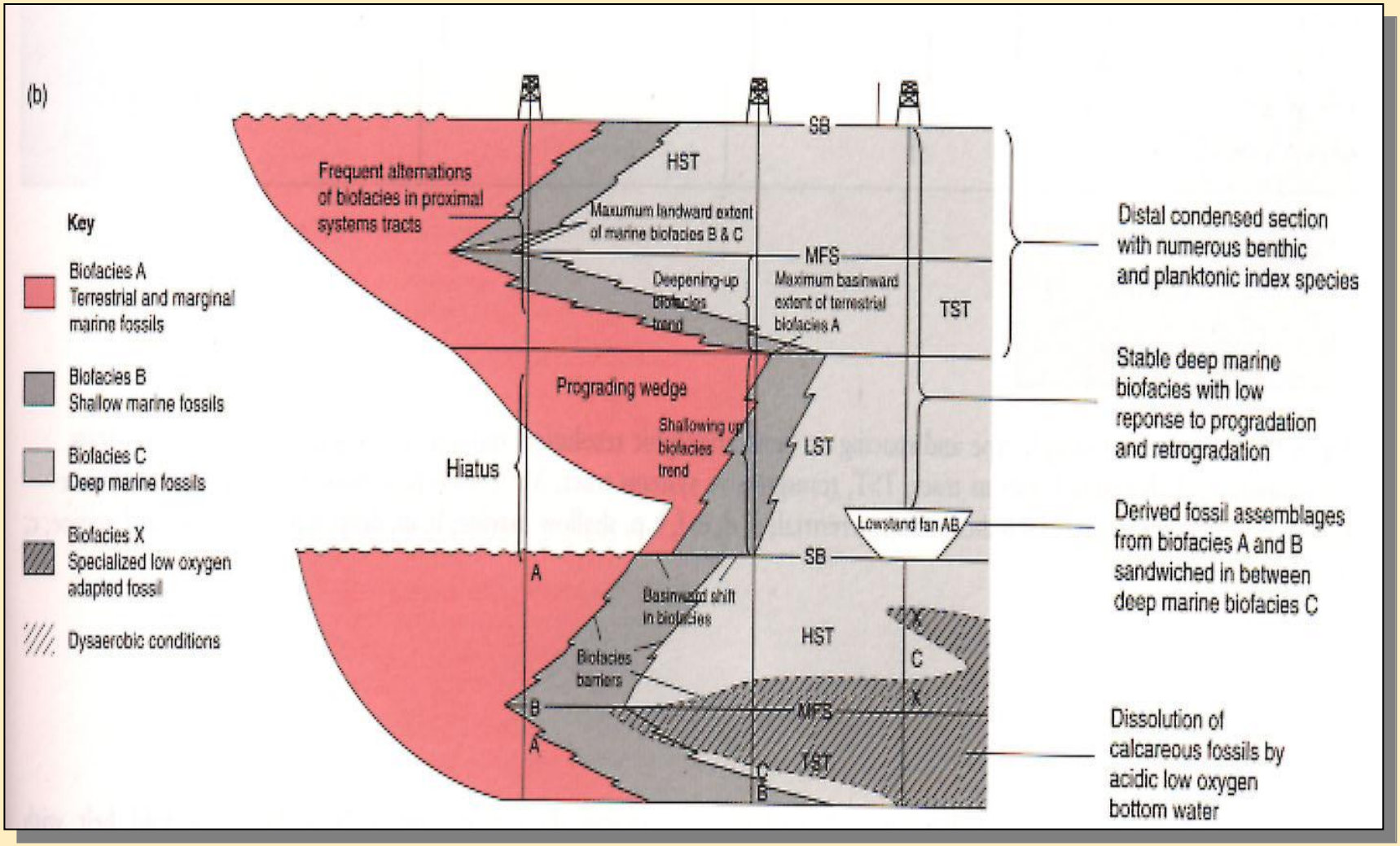
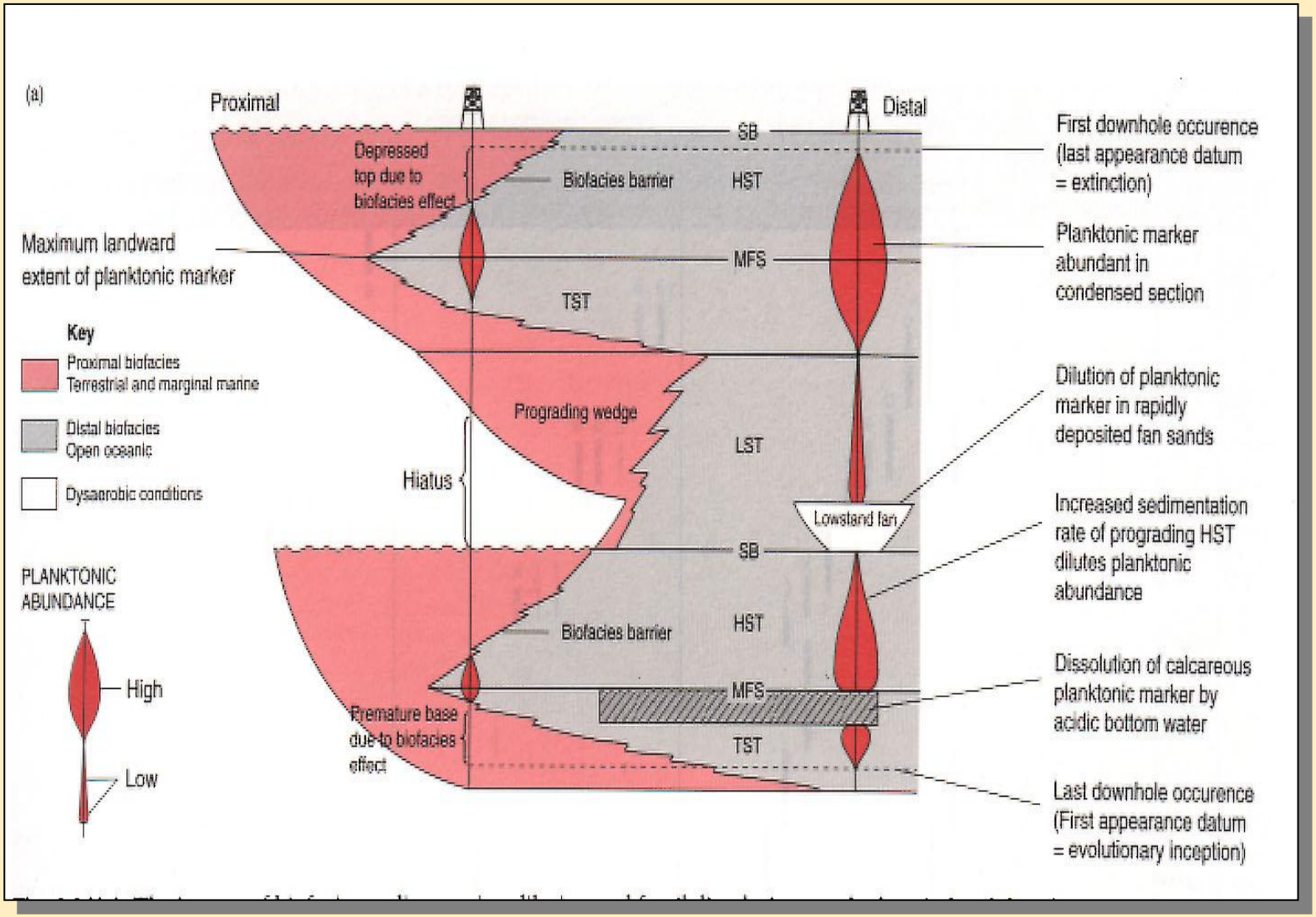


Fig. 11.6 Cartoon illustrating different types of source-rock setting on a typical modern delta plain from southeast Asia (based on the Klang Delta). Lower delta-plain environments are thought to be areas where the preservation of oil-prone (organic matter likely to generate oil) is enhanced in brackish alkaline environments. Hot humid climatic regimes in the post-Cretaceous era are the most favourable for generating high foliage-to-wood ratio plant communities, which, given favourable preservation, can result in deposition of oil-prone coal source rocks


EUSTATIC CURVE
high
low
CYCLE
REGRESSION
TRANSGRESSION
3rd OR. SEQ.
LST
sb
HST
mfs
TST
tls
TERRIGENOUS INPUT
increasing
SYSTEMS TRACTS
(3)
erosion
shallowing up
(2)
shallowing up
(1)
0m
deepening up
(no scale)
IDEALIZED PALYNOFACIES
PM1/2-B
PM 1 to PM 4
PM4-T
marine plankton


(b)
Key
Biofacies A
Terrestrial and marginal marine fossils
Biofacies B
Shallow marine fossils
Biofacies C
Deep marine fossils
Biofacies X
Specialized low oxygen adapted fossil
Dysaerobic conditions
Frequent alternations of biofacies in proximal systems tracts
SB
HST
Maximum landward extent of marine biofacies B & C
MFS
Deepening-up biofacies trend
Maximum basinward extent of terrestrial biofacies A
TST
Prograding wedge
Shallowing up biofacies trend
LST
Hiatus
Lowland fan AB
SB
A
Basinward shift in biofacies
HST
Biofacies barriers
X
C
X
B
MFS
A
TST
C
B
Distal condensed section with numerous benthic and planktonic index species
Stable deep marine biofacies with low reponse to progradation and retrogradation
Derived fossil assemblages from biofacies A and B sandwiched in between deep marine biofacies C
Dissolution of calcareous fossils by acidic low oxygen bottom water


(a)
Proximal
Distal
SB
Depressed top due to biofacies effect
Biofacies barrier
HST
Maximum landward extent of planktonic marker
MFS
TST
Key
Proximal biofacies
Terrestrial and marginal marine
Distal biofacies
Open oceanic
Dysaerobic conditions
Prograding wedge
LST
Hiatus
Lowstand fan
SB
PLANKTONIC ABUNDANCE
High
Low
Biofacies barrier
HST
MFS
Premature base due to biofacies effect
TST
First downhole occurence (last appearance datum = extinction)
Planktonic marker abundant in condensed section
Dilution of planktonic marker in rapidly deposited fan sands
Increased sedimentation rate of prograding HST dilutes planktonic abundance
Dissolution of calcareous planktonic marker by acidic bottom water
Last downhole occurence (First appearance datum = evolutionary inception)

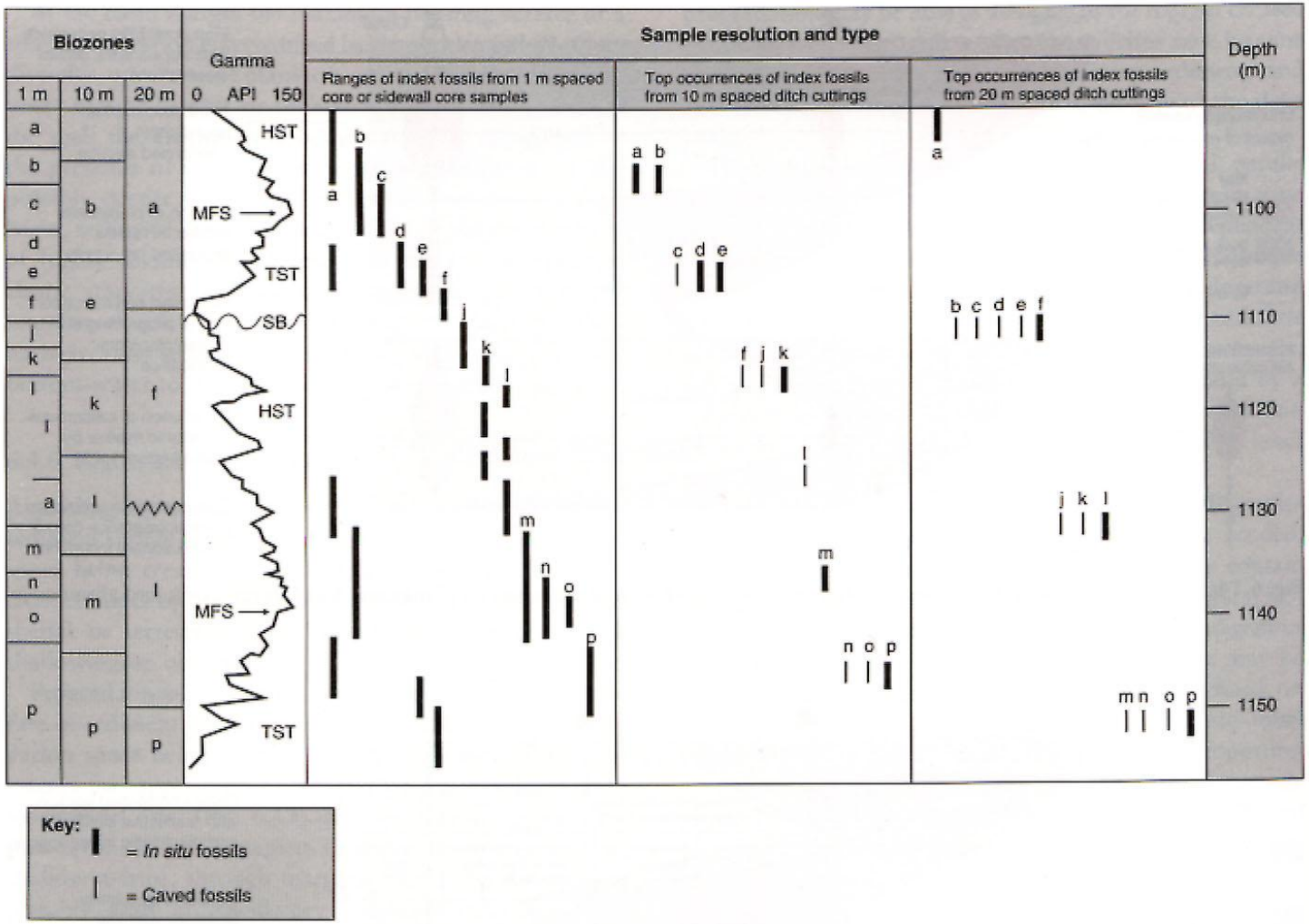
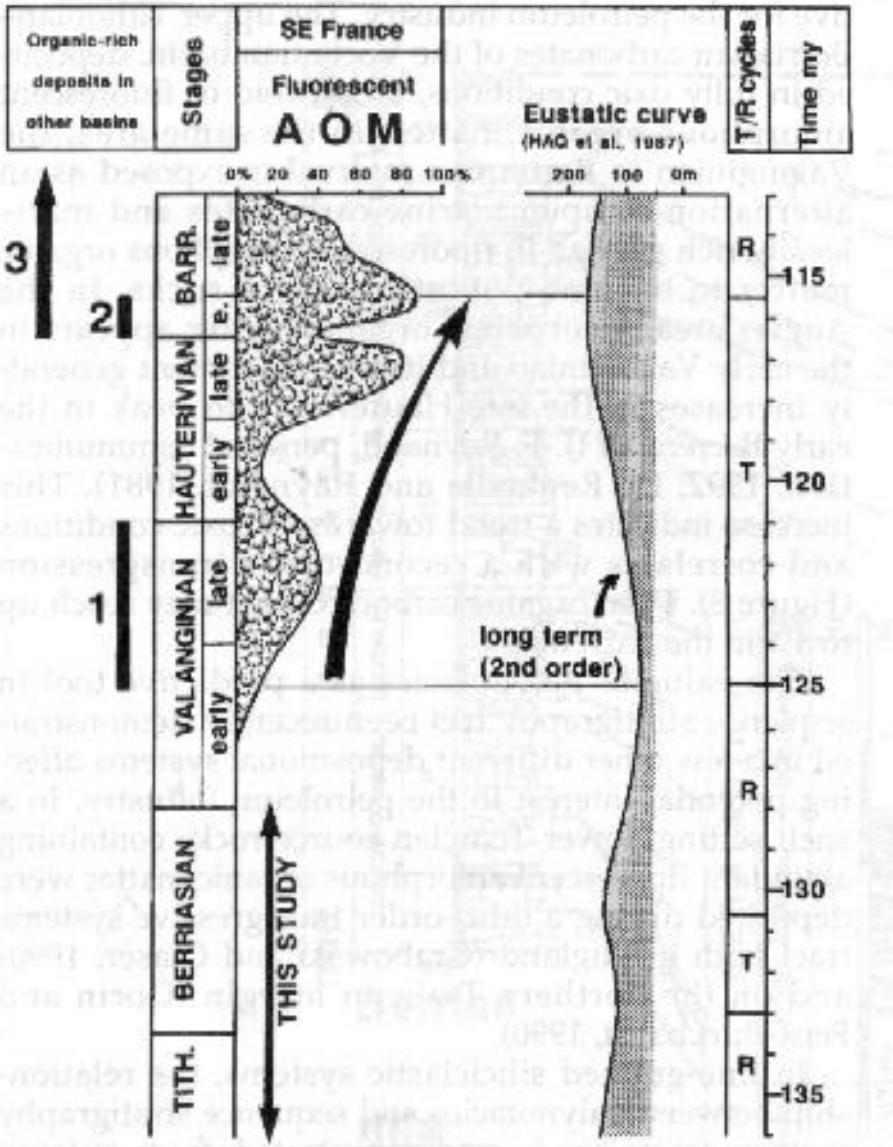


Fig. 6.15 The effects of sample type and spacing on biostratigraphic resolution and impact for sequence and systems tract recognition. HST, highstand systems tract; TST, transgressive systems tract; MFS, maximum flooding surface; SB, sequence boundary. Palaeoenvironmental indicators; j, terrestrial; a, d, e, f, l, p, shallow marine; b, m, deep marine; k, marginal marine; c, n, o, oceanic planktonics


Organic-rich deposits in other basins
Stages
SE France
Fluorescent AOM
0% 20 40 60 80 100%
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200 100 0m
T/R cycles
Time my
BARR.
late
e.
HAUTERIVIAN
late
early
VALANGINIAN
late
early
BERRIASIAN
TITH.
3
2
1
THIS STUDY
long term
(2nd order)
R
T
R
T
R
115
120
125
130
135

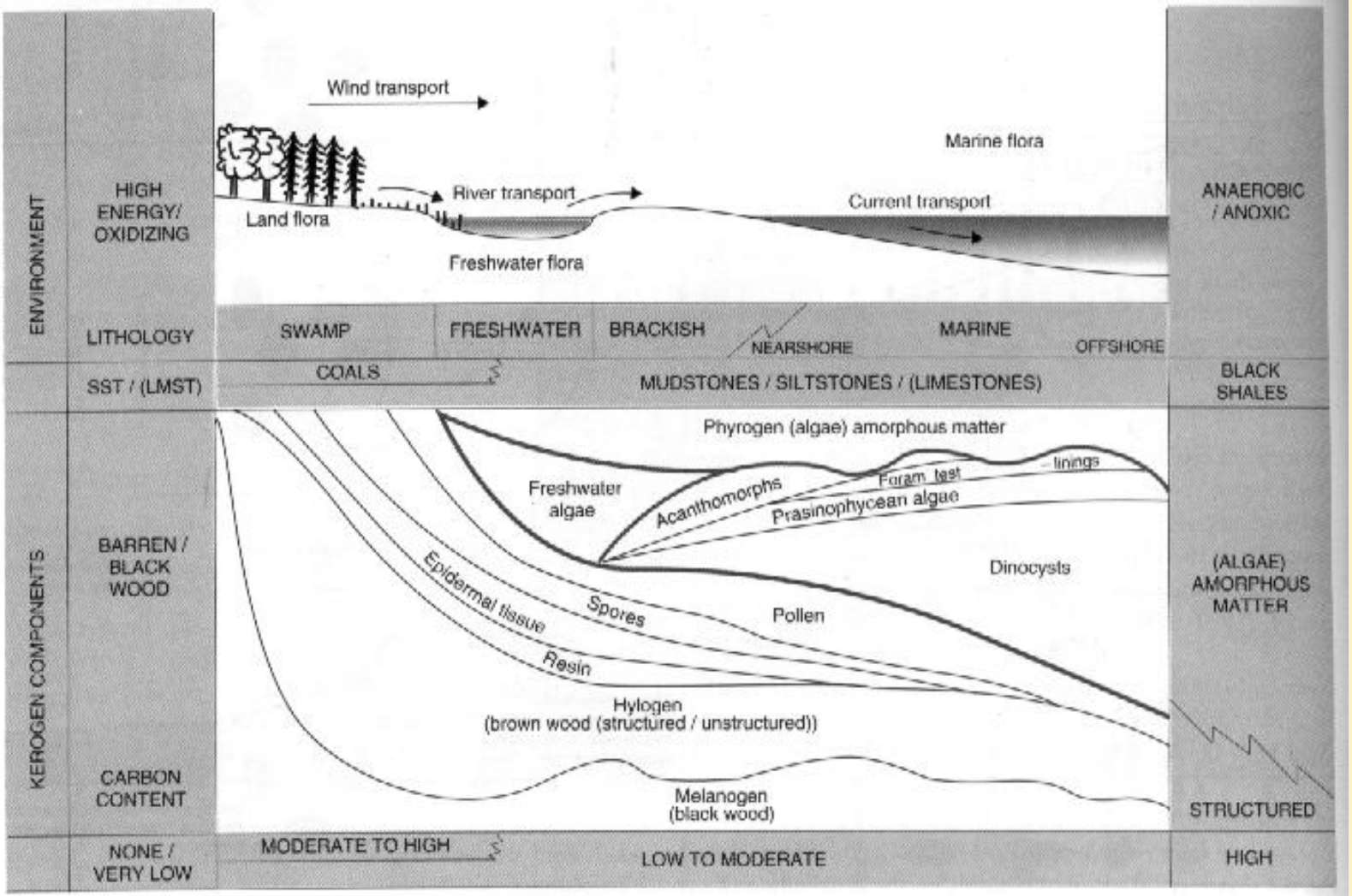
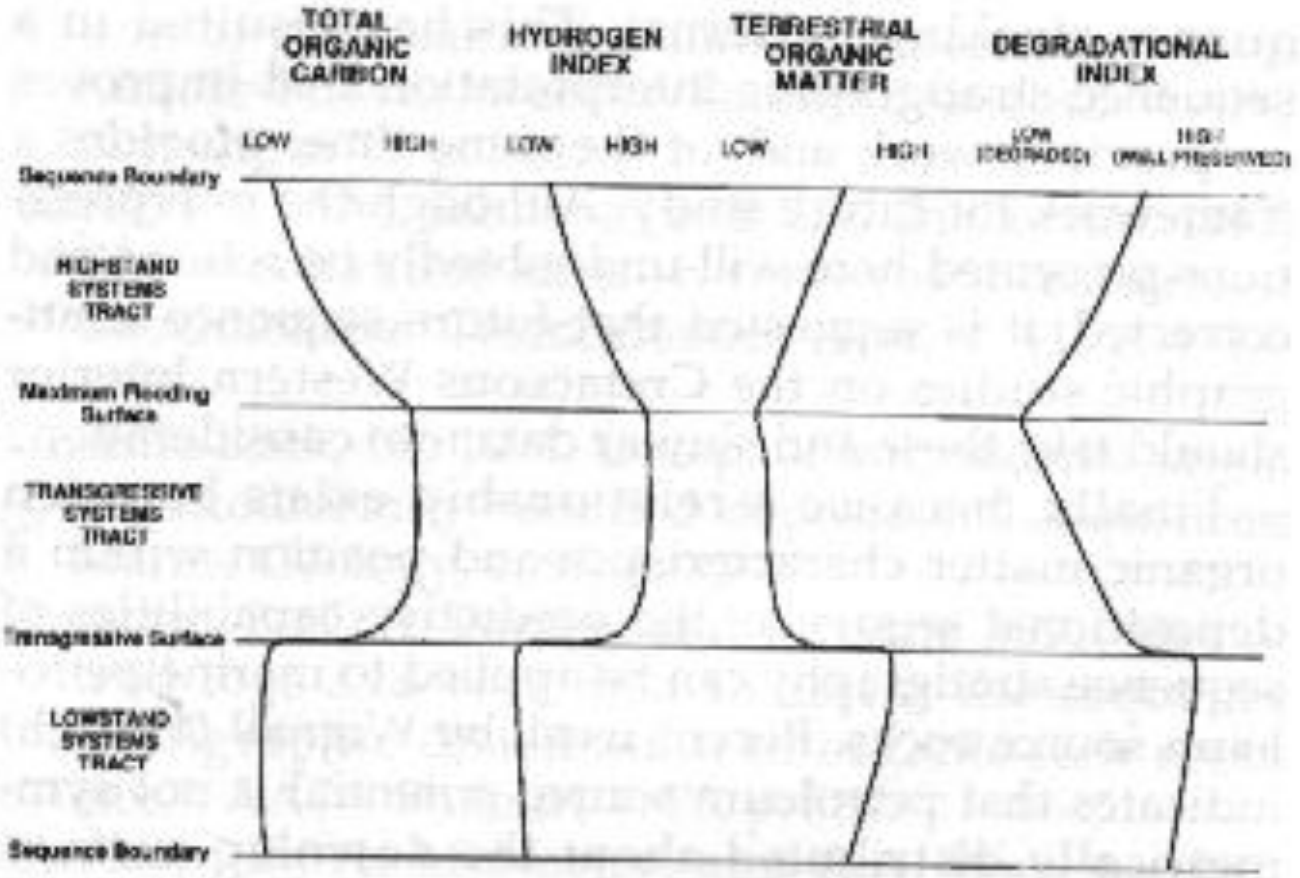


Fig. 6.5 Palynofacies: the distribution of palynological particle types in specific environments



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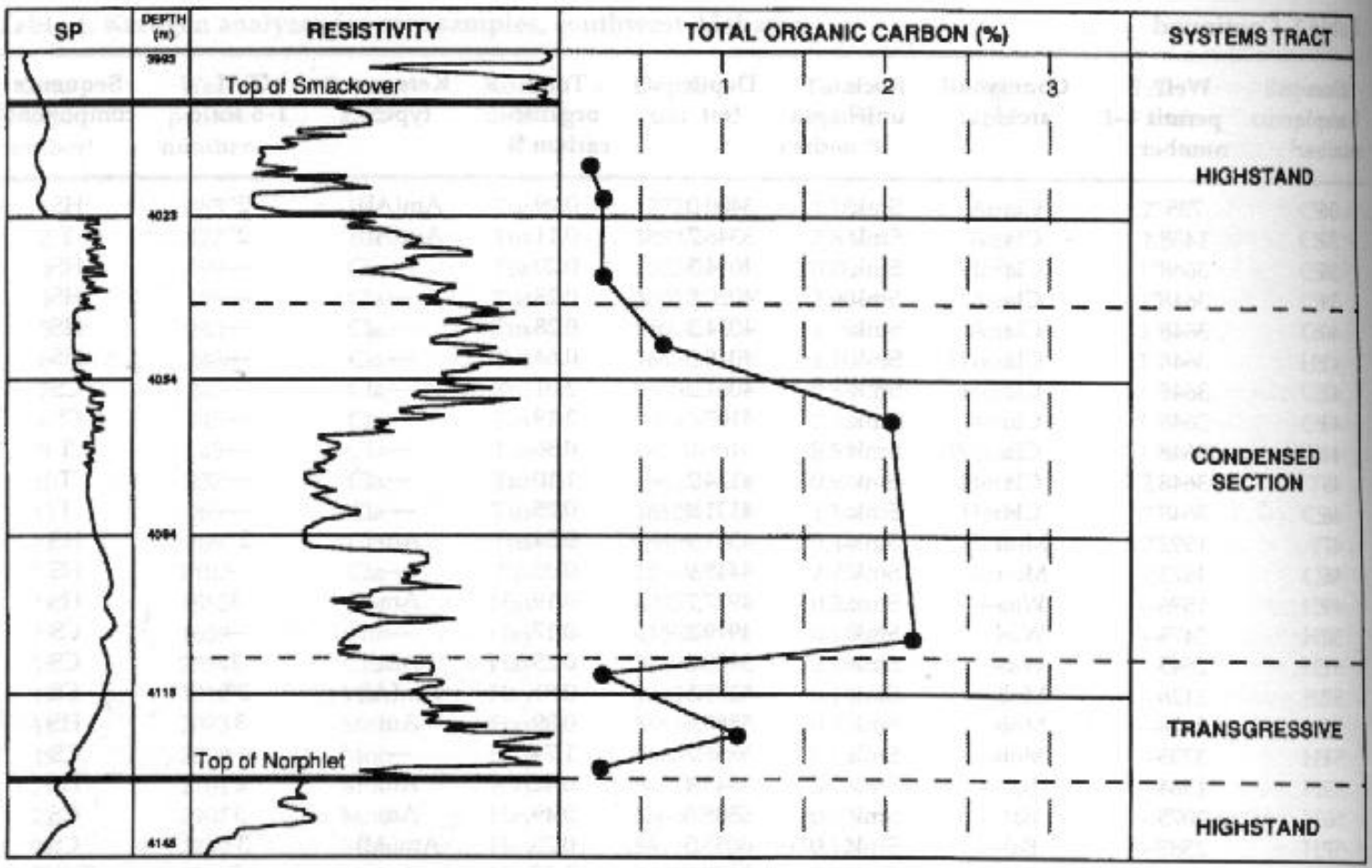

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