

Ambiente marino profundo

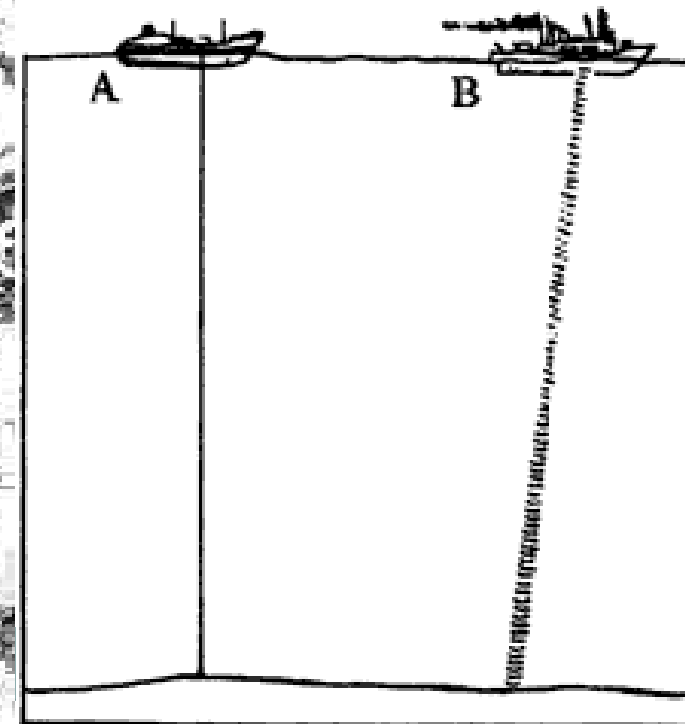


Ambiente Marino Profundo

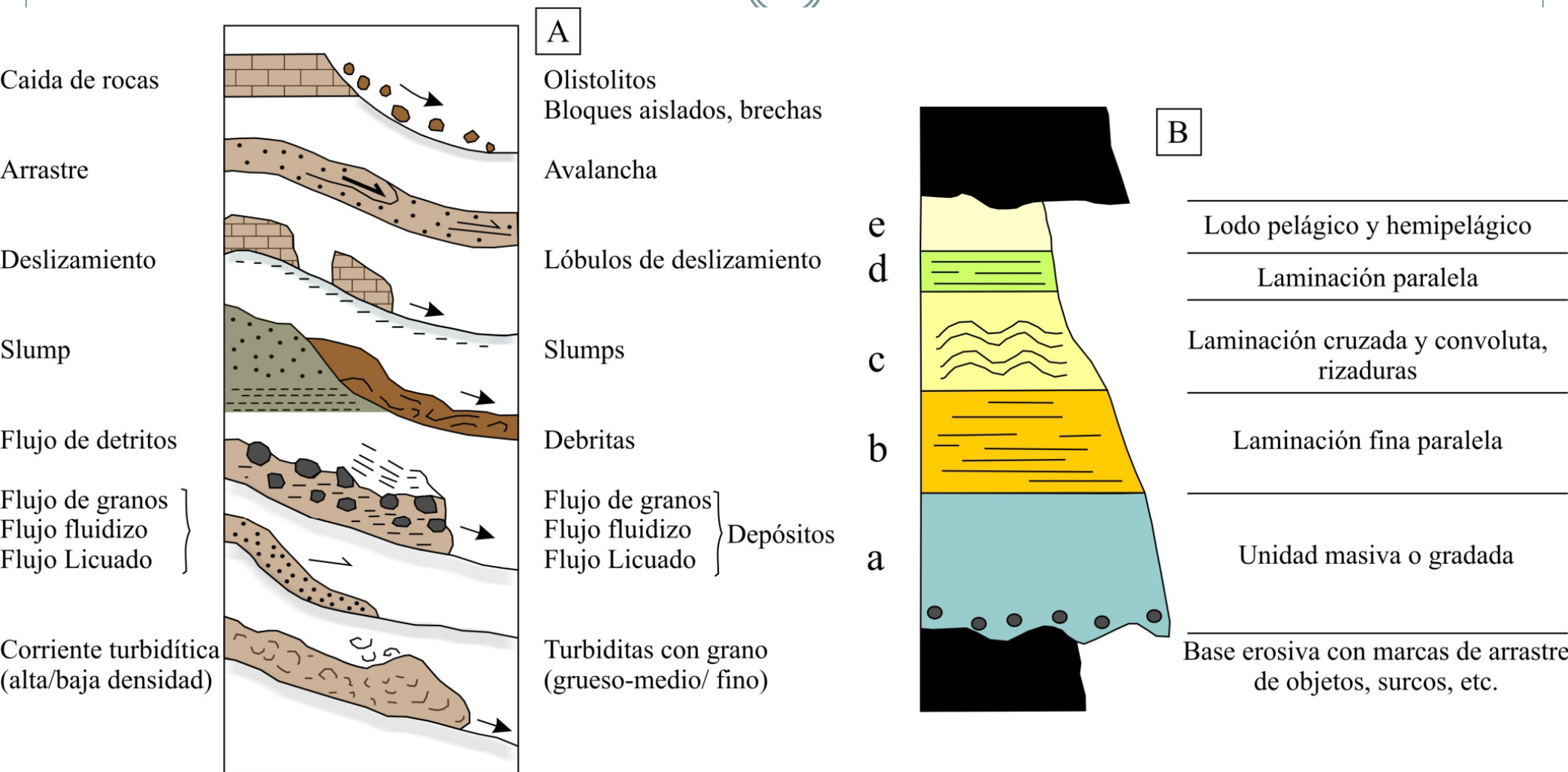
La profundidad promedio de los océanos es 3800 m, la profundidad máxima alrededor de 11.520 metros.

Factores de los ambientes marinos:

Agua
Profundidad
Cercanía a los continentes
Clima
Acción de los seres vivos



Procesos Depositacionales



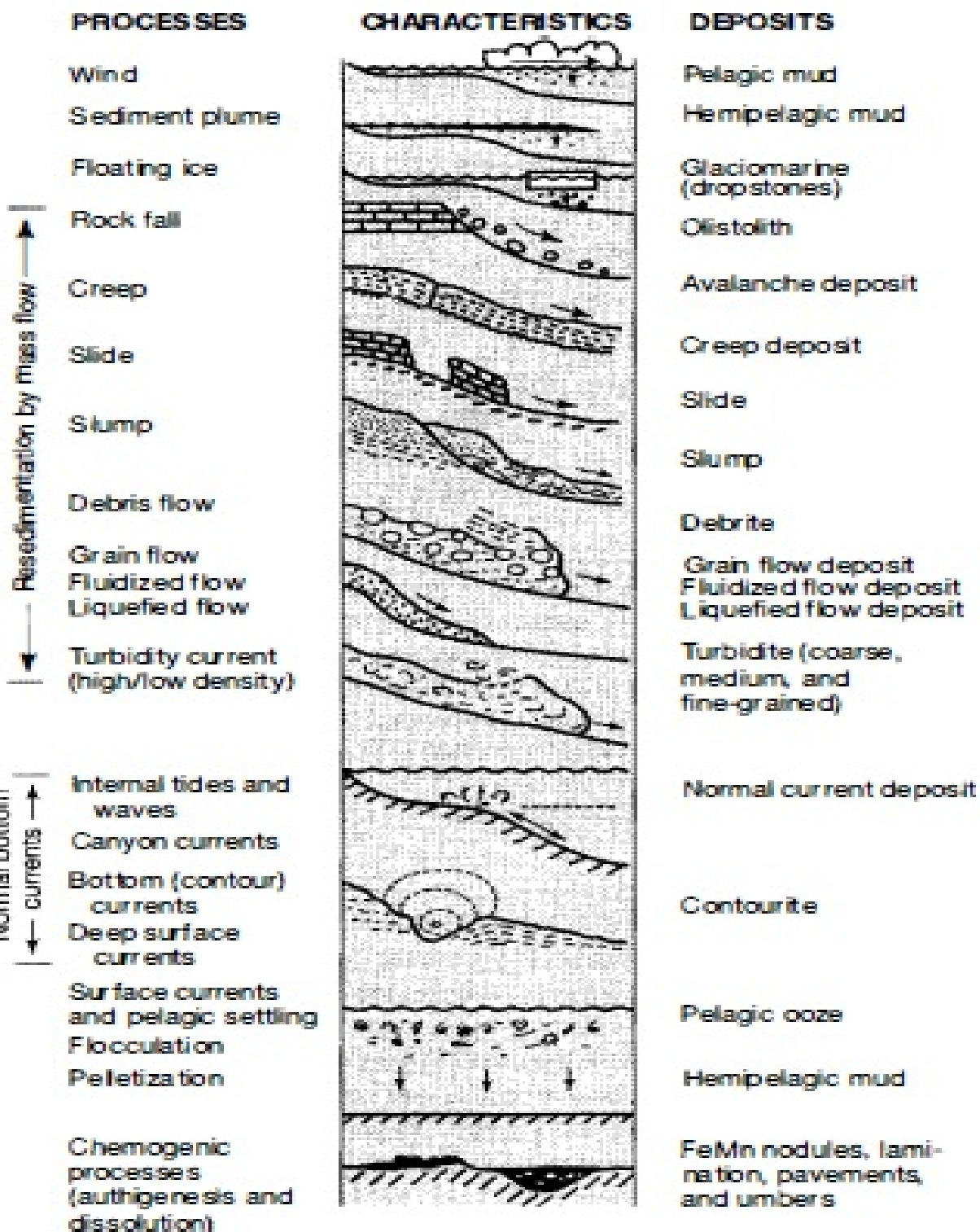


Figure 10.14

The various kinds of processes that operate in the deep sea to transport and deposit sediments. [After Stow, D. A. V., 1994, Deep sea processes of sediment transport and deposition, in Pye, K. (ed.), *Sediment transport and depositional processes*, Blackwell Scientific Publications, Oxford, Fig. 8.2, p. 261, reproduced by permission.]

Nódulos



Clasificación de Sedimentos Marinos Basados en su Modo de Formación



- *Terrigenous*: Sands and mud produced by weathering and erosion of rocks on land.
- *Biogenic*: CaCO_3 (calcium carbonate) and SiO_2 (silica) muds and oozes composed of hard parts of organisms.
- *Authigenic*: formed by precipitation of minerals in seawater (Manganese (Mn) and Phosphorus (P) nodules).
- *Volcanogenic*: ejected from volcanoes (ash).
- *Cosmogenous*: pieces of meteorites that survive trip thru atmosphere.

Table 10.1 Principal kinds of deep-sea sediments

Terrigenous siliciclastic deposits

Hemipelagic mud—mixtures of terrigenous mud and biogenic remains; deposited from nepheloid plumes and by suspension settling and pelagic rain-out

Turbidites—graded gravel/sand/mud; deposited by turbidity currents

Contourites—sandy or muddy sediments deposited and/or reworked by contour currents

Glacial-marine sediments—Gravel, sand, and mud deposited by ice rafting

Slump and slide deposits—Terrigenous or pelagic deposits emplaced downslope by mass-wasting processes

Pelagic deposits

Pelagic clay— >2/3 siliciclastic clay; deposited by suspension settling and authigenic formation of clay minerals

Oozes— >2/3 planktonic biogenic remains; deposited by pelagic rain-out

Calcareous—dominantly CaCO_3 biogenic remains

Siliceous—dominantly SiO_2 biogenic remains

Allochthonous deep-sea carbonates

Shallow-water carbonates emplaced downslope by storms or sediment gravity flows

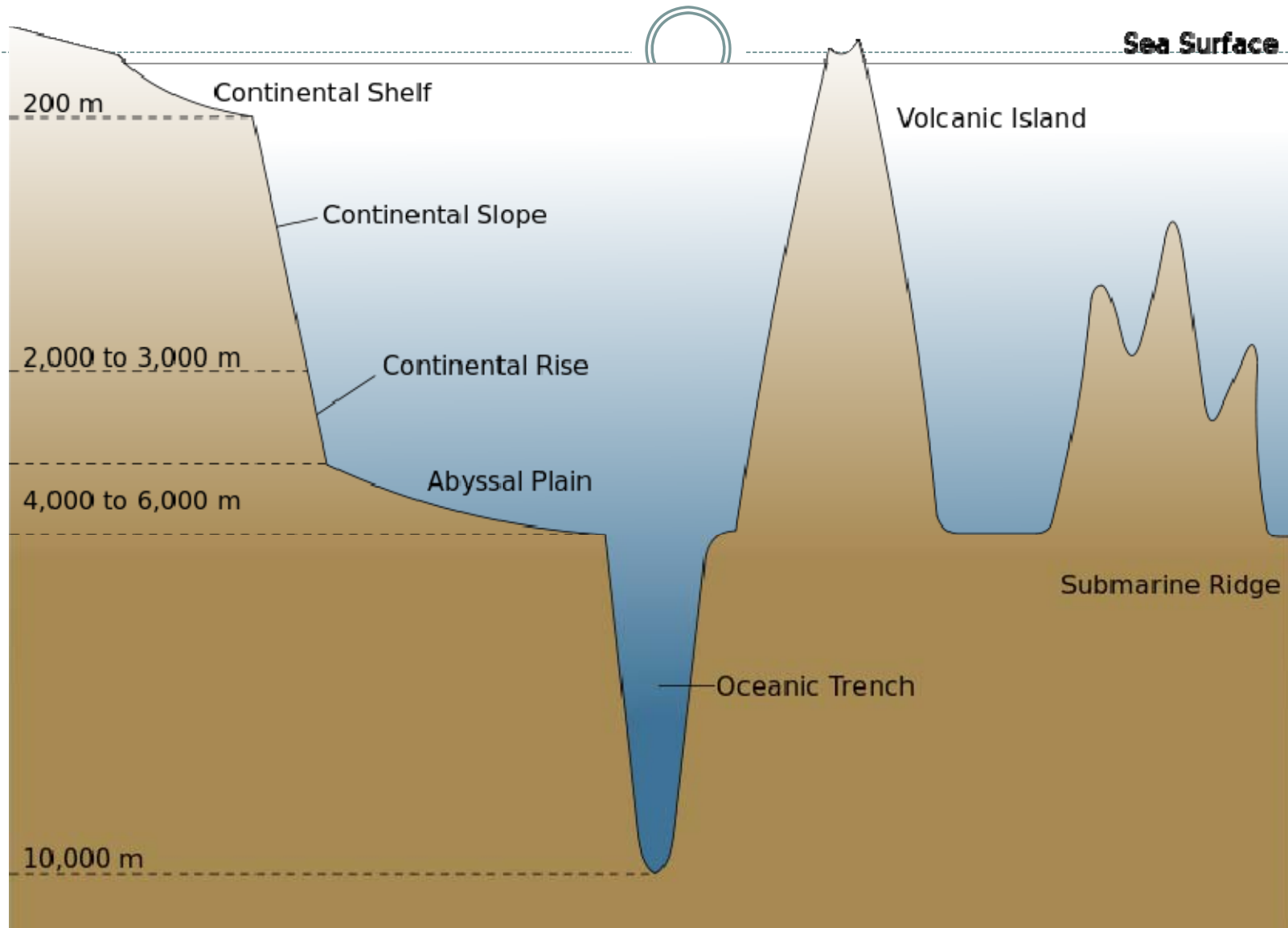
Cuenca Oceánica



Amplias depresiones geológicas que quedan por debajo del nivel del mar.

Aprox. 71% del área del planeta es ocupada por cuencas oceánicas que se han formado por la expansión del fondo oceánico y su corteza (oceánica) esta cubierta con basalto.

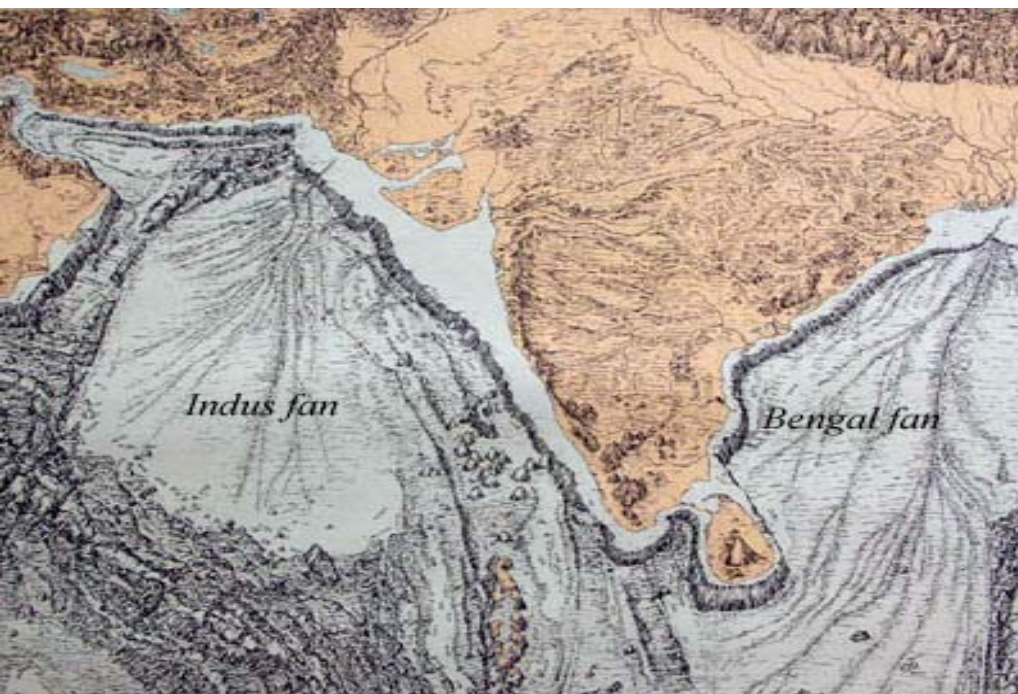
Cuenca Oceánica



Abanicos submarinos



- **Un abanico submarino es un cuerpo de sedimentos en el fondo marino depositados por procesos de flujo de masa que pueden ser**
- **en forma de abanico, pero más alargados y a veces las formas lobulares también están presentes.**



En el norte del océano indico se encuentran los dos abanicos marinos mas grandes del planeta (el Bengal y el Indus). La mayoría de sus sedimentos son derivados de los continentes a través de sistemas fluviales.

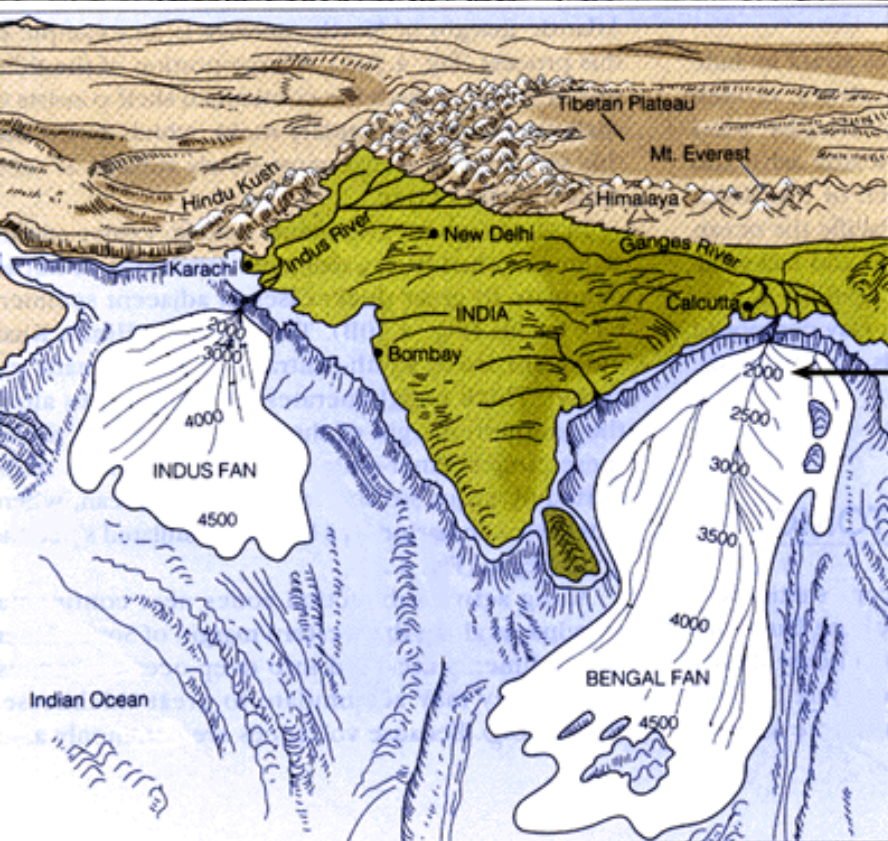


FIGURE 4.29 The Indus and Ganges-Bramaphutra rivers have built the vast Indus and Bengal deep-sea fans on the seafloor adjoining the Indian subcontinent.

Numbers indicate depth below sea level.

El abanico Bengal tiene aprox. 3,000 km de longitud, su máxima anchura es de 1430 km y su máximo grosor es de 20 km. Sus sedimentos provienen desde el Himalaya y son transportados por el sistema fluvial del Ganges-Brahmaputra.

El segundo mas grande es el abanico Indus (1500 km de long. 960 km de anchura máx.. Y un grosor máx.. De <10 km) en el mar Árabe no solo recibe sedimentos del Himalaya, también los recibe de suelos aluviales de Pakistán y de suelos áridos de Arabia.

Elementos arquitectónicos de un abanico submarino.


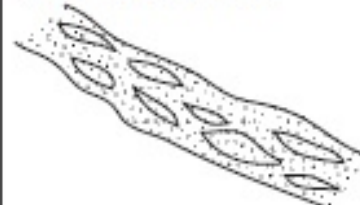
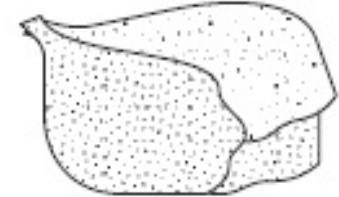

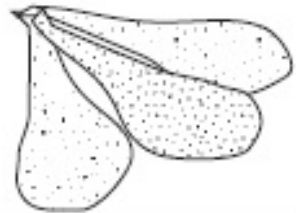

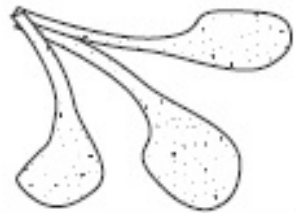

	Channels	Lobes	Sheets
Gravel-rich systems	poorly channelised 		
Sand-rich systems	braided channels 	channelised lobes 	
Mixed sand and mud systems	channel and levee complexes 	depositional lobes 	
Muddy systems	channel and levee complexes 	depositional lobes 	sheets 

Fig. 16.3 The proportions of different architectural elements on submarine fans are determined by the dominant grain size deposited on the fan.

Sistemas de Abanicos Submarinos



- Existen cuatro tipos de sistemas de abanicos submarinos, todos controlados por la clase de sedimentos presentes:
 - -Sistema con abundantes gravas
 - -Sistema con abundantes arenas
 - -Sistema con mezcla de arenas y lodos
 - -Sistema con abundantes lodos

Sistema con abundantes gravas

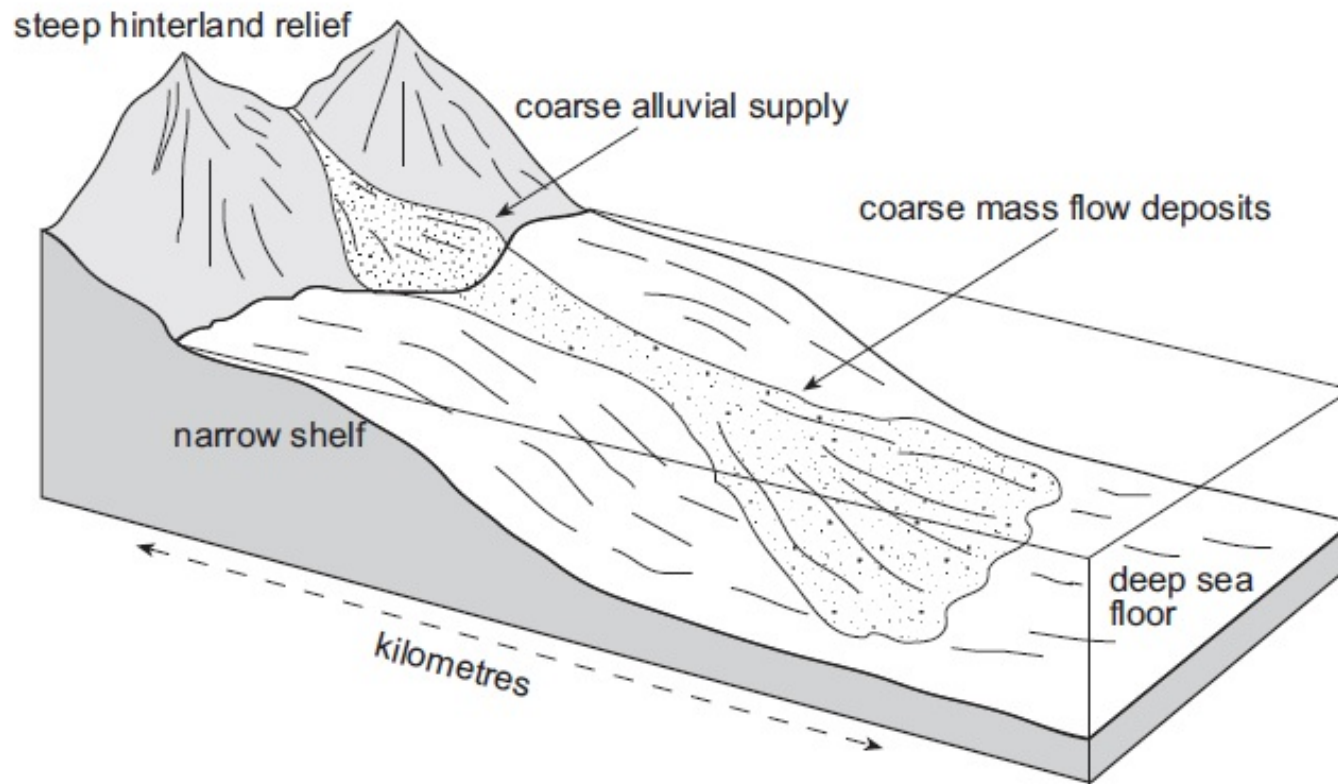


Fig. 16.7 Facies model for a gravel-rich submarine fan: typically found in front of coarse fan deltas, the fan is small and consists mainly of debris flows.

Sistema con abundantes arenas

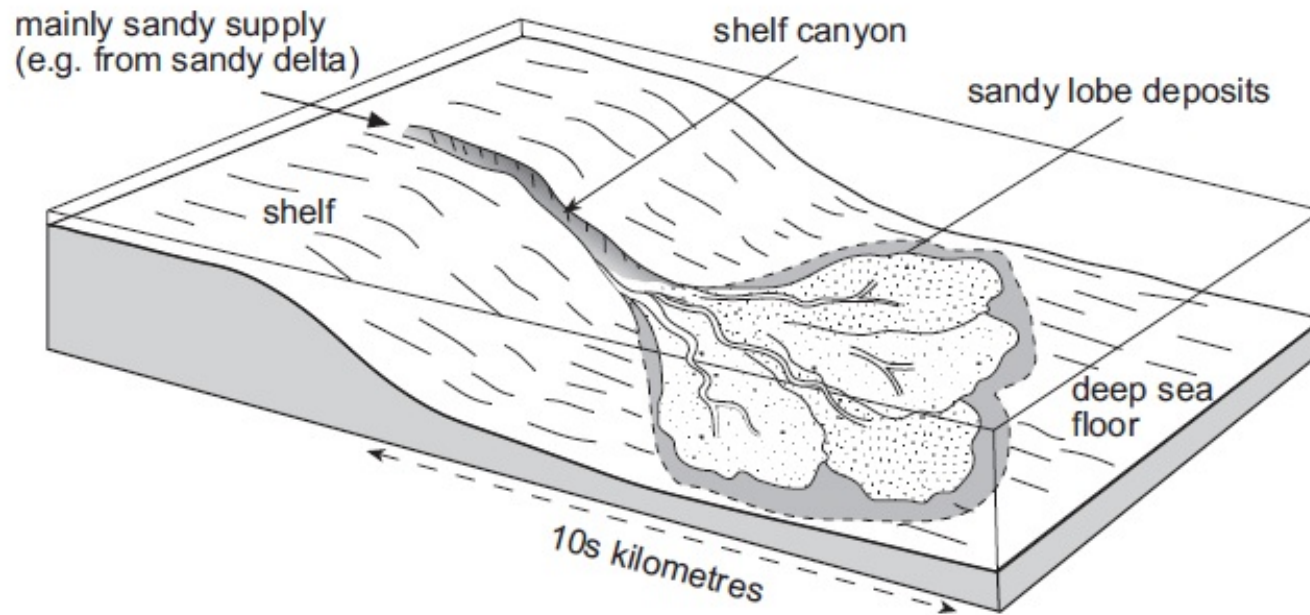


Fig. 16.8 Facies model for a sand-rich submarine fan: sand-rich turbidites form lobes of sediment that build out on the basin floor, with switching of the locus of deposition occurring through time.

Sistema con mezcla de arenas y lodos

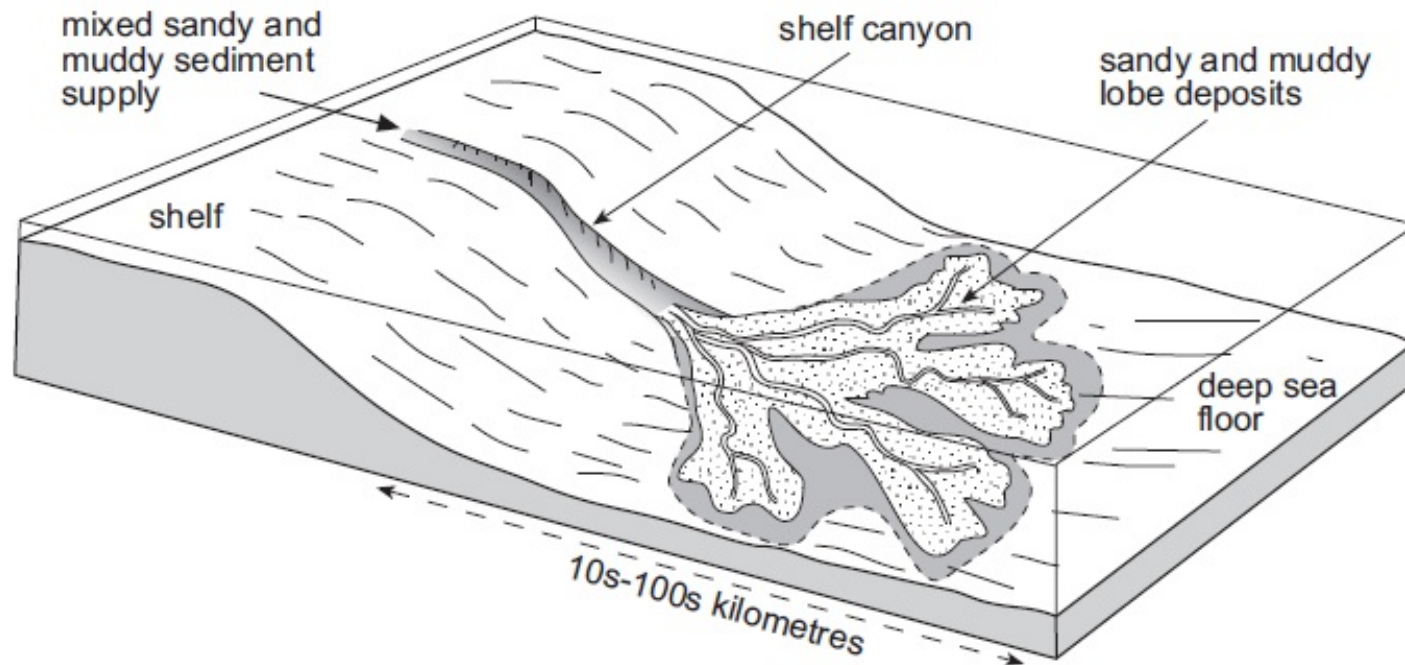


Fig. 16.9 Facies model for a mixed sand–mud submarine fan: the lobes are a mixture of sand and mud and build further out as the turbidites travel longer distances.

Sistema con abundantes lodos

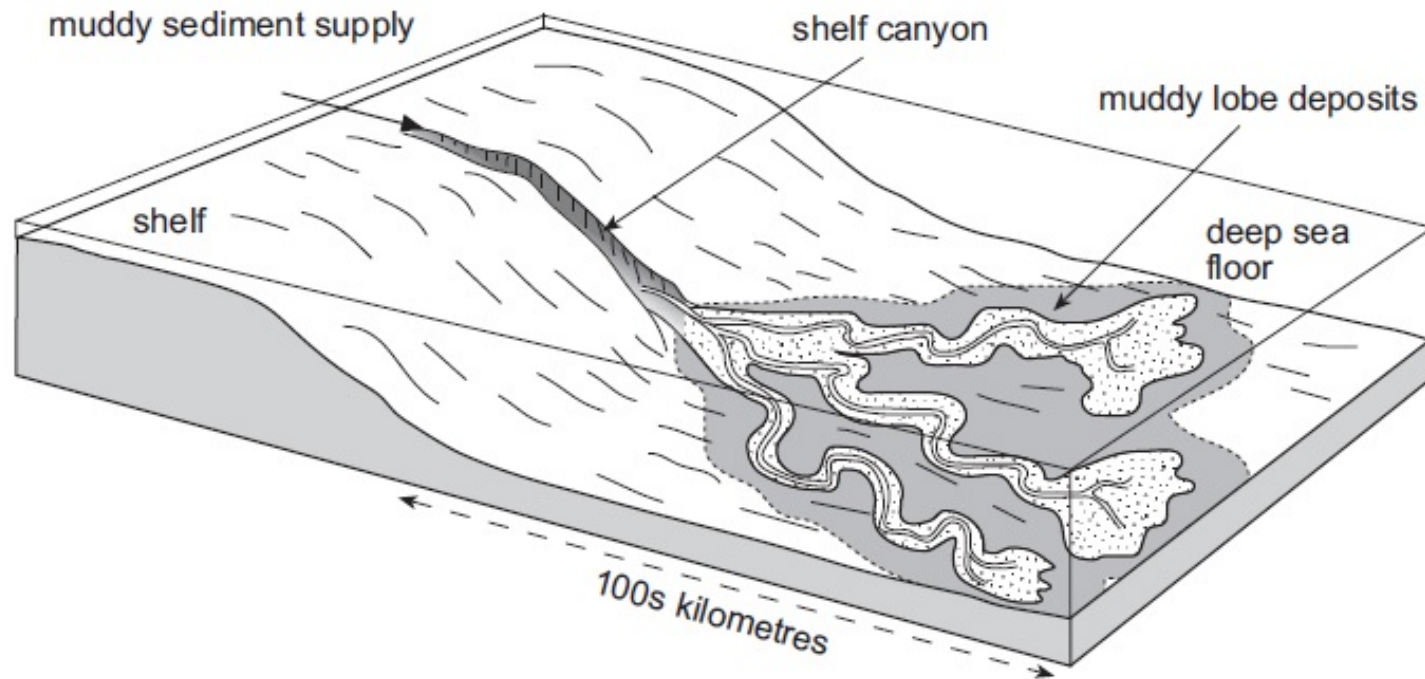


Fig. 16.10 Facies model for a muddy submarine fan: lobes are very elongate and most of the sand is deposited close to the channels.

Sedimentos Pelágicos



- Son sedimentos que proceden principalmente de partículas que se encuentran en suspensión en los mares. Estas partículas pueden proceder del plancton marino (calcáreo o silíceo) e incluso ser de arcillas, en cuyo caso se generan las “arcillas abisales” de algunos fondos oceánicos profundos.

Ooze



- Sedimentos de grano fino presentes en el fondo marino, contienen al menos 30% de material biogénico.
- El termino hace referencia a la composición, la cual refleja su origen.

Clasificación de Oozes

- -Silíceo:



Siliceous oozes have a preponderance of siliceous (glass) shells, primarily from tiny phytoplankters called diatoms. The white chunks, seen above, are nearly solid diatom shells with little sediment. When the siliceous ooze is this concentrated it is called 'diatomaceous earth' and mined for use as a grit and filter.

- -Calcáreo:



Calcareous foram ooze of the ocean floor viewed from the submersible Alvin in the Oceanographer Fracture Zone, central North Atlantic (~35N, 35W). Trail of burrows made by an unidentified organism.

- -Arcillas rojas:



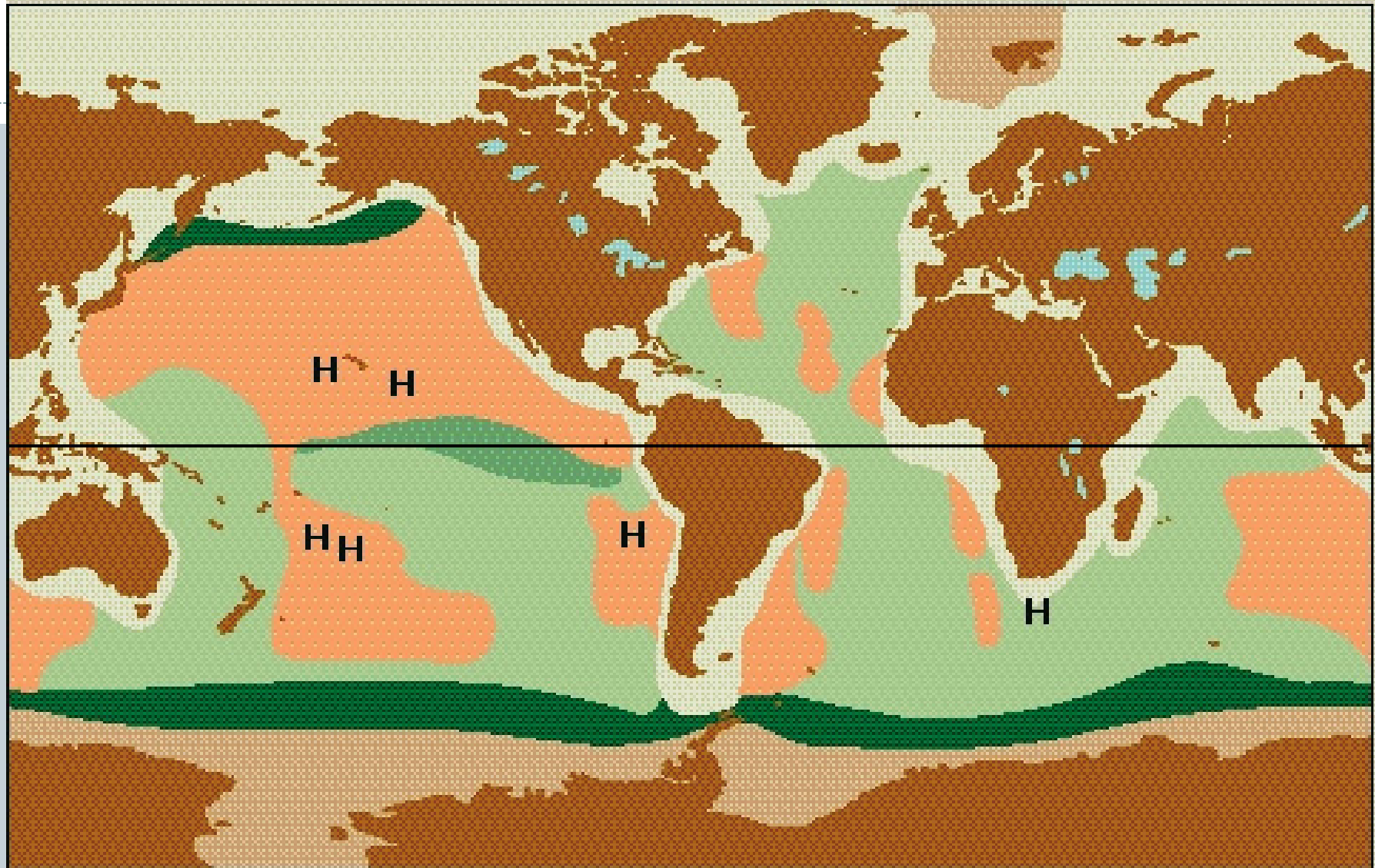
Ocean floor near Wolfsville on red clay in Minas Basin, Nova Scotia, Canada.

Sedimentos Hemipelágicos



- Constituyen los sedimentos típicos de los taludes continentales. Los conforman mezclas de material terrígeno (limo fundamentalmente) con material pelágico (plancton); sin embargo, la fracción terrígena mayor de 5 micras debe ser superior al 25%.

General Sediment Distribution Patterns



Terrigenous deposits:

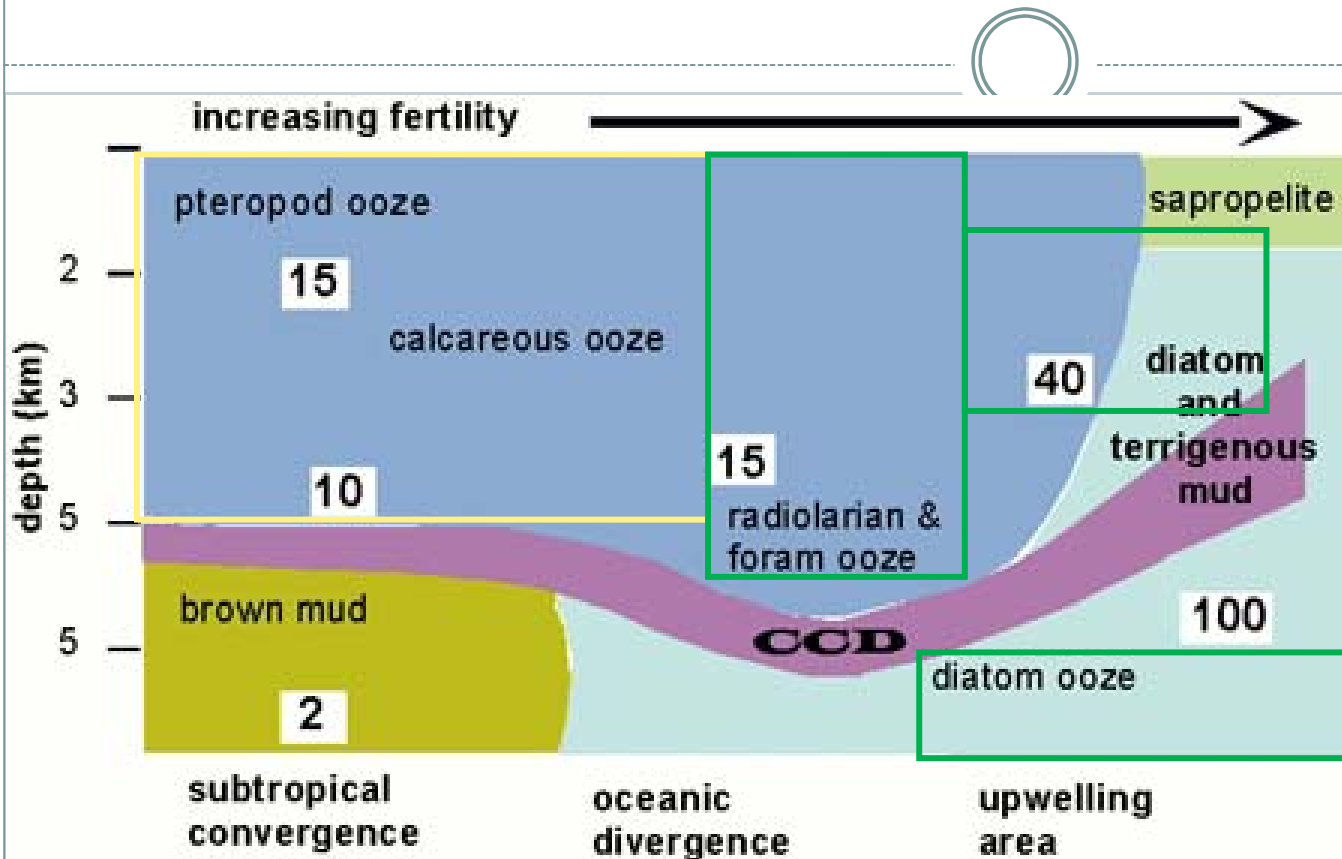
- Continental margins
- Glacial deposits
- Clays

Biogenous deposits:

- Calcareous oozes
- Siliceous radiolarian oozes
- Siliceous diatom oozes

H Hydrogenous deposits
also present

Fósiles



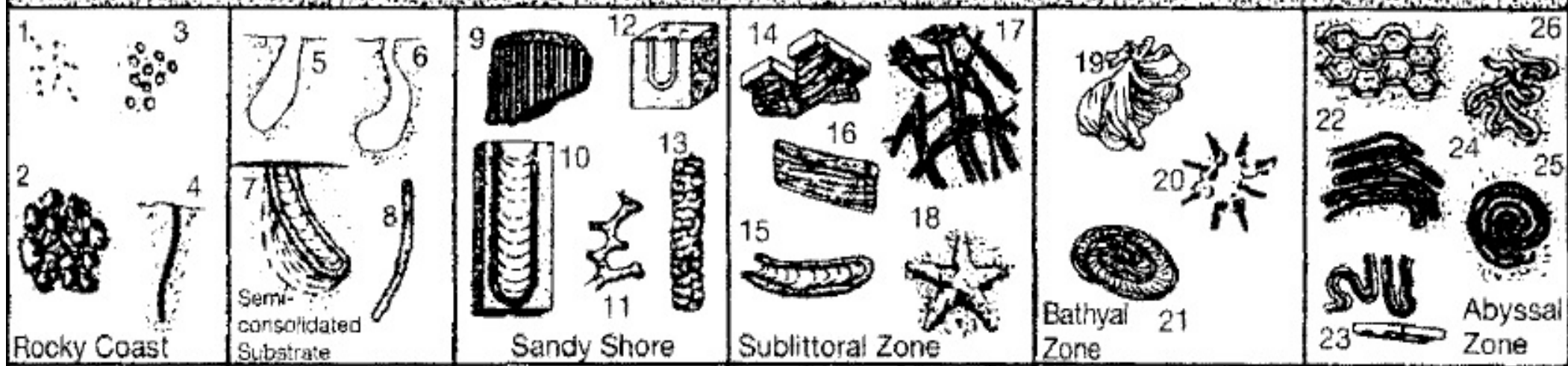
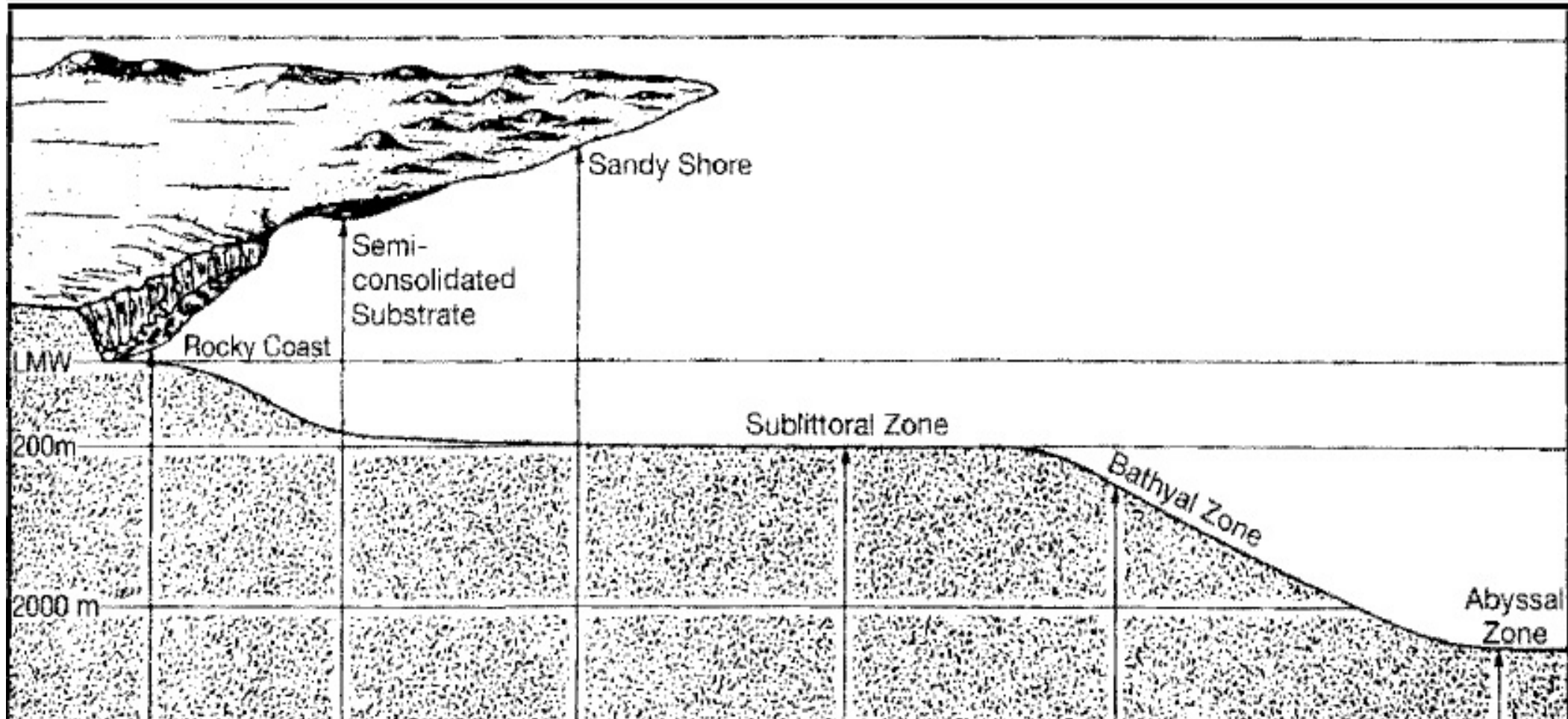
Distribution of modern sediment facies in the context of depth and ocean fertility, based on sediment patterns in the eastern central Pacific. Numbers are typical sedimentation rates in mm/1000 yrs

Carbonatados Silíceos

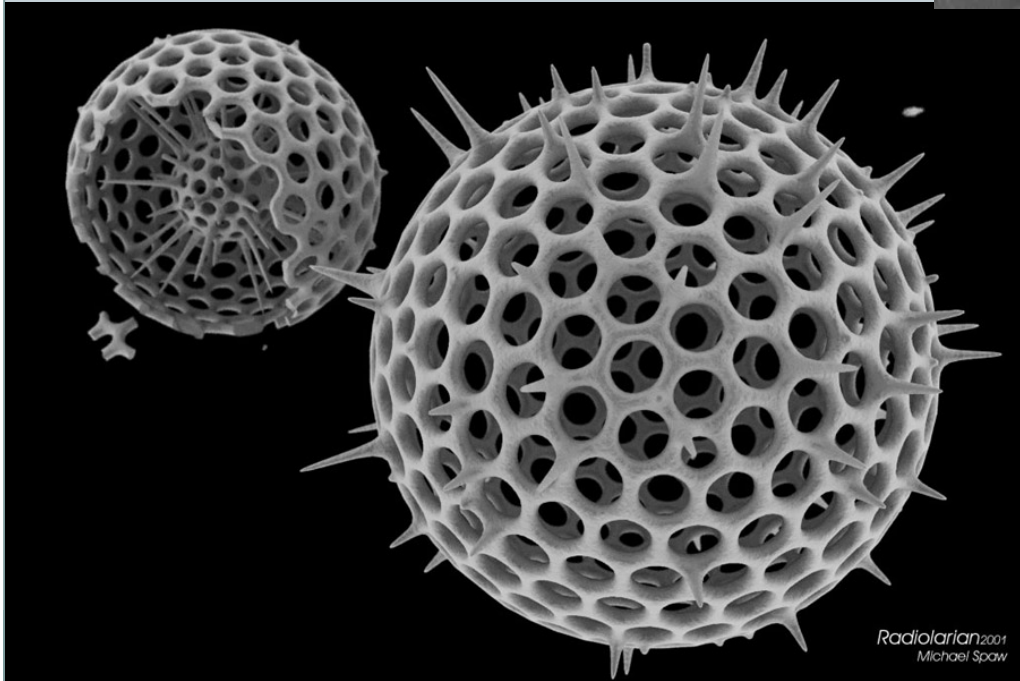
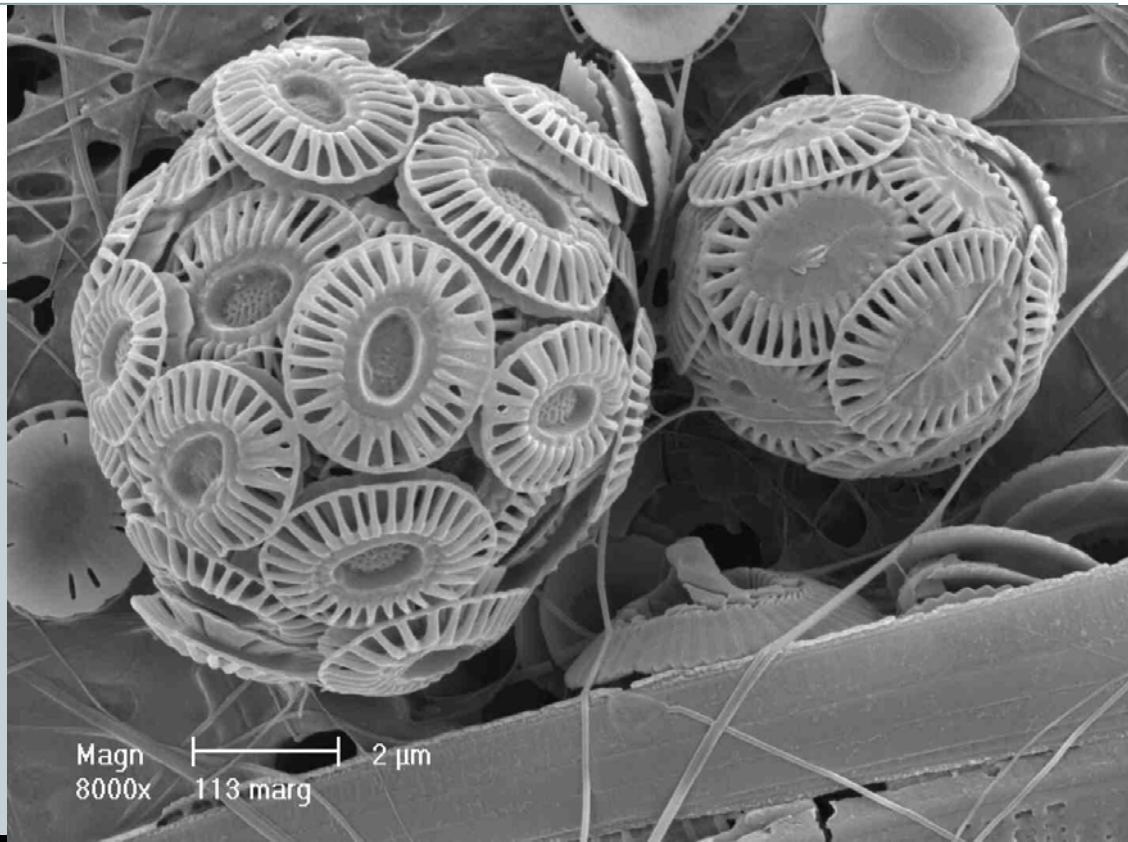
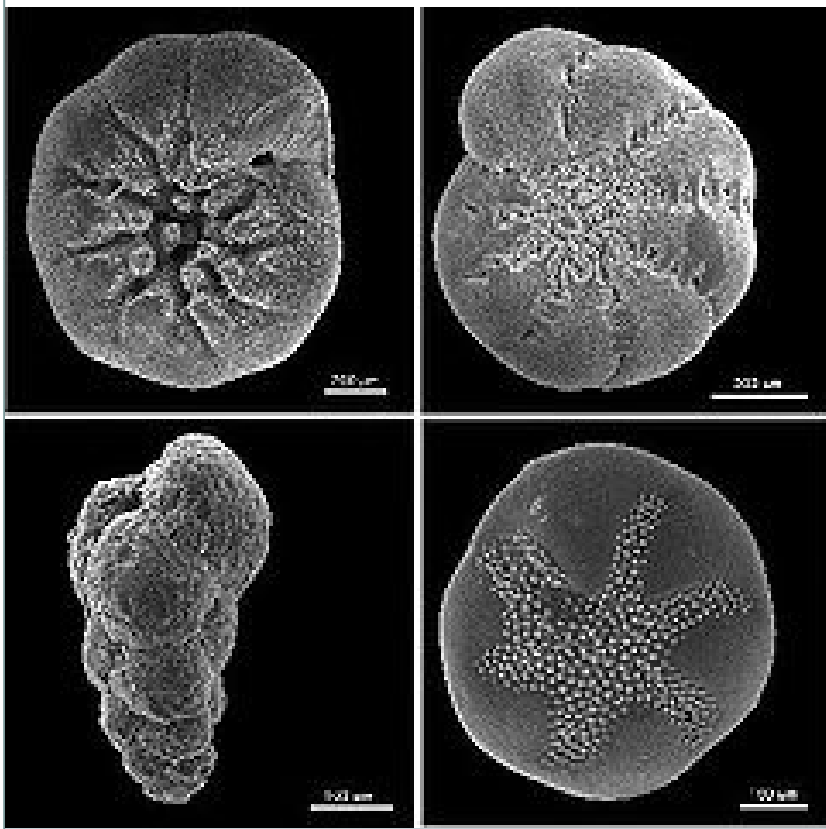
La sapropelita es un sapropel solidificado (sapropel = barro o lodo con un contenido variable de materia orgánica no identificable en un ambiente acuático sin oxígeno).

CCD (Nivel de compensación de los carbonatos):

Nivel bajo el cual se disuelven todos los carbonatos.



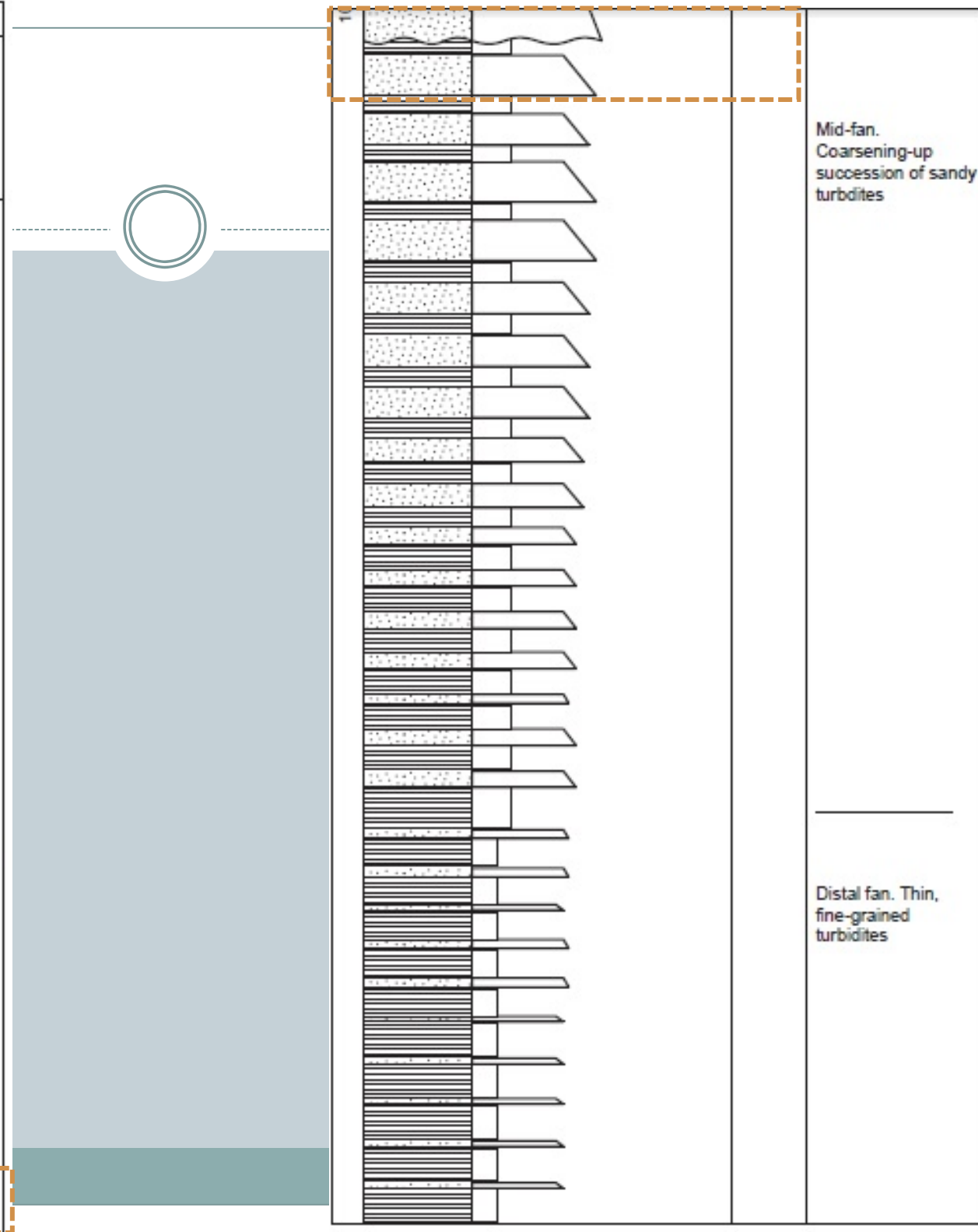
<i>Trypanites</i>	<i>Glossifungites</i>	<i>Skolithos</i>	<i>Cruziana</i>	<i>Zoophycos</i>	<i>Nereites</i>
-------------------	-----------------------	------------------	-----------------	------------------	-----------------



Logs

Grain Size		Bouma (1962) Divisions	Interpretation
Mud	T_{ep}	Pelite	Pelagic sedimentation
	T_{ef}	Massive or graded Turbidite	fine grained, low density turbidity current deposition
		Upper parallel laminae	? ? ?
Sand Silt	T_c	Ripples, wavy or convoluted laminae	Lower part of Lower Flow Regime
	T_b	Plane parallel laminae	Upper Flow Regime Plane Bed
Sand (to granule at base)	T_a	Massive graded	(?) Upper Flow Regime Rapid deposition and Quick bed (?)

Submarine fan						
Scale	Lithology	MUD SAND GRAVEL			Structures etc	Notes
		day silt	vf, m f, c	gran pebb cobb boul		
						Inner fan. Submarine fan channel filled with thick conglomerate and sandstone turbidites
						Inner Fan. Thin-bedded levee deposits
						Mid-fan. Channel on lobe



Características de depósitos marinos



- Sedimentos– Lodos, arenas, grava y calizas de granos finos.
- Geometría– Principalmente laminas delgadas, excepto en abanicos submarinos.
- Estructuras Sedimentarias– Turbiditas gradadas, laminacion horizontal y ripples.
- Fósiles– pelagic, free swimming and floating organisms
- Color– Variable con arcillas pelágicas rojas, turbiditas oscuras y calizas pelágicas pálidas.

Bibliografía



- **Boggs, Sam. Principles of sedimentology and stratigraphy, 4 ed, Pearson & Prentice Hall, 2006, Pág 349- 364**
- **Nichols, Gary. Sedimentology and stratigraphy, 2 ed, Wiley-Blackwell, 2009, Pág 247-262**
- **Kennett, James. Marine Geology, Prentice Hall, 1982, Pág 396-492**
- **Llorente B. Jorge. La distribución de los seres vivos y la historia de la Tierra, 2 ed, Fondo de Cultura Económica, 2002, Pág 45-50**

Cibergrafía



- http://www.nio.org/index/option/com_nomenu/task/show/tid/2/id/138/
- http://es.wikipedia.org/wiki/Cuenca_oce%C3%A1nica
- <http://www.marinebio.net/marinescience/02ocean/mgbottom.htm>