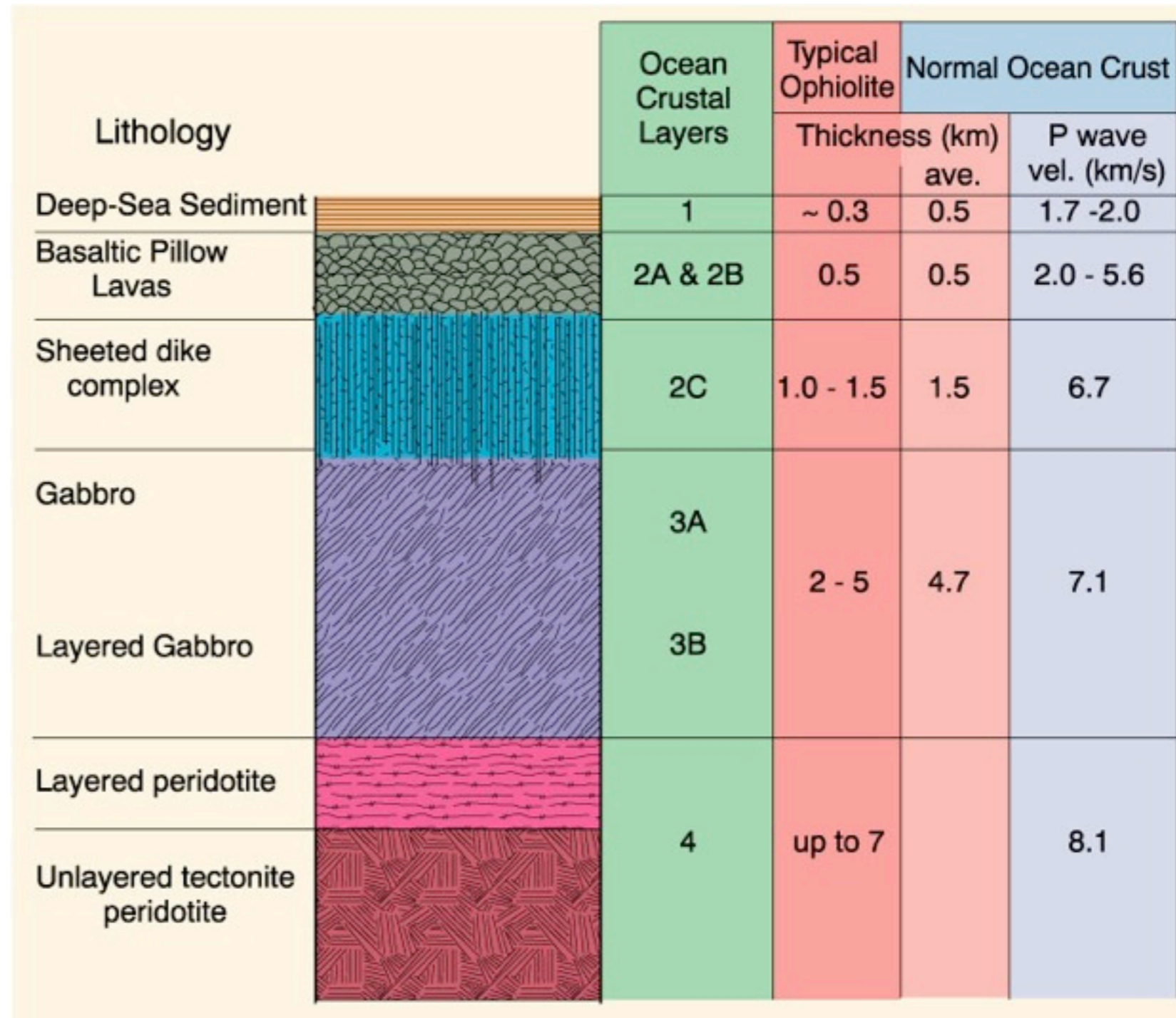


09- Sedimenten in Ozean

Oceanic Crust and Upper Mantle Structure

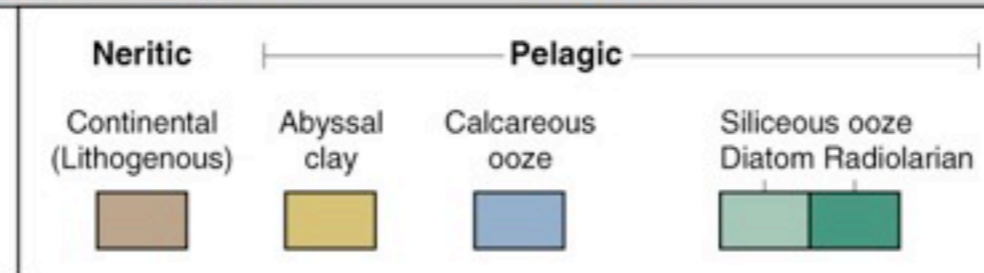
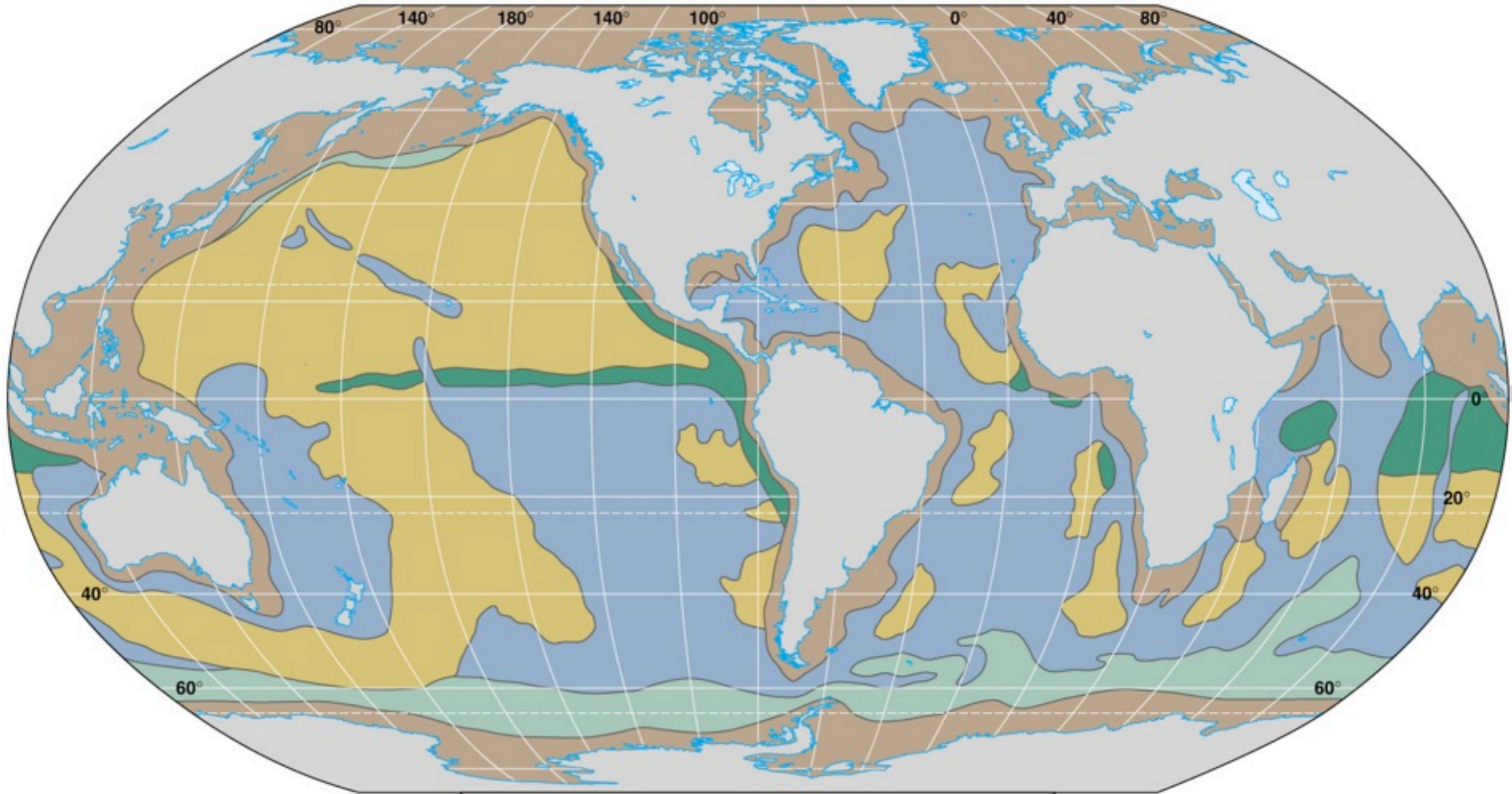
Layer 1

A thin layer of pelagic sediment



Distribution of marine sediments

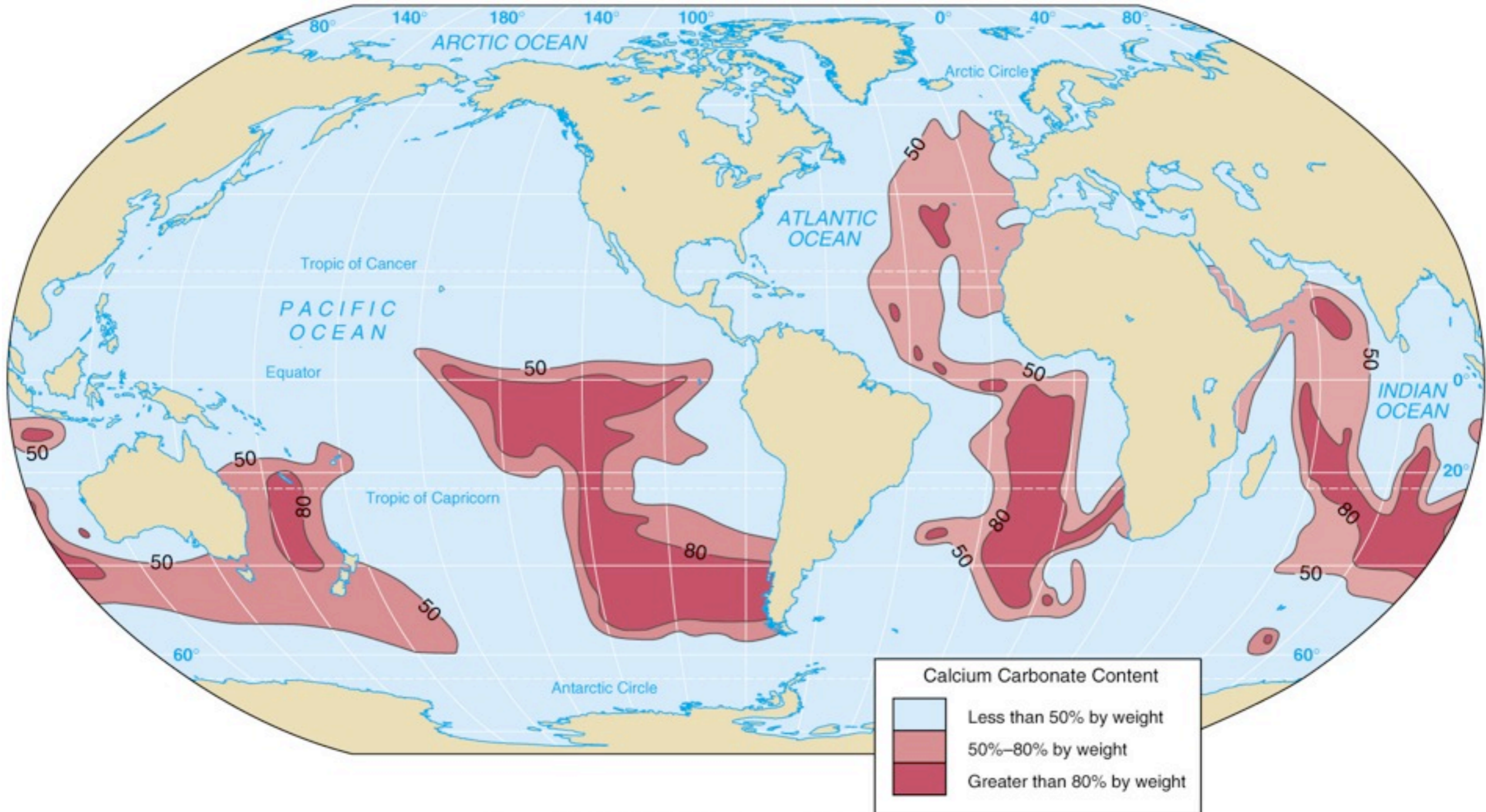
Neritic and pelagic marine sediments



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Distribution of marine sediments

calcareous oozes

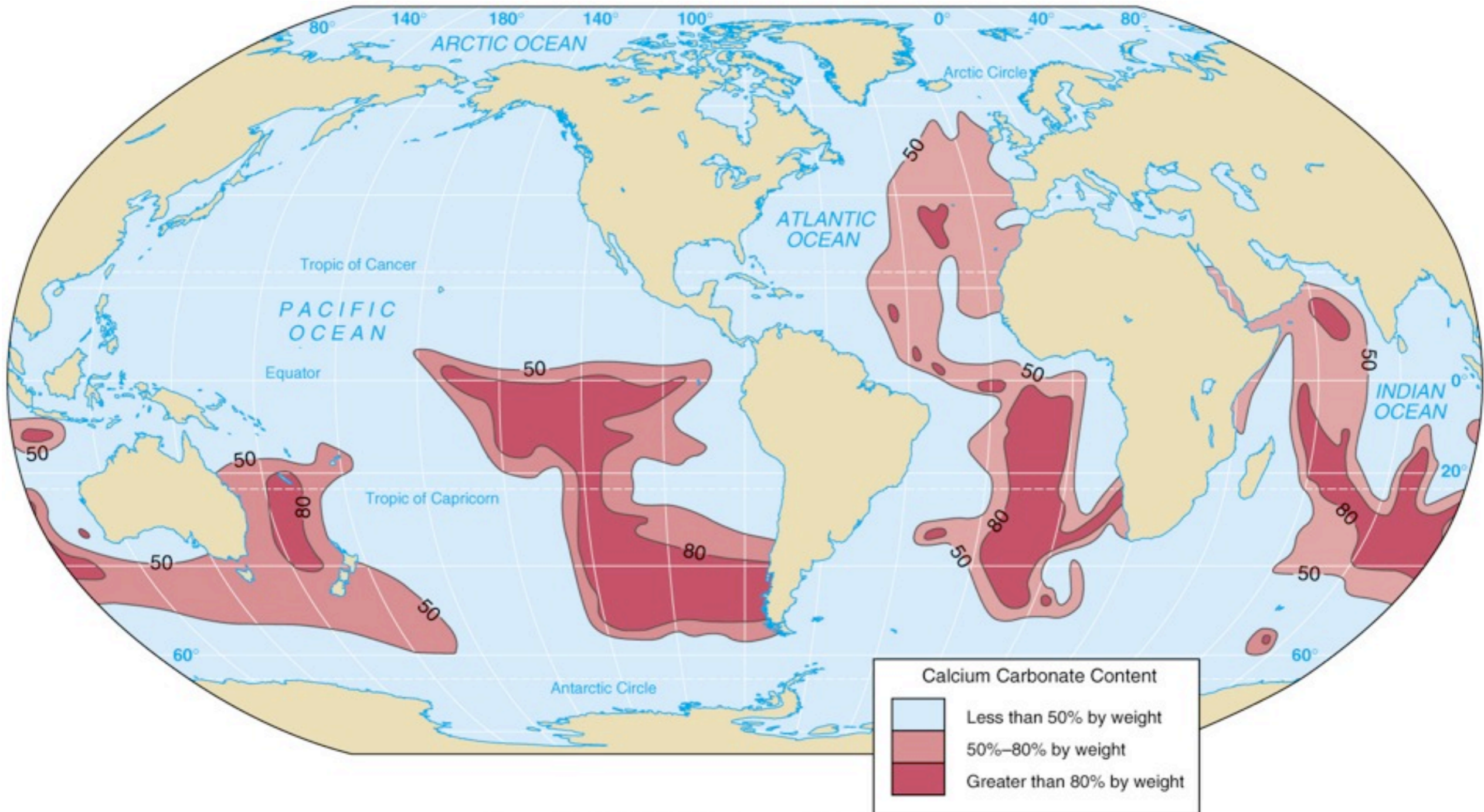


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Why in these places?

Distribution of marine sediments

calcareous oozes



The shallow oceans are supersaturated with respect to calcite, the deep ocean is undersaturated. Hence Calcareous sediment only accumulates (either by reef building or rain of planktonic shells) in water shallower than the CCD, and these locations are restricted to young seafloor, continental margins, and oceanic plateaux

Distribution of biogenous sediments

Most common as pelagic deposits

Factors controlling distribution

Productivity

Destruction (dissolution)

Calcareous ooze and the CCD

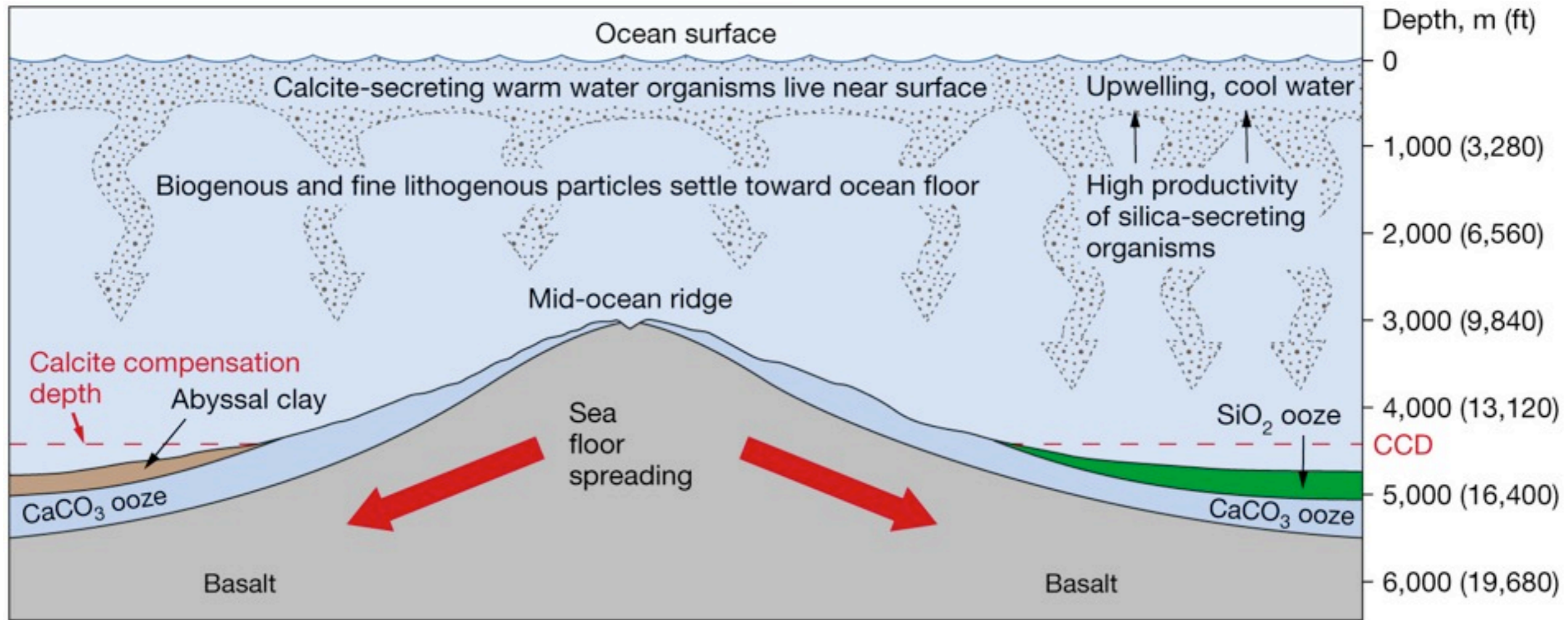
Warm, shallow ocean saturated with calcium carbonate

Cool, deep ocean undersaturated with calcium carbonate

Lysocline--depth at which CaCO_3 begins to dissolve rapidly

Calcite compensation depth CCD--depth where CaCO_3 readily dissolves

Calcareous ooze and the CCD



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Scarce calcareous ooze below 5000 m in modern ocean

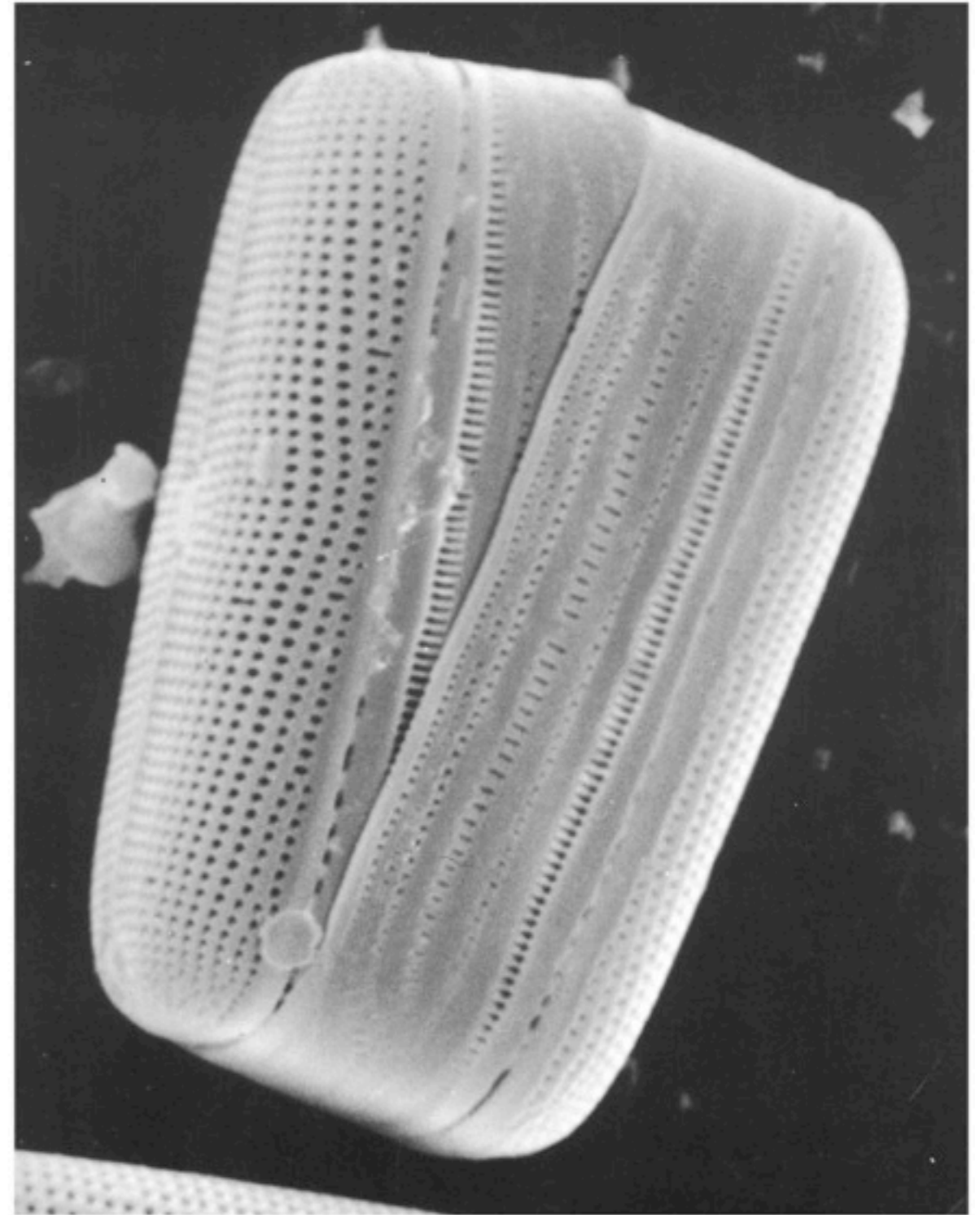
Ancient calcareous oozes at greater depths if moved by sea floor spreading

Silica in biogenic sediments

Diatoms (algae)

Photosynthetic

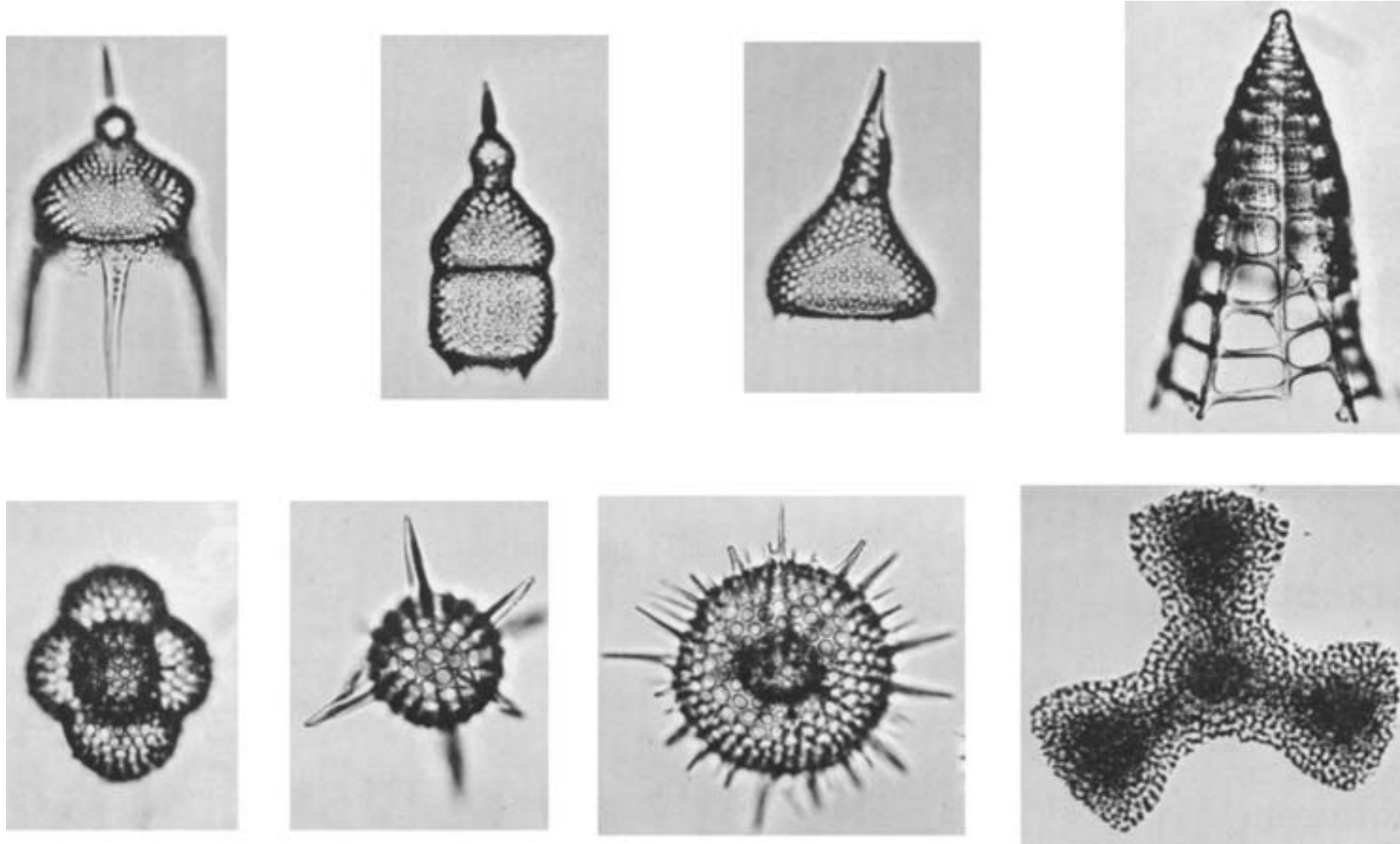
Diatomaceous earth



(a)

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Silica in biogenic sediments

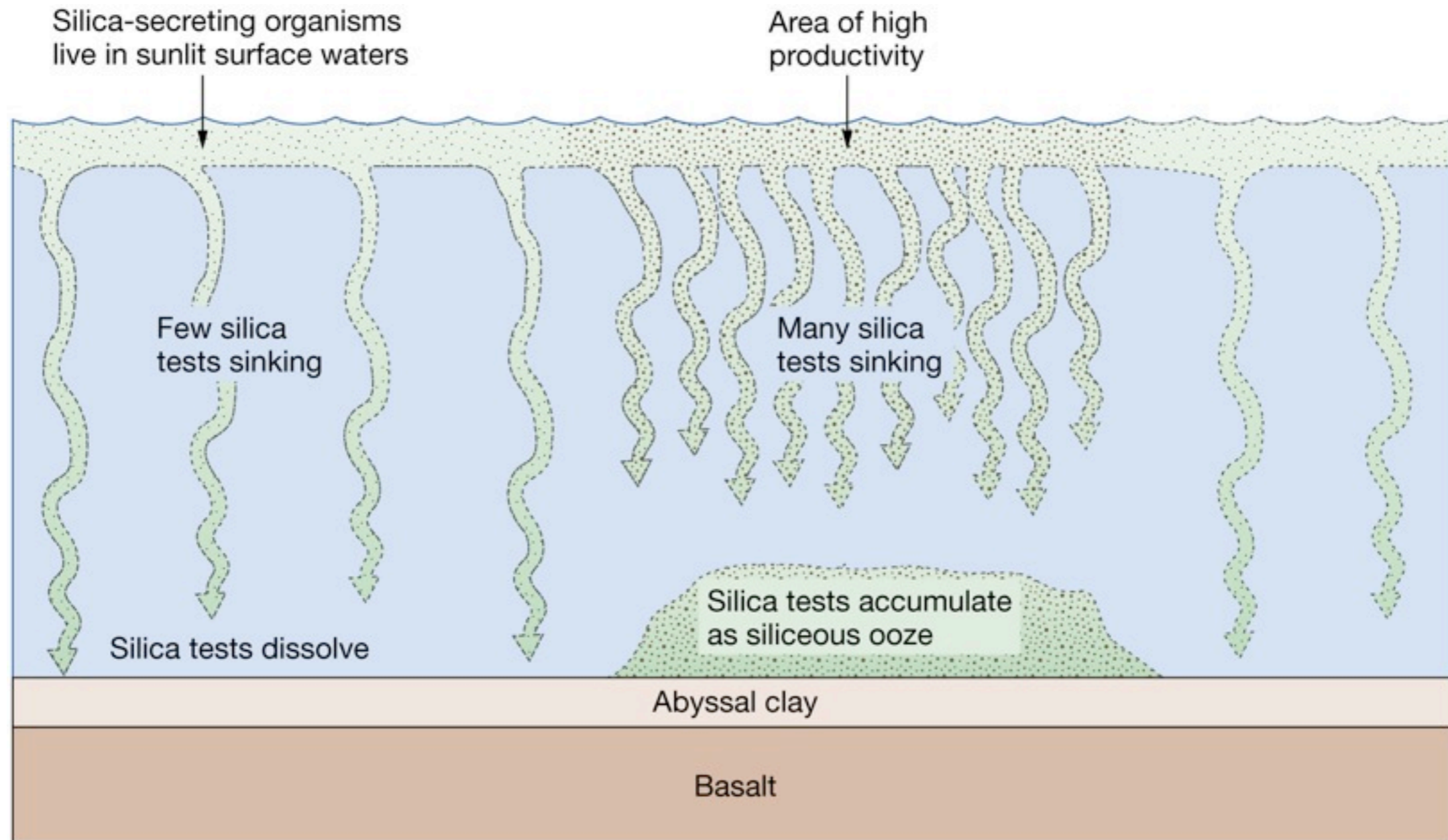


Examples of nasselarian (top) and spumellarian (bottom) polycystine **radiolarians**

Siliceous ooze

Seawater undersaturated with silica

Siliceous ooze commonly associated with high biologic productivity in surface ocean

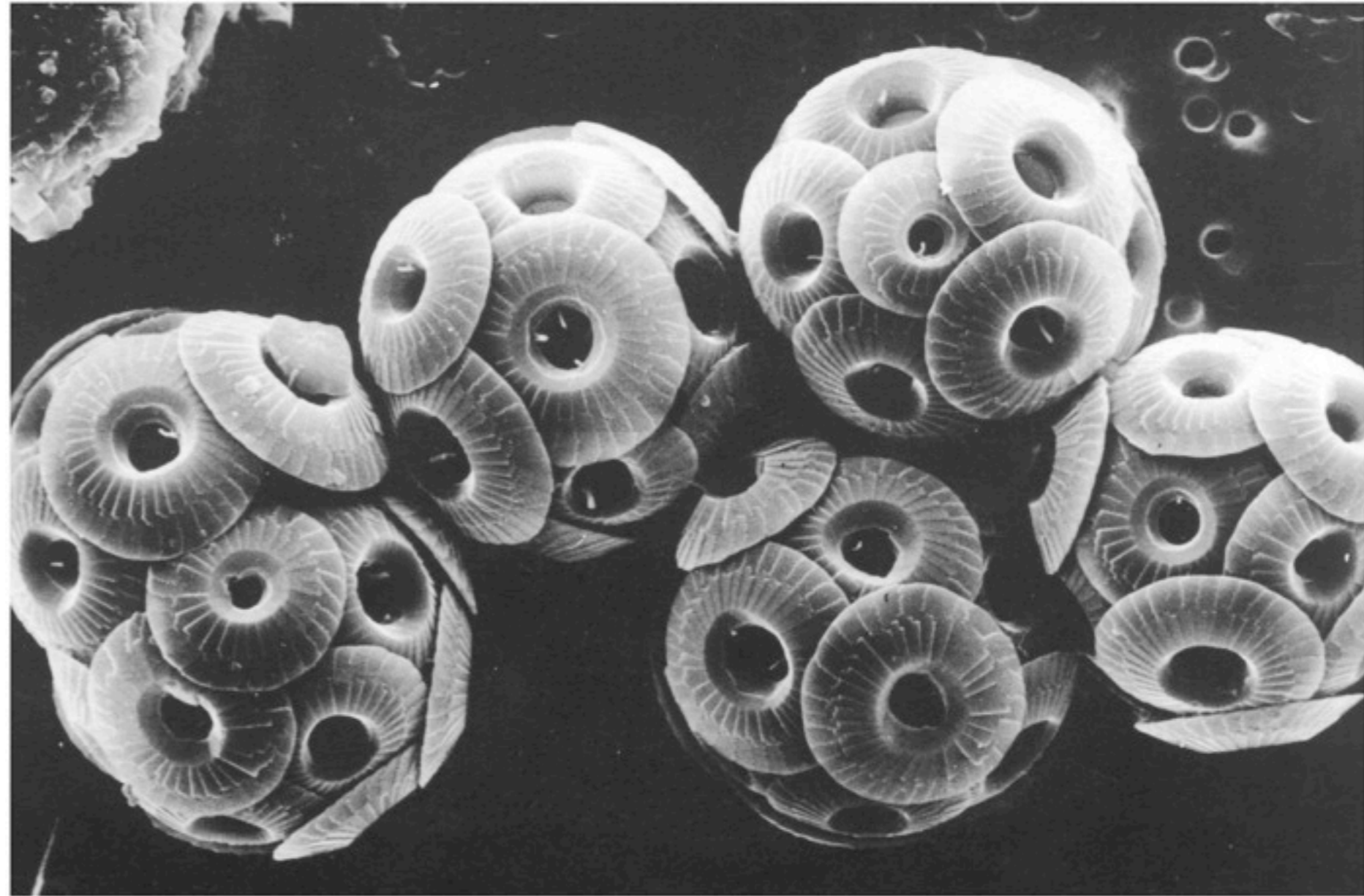


Calcium carbonate in biogenous sediments

Coccolithophores
(algae)

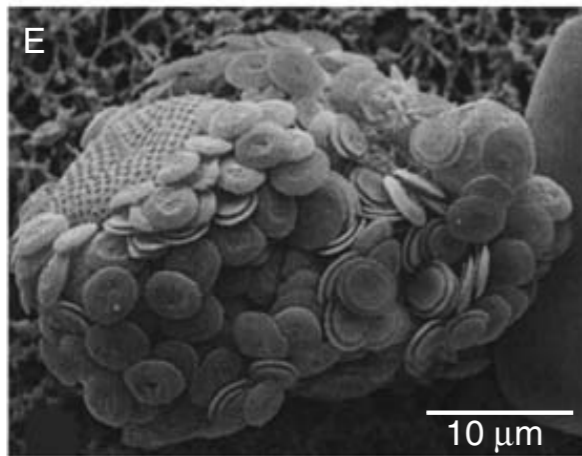
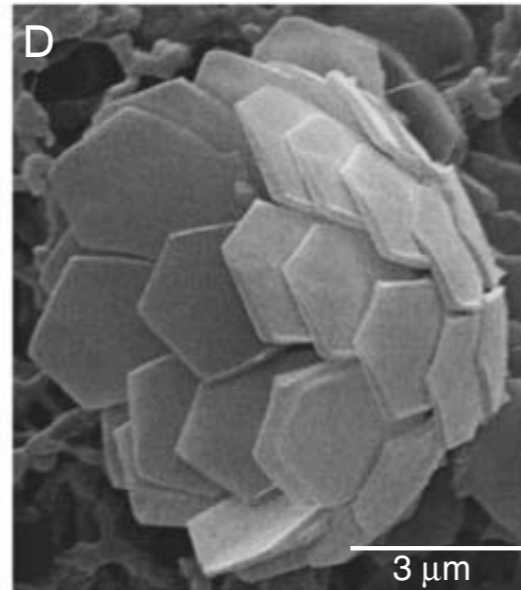
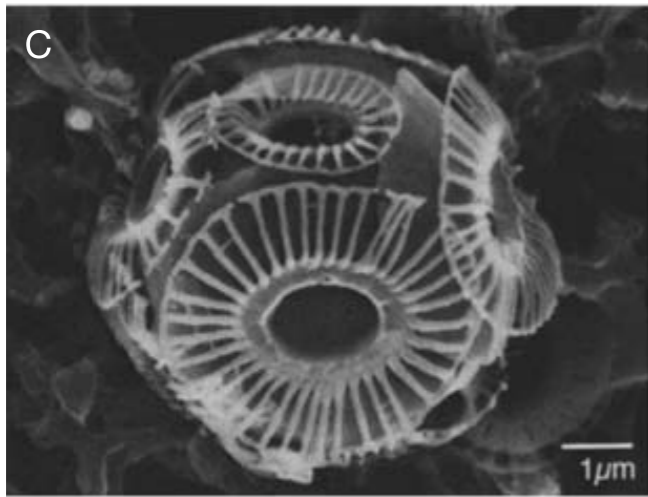
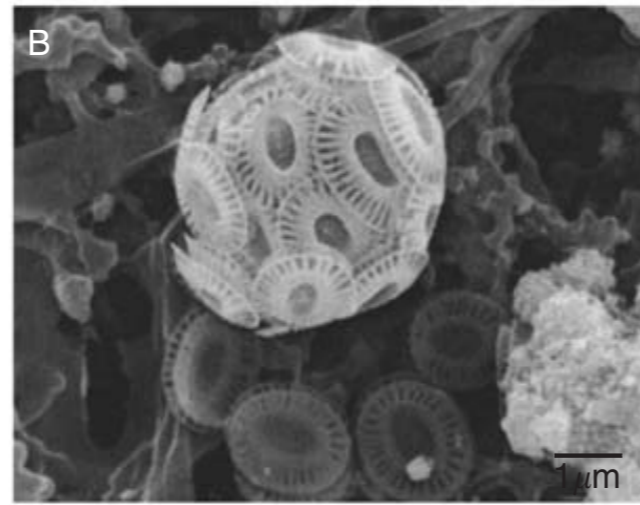
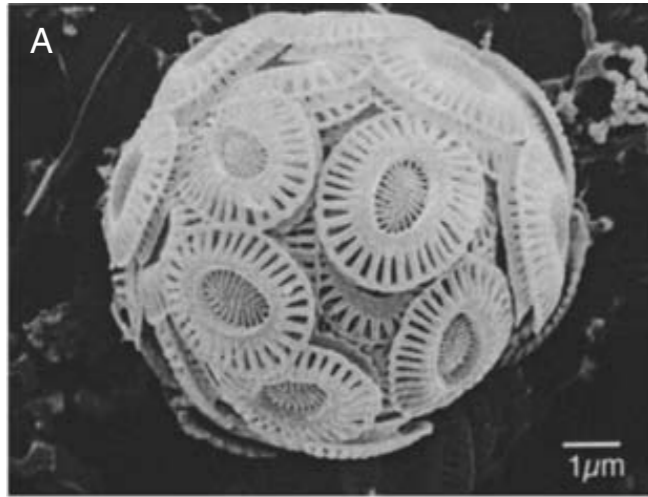
Photo-synthetic

Coccoliths
(nanno-plankton)



(a)

Scanning electron micrographs of coccolithophores



A: mature *Emiliana huxleyi* Type A (warm);
B: young *E. huxleyi* Type A (warm), and individual coccoliths;
C: young *E. huxleyi* Type B (cold);
D: *Florisphaera profunda*
E: *Reticulofenestra sessilis*.
Modified from Hagino, K., Okada, H., Matsuoka, H., 2005.

Coccolithophore assemblages and morphotypes of *Emiliana huxleyi* in the boundary zone between the cold Oyashio and warm Kuroshio currents of the coast of Japan.

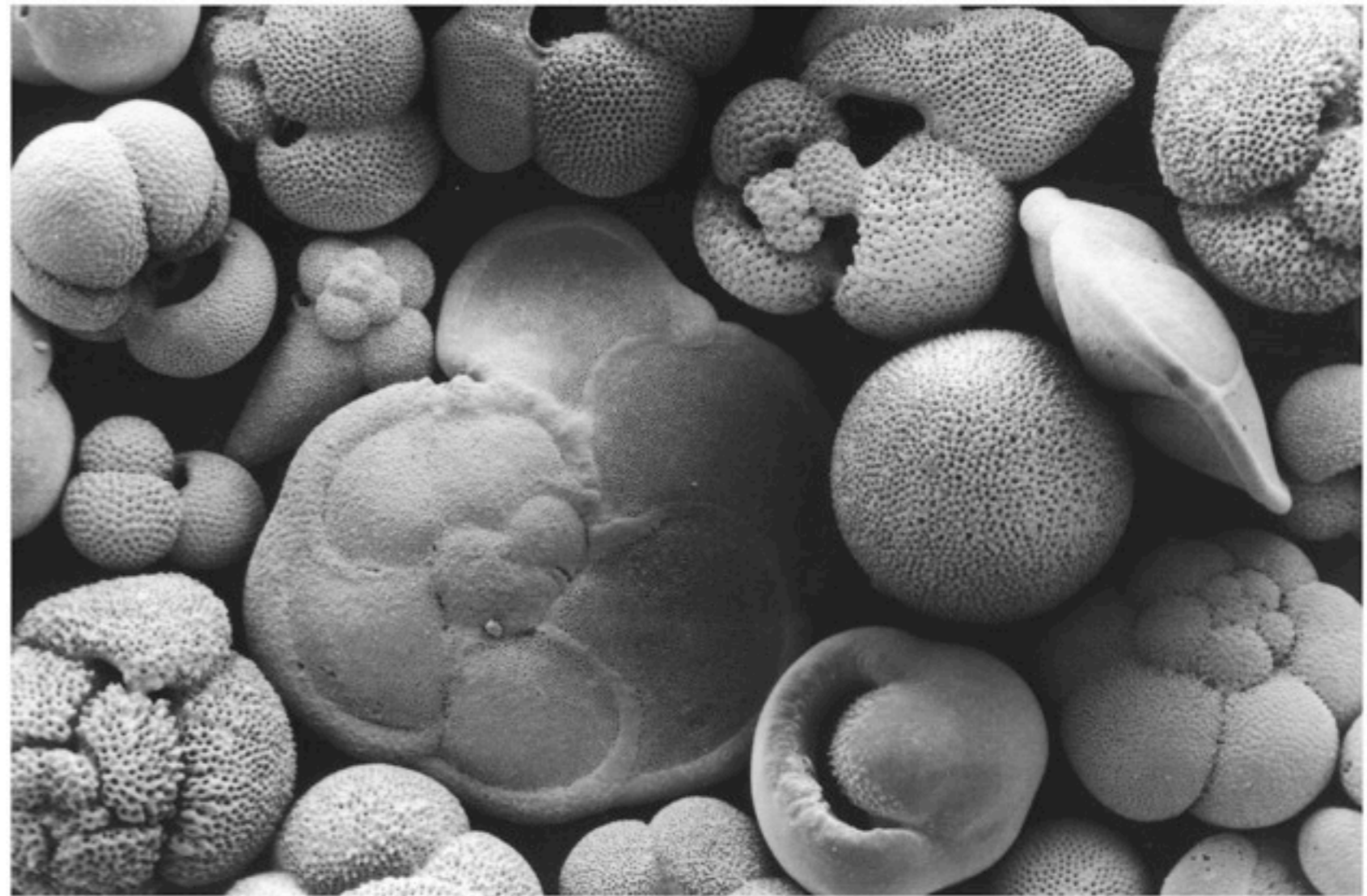
Calcium carbonate in biogenous sediments

Foraminifera

(protozoans)

Use external food

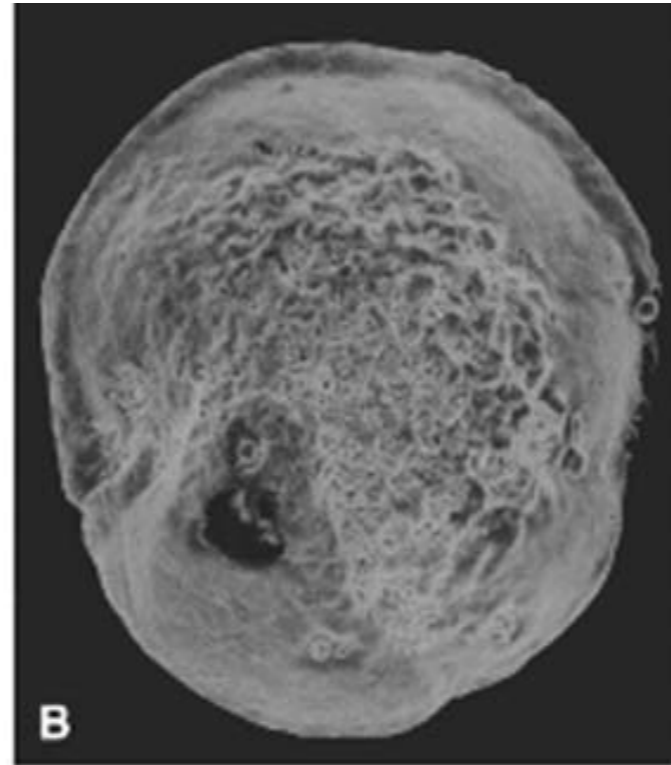
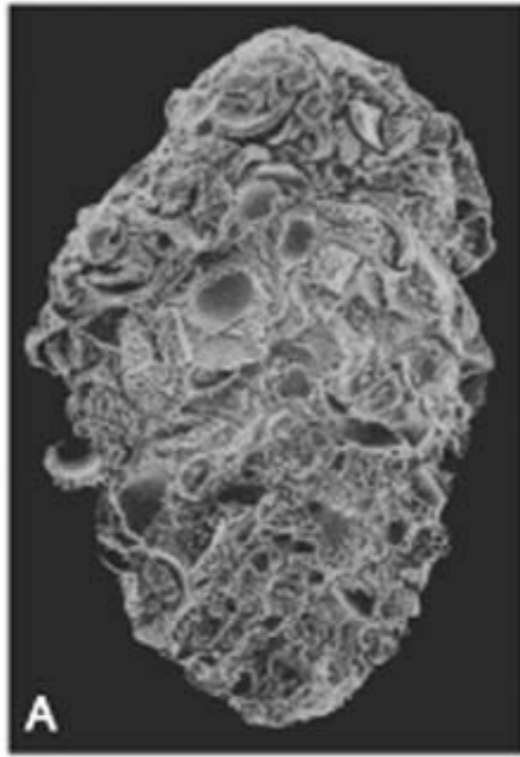
Calcareous ooze



(c)

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Calcium carbonate in biogenous sediments



Examples of benthic foraminifera.

A: Textularia,
B: Cibicides,
C: Uvigerina,
D: Stilostomella
E: Bulimina.



Calcium carbonate in biogenous sediments

Living Foraminifera



Hydrogenous marine sediments

Minerals precipitate directly from seawater

Manganese nodules

Phosphates

Carbonates

Metal sulfides

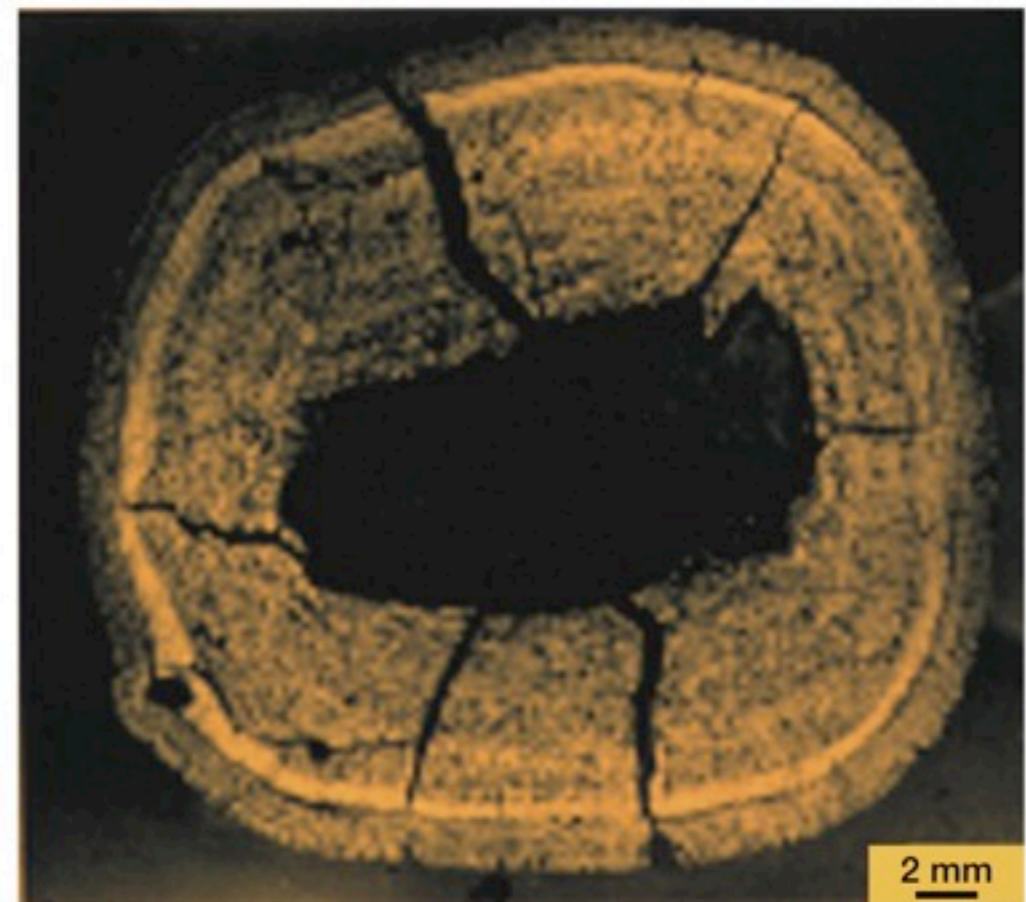
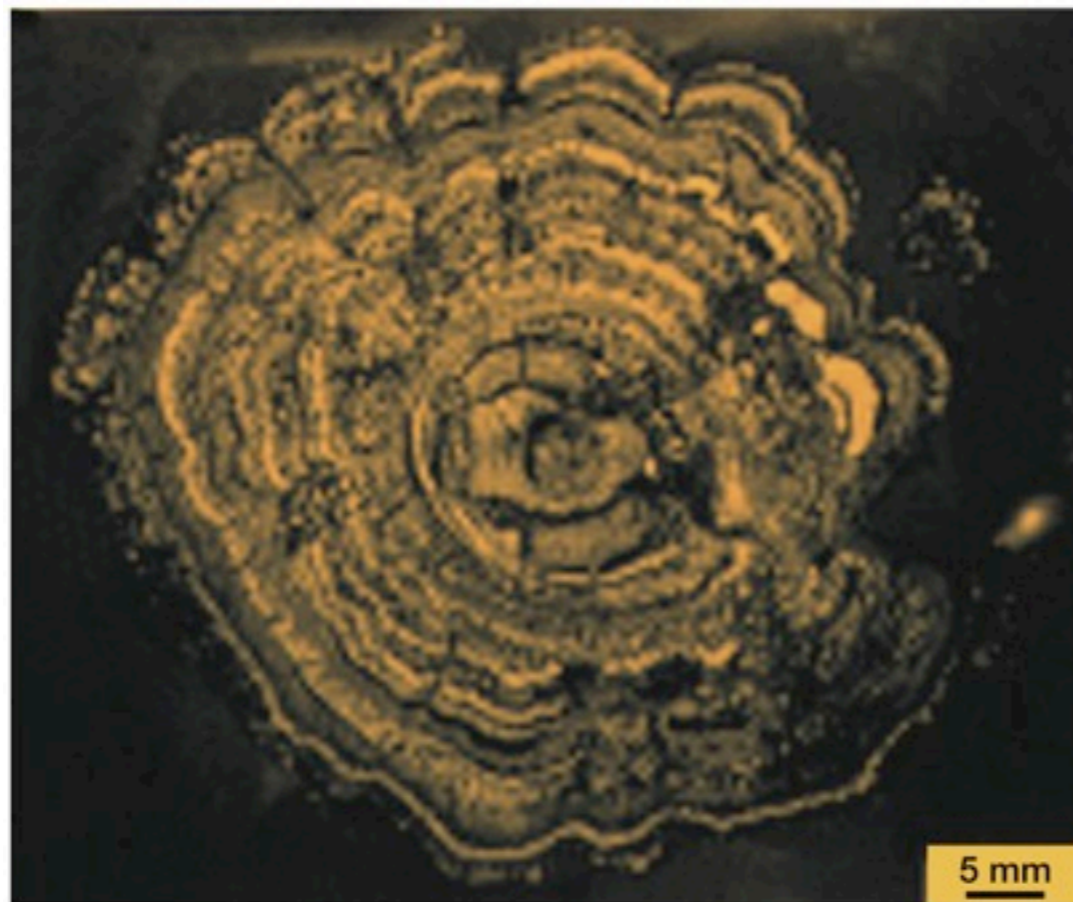
Small proportion of marine sediments

Distributed in diverse environments

Iron-Manganese nodules

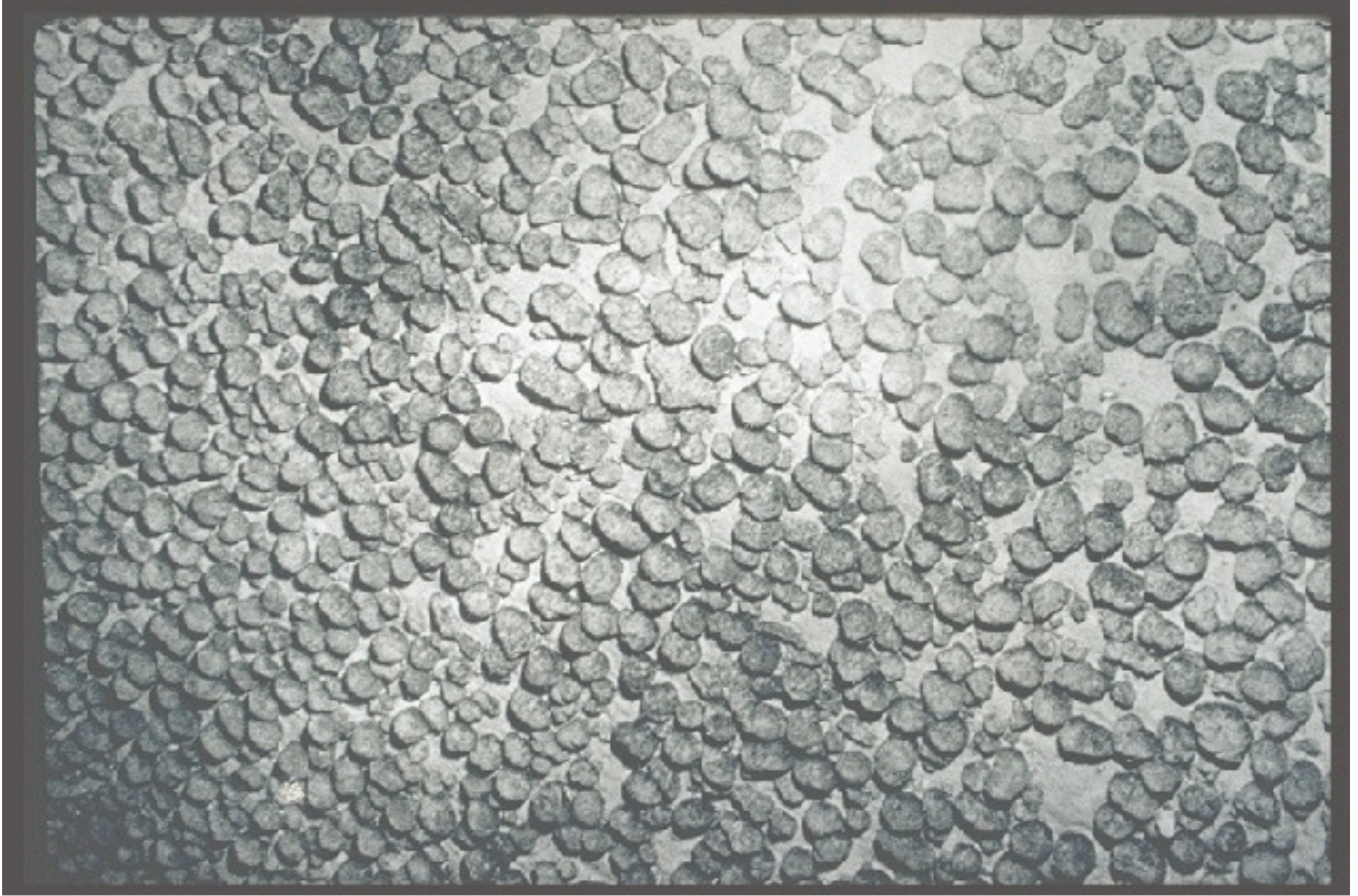
**Fist-sized lumps of manganese, iron,
and other metals**

Very slow accumulation rates

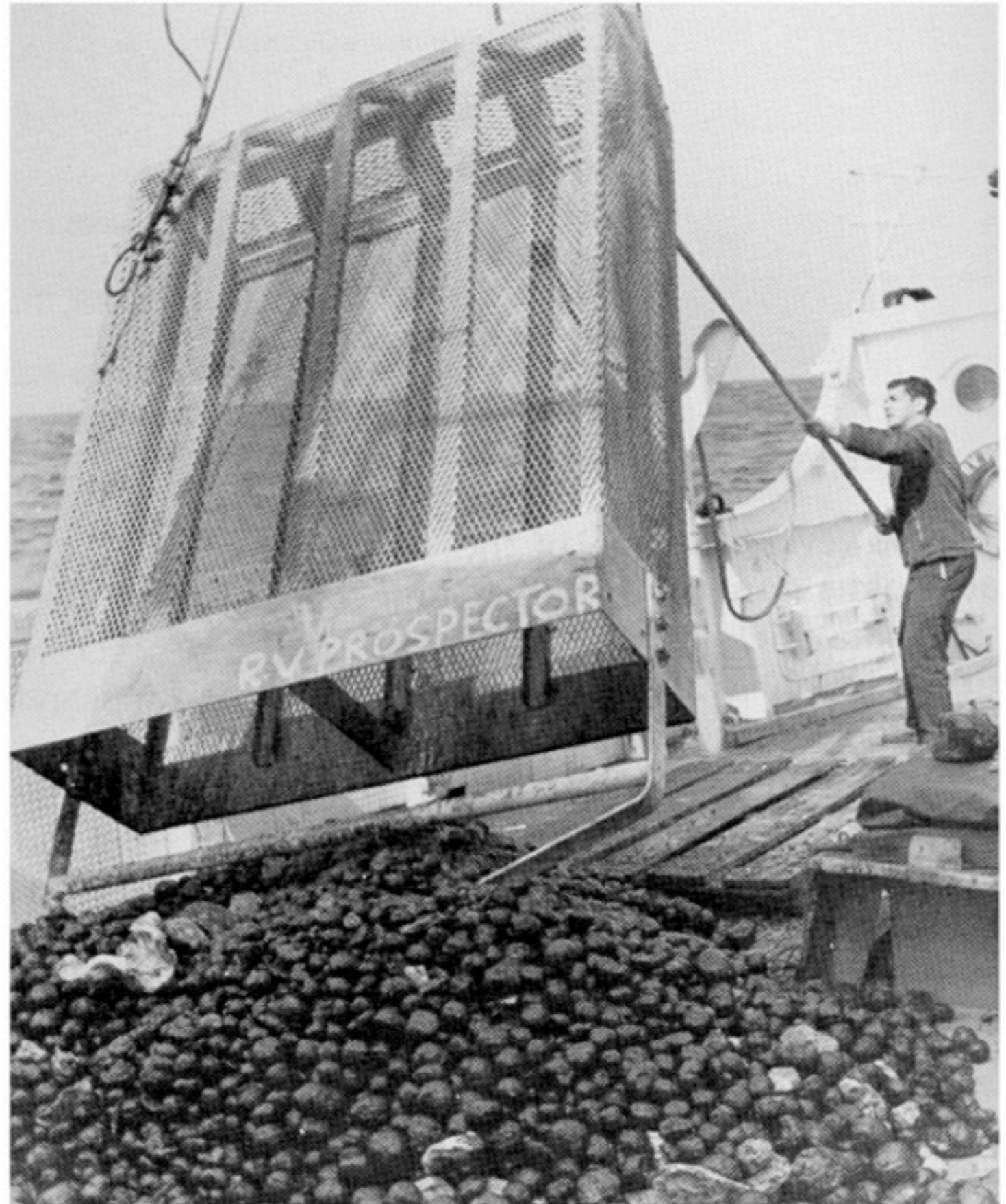


(a) Fig. 4.15a

Hydrogenous marine sediments

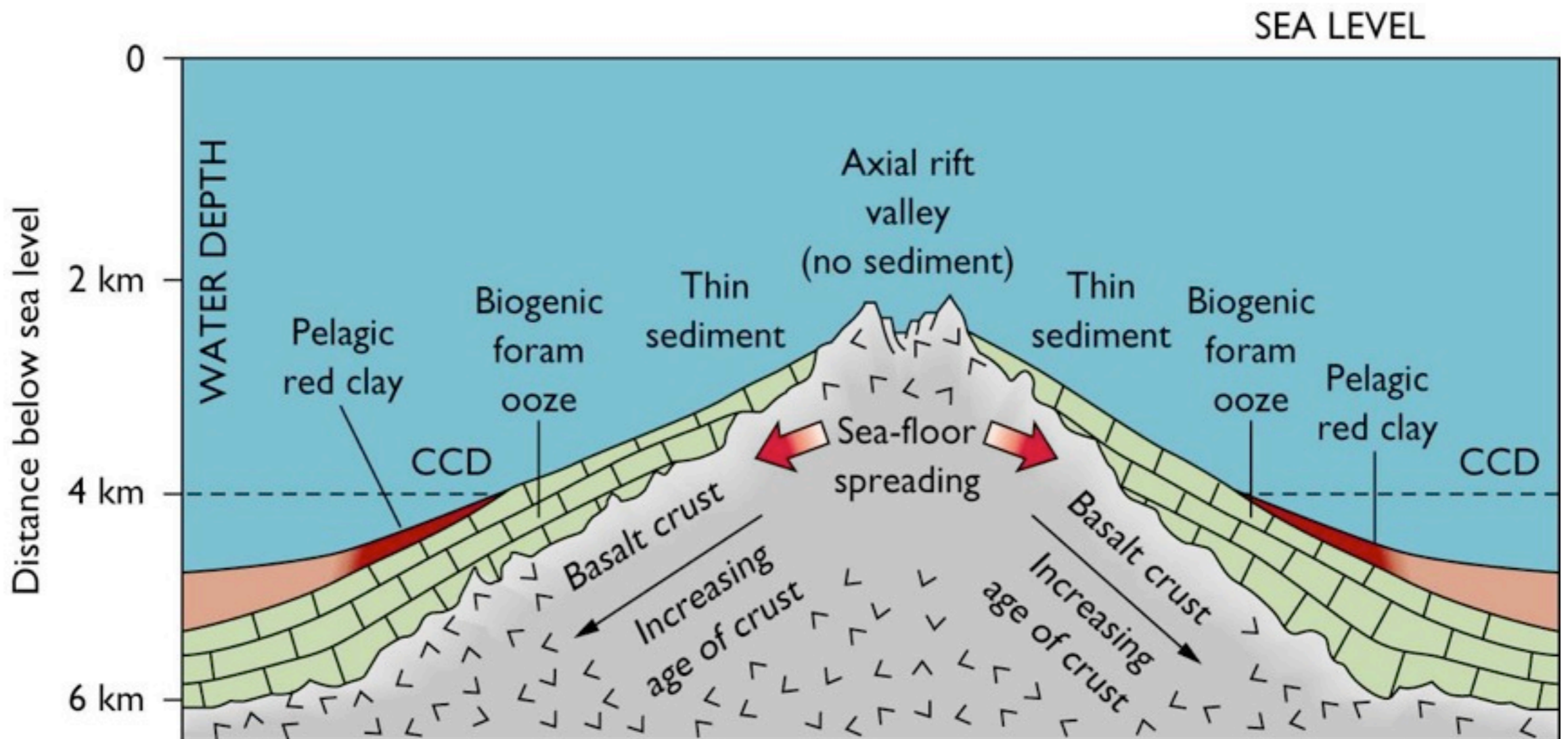


Manganese nodules



Sedimentation in the Ocean

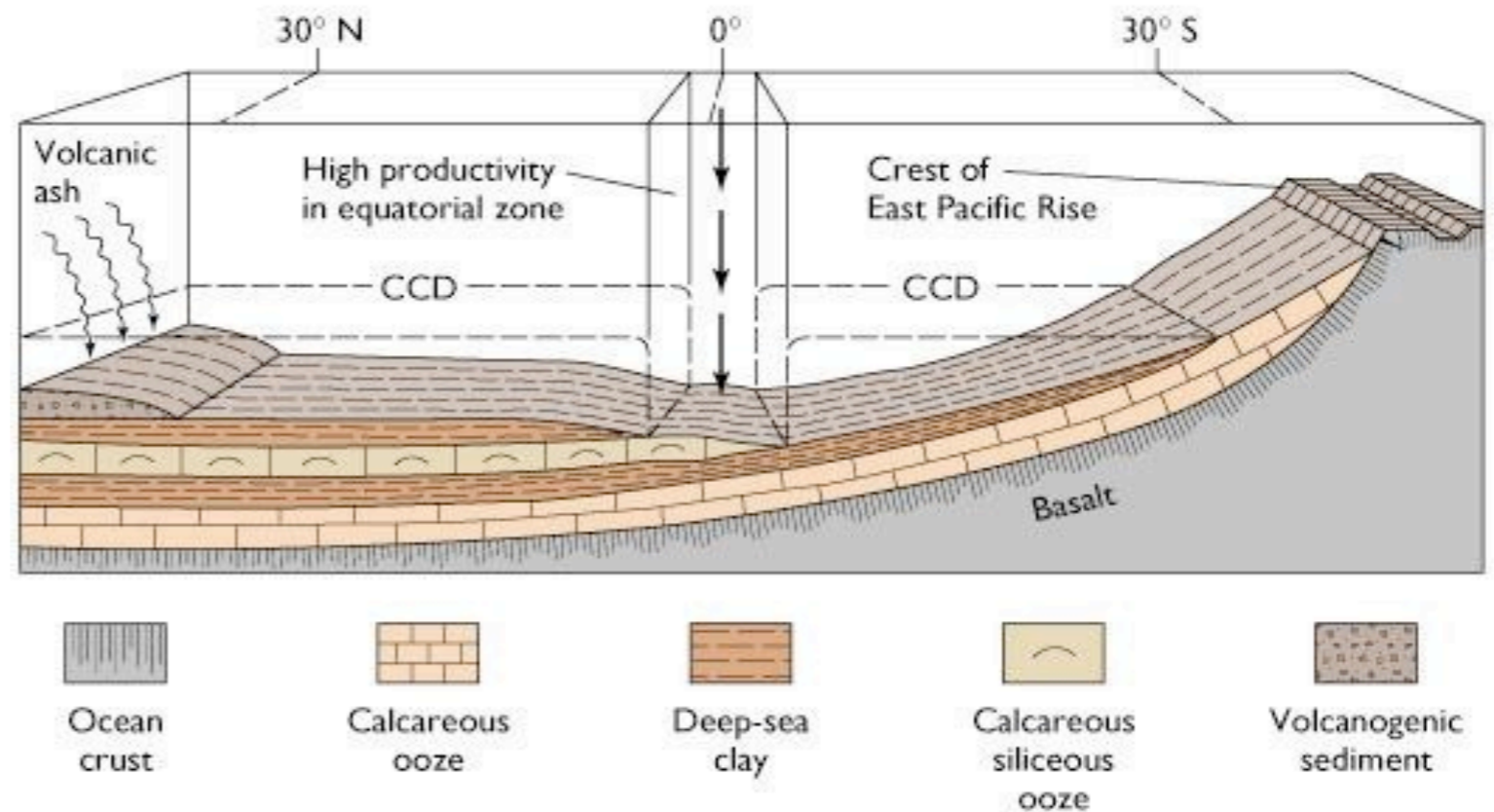
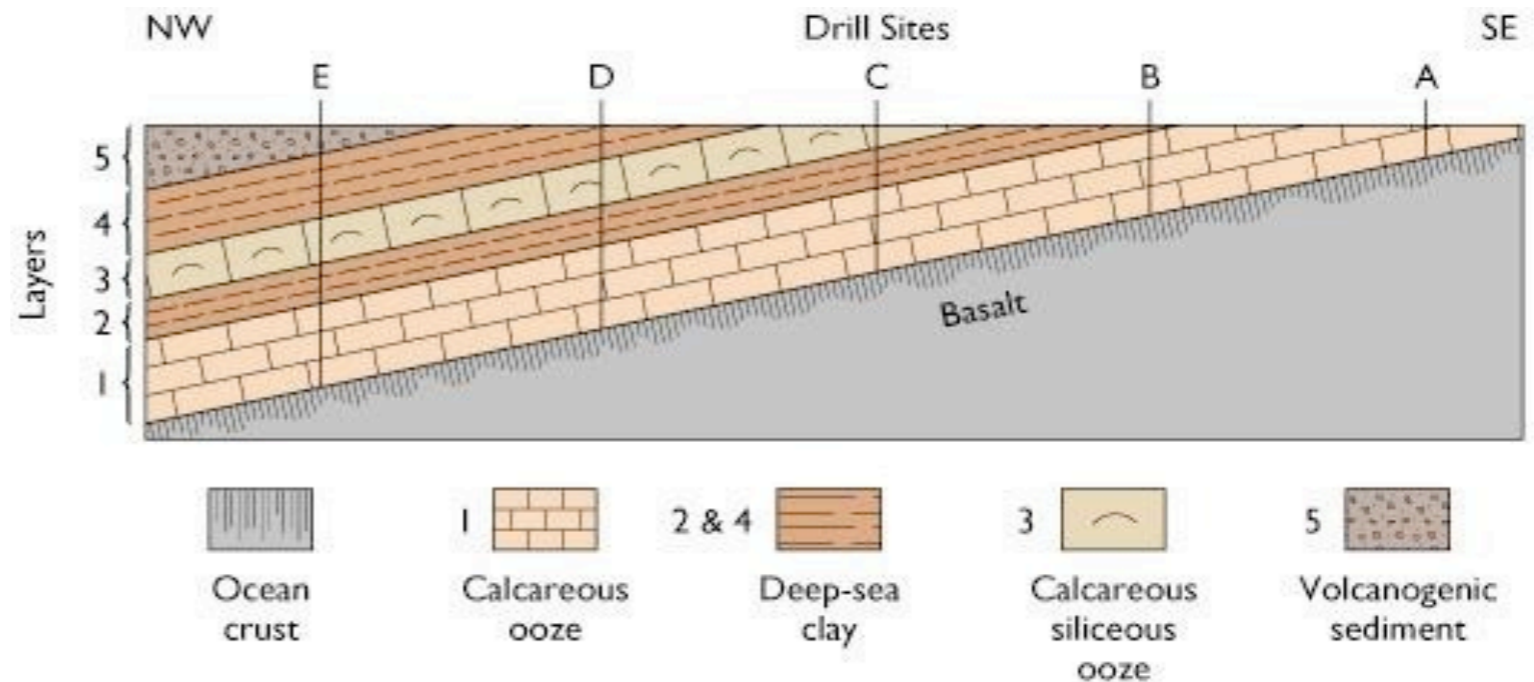
The Atlantic basin contains a “*two-layer-cake*” stratigraphy—a thick basal layer of carbonate ooze overlain by a layer of mud.



Stratigraphy of the Atlantic Basin

Sedimentation in the Ocean

The Pacific basin contains a “*four-layer-cake*” stratigraphy, because unlike the Atlantic its sea floor as it spreads crosses the equator where the CCD is lowered to the ocean bottom.



Picture of ophiolites (S-Italy)



Picture of ophiolites (S-Italy)



Picture of ophiolites (S-Italy)



Picture of ophiolites (S-Italy)



Picture of ophiolites (S-Italy)

