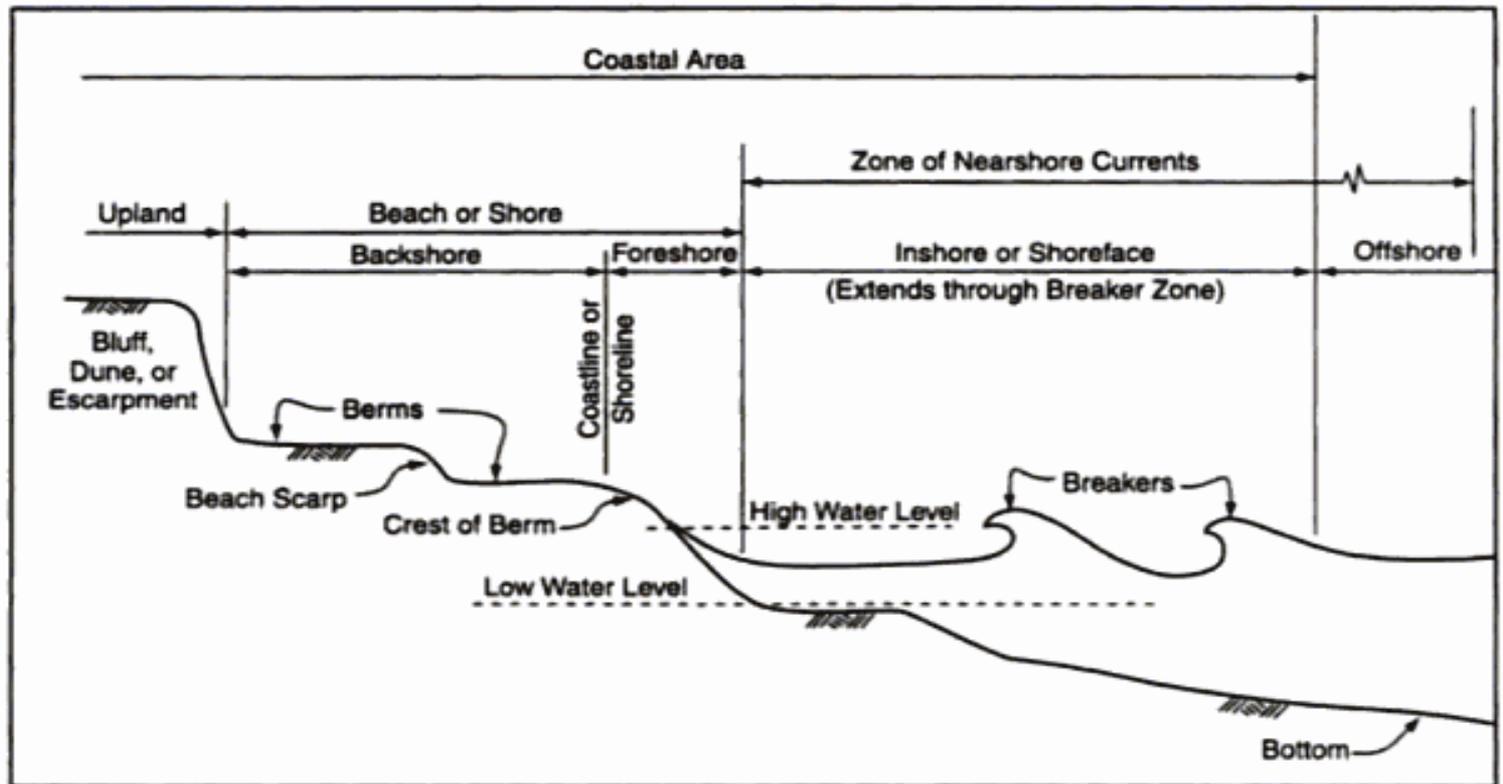


Environmental Resources III

COASTAL RESOURCES

PARTICULAR ENVIRONMENTAL FEATURES: THE COASTAL ZONE

- The coastal zone is of particular interest because of:
 1. Its ecosystems of biodiversity importance.
 2. The threats posed to it by human activity.
- Extent of the coastal zone:



Coastal Processes and Landforms

Erosional and depositional landforms of coastal areas are the result of the action of ocean waves.

Erosional Landforms

Sea Cliffs

Wave-cut Notches

Caves

Sea stacks

Sea arches

Depositional landforms

Beaches

Barrier Spit

Baymouth Bar

Lagoon

Tombolo

Erosional Coastal Landforms

Along rugged, high-relief, tectonically-active coastlines

Sea cliffs

A tall, steep rock face, formed by the undercutting action of the sea

Wave-cut notches

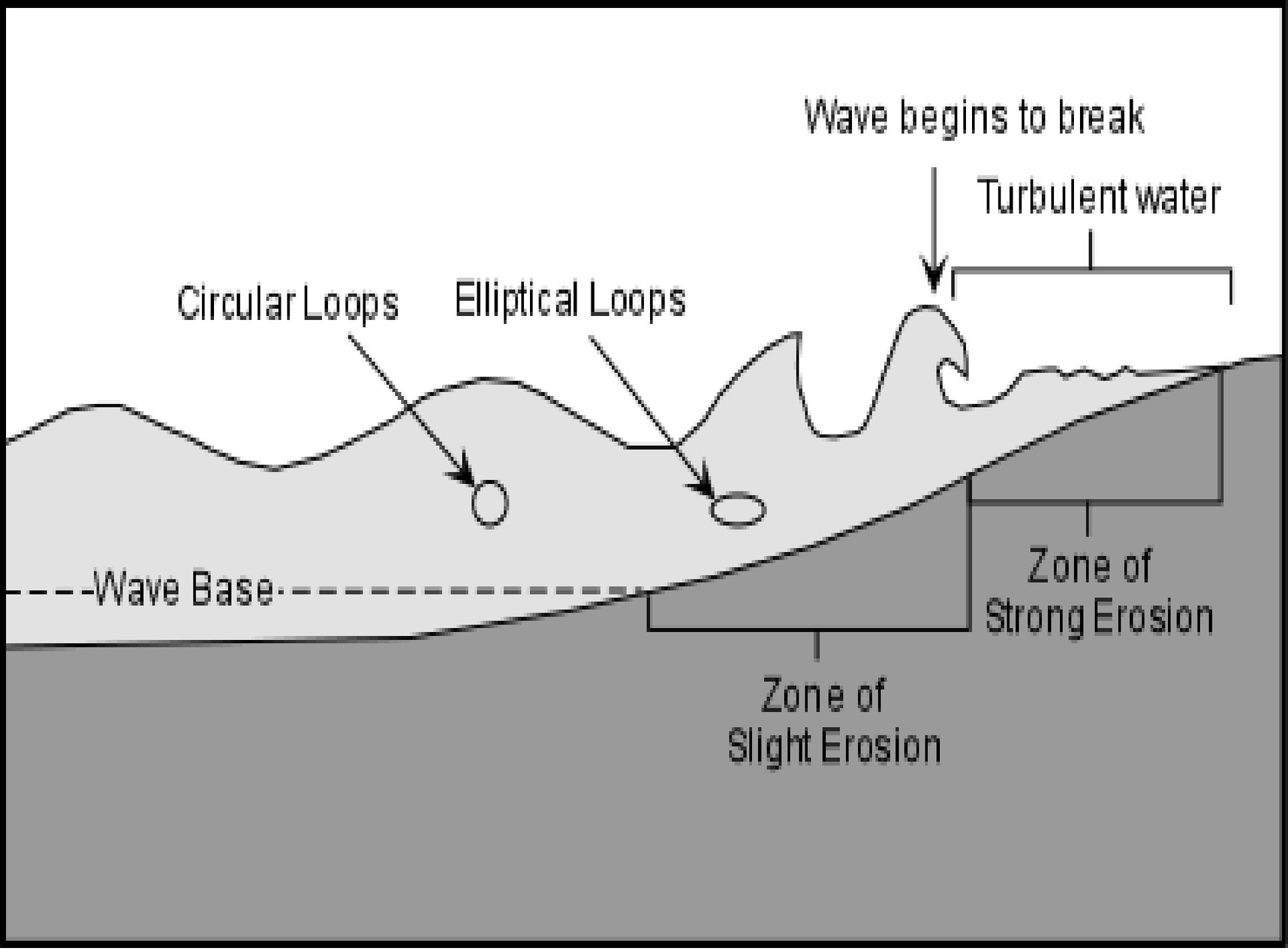
A rock recess at the foot of a sea cliff where the action of waves is concentrated

Sea Caves

Caves form in more erosive sediment when the rock does not fully collapse in a deeply-notched environment







Wave begins to break

Turbulent water

Circular Loops

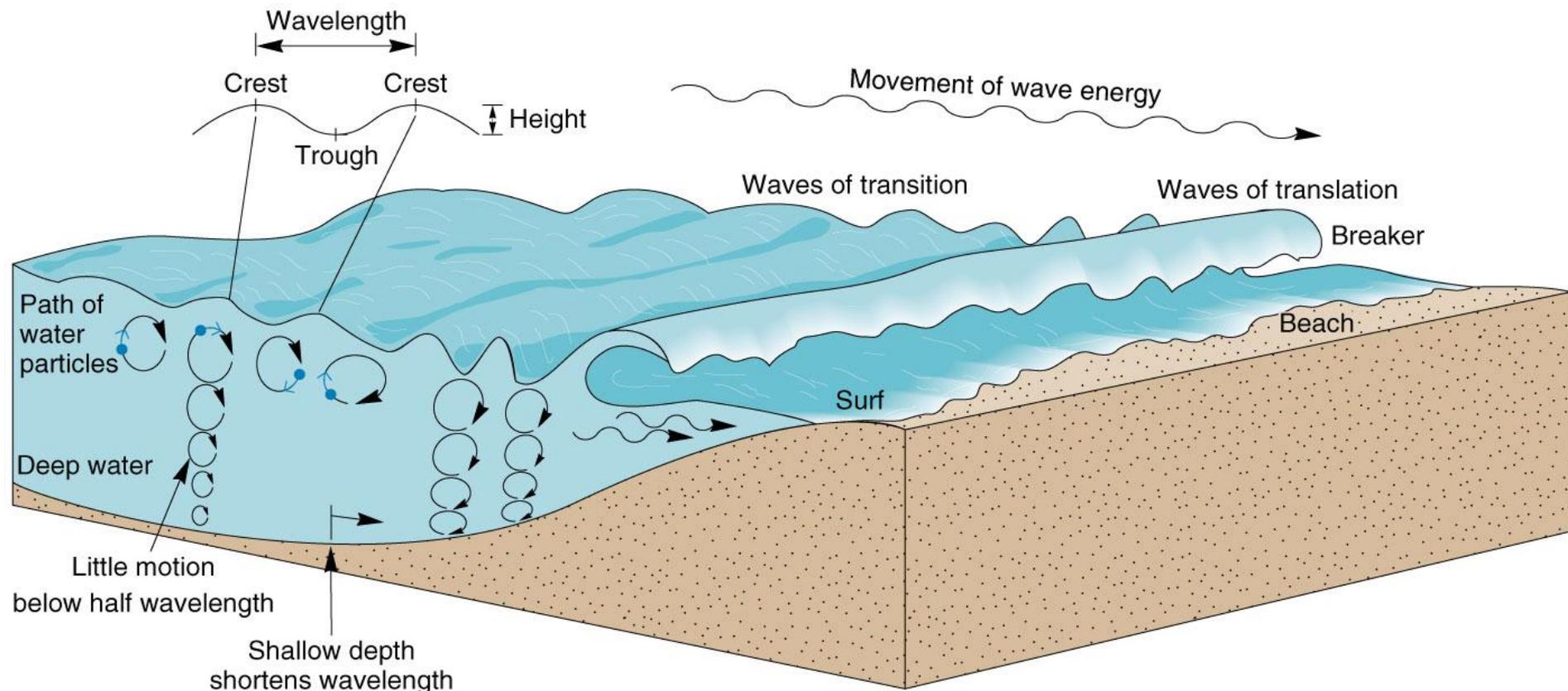
Elliptical Loops

Wave Base

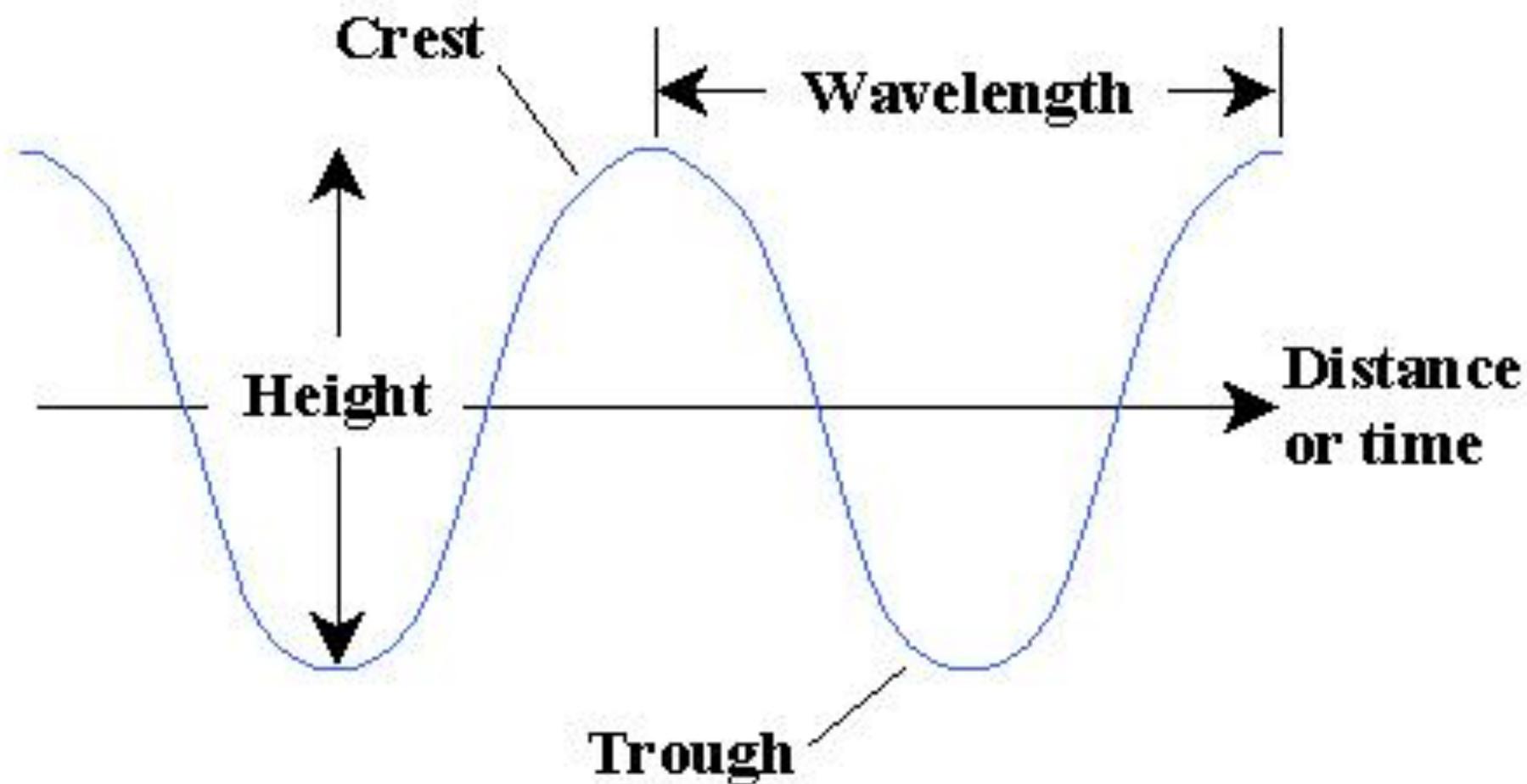
Zone of Strong Erosion

Zone of Slight Erosion

Wave Formation



(a) (depth less than one-half wavelength)



Transport of Sediments by Wave Action

Rock particles are eroded from one area and deposited elsewhere. Wave refraction affects this process.

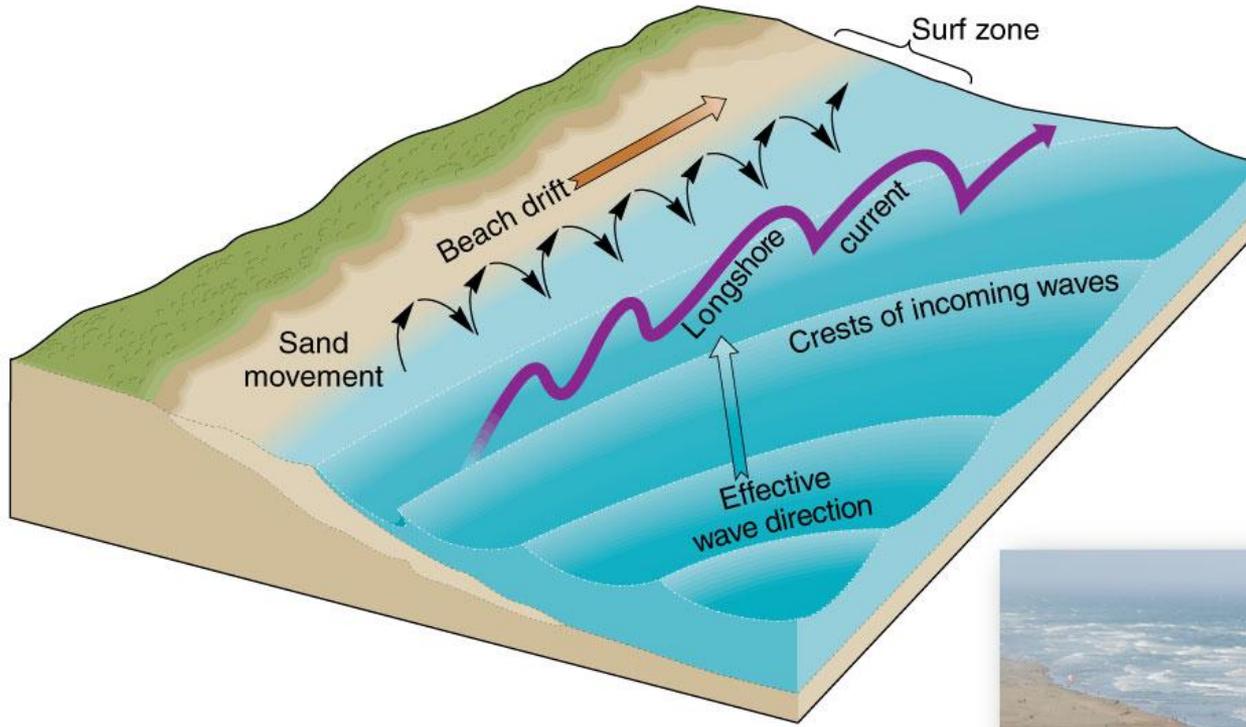
Beach Drift:

Swash and backwash rarely occur in exactly opposite directions

Upward movement occurs at some oblique angle
Backward movement occurs at right angles to the beach.

This creates lateral movement of particles (beach drift)

Longshore Current and Beach Drift

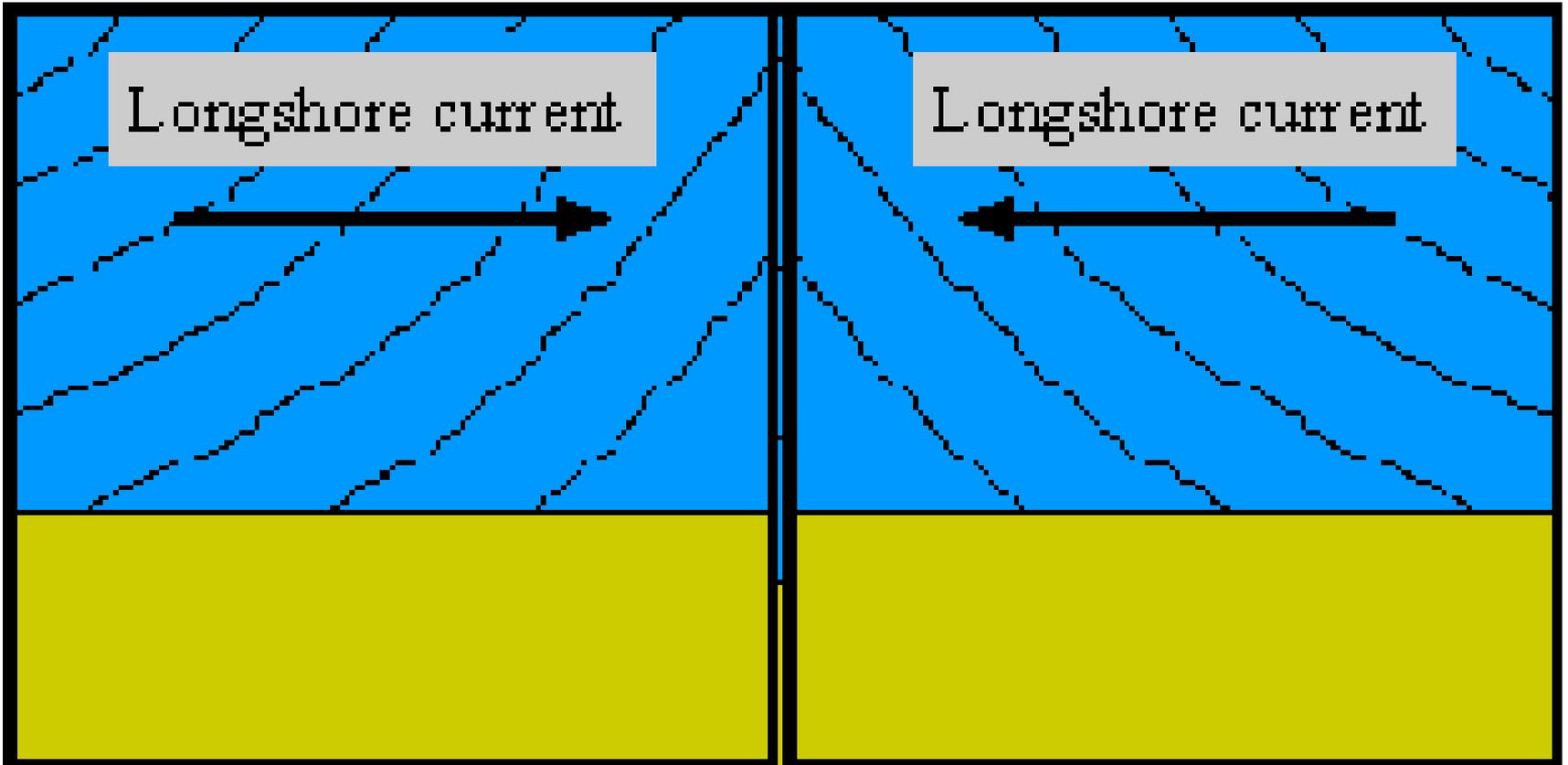


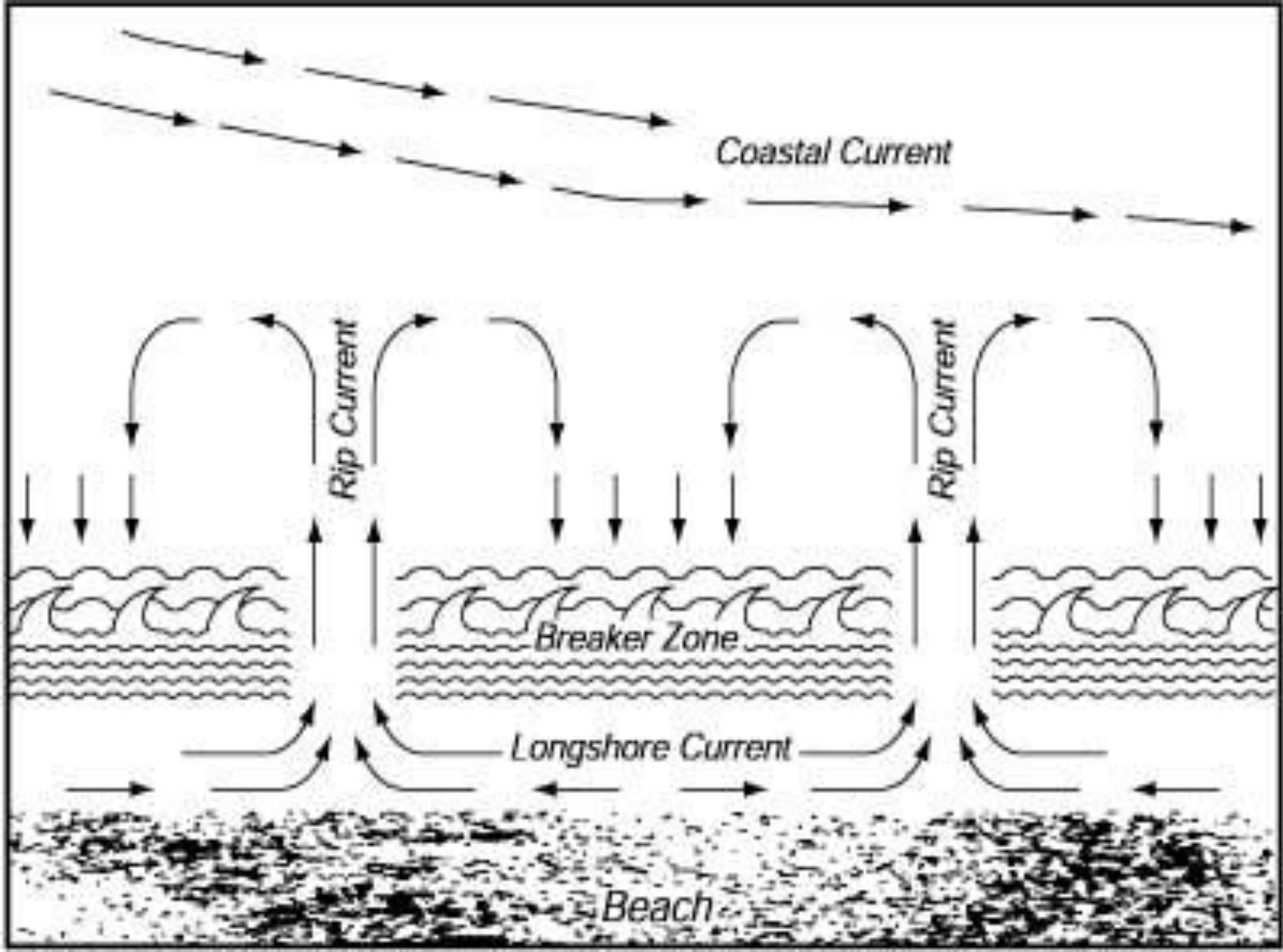
(a)



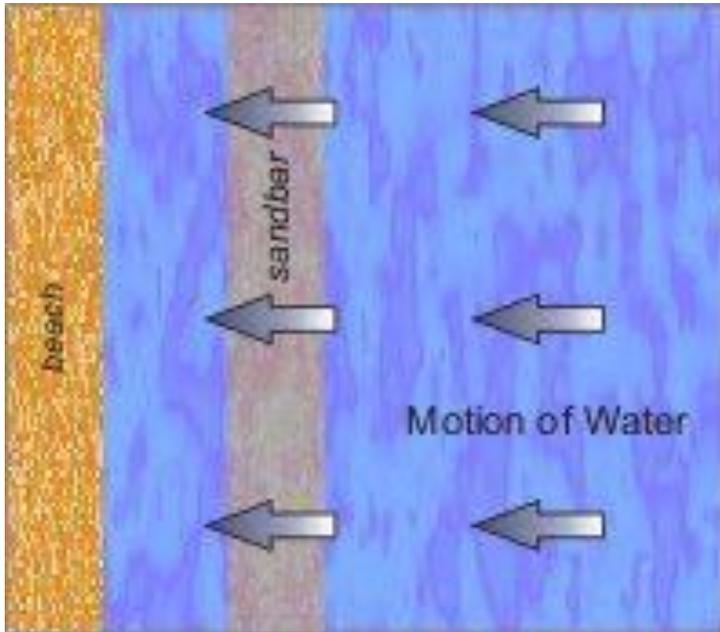
(b)

Longshore Currents

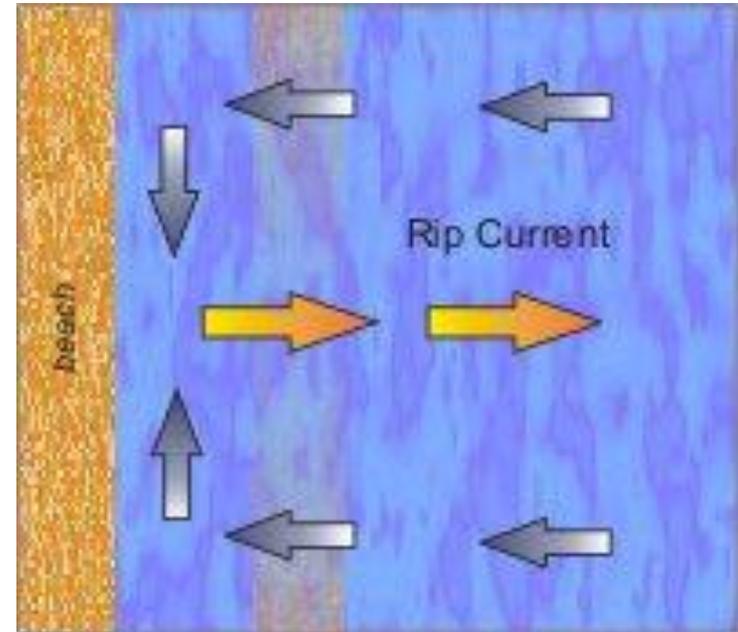




Rip Currents



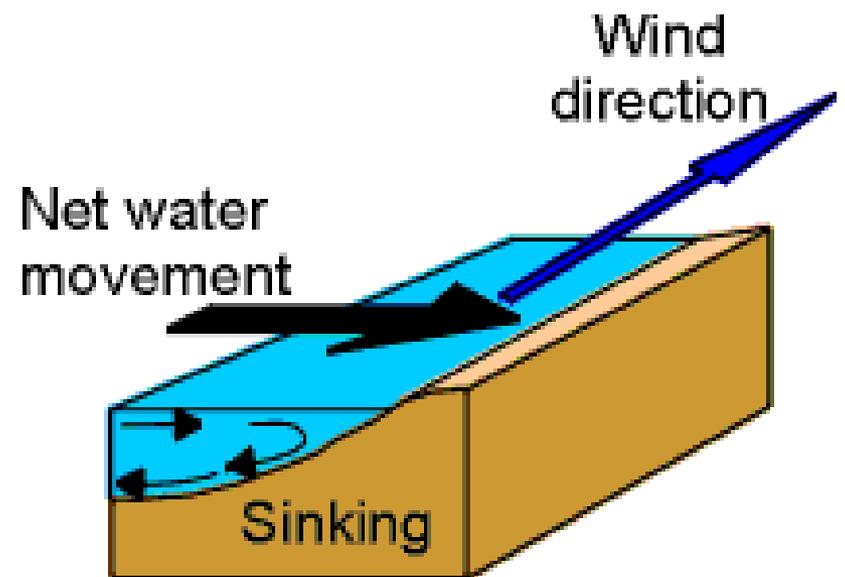
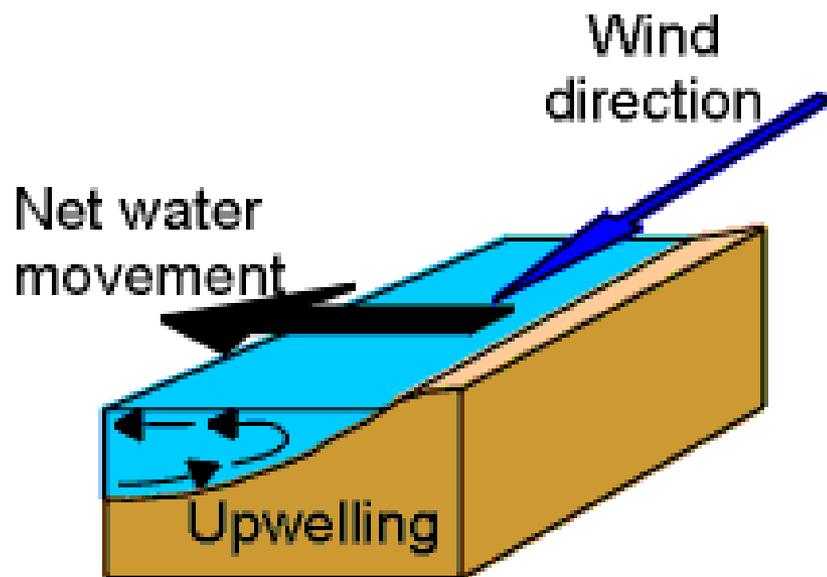
Rip currents form when waves are pushed over sandbars.



The weight of excess water near the shore can 'rip' an opening in the sandbar, causing water to rush seaward.

Rip Current

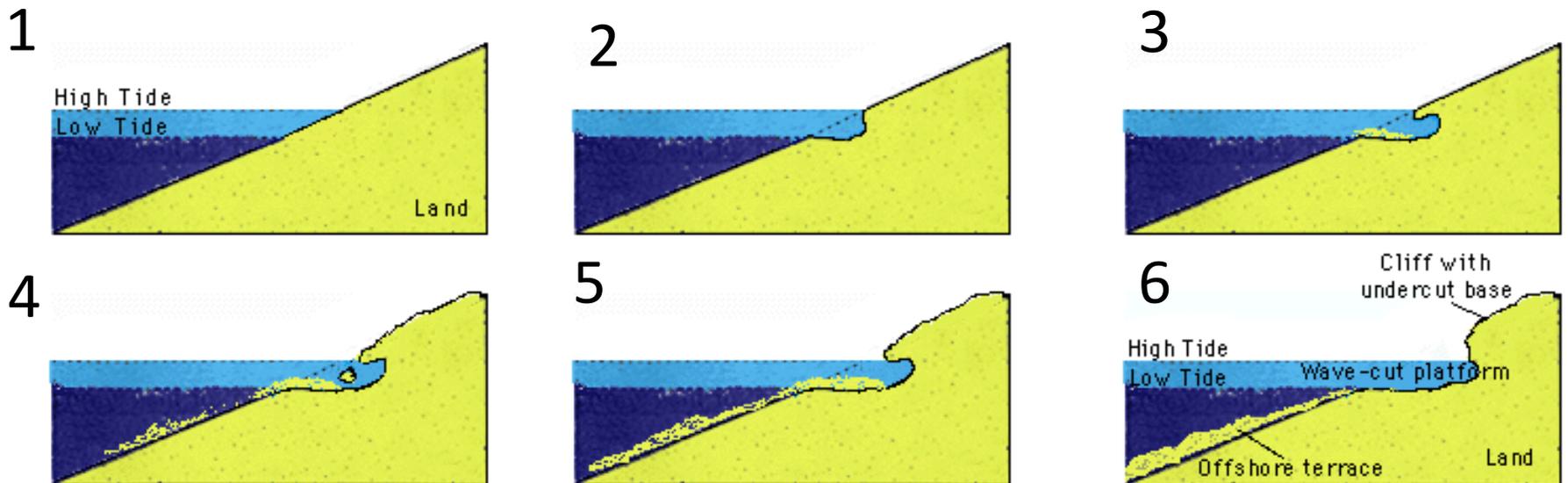




Wave-cut platform

Horizontal benches in the tidal zone extending from the sea cliff out into the sea

If the sea level relative to the land changes over time (becoming lower with respect to the land due to uplift), multiple wave cut platforms (terraces) result



Erosional Features

Notched cliff



Arch

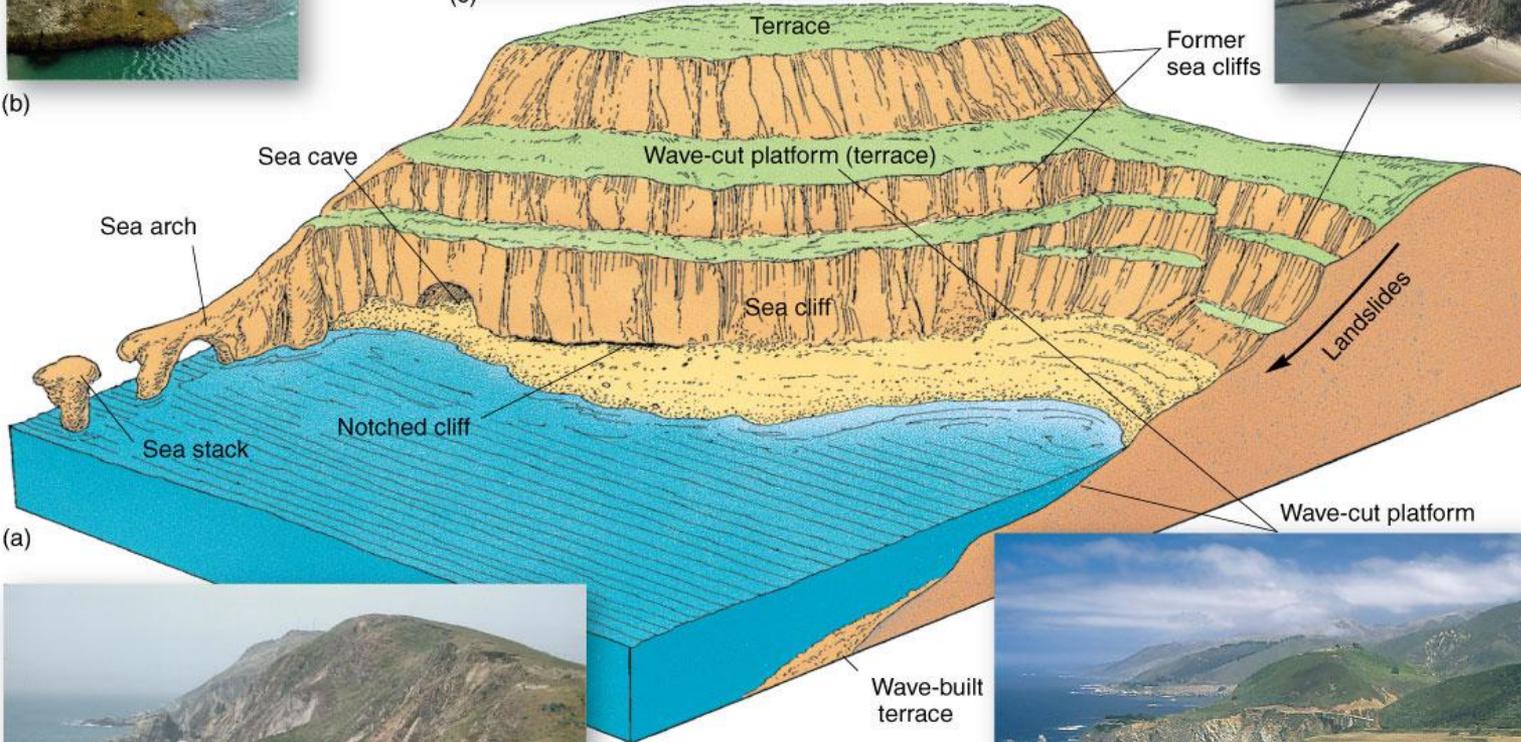


(c)

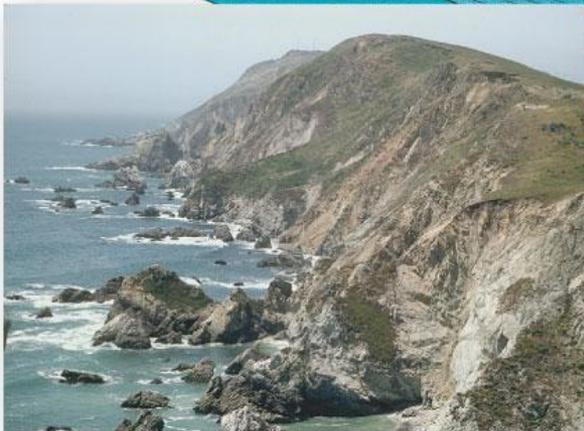
Collapsing cliffs



(d)



(a)

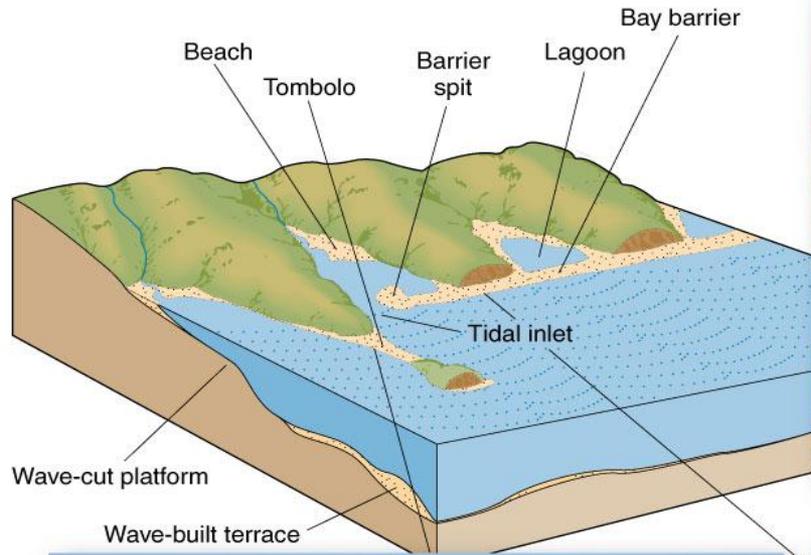


(e)



(f)

Depositional Coastal Features



(a)



(c)

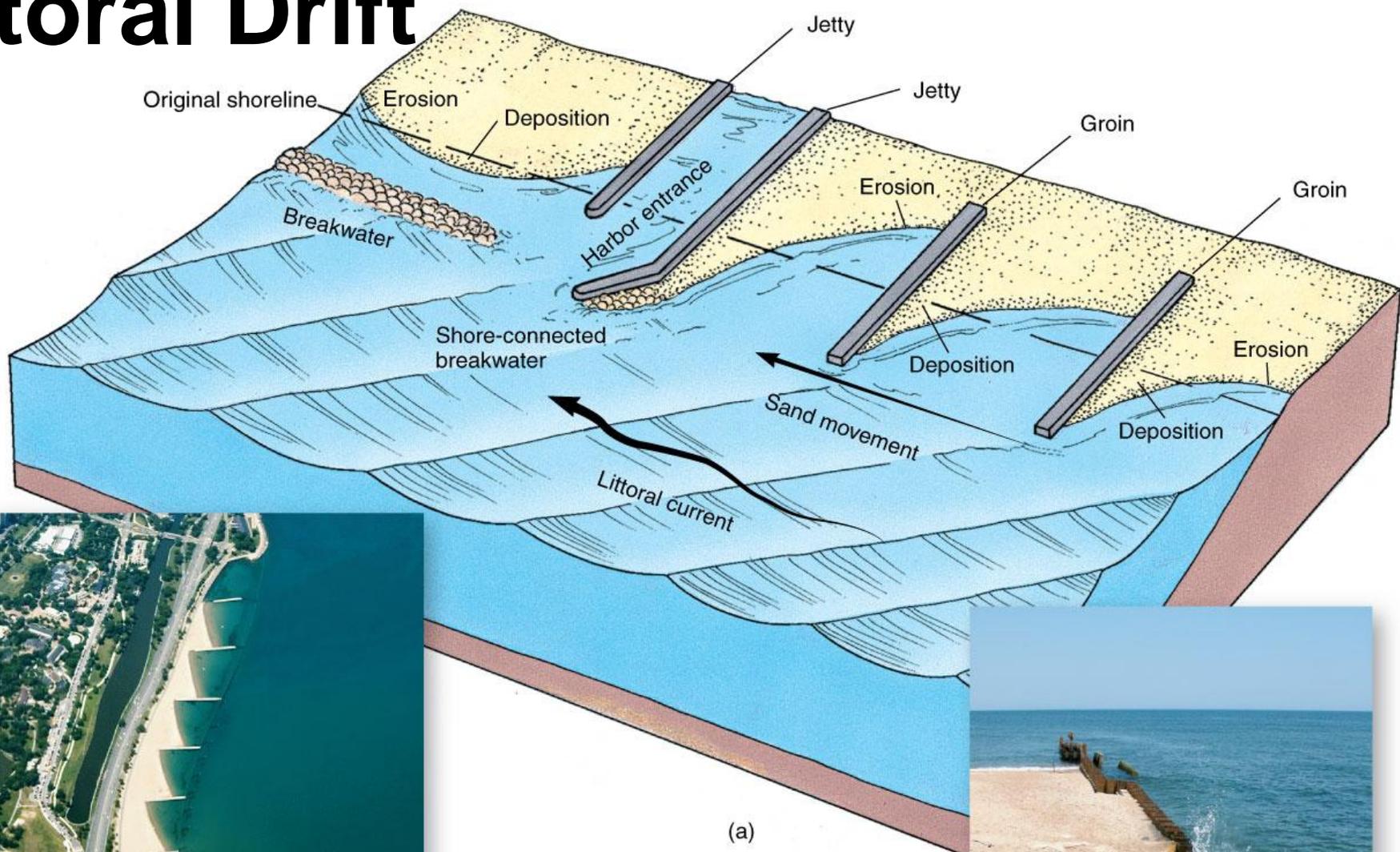


(b)



(d)

Littoral Drift

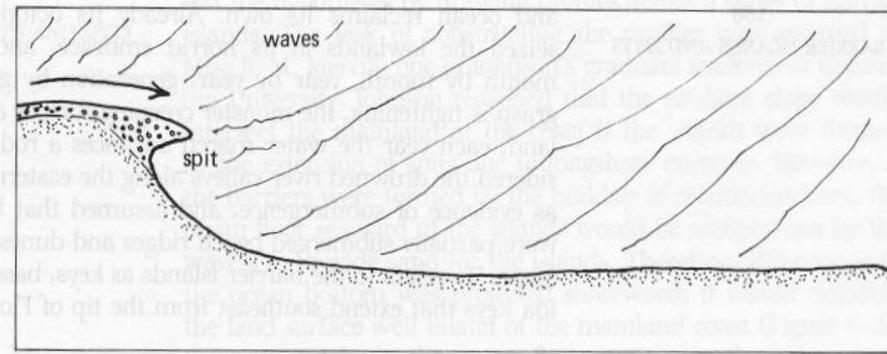


Barrier Spit

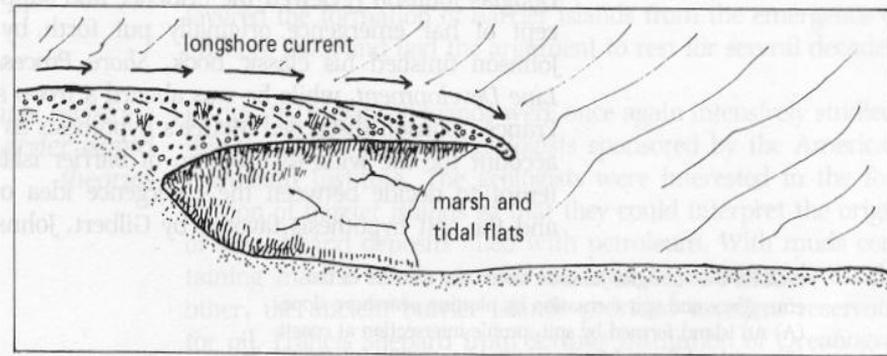
Material transported by littoral drift deposited along ridge, extending outward from a coast in an area with weak offshore currents

If the spit grows to completely block an embayment, it is called a bay barrier or baymouth bar

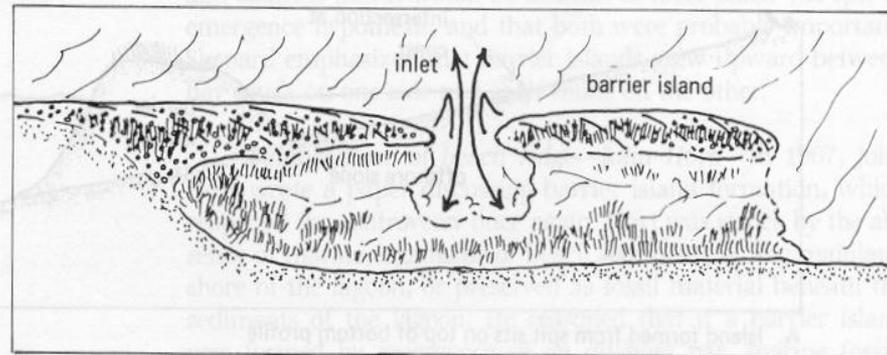
A lagoon is a body of water behind the barrier



A.



B.



C.

FIGURE 6-2. Spit theory of barrier island formation proposed by Gilbert in 1885. (A) Spit starts to grow from point of land; (B) spit is extended along the coast by longshore currents; (C) spit is breached during a storm, forming a tidal inlet and barrier island.

Drawing by C. W. L.



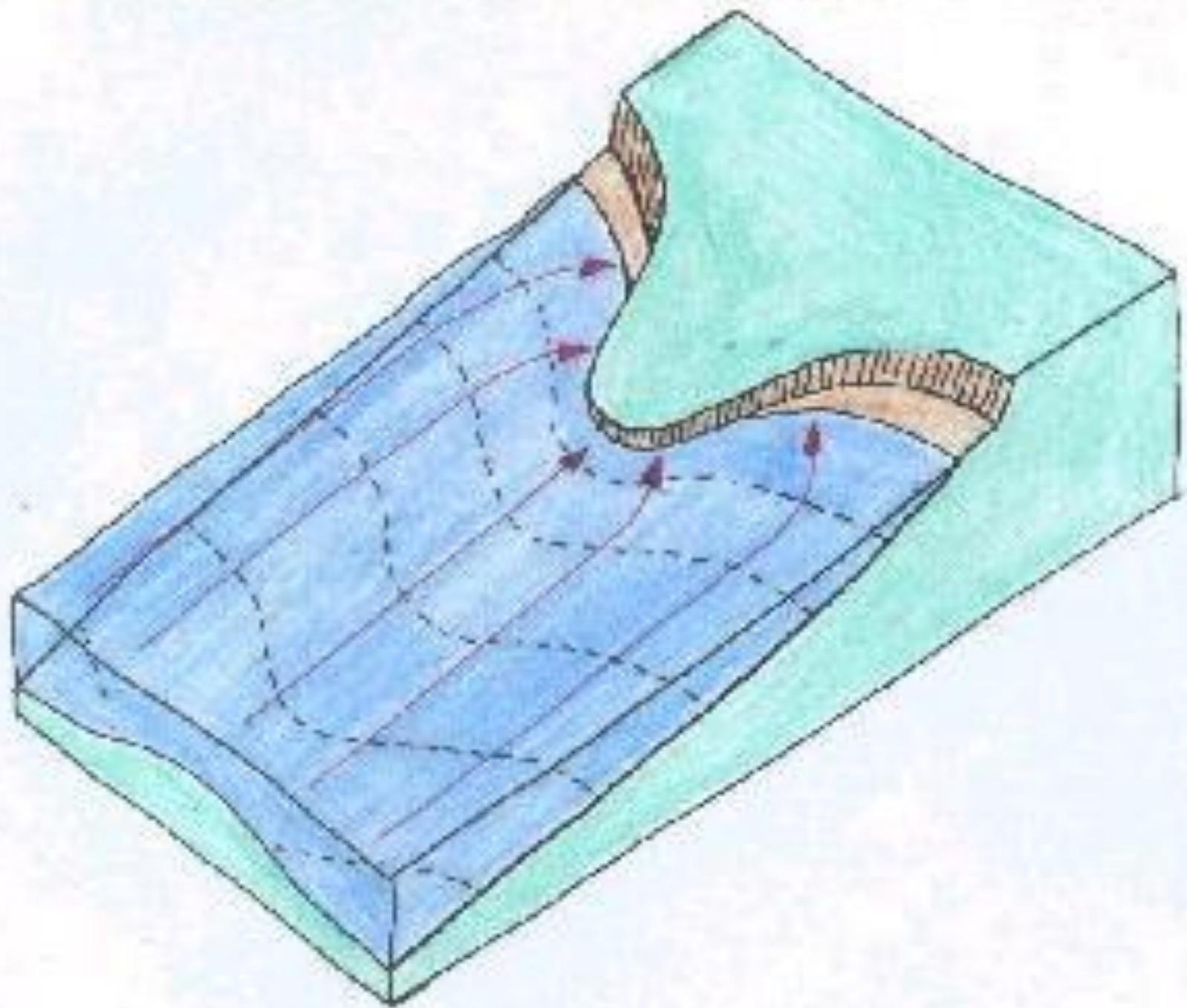
Puget Sound, WA

Bay Barrier

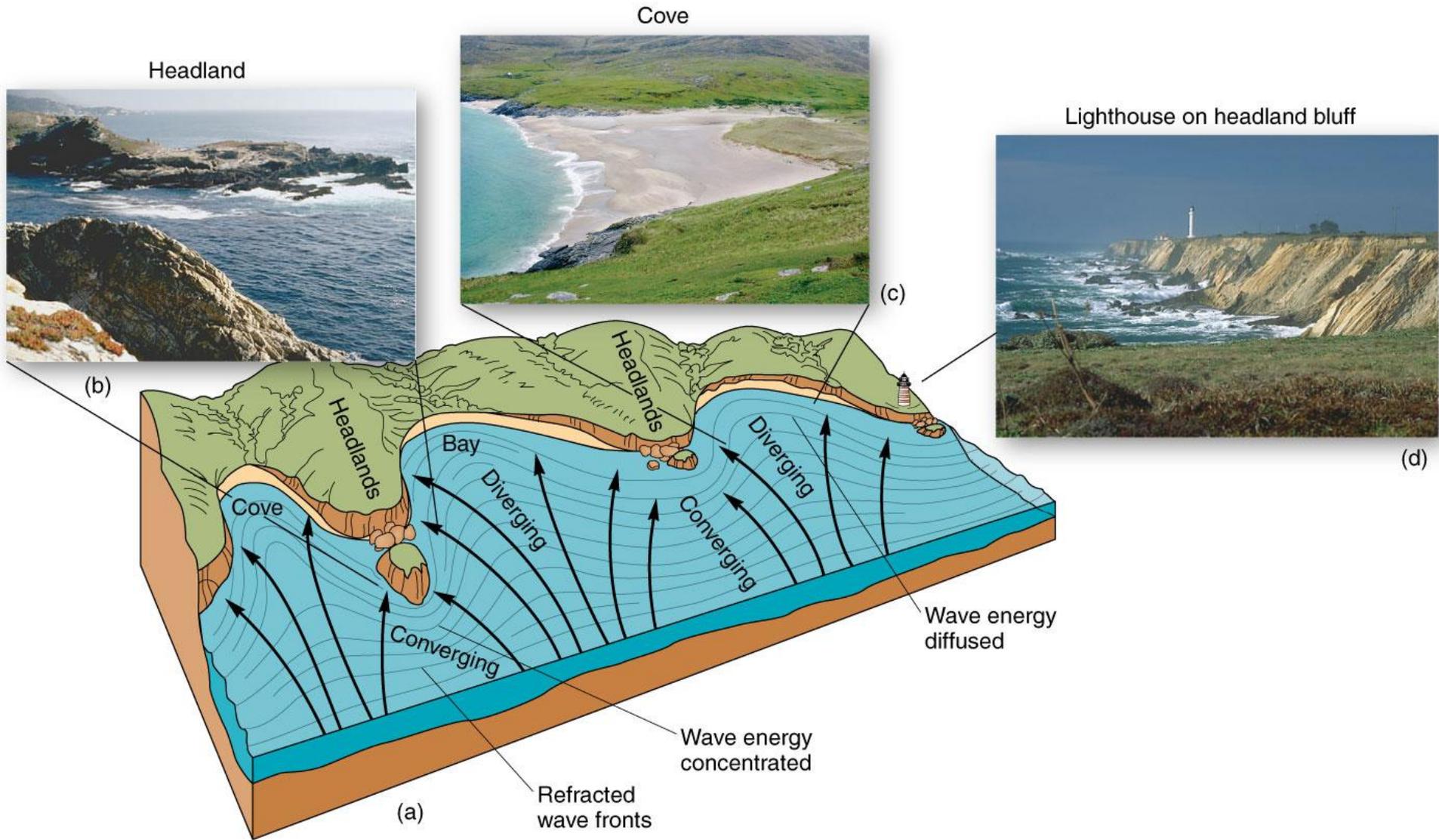




Near Eureka, CA



Coastal Straightening







Frost Island, WA

A tombolo occurs when sediment deposits connect the shoreline with an offshore sea stack or island



Rebounding Coast

isostatic rebound



Barrier Islands

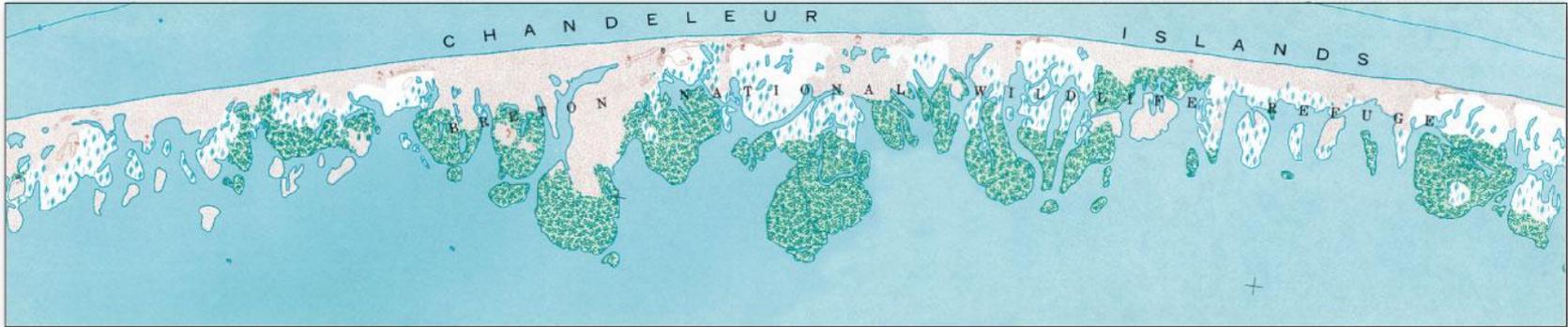


(a)

(b)

(c)

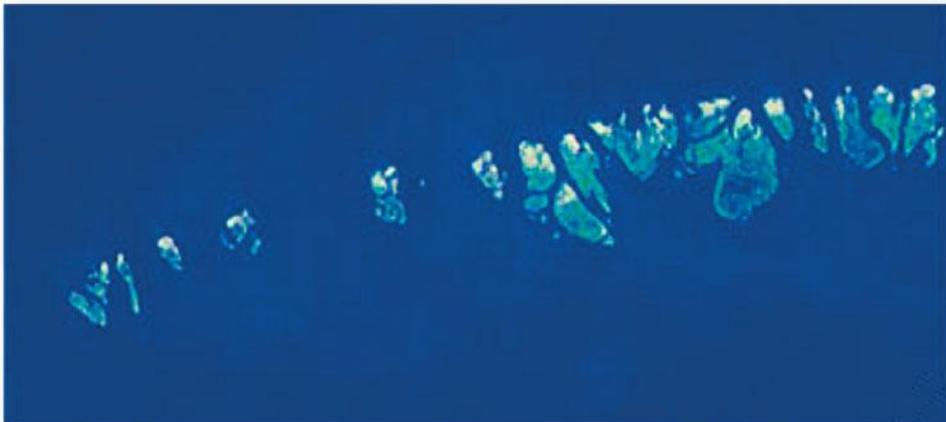
Chandeleur Islands



(a)



(b) 1988



(c) September 16, 2005



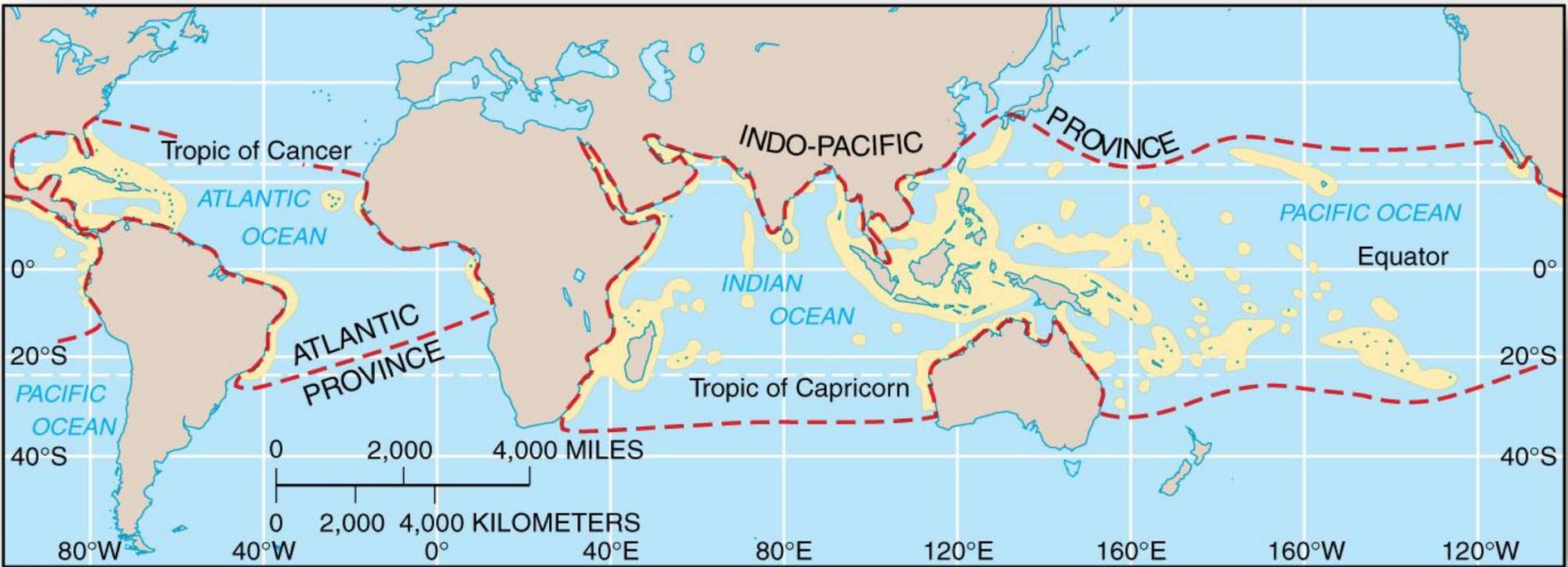
July 17, 2001



August 31, 2005



Coral Reef Distribution



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Figure 13.17

Coral Reef Formation and Forms

Fringing



Barrier



Atoll



Tahiti
(18° S 149° W)
Hawai'i
(20° N 156° W)
Grand Comoro
(12° S 44° E)

O'ahu
(22° N 158° W)
Rarotonga
(21° S 160° W)

Mayotte
(13° S 45° E)
Santa Cruz
(11° S 166° E)
Bora Bora
(16° S 151° W)

Truk
(7° N 152° E)
Clipperton
(10° N 109° W)
Aitutaki
(19° S 160° W)

Bikini
(12° N 165° E)
Eniwetok
(12° N 162° E)
Kwajalein
(9° N 167° E)

Coral Reef Formations



Coastal Salt Marsh





Mangroves



(a)



(b)



(c)