

Coastal Processes & Terrain

Part II



**The sea heaves up, hangs loaded o'er the land,
Breaks there, and buries its tumultuous strength.**

— Robert Browning Hamilton



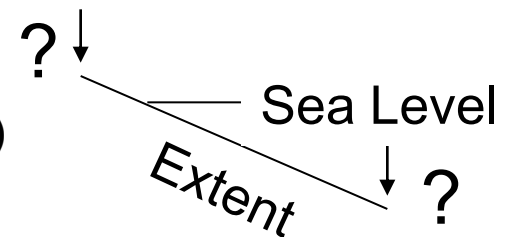
❖ Coastal Landforms

- Depositional Landforms

Animator  (Coastal Stabilization Structures)

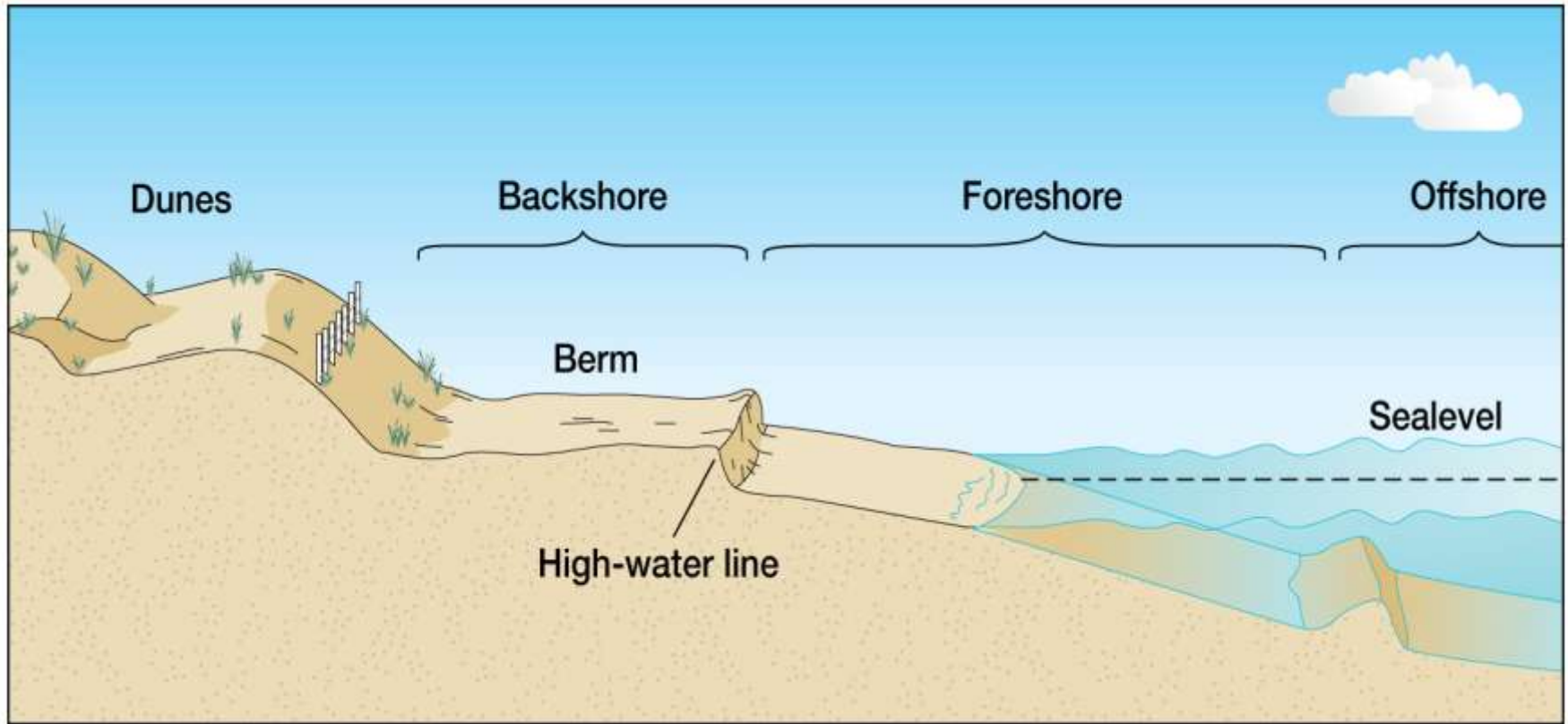
- Beaches

- Most widespread marine dispositional feature on land
 - Mostly sand deposits
- Extent
 - Inland margin (storm wave deposits)
 - Seaward margin (neap tide line)





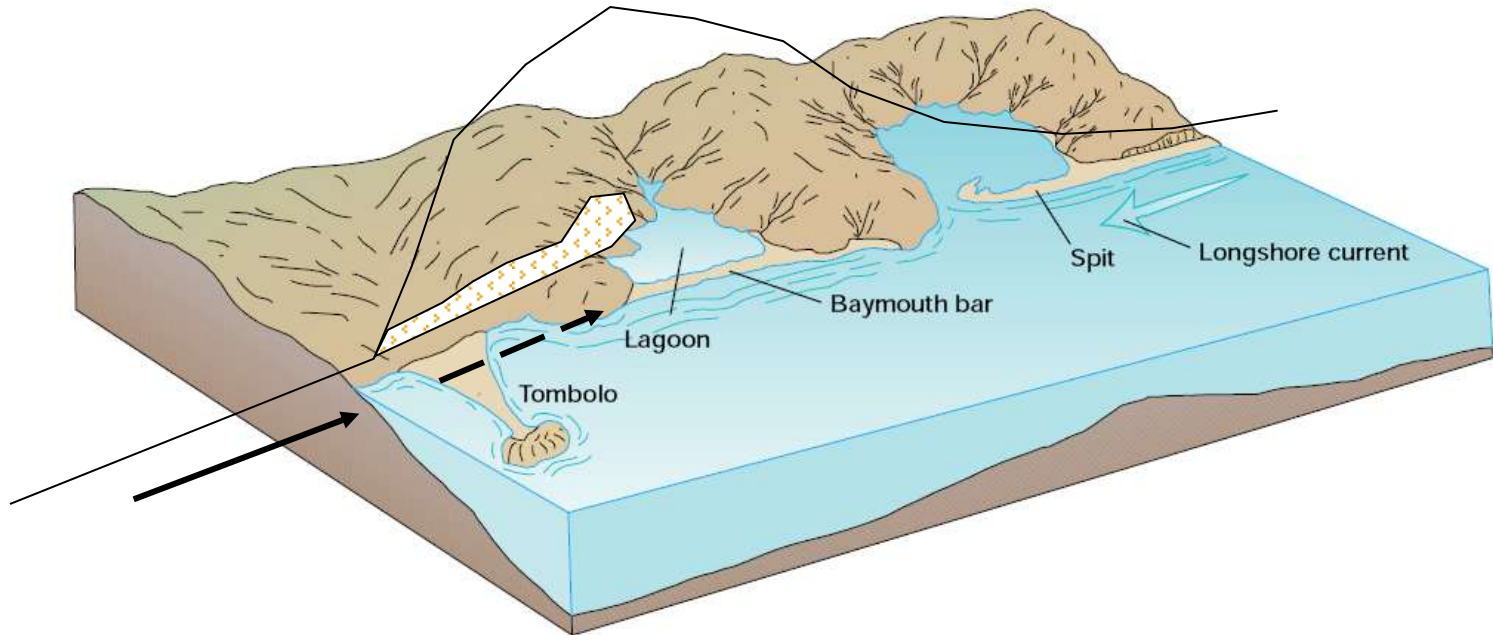
- Components of the beach environment





– Spit and related features

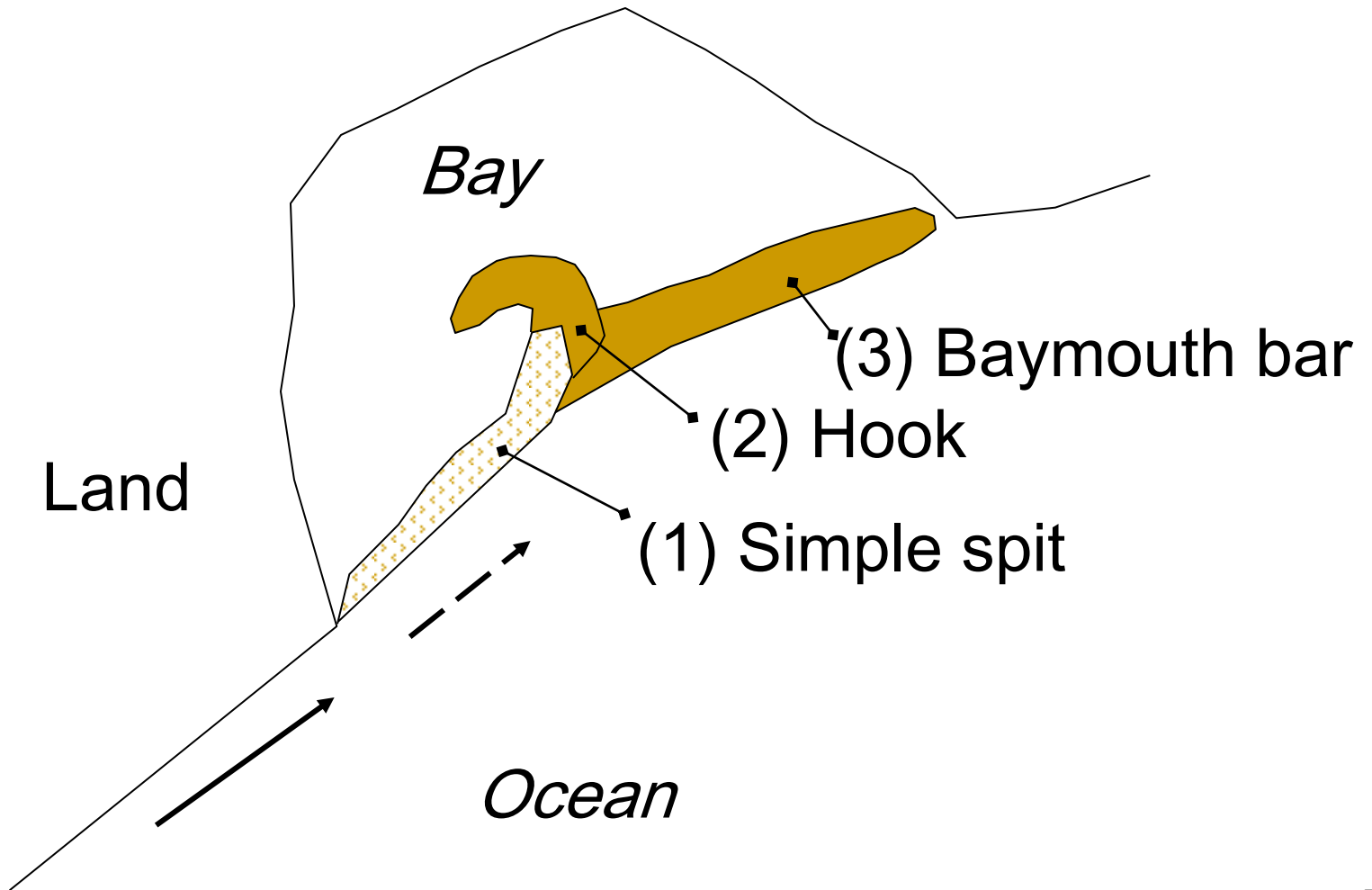
- Spit: Linear strand of marine sediments attached to shore
- Formation usually involves longshore current transport
- Related features



Types of spits and the longshore current.

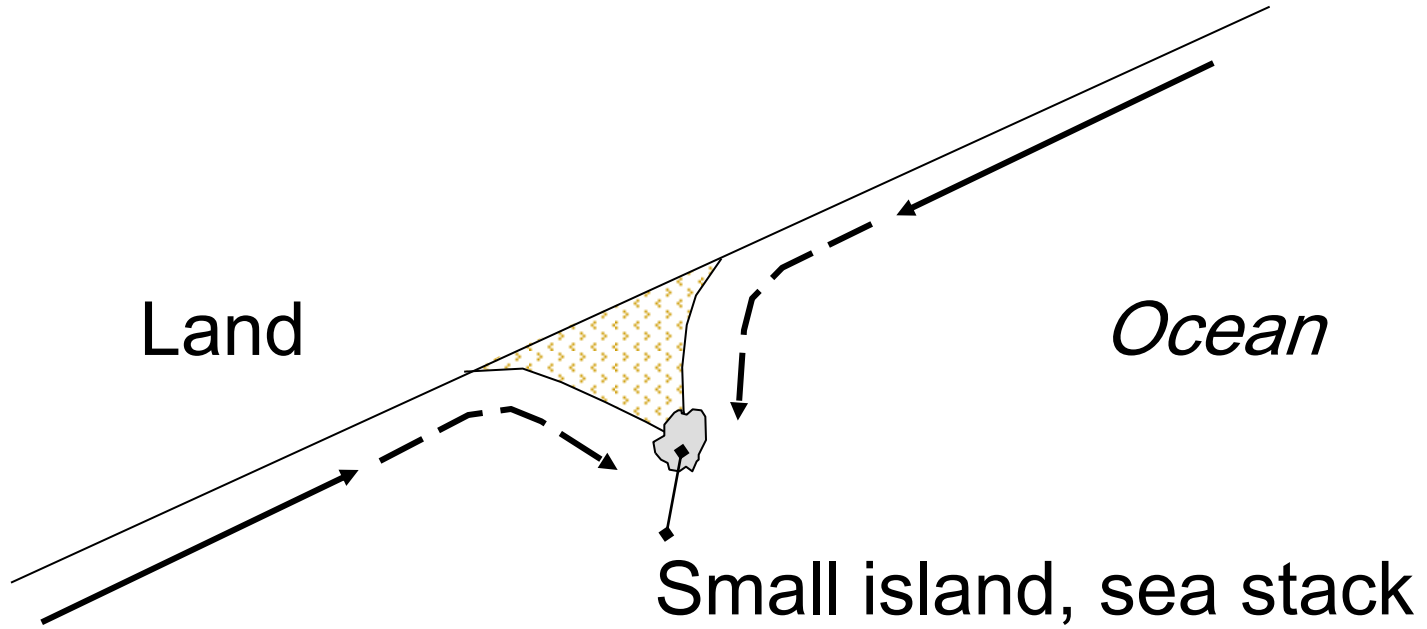


- Idealized drawings of formation of spit and related features





- Tombolo formation





- Photographs of spits and related features



Spit at Cape Henlopen, Delaware

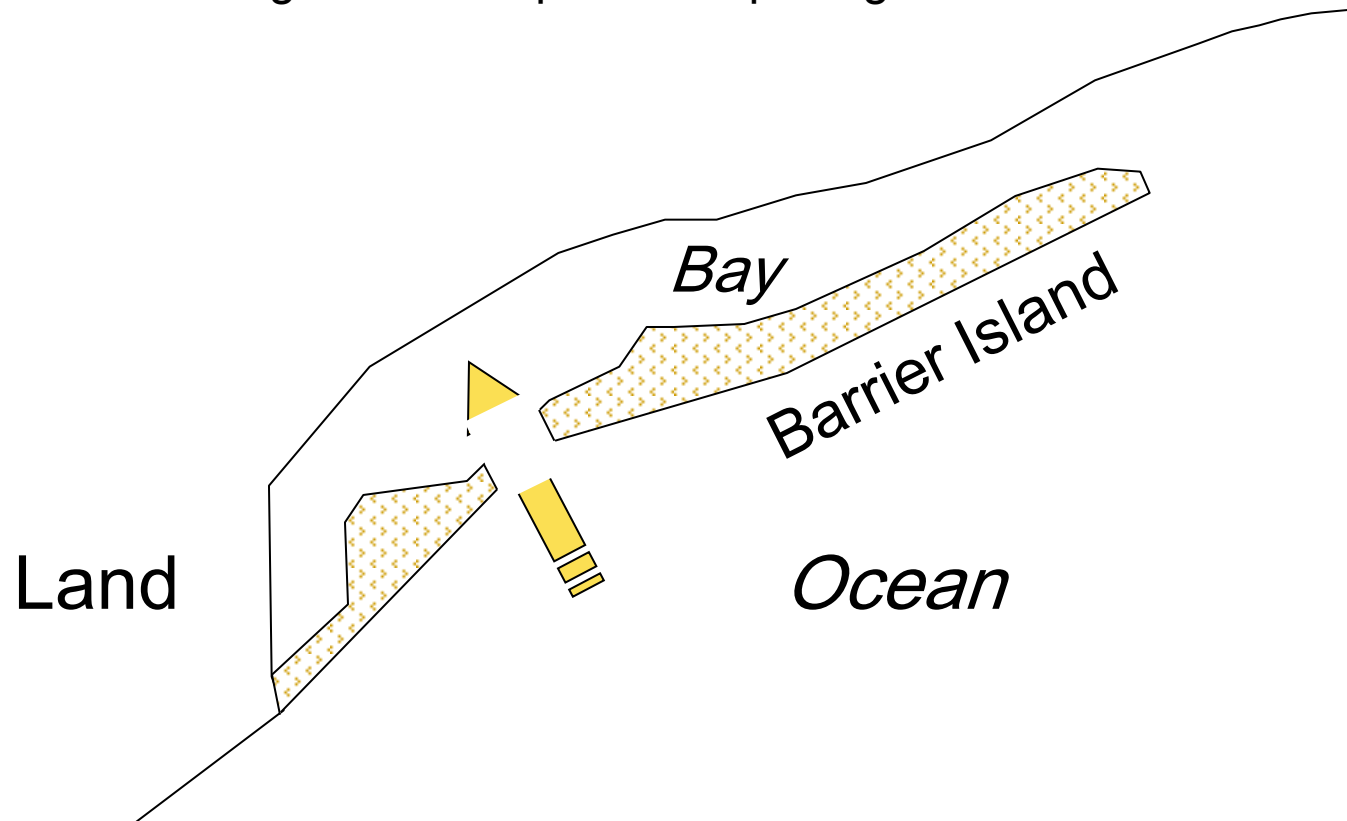


Tombolo and Mont Saint Michel on the northwest coast of France.



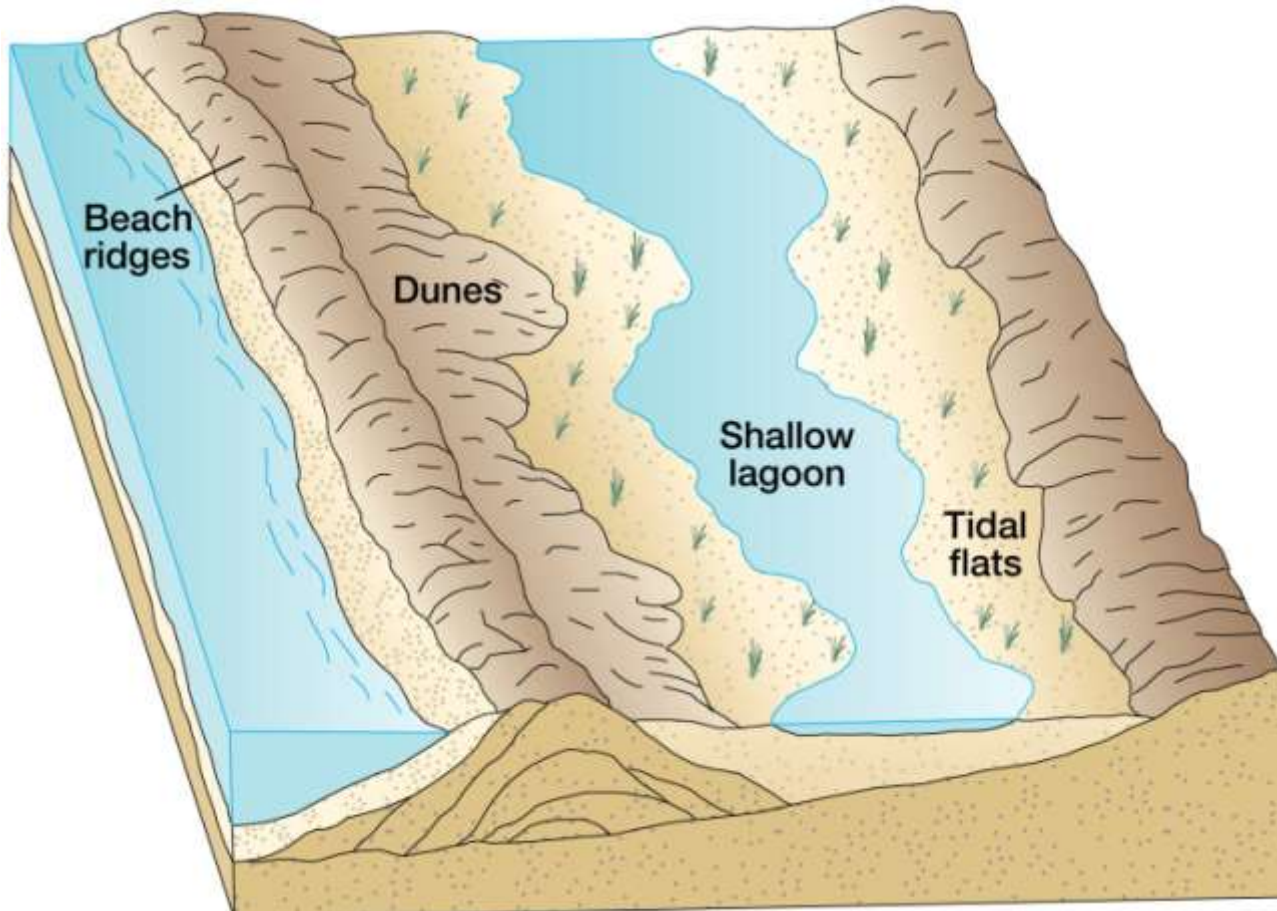
– Barrier Islands

- Coastal islands, parallel to the mainland shore
- Complex origins
 - Pleistocene sediments washed toward mainland
 - Longshore transport and spit segmentation





- Lagoon formation
 - Landward side of barrier island, protected from large waves
 - Low energy environment, fine mud deposits (tidal flats)





– Human Alteration of Coastal Sediment Budgets

- Beach starvation (unintentionally shrinking beaches)
 - Dam construction on rivers reduces sediment discharge into oceans, starving nearby beaches of sand



Old debris dam in Santa Ynez Mountains, near Santa Barbara, CA



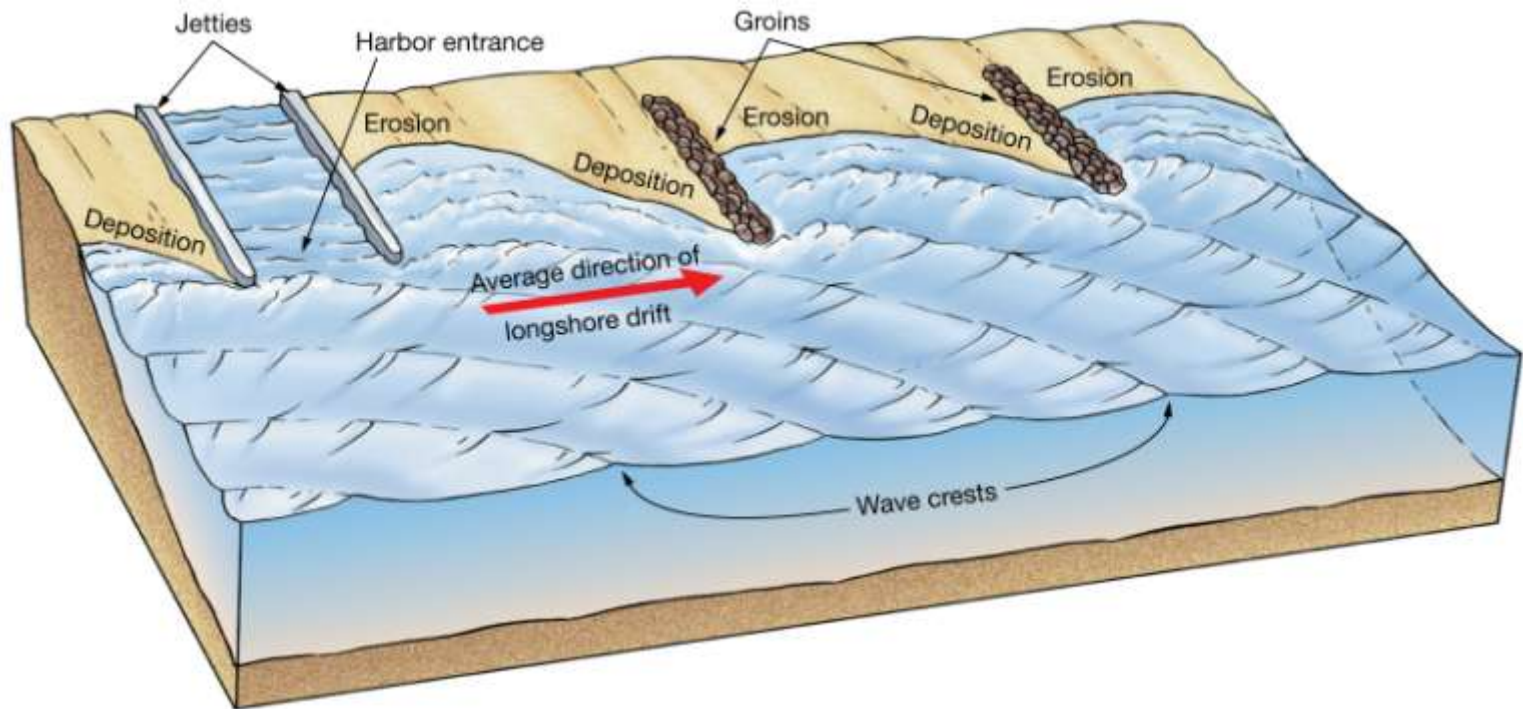
- Beach nourishment (re-building beaches)
 - Adding sand to beaches by dredging and pumping sand from off-shore



A slurry of sand and water is pumped on shore and the sand is spread onto the beach of Rehoboth Beach, DE



- Beach preservation (maintaining beaches)
 - Build structures that modify longshore transport and wave action in order to keep sand on beaches
 - Jetty
 - Groyne





• Shorelines of Submergence

– Ria Shorelines

- Hilly or mountainous areas
 - flooded valleys become estuaries



Chesapeake Bay



– Fjorded Coasts

- Fjord – glacial trough that is inundated by the sea





- Wave-cut Cliffs and Platforms
- Marine Terraces



Near Fort Ross, CA



- Coral Coasts

- Coral Polyps

- Reef-building varieties. warm tropical waters





– Shallow-water Platforms

- Australia's Great Barrier Reef





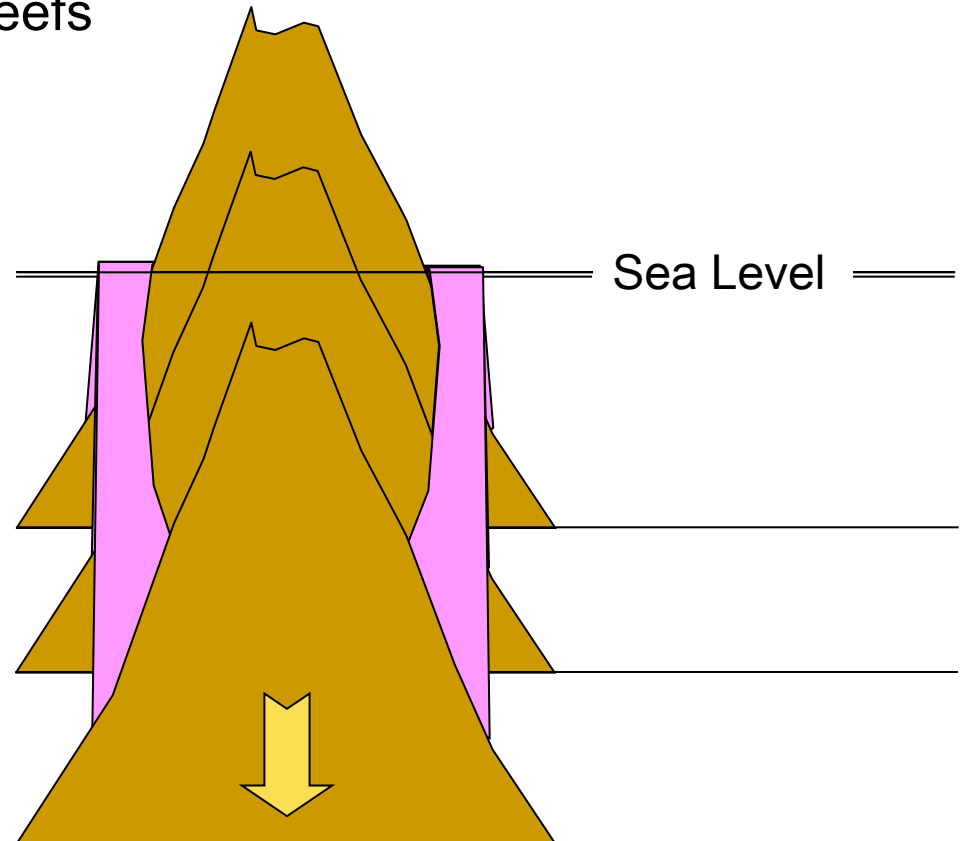
– Sinking Islands

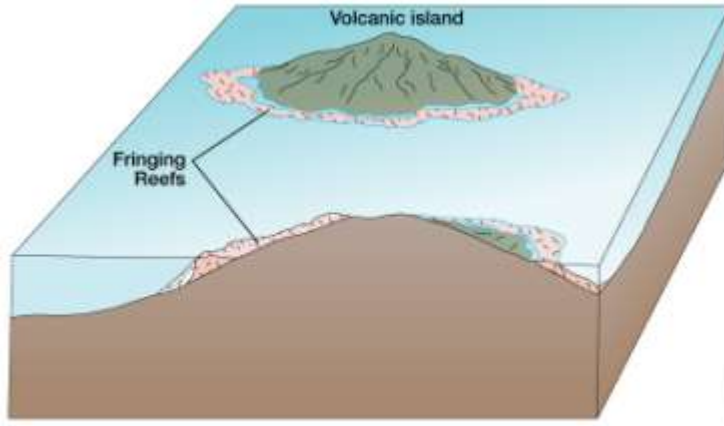
- Three types of reefs

✓ Fringing

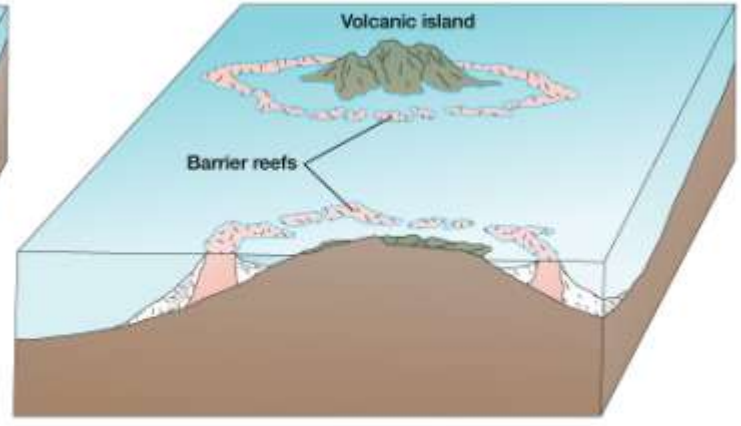
✓ Barrier

✓ Atoll

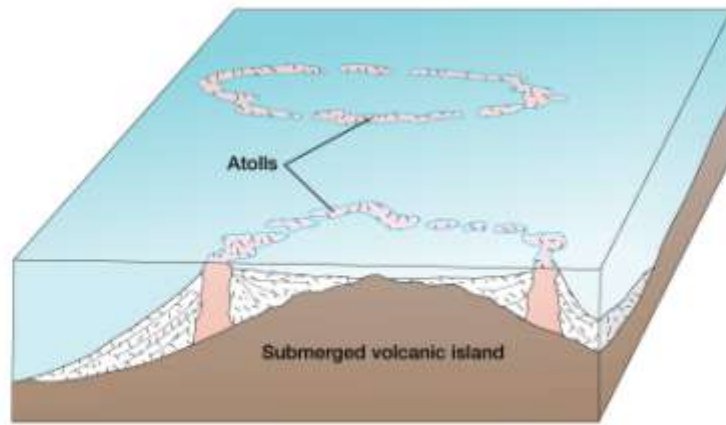




(a)



(b)



(c)



Part of the fringing reef on the island of Moorea, French Polynesia.



❖ Summary

- The principal forces shaping coastlines are changes in sea level, tides, waves, currents, stream outflow, ice push and organic secretions.
- Waves cause erosion as they constantly crash onto the shore.
- Waves and longshore currents transport sediments along a coast.



- Landforms along coastlines include beaches, wave-cut benches, wave-built terraces and barrier islands and their lagoons, spits, fjords and coral reefs.