

Depositional Environment

- Sedimentary depositional environment describes the combination of physical, chemical and biological processes associated with the deposition of a particular type of sediment.

Types of Depositional Environments

Three types

- **Continental Deposits**
- **Transitional Deposits**
- **Marine Deposits**

Continental Deposits

Four main types

- **Terrestrial deposits:**
- **Fluvial deposits:**
- **Lake deposits (Lacustrine):**
- **Cave deposits (Speleal):**

Terrestrial deposits

Two types

- **Desert deposits:**
- Sediments accumulated by (Wind blown sediments, Wash from upland slopes).
- Most sediments are etched & polished.
- Aeolian sediments are characterized by Wedge-shaped cross bedded units



Terrestrial deposits

- **Glacial deposits:**
- A glacier is a mass of ice which moves over land.
- A glacier forms in locations where the mass accumulation of snow and ice exceeds over many years.
- Glacial deposits are composed of different amounts and shapes of till.
- Till is a general term used to describe all the unsorted rock debris deposited by glaciers.

Terrestrial deposits

- Till is composed of rock fragments ranging from clay to boulder size. Till is generally identified by being unsorted (all the rock is jumbled together) and unlayered.
- The glacier will often carry large boulders, sometimes as large as cars or small homes, as they advance. When the glacier retreats, these large boulders are left behind, often dropped among much smaller glacial till.
- These large boulders are called erratics.



Fluvial deposits

Four types

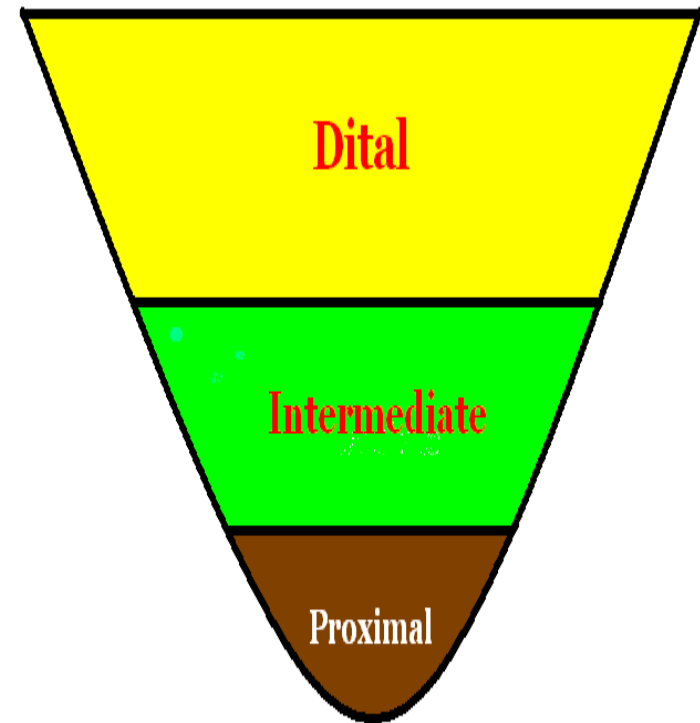
Alluvial Fan

- An alluvial fan is a fan-shaped deposit formed where a fast flowing stream flattens, slows, and spreads typically at the exit of a canyon onto a flatter plain
- Fan surface is usually desiccated by network of channels & has 3 main zones:

1-Proximal: coarse grains

2-Intermediate grains: Medium grains

3- Dital: fine grains



Alluvial fan

Fluvial deposits

- **River & Stream**
- It comprises the motion of sediment and erosion of or deposition on the river bed.
- Types of river deposition:
 - 1-Meandering:** with high sinuosity streams make a distinct channel
 - 2-Braided:** with low sinuosity are frequent & braided



Fluvial deposits

- **Piedmonts Sediment**
- Accumulate in the basis of mountains as a result of soil creep, Rain Wash, Rock streams & Mud flow
- **Valley flat Sediments**
- Differ from Piedmonts is that they show better sorting, stratification & more organic matters

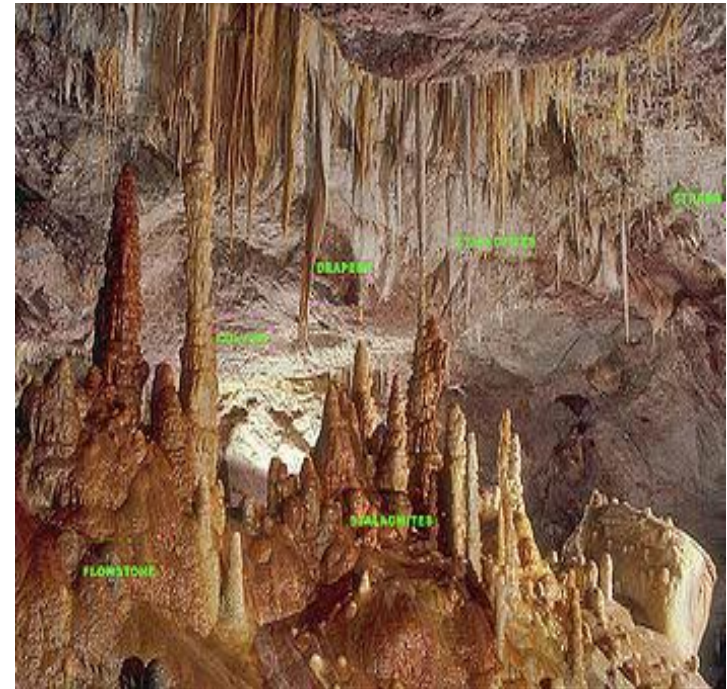
Lake deposits

- **Lake deposits (Lacustrine):**
- Lakes are well-suited to the development of deltas.
- Deltas are built up by sediment-laden streams, & they drop their load of sediment as they lose velocity.
- **Bottom Set Beds:** Fine sediment is carried by feeble current to basin bottom
- **Top set Beds:** as the delta builds, gradually filling the basin over its deposits



Cave deposits

- Water seeping through cracks in a cave's surrounding bedrock may dissolve certain compounds, usually calcite or gypsum. When the solution reaches an air-filled cave, a discharge of carbon dioxide may alter the water's ability to hold these minerals in solution, causing its solutes to precipitate. Over time, which may span tens of thousands of years, the accumulation of these precipitates may form speleothems.



Transitional deposits

Four types

- **Lagoons**
- **Deltas**
- **Beach**
- **Tidal**

Transitional deposits

Lagoons:

- A lagoon is a shallow body of water separated from a larger body of water by barrier islands or reefs.
- A lagoon is a body of comparatively shallow salt or brackish water separated from the deeper sea by a shallow or exposed barrier beach or coral reef. The water salinity ranges from fresh water to water with salinity greater than that of sea.
- In stagnant lagoons, Activity of bacteria leads to form H_2S which causes precipitation of Black Iron Sulphides
- In lagoons with extensive evaporation, Salinity may become too great & form Salt & Gypsum



Transitional deposits

Deltas:

- A delta is a landform that is created at the mouth of a river where that river flows into an ocean, sea, lake.
- Deltas are formed from the deposition of the sediment carried by the river as the flow leaves the mouth of the river.
- Over long periods of time, this deposition builds the characteristic geographic pattern of a river delta.
- Delta is divided to Delta front which include Sand Bars at the mouth of distributy & Delta plain which include channels, bays & flood plains

Transitional deposits

Beach

- A beach is a landform along the shoreline of an ocean, sea, lake, or river. It usually consists of loose particles, which are often composed of rock, such as sand, gravel, pebbles, or cobblestones. The particles comprising the beach are occasionally biological in origin, such as mollusc shells or coralline algae.

Transitional deposits

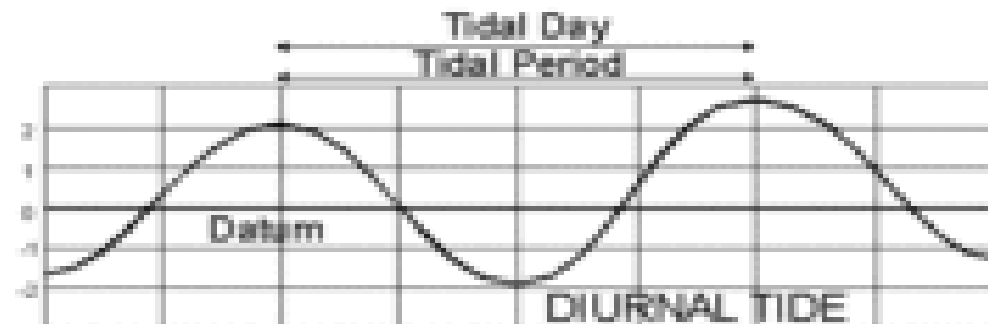
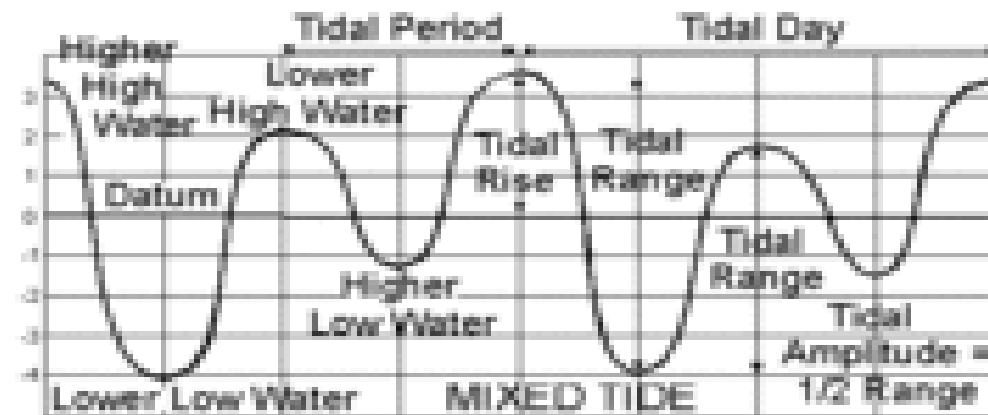
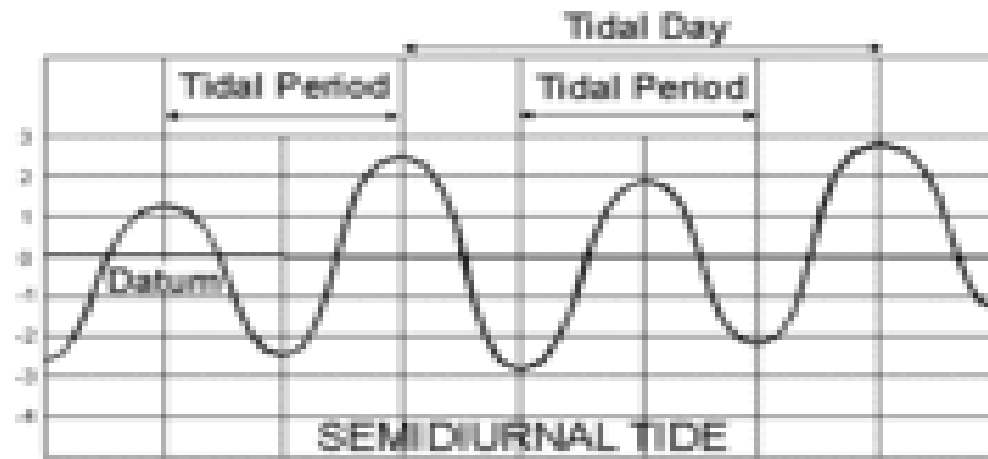
- **Tidal**
- **Tides** are the rise and fall of sea levels caused by the combined effects of the gravitational forces exerted by the Moon and the Sun and the rotation of the Earth.



- Some shorelines experience two almost equal high tides and two low tides each day, called a semi-diurnal tide.
- Some locations experience only one high and one low tide each day, called a diurnal tide.
- Some locations experience two uneven tides a day, or sometimes one high and one low each day; this is called a mixed tide.

Distribution of Tidal Phases

Tidal Height (in feet above or below the standard datum)



Marine deposits

Four types

- **Marine Shoreline Environments:**
- **Shallow Marine (Neritic Zone):**
- **Intermediate Seas (Bathyal deposits)**
- **Deep Marine (Abyssal Deposits)**

- **Life of the Sea zones:**
- **Littoral or Tidal Zone:** Difficult living conditions because of the strong wave action so organisms must be attached or buried
- **Neritic Zone:** It is the most life area in marine, Sea in this area is lighted & abundance of food
- **Bathyal Zone:** No light or very little, so plant life is rare but it has animal population which called Bottom Living Seavengers
- **Abyssal Zone:** No light, near freezing temp. & pressure reach to 1 Ton/inch² (specialized creatures can live at this depth)

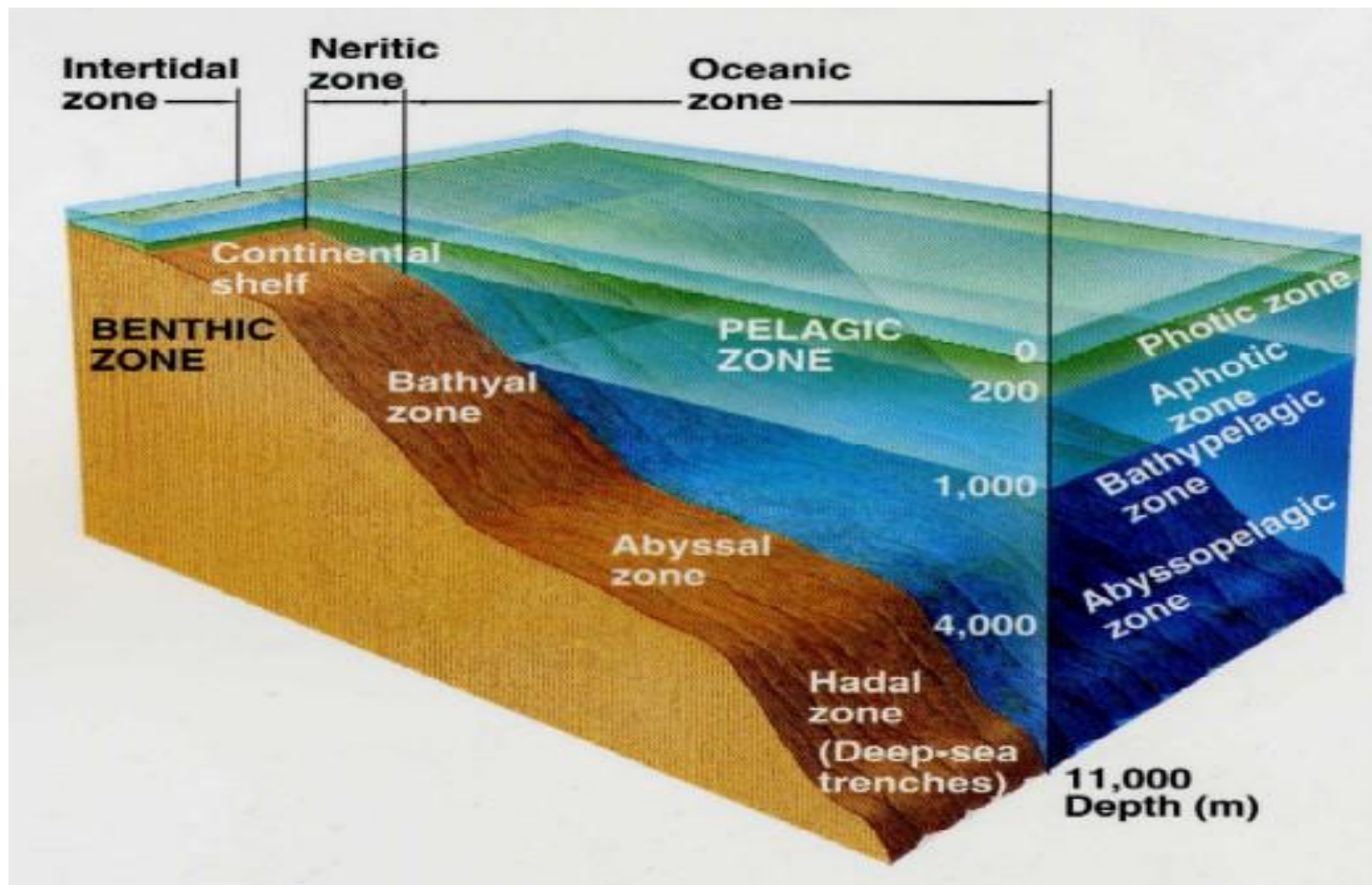
Depth relative to MSL	Sea bottom description	Water Body	Sediment Description
20 m above or below MSL	Littoral or Tidal zone	_____	Littoral facies
20:200m	Continental shelf Epicontinental Eperic Sea	Neritic Zone	Shallow Marine
200:2000m	Continental Slope Continental Margin Intermediate Slope	Bathyl Zone	Intermediate
More than 2000m	Deep	Abyssal Zone	Deep Marine

Marine deposits

- **Marine Shoreline Environments:**
- Much siliclastic sediments can be deposited in marine shoreline.
- Beaches & Barriers developed in areas of high wave action.
- Beaches are linear belts of sand along beach where Barriers are separated from land by lagoon

Marine deposits

- **Shallow Marine (Neritic Zone):**
- Coarser materials are deposited near shore & grade into finer deposits upward. Shallow marine sediments is made of sediments derived from land by ways of Stream, Glaciers or Aeolian. Sediments may consist of remains of organisms & chemical precipitates.
- Structural features: usually lenticular beds. Ripple, currents marks have great variation in trend & extension. Sea floor has steep slopes, so sediments may slump & develop crimped & irregular bedding planes



Marine deposits

- **Intermediate Seas (Bathyal deposits)**
- At the continental slope, & covered by fine sediments of land origin which called Blue Muds.
- The presence of Blue Muds color is due to presence of organic matter & also to De-Oxided conditions of Iron.
- Blue Muds may cover over 20 million Km² of the ocean basin

Marine deposits

- **Deep Marine (Abyssal Deposits)**
- Many sediments are Volcanic & meteoric origin. Very poorly sorted, Set in motion by storms and quakes, Calcareous and siliceous sediment. In greatest depth of ocean, the bottom is covered by Fine Red Clay which composed of Calcareous to siliceous to terrestrial clay, Shells & other organic matters

