

SEA LEVELS

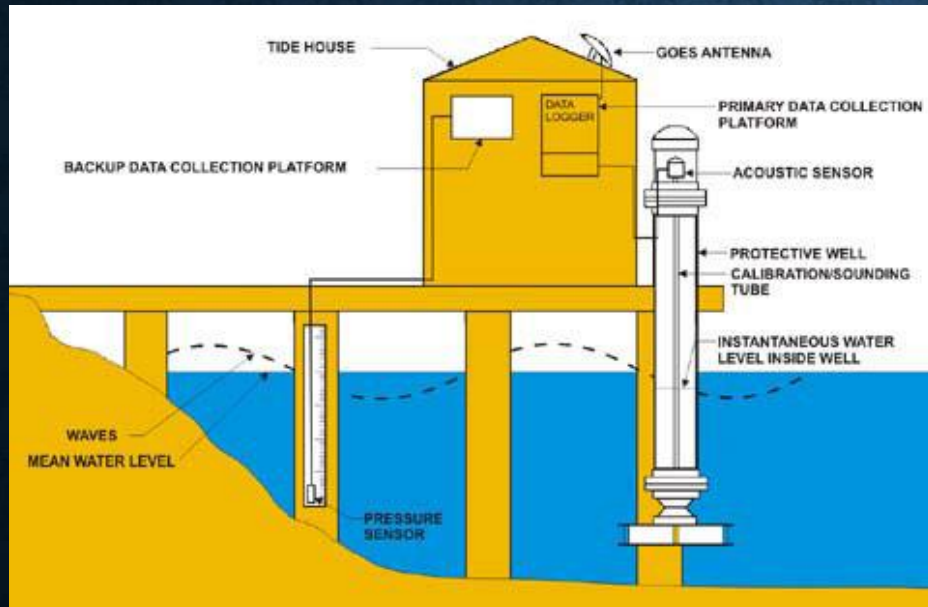
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HOW ARE SEA LEVELS MEASURED

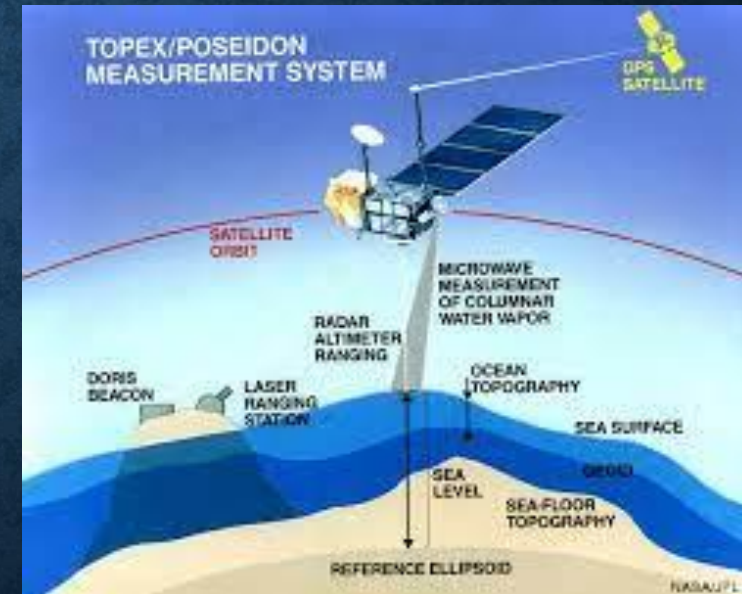
- Two methods to measuring the ocean:
 - Tide Stations
 - Around the globe
 - Shows what is happening at a local level
 - Height of the water relative to the local coast
 - Satellite Measurements
 - Tells us the average height of the ocean

HOW ARE SEA LEVELS MEASURED

Tide Stations



Satellite measurements



HOW HAS SEA LEVELS CHANGED

- Over the past 100 years, global temperatures have risen about 1 degree Celsius
 - Sea levels risen 160 to 210 mm or about 6 to 8 inches
 - About half of that has occurred since 1993
 - Rate of sea level rising is unprecedented over the past several millennia



HOW HAS SEA LEVELS CHANGED

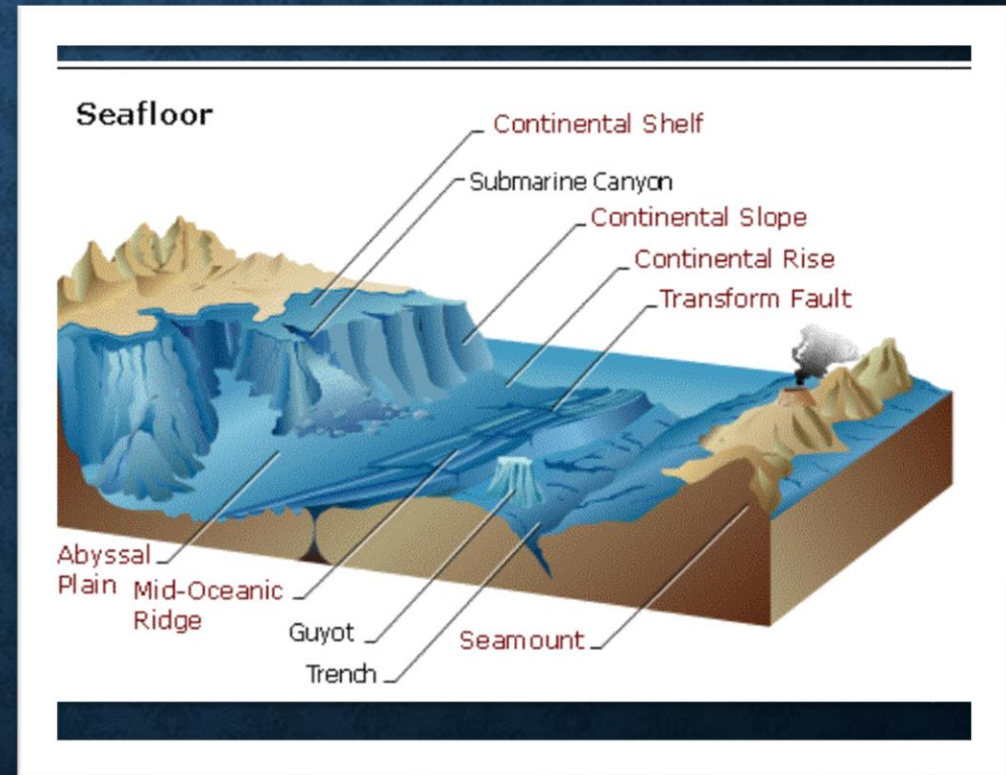
- Sea level continue to rise at a rate of about 1/8th of an inch a year
- The global mean water level rose by .14 inches per year from 2006 – 2015
 - 2.5 times the average rate of .06 inches per year throughout the 20th century
- In 2014, global sea level was 2.6 inches
 - About the same average of 1993
 - 1993's average is one of the highest annual average in the satellite record
- From 2018 to 2019 global sea level rose .24 inches
- In 2019, global mean sea level was 3.4 inches above 1993 average
- By the end of the century. Global mean sea level is likely to rise at least one foot from 2000 levels
 - Even if greenhouse gas emission follow a relatively low pathway in the coming years

WHY SEA LEVELS ARE RISING

- Climate change is the cause of sea levels rising in two ways:
 - Glaciers and ice sheets are melting across the world
 - Volume of the ocean is expanding as it warms
- A smaller contributor:
 - A decline in the amount of water on land due to groundwater pumping

CHANGES IN SEA LEVEL DIFFER ON AREA

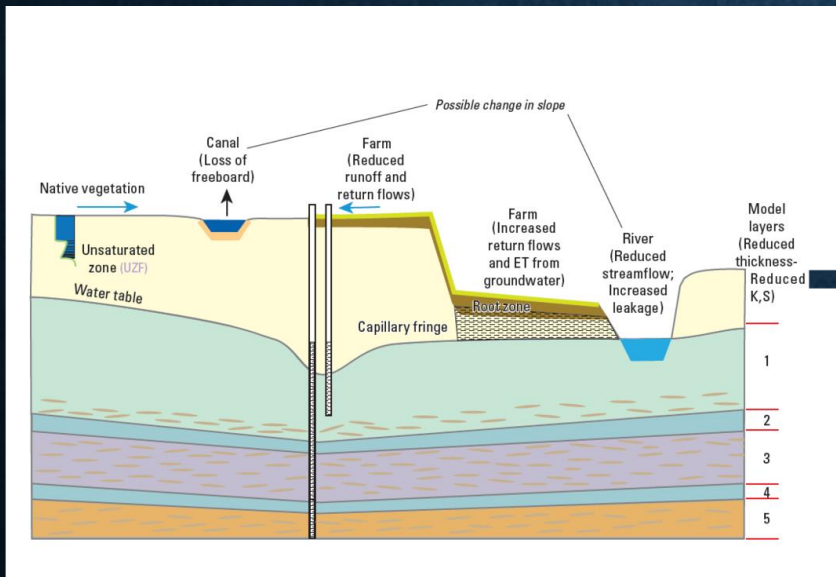
- Global and relative sea level trends are different
- Sea floor is not flat
- Sea surface is not changing at the same rate globally



FACTORS OF SEA LEVEL CHANGES

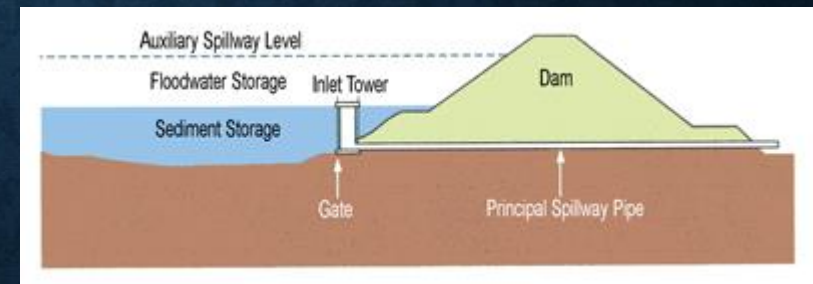
Subsidence

- Gradual settling or sudden sinking of Earth's surface



Upstream Flood Control

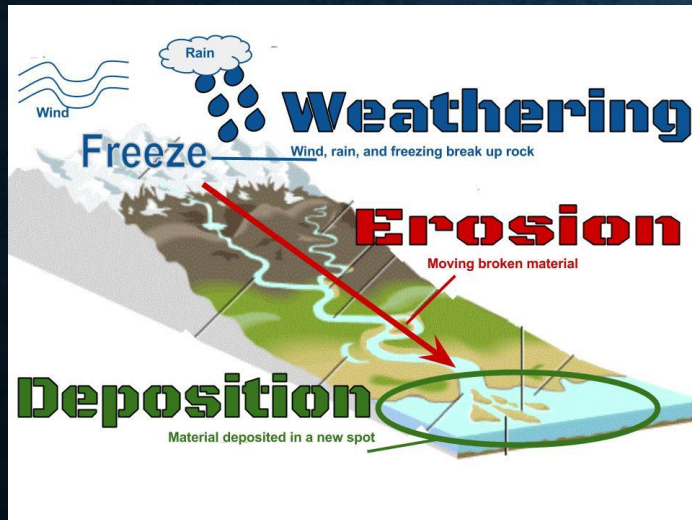
- Dams are built to temporarily trap and store water runoff after heavy rainstorms
- The dams slowly release water through a pipe in the dam



FACTORS OF SEA LEVEL CHANGE

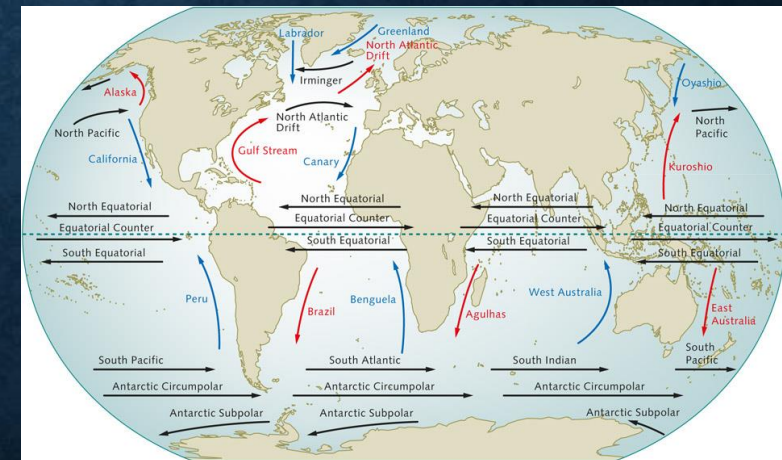
Erosion

- Process where dirt and sand are worn away and transported by natural forces



Regional Ocean Currents

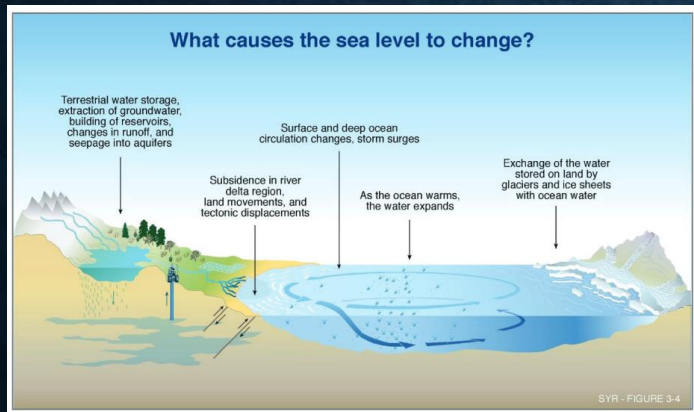
- Continuous and direct movements of the ocean



FACTORS OF SEA LEVEL CHANGE

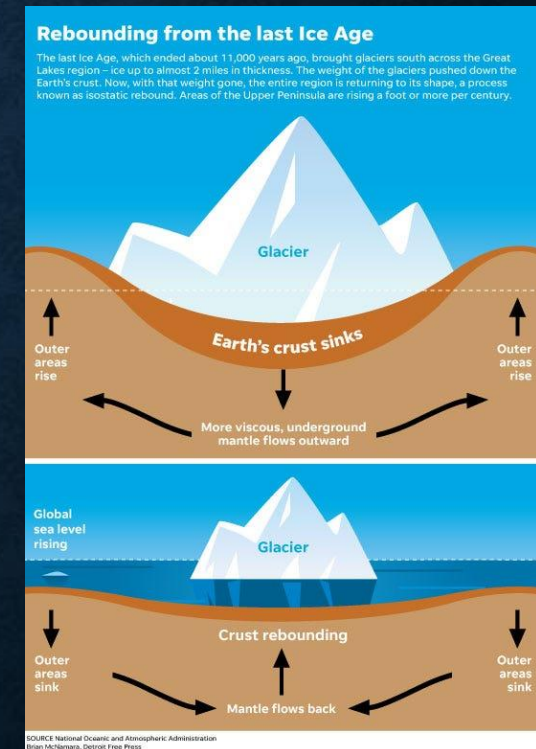
Variation in Land Height

- When land sinks it increases sea levels and when land rises it decreases sea levels



Land Still Rebounding from Glaciers

- When glaciers melt the land rebounds and bulging parts sink down
 - The coastal areas that are sinking leads to increased sea levels



U.S. SEA LEVEL CHANGES

- Fastest rates of sea level rising:
 - Gulf of Mexico from the mouth of the Mississippi westward
 - Mid-Atlantic Ocean
- Sea Levels falling:
 - Alaska
 - Pacific Northwest

EUROPEAN SEA LEVEL CHANGE

- Most coastal regions experienced rising sea levels
- Areas where sea levels are sinking
 - Northern Baltic Sea coast
 - Northern Atlantic coast
- Why these two areas are experiencing sea levels sinking
 - Land levels are rising because of post-glacier rebound

AFRICA'S SEA LEVEL CHANGE

- Sea levels are increasing above 5 mm per year from the southwest Indian Ocean
 - Islands like Madagascar and Mauritius are at risk
- West coast will be impacted the most
 - Saint-Louis in northern Senegal was named the city most threatened by rising sea levels
 - The city only stands 4 meters above sea level
 - Areas have already been abandoned by flooding
 - Sea level forecasting to drastically change economies and communities

CONSEQUENCES OF SEA LEVELS RISING

- Effects on coastal habitats
 - Destructive erosion
 - Wetland flooding
 - Aquifer and agriculture soil contaminated with salt water
 - Loss of habitat for fish, birds, and plants
- More severe hurricanes and typhoons

CONSEQUENCES OF SEA LEVELS RISING

- Flooding
 - People are migrating to higher ground
 - Threatens local infrastructure
 - 40% live in costal areas
 - 10 of the world's largest cities are on the coast



SOURCES

- <https://oceanservice.noaa.gov/facts/sealevel.html#:~:text=Sea%20level%20is%20primarily%20measured,a%20specific%20point%20on%20land.>
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