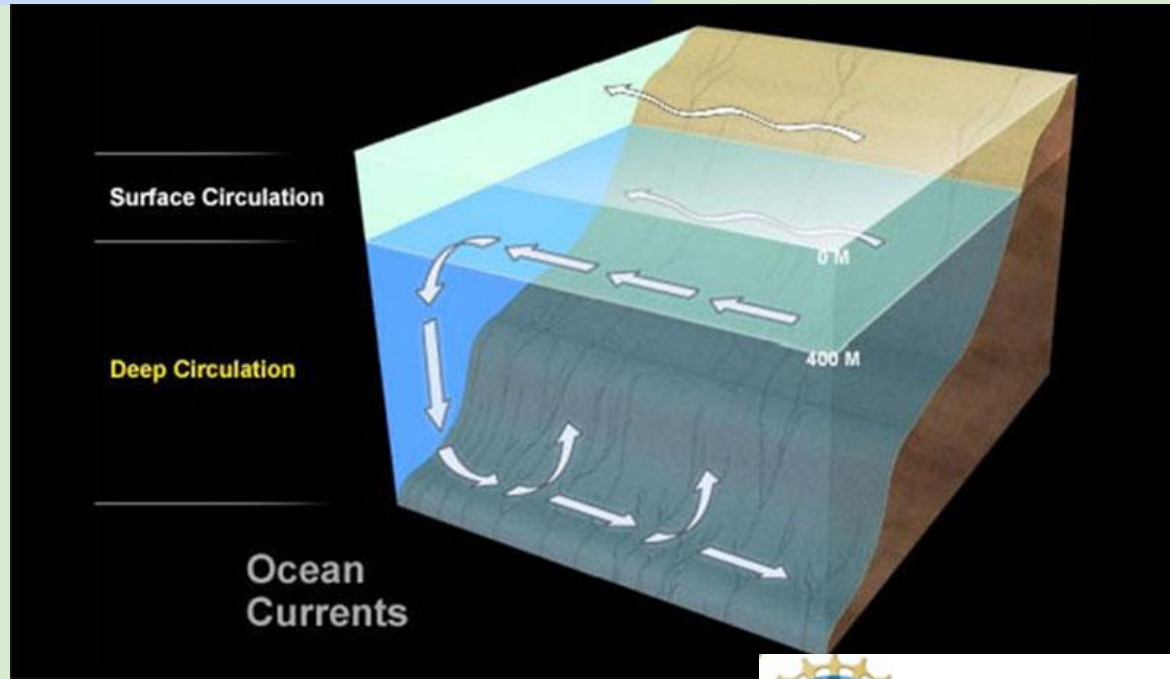


Ocean Currents & Green Energy



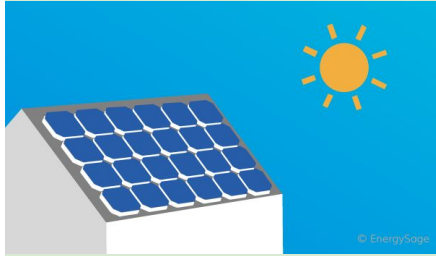
Northwestern

Ocean current layer model



- Ocean temperature and motion fields can be separated into three distinct layers: mixed surface layer, upper ocean (above the thermocline), and deep ocean.

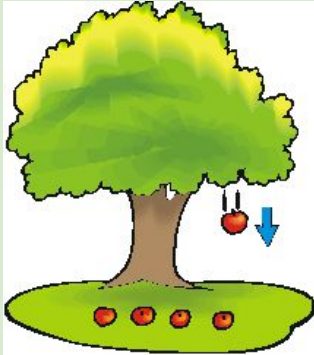
Causes of Ocean Currents



Solar Heating



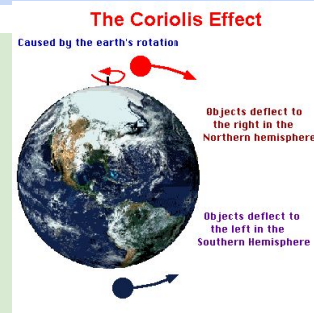
Gravity



Salinity



Wind



Coriolis Effect

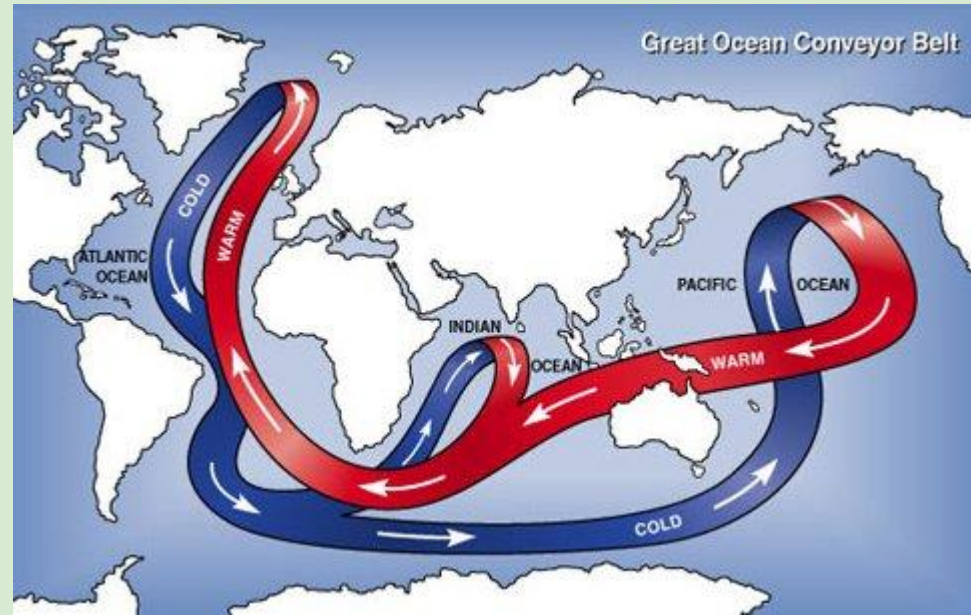


Temperature

Underwater earthquakes

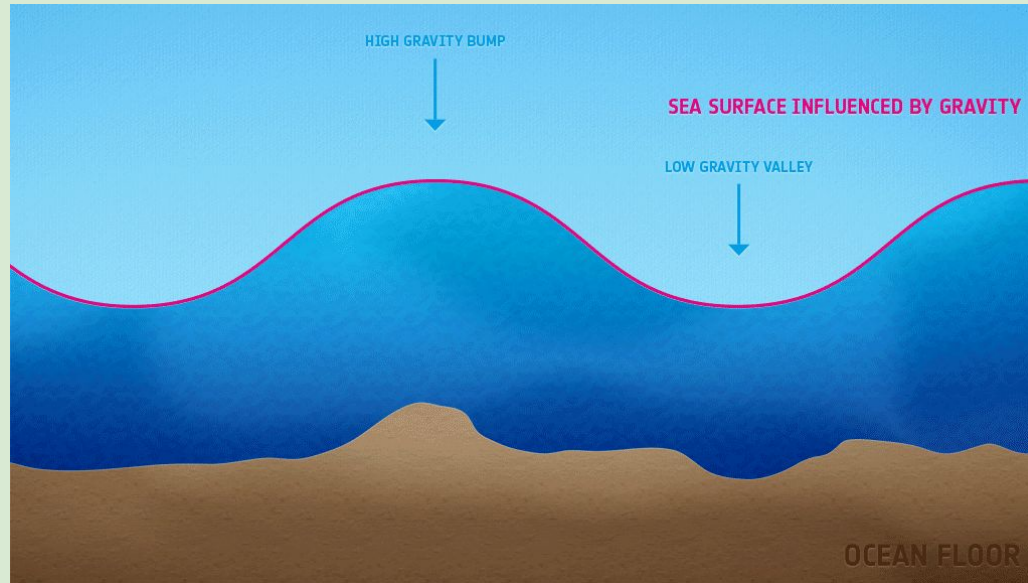
Thermohaline Circulation

- “Thermohaline” refers to the temperature and salinity of water; which controls the density and thus the weight of water.
- Thermohaline circulation of ocean currents is frequently referred to as the global ocean conveyor belt



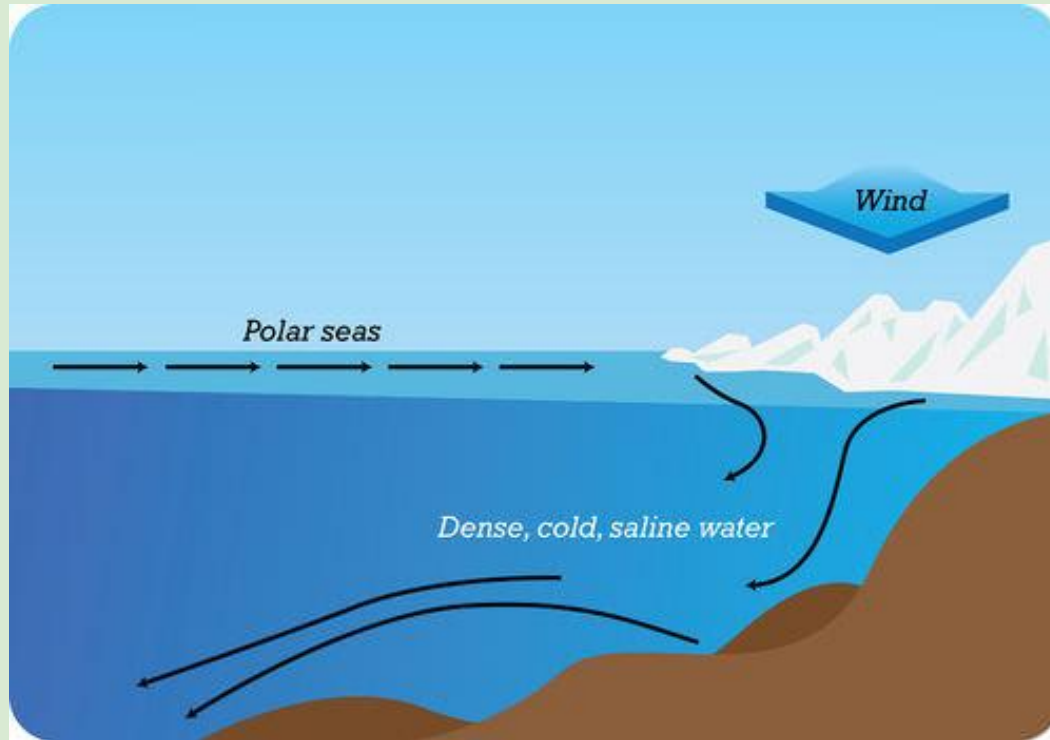
Horizontal Currents

Surface Currents



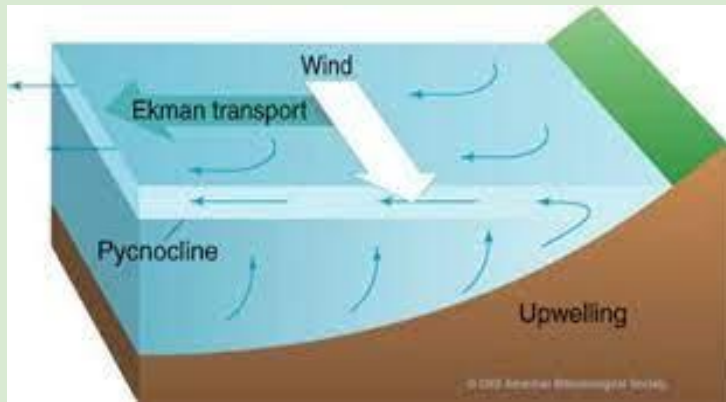
Horizontal Ocean Currents

Deep Water Currents:

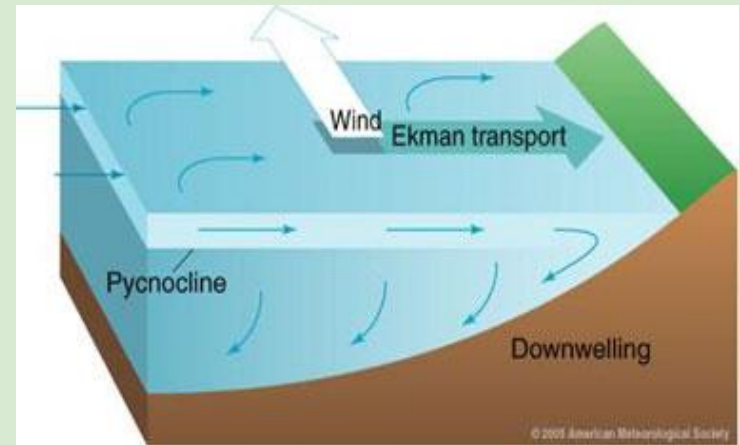


Vertical Currents

Upwelling:



Downwelling:



Why are people developing new renewable energy?

Renewable energy emits no or low greenhouse gases, beneficial for the climate change

Renewable energy emits no or low air pollutants which is beneficial for our health

Renewable energy comes with low costs



So how can oceans help contribute to renewable energy?



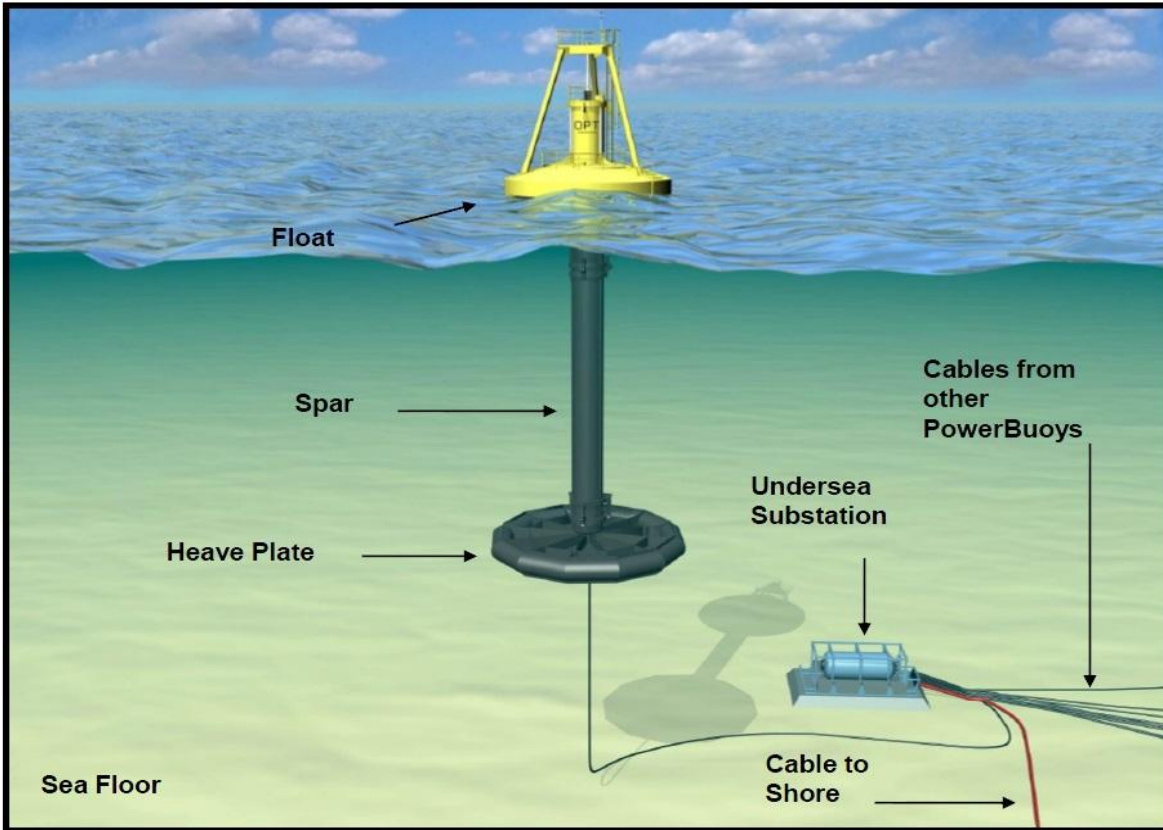
An average 4-foot, 10-second wave striking a coast puts out more than 35,000 horsepower per mile of coast.

What technologies exist to capture ocean current energy?

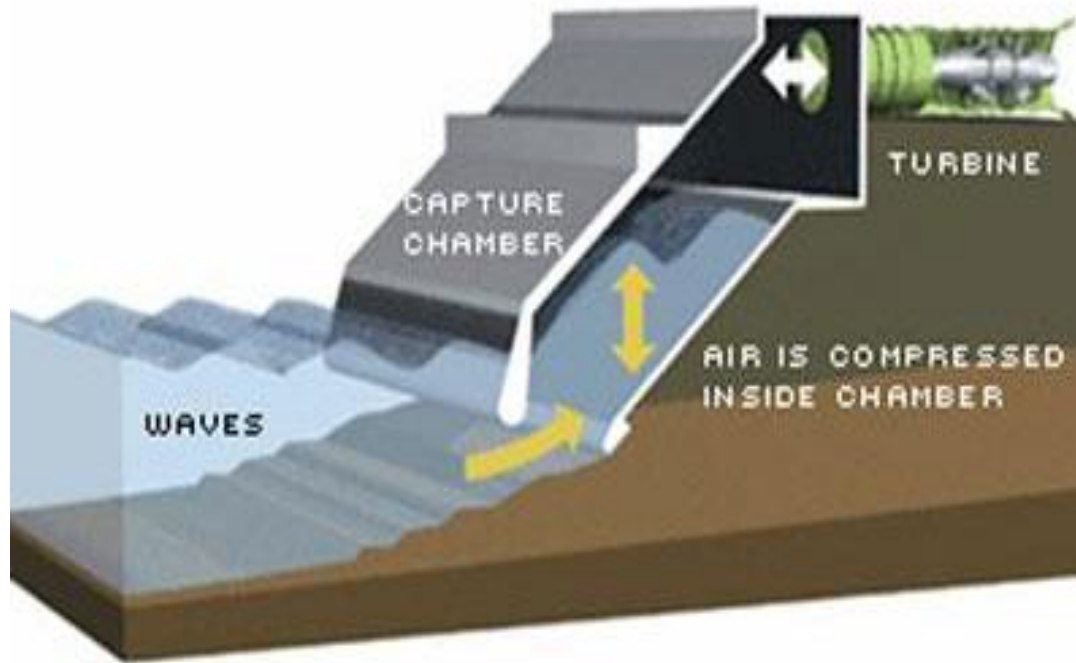
Attenuators



Absorbers



Oscillating Water Columns (OWC)



Challenges In Developing This Technology



Environmental disruption

**Abundances of unproven
prototype & Corrosion
and Biofouling**



**Expense for early stage
development**



Unpredictable weather

The threat of climate change



Resources For Climate Change:

<https://climate.nasa.gov/solutions/resources/>

<https://www.npr.org/2020/03/06/812703289/resources-on-climate-change>

https://blueprintforbetter.org/?utm_source=google&utm_medium=search&utm_campaign=b4b-search-standard-top-kw&gclid=EAIaIQobChMIiaOfioHX8QIVhSCtBh1uMAQ1EAAYBCAAEgK1NfD_BwE

Supplies used throughout the project



- links in slide 18 where the items were purchased.



Thank you so much for listening feel free to ask questions !

GEOPATHS
@ Northwestern University