

# ***RELIEF OF OCEAN FLOOR***

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# Ocean Relief

- *It is impossible to see relief of oceans through naked eye*
- *During 1884-89, Challenger expedition has given tremendous and revolutionary information regarding ocean relief.*
- *The expedition has broken some earlier myth and gave the new facts based on scientific study/techniques.*
- *Challenger expedition concluded that the deepest part is near the coast not in the central/middle part of the oceans.*
- *Another fact came out that the central part of the oceans has longest mountain ranges in the form of **Mid Oceanic Ridge**. The relief of ocean is more varied than continents.*

# OCEAN RELIEF

| Class interval of relief | % of oceanic area |
|--------------------------|-------------------|
| 0-200                    | 7.6%              |
| 200-1000                 | 4.3%              |
| 1000-2000                | 4.2%              |
| 2000-3000                | 6.8%              |
| 3000-4000                | 19.6%             |
| 4000-5000                | 33.0%             |
| 5000-6000                | 23.3%             |
| Above 6000               | 1.2%              |
| Total                    | 100.0%            |

# OCEAN RELIEF

| <b>Class interval of relief (in m.)</b> | <b>Atlantic ocean</b> | <b>Pacific ocean</b> | <b>Indian ocean</b> |
|-----------------------------------------|-----------------------|----------------------|---------------------|
| <b>0-200</b>                            | 3.8                   | 5.7                  | 4.2                 |
| <b>200-1000</b>                         | 7.1                   | 3.1                  | 3.1                 |
| <b>1000-3000</b>                        | 14.1                  | 9.1                  | 10.8                |
| <b>3000-4000</b>                        | 18.5                  | 18.5                 | 24.0                |
| <b>4000-6000</b>                        | 55.9                  | 61.8                 | 57.5                |
| <b>Above 6000</b>                       | 0.6                   | 1.8                  | 0.4                 |
| <b>total</b>                            | 100.0                 | 100.0                | 100.0               |

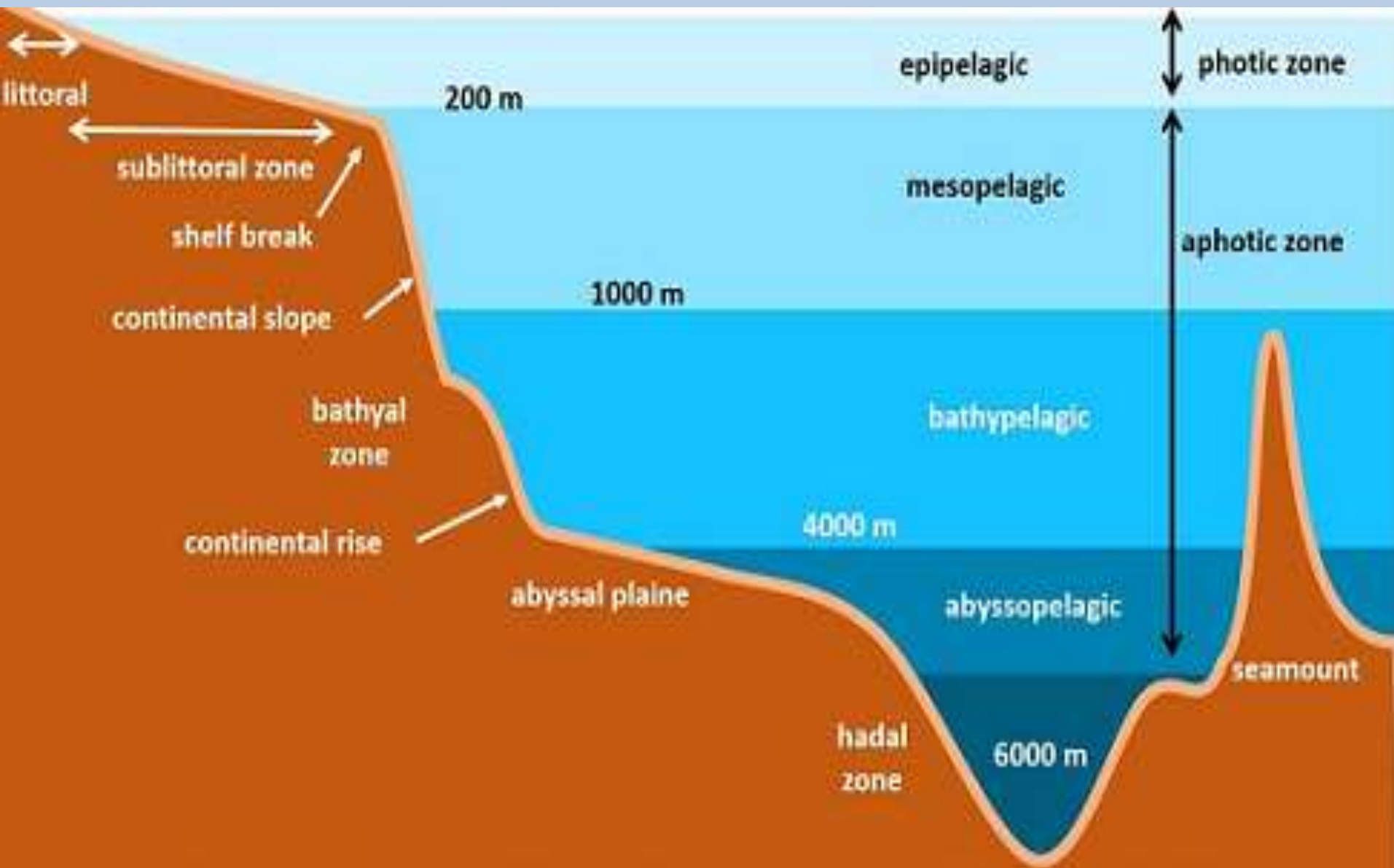
# OCEAN RELIEF

*The average depth of ocean is nearly 4000 meters whereas, it is only 840 meters for continents. **Multi-beam Eco sounder** helps in mapping the oceans. **Hypsographic or Hypsometric curve** is suitable for showing the (depth and height) relief of oceans and continents. The line on the map joining the places or points of equal depth is known as **Isobaths**. From continent to the deep of the ocean; six major reliefs are found successively.*

# *Six major divisions of ocean reliefs:*

- *1. Continental shelf*
- *2. Continental slope*
- *3. Mid Oceanic Ridge*
- *4. Deep sea plain/Basins*
- *5. Trenches*
- *6. Other features*

# *divisions of ocean reliefs*





# OCEAN RELIEF





# OCEAN FLOOR – DETAILS

## **1. Continental shelf**

- *Continental shelf is a granitic structure found up to 200 m. of depth and considered as the part of continent.*
- *Average slope of the relief is 17 feet per mile ( $1^{\circ}$  to  $3^{\circ}$ ).*
- *Maximum extension of continental shelf is in Atlantic Ocean. It is extended from Hudson Bay to North Sea and up to Norway Sea continuously.*
- *.due to coastal mountains continental shelves become narrower.*
- *.most narrower continental shelf is on the coast of Namibia and Angola.*
- *.average width of continental shelf is nearly 30 miles/ 70 kms.*
- *.8.6 % area of the ocean comes under continental shelf.*
- *.out of the total area of the Atlantic ocean, Pacific ocean and Indian ocean; continental shelf is extended over 13.3%, 5.7% and 4.2% respectively*
- *20% reserve of mineral oil and natural gas of the world is found here while it is the home of 90% of oceanic bio-resources.*
- *Gujarat has the widest coast (more than 100 kms.) in India.*

# OCEAN FLOOR – DETAILS

## **2. Continental slope-**

- *Continental slope is also a part of continent made up of granite. Average slope of this relief is 68 feet per mile ( $5^{\circ}$ ). Submarine canyons are found on continental slope.*
- *.average slope of continental slope along St. Helena is  $40^{\circ}$ . It is  $30^{\circ}$  along Spain,  $15^{\circ}$  along St. Paul and  $5^{\circ} - 15^{\circ}$  along Calicut of India.*
- *. average depth of continental slope is 2000-3000 m.*
- *.depth of continental slope near Peru and Chili coast is 3700m.*
- *.continental slope is extended over 8.5 % area of the total ocean.*
- *.continental slope is extended nearly 12.4 %, 7% and 6.5 % over Atlantic Ocean, Pacific Ocean and Indian Ocean respectively.*
- *.continental slope is generally devoid of marine deposits or have little layer of materials due to slope.*

# OCEAN FLOOR – DETAILS

## 3. Mid Oceanic Ridge

- *Mid oceanic ridges are formed by the (magma coming out at this point) diversion of plate.*
- *. Average depth of **M.O.R.** is 2000-4000m.*
- *. Due to diversion of plate, magma comes out and solidifies quickly and forms the ridge like structure along the plate.*
- *. Longest ridge is 14000 kms long found in Atlantic Ocean. It starts from Iceland in the north to Bonnet island in the south in 'S' shape.*
- *.The ridge is known as Dolphin Ridge in the north and Challenger Ridge in the south in Atlantic Ocean.*
- *.Indian ocean ridge is 9000 kms long from Lakshadweep to Antarctica with average depth of 2000m.*
- *The total length of mid oceanic ridge is more than 75000 kms.*
- *Ridges are found in the middle part of the ocean.*
- *. **Different name of Indian Ocean ridge-***
- *North of equator =Lakshadweep-Chagos ridge*
- *0<sup>0</sup>-30<sup>0</sup> S. = Chagos-St. Paul ridge*
- *30<sup>0</sup>-50<sup>0</sup> S. = St. Paul- Amsterdam ridge*
- *South of 50<sup>0</sup>= a) Kargulen-Gausberg ridge (west)*
- *b) India- Antarctica ridge(east)*

# OCEAN FLOOR

- **4. Deep sea plain/Basins-** Deep Sea plane is basaltic structure formed by plate tectonic activity. It is the result of sea floor spreading (1 fathom=6feet) (according to Harry-Hess).
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- . Average depth of Deep Sea plane is 3000 - 6000m.
- .More than 80% of oceanic area is comes under this relief.
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# OCEAN FLOOR

## Atlantic Ocean

### **Western part**

### **Eastern part**

1. Labrador basin-4000m.  
5. Angola basin-5000m.

1. Spanish basin-

2. N. America basin- 5000m.  
6. Cape basin-4000m.

2. Canary basin-

3. Brazilian basin- 4000m.  
5000m

3. Cape Bherde basin -

4. Argentinian basin-5000.  
7. Aghulhas basin-4000m.

4. Gini basin-5000m.

# OCEAN FLOOR

## *Indian Ocean*

### *Western Part*

- 
- 1. *Oman basin-6000m.*
- 
- 2. *Arabian basin-6000m.*
- 
- 3. *Somali basin-6000m.*
- 
- 4. *Mauritius basin-4000m.  
(South of 50°)*
- 5. *Netal basin-4000m.*
- 6. *Aghulhas basin-6000m.*

### *Eastern Part*

- 1. *Andaman basin:  
600-2000m (North of 10°)*
- 2. *Cocos-kiling basin:  
2000-4000m. (10°N.-50°S)*
- 3. *Indian Ocean- Antarctica  
basin- 4000-6000m.*

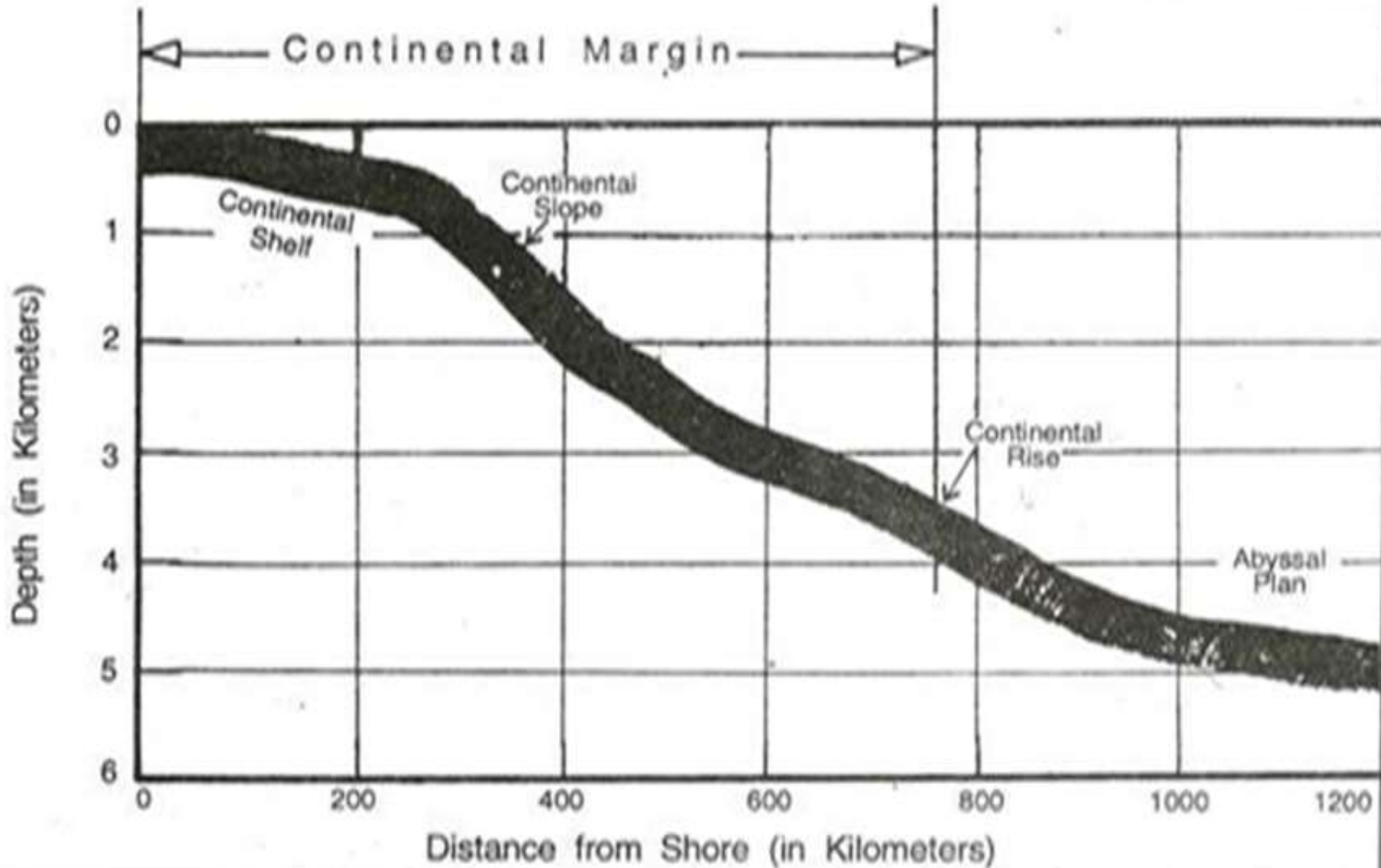
# OCEAN FLOOR

## *Pacific Ocean*

- *1. California basin- N.E.Pacific*
- *2. Japanese basin- N.W. Pacific*
- *3. Peru-Chili basin- S.E.Pacific*
- *4. Australian basin- S.W.Pacific*



# RELIEF OF OCEAN FLOOR



# OCEAN FLOOR

- **5. Trenches-** *Deeps/trenches are (deepest part of ocean) depressions found in the ocean floor. Deeps are called Tiefe and Fosse in Germany and France respectively. Altogether 57 deeps are known in which 32 are in Pacific while 19 are in Atlantic and 6 are in Indian Ocean. It can be compared with the gorge found on landmass. Oceanic deep or trenches are the result of subduction of oceanic plate (tectonic activities). Mariana, Port Rico and Sunda trenches are the deepest trenches of Pacific, Atlantic and Indian Ocean respectively. The deepest part of any ocean in the world is the Mariana trench. Trenches are 300-5000 kms long and 30- 100 kms wide.*

# OCEAN FLOOR

| SI.NO | NAME             | DEPTH<br>(in metres) | LOCATION                 |
|-------|------------------|----------------------|--------------------------|
| 1     | Mariana          | 9640                 | North Pacific            |
| 2.    | Tonga            | 9185                 | C.South Pacific          |
| 3.    | Philippine/Swire | 8720                 | N.W.Pacific              |
| 4     | Port Rico/Nares  | 8525                 | Off W. Indian Islands    |
| 5.    | Japan/Tuscarora  | 8515                 | Off Japan                |
| 6.    | Romanche /Tizard | 7378                 | S.Atlantic               |
| 7.    | Sunda/Wharton    | 7000                 | E. Indian Ocean          |
| 8.    | Murray           | 6475                 | C.N.Paciic               |
| 9.    | Bailey           | 6280                 | N.W.Pacific              |
| 10.   | Brooke           | 6270                 | N.W. Pacific             |
| 11.   | Belknap          | 6105                 | Central Pacific          |
| 12.   | Chun             | 6070                 | N. Pacific               |
| 13.   | Moseley          | 6050                 | N. Atlantic              |
| 14.   | Valdivia         | 5732                 | S.Atlantic&Indian oceans |
| 15.   | Buchanan         | 5600                 | Ern.S.Atlantic           |



# OCEAN FLOOR

## 6. Other features

- *Other features include coral reefs, sea-caves Guyots and sea-mount like structures. Coral reef is a depositional features found on continental shelf. Generally, **coral reefs** are found on the eastern coast of islands or continents between 30°North to 30°South latitudes. **Sea -caves** are V shaped valley developed in continental shelf. It is found normally on the mouth of large rivers. According to some scientists sea-caves are submerged valley and were the part of landmass during Pleistocene age.*
- *Narrow deep V shaped valley cut deep into the continental shelf and slope are also called **Submarine Canyons**. Canyons are 610-915 m deep. Sometime it is found up to 3048 m deep. There are 102 submarine canyons in the world which are of three types-*
- ***a- Small gorges** found on the shelf and slope. e.g- Oceanographer Canyon in New England Region.*
- ***b- River mouth canyons** begin at the mouth of the river and extended over the shelf. e.g- Mississippi River Canyon.*
- ***c- Deep dissected canyons** -along the coast of California.*
- ***Guyots and sea-mounts** are hill-like structures found on oceans basins. These are residual hills of basalt in which Guyots are flat topped hills whereas sea-mounts are pointed topped hills.*

# OCEAN FLOOR

| OCEANS         | AREA<br>(IN LAKH Sq. Kms) | AVERAGE DEPTH<br>( in metres) |
|----------------|---------------------------|-------------------------------|
| Pacific Ocean  | 1655                      | 5000                          |
| Atlantic Ocean | 821                       | 3920                          |
| Indian Ocean   | 736                       | 4000                          |
| Arctic Ocean   | 140                       | 1280                          |

# OCEAN FLOOR

- THANK YOU