

# The Ocean Environment: Setting the Scene

ES 383

Colby at Bigelow, September 2018



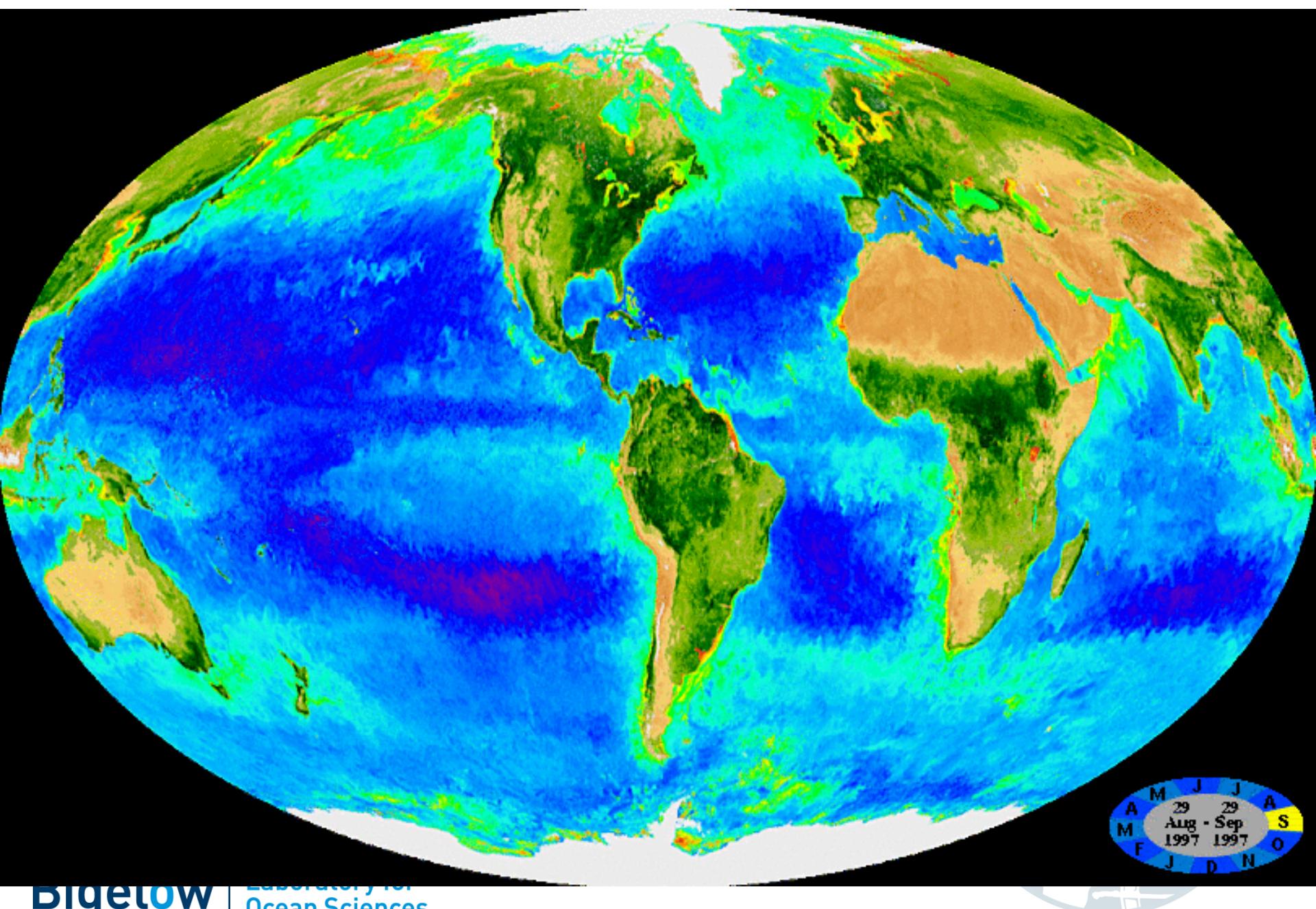
*"Take a peep over the weather bow, and then back to me and tell me what ye see there."*

...  
*The prospect was unlimited, but exceedingly monotonous and forbidding; not the slightest variety that I could see.*

...  
*"Not much," I replied- "nothing but water"*







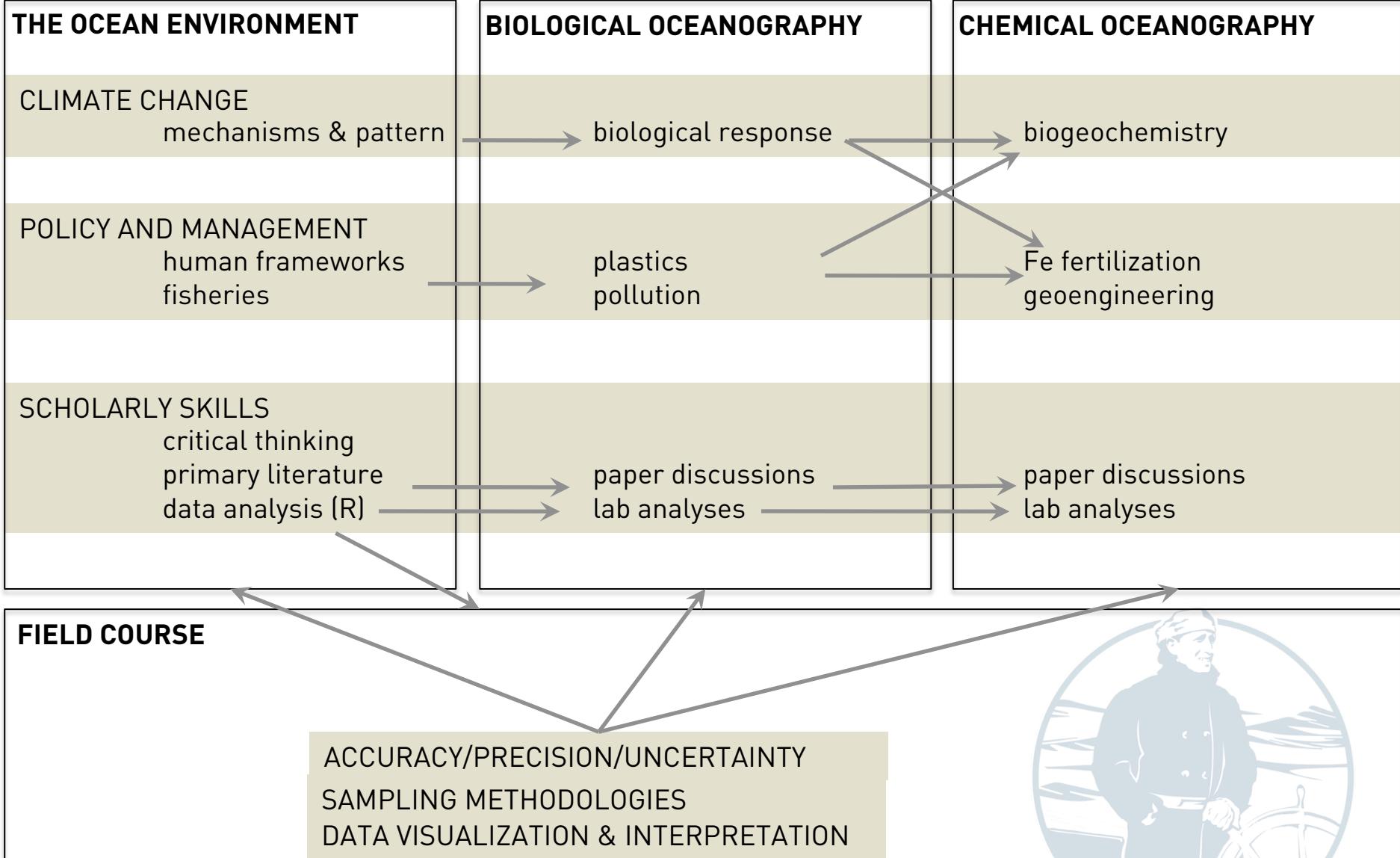
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## MULTI-DISCIPLINARY

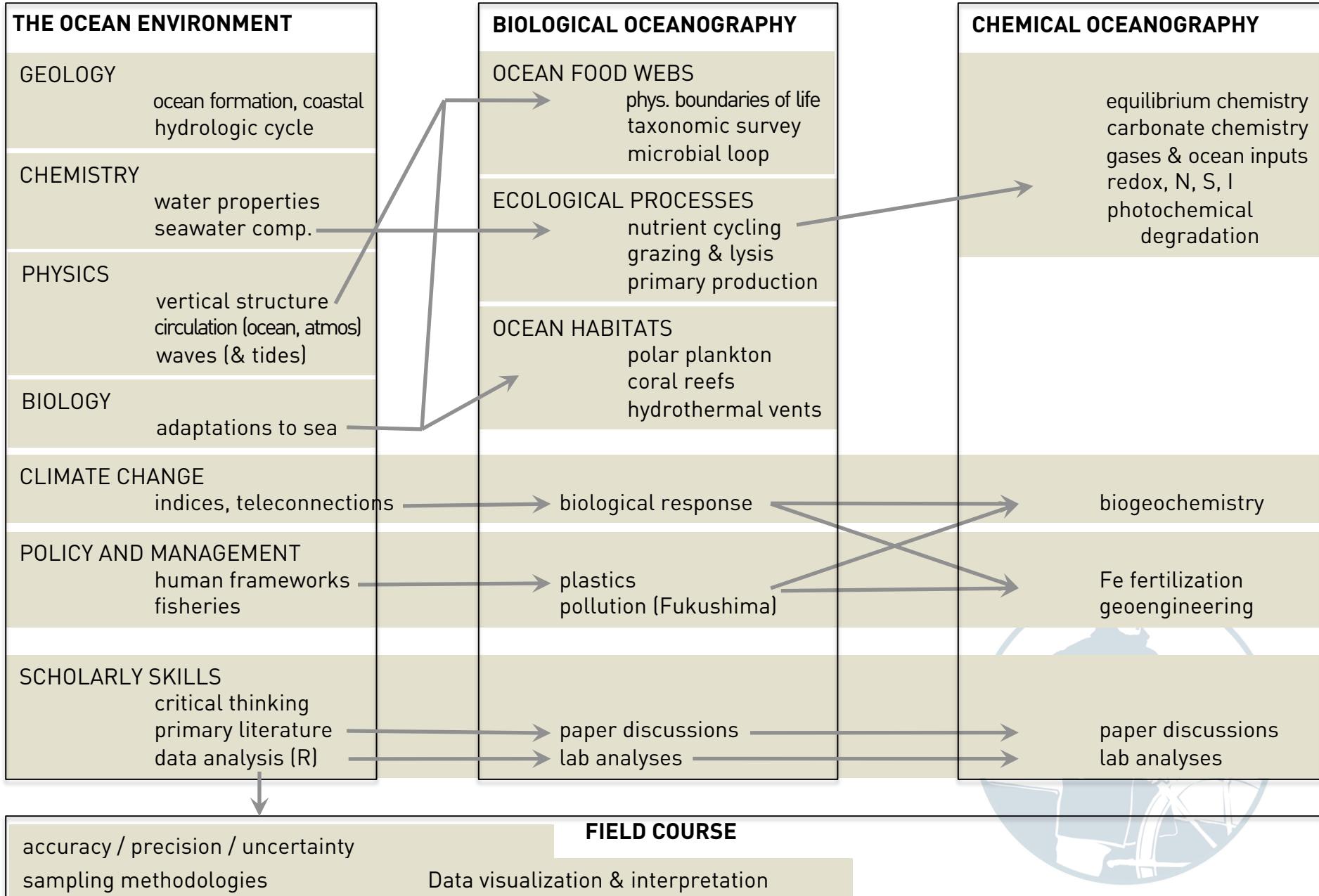
Biological (course 2)  
Chemical (course 3)  
Physical  
Geological  
Earth System Science  
Engineering



# THE CHANGING OCEAN

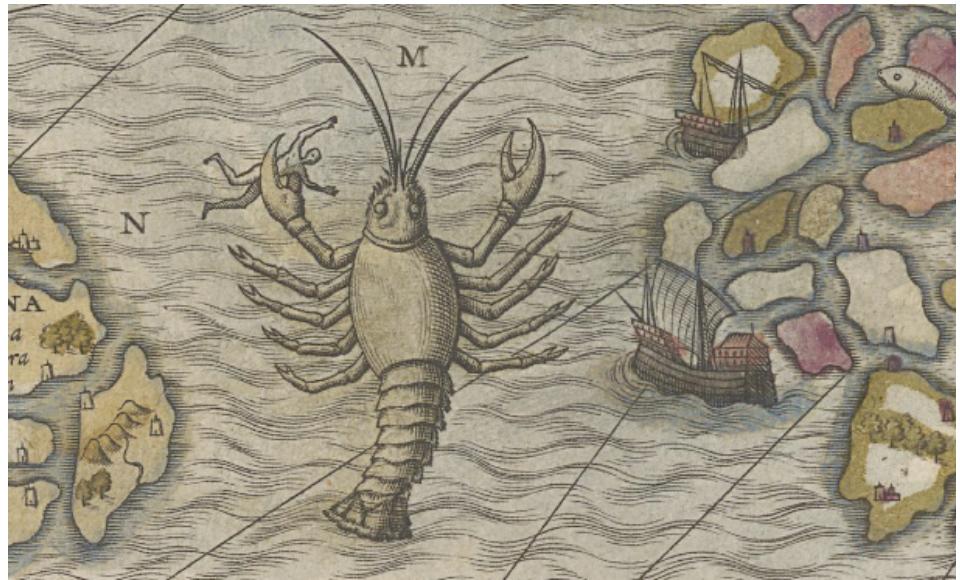


# THE CHANGING OCEAN



# History

Our perception of the ocean has changed over time



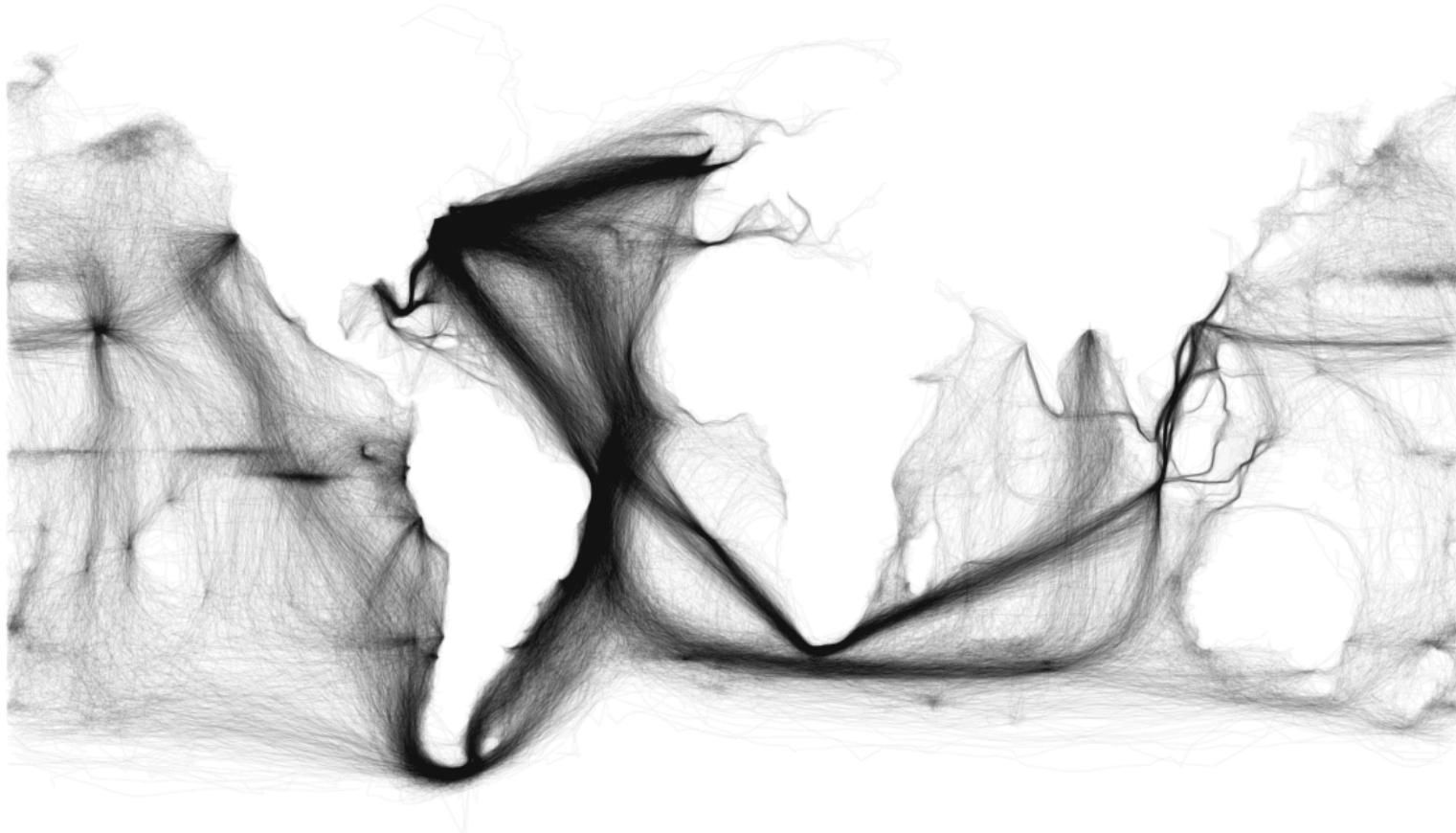
# History

- New lands
- New or better trade routes
- Financial reward (colonization)
- Charts of lands, winds, currents (Hydrography)
- Improved navigational methods
- Trade, commerce



First chart of the Gulf Stream, Benjamin Franklin, 1769

# History



19th-century whaling: <https://youtu.be/Tn7fQ5mYHPA>



# History

- Practical
  - Fisheries
  - Aquaculture
  - Resource extraction
  - Transportation
  - Geopolitics
- Curiosity
  - Beagle (Darwin)
  - Tara expedition
- Sustainability  
→ Climate system



# Location system

- **Latitude:** parallels, 0-90°N, 0-90°S
  - **Longitude:** meridians, 0-180°E, 0-180°W
  - 23.5°: tropics of Cancer (N), Capricorn (S)
  - 66.6°: Arctic (N), Antarctic (S) circles
  - 0° latitude: ?
  - 0° longitude: ?
  - ? °: international date line
- 
- Time keeping: Greenwich, GMT = Zulu = Universal Time Coordinated, UTC= Military time 0-24h



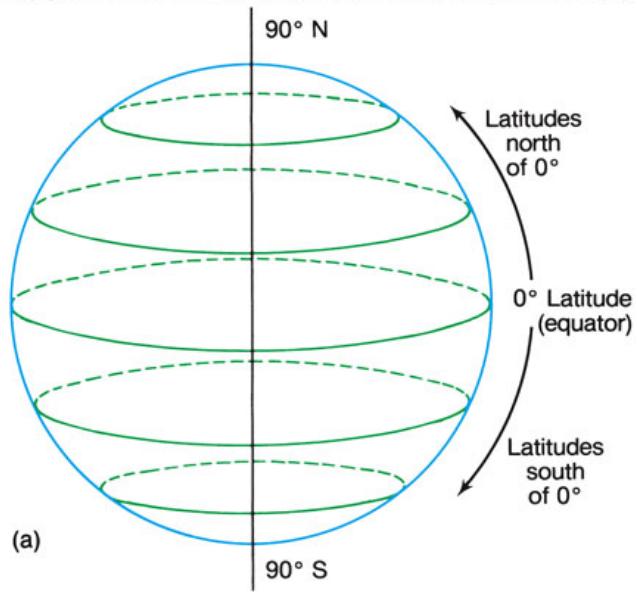
# Location system

- **Latitude:** parallels, 0-90°N, 0-90°S
- **Longitude:** meridians, 0-180°E, 0-180°W
- 23.5°: tropics of Cancer (N), Capricorn (S)
- 66.6°: Arctic (N), Antarctic (S) circles
- 0° latitude: → Equator
- 0° longitude: → Prime Meridian
- ? °: international date line → ≈180°
  
- Time keeping: Greenwich, GMT = Zulu = Universal Time Coordinated, UTC= Military time 0-24h

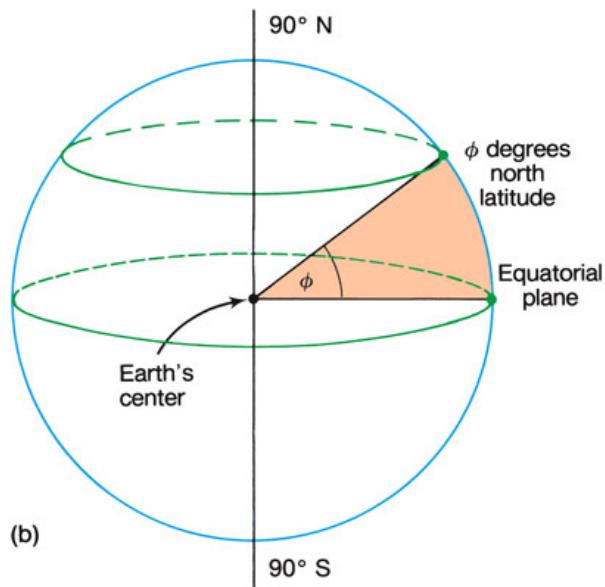


# Location system

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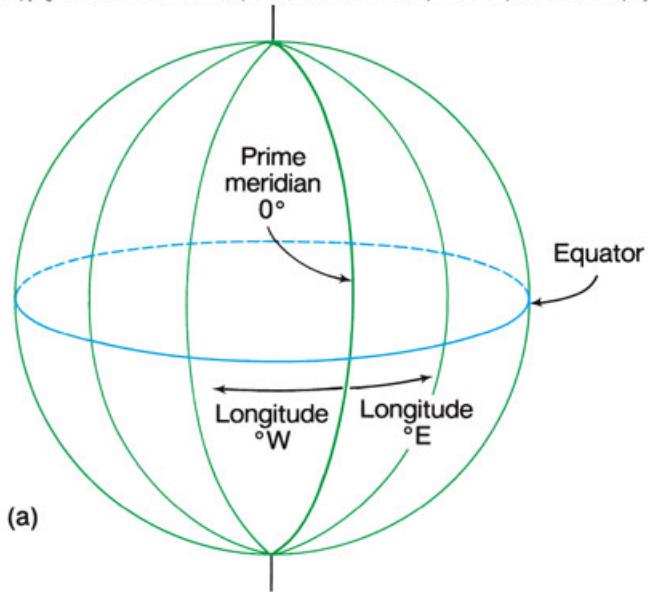


(a)

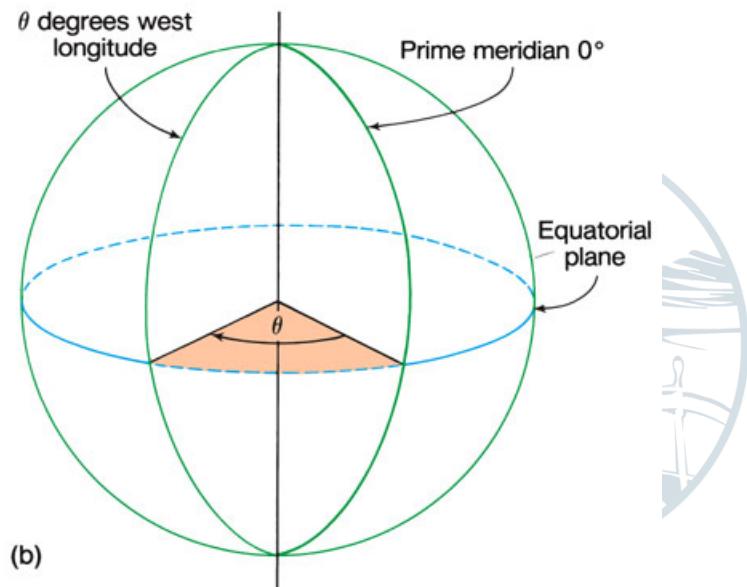


(b)

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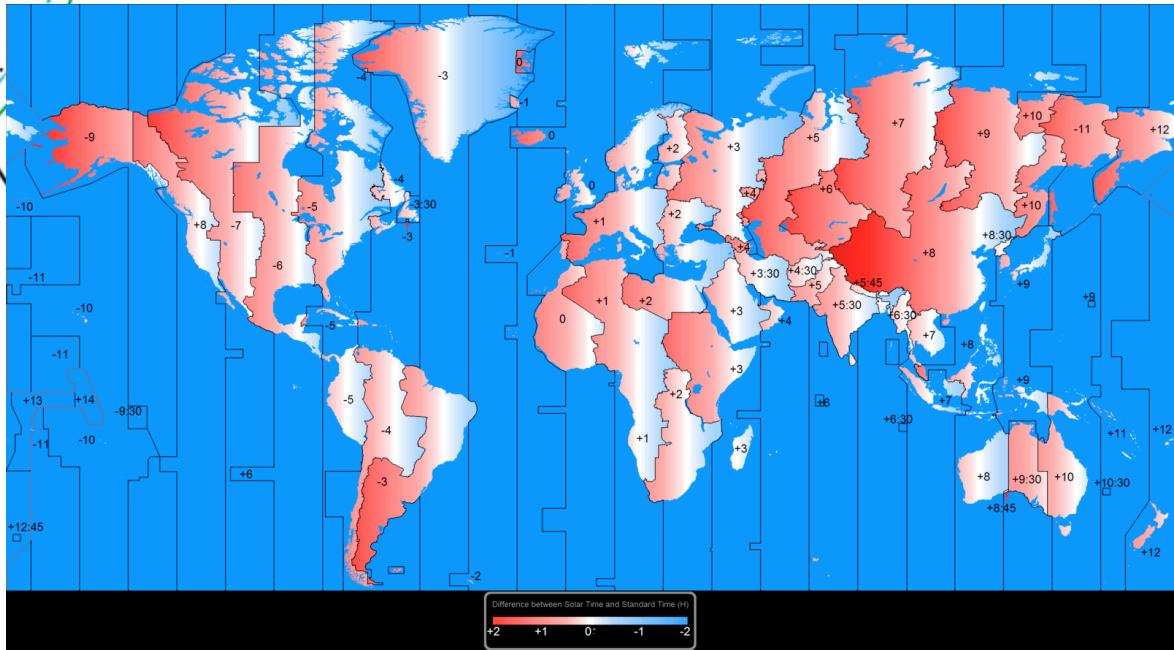
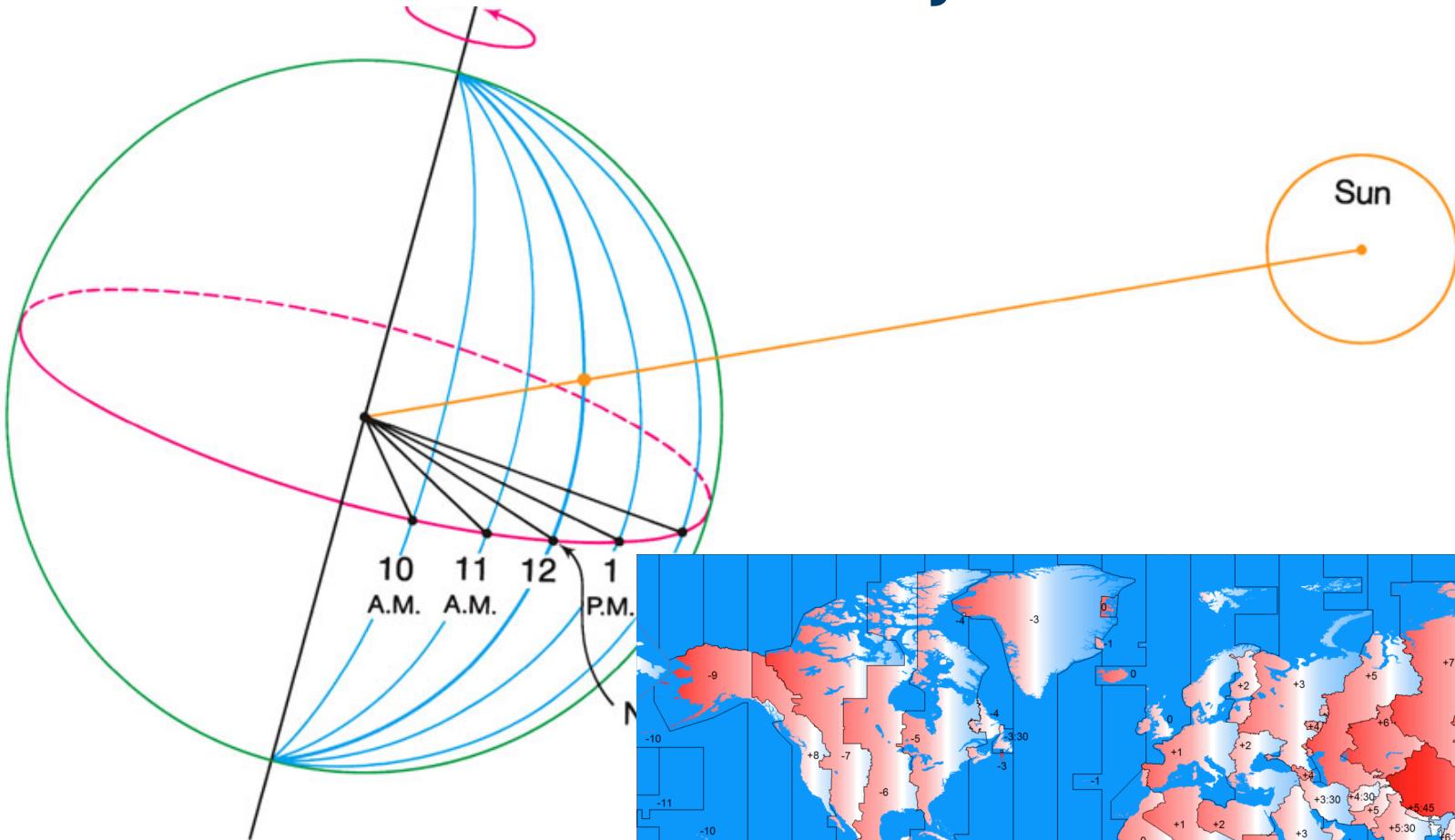
(a)



(b)

**Bigelo** (b)

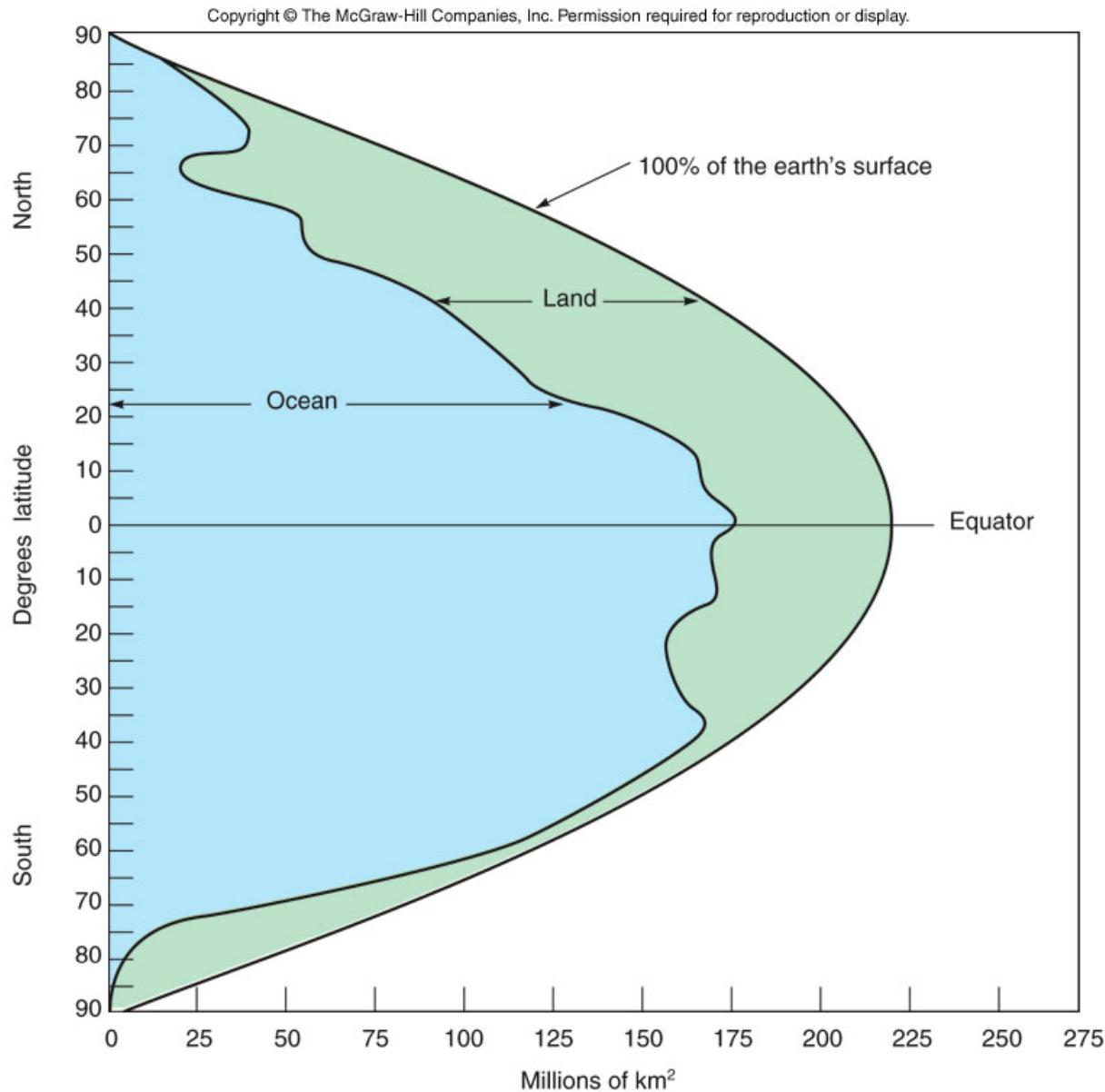
# Location system



# Location system

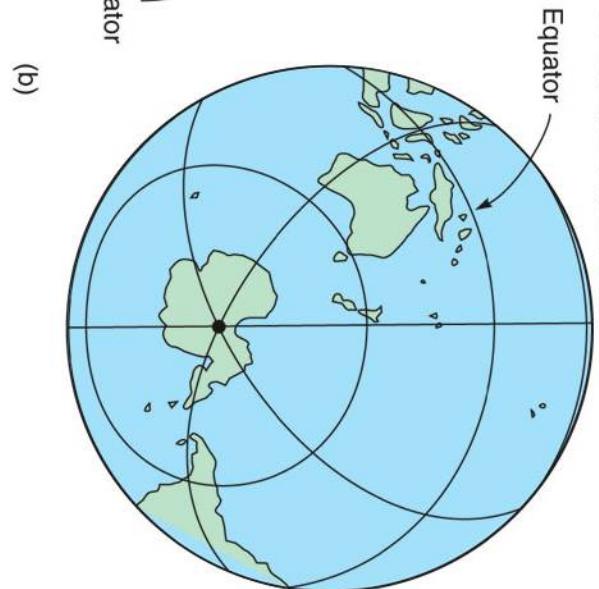
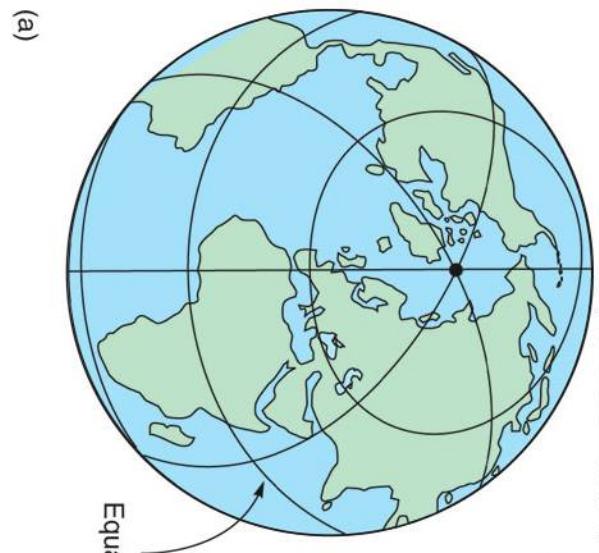
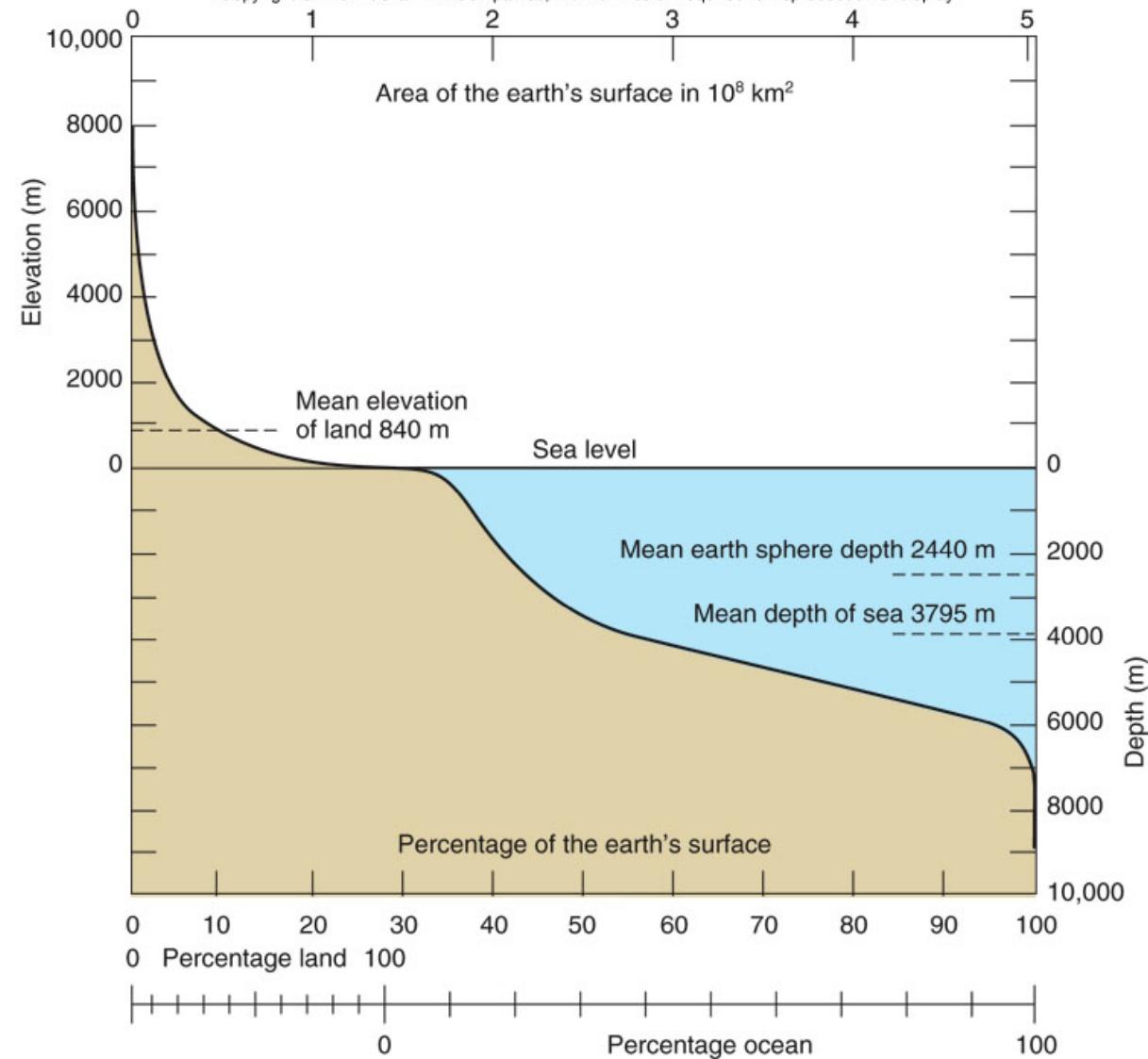


# Land/water distribution



# Land/water distribution

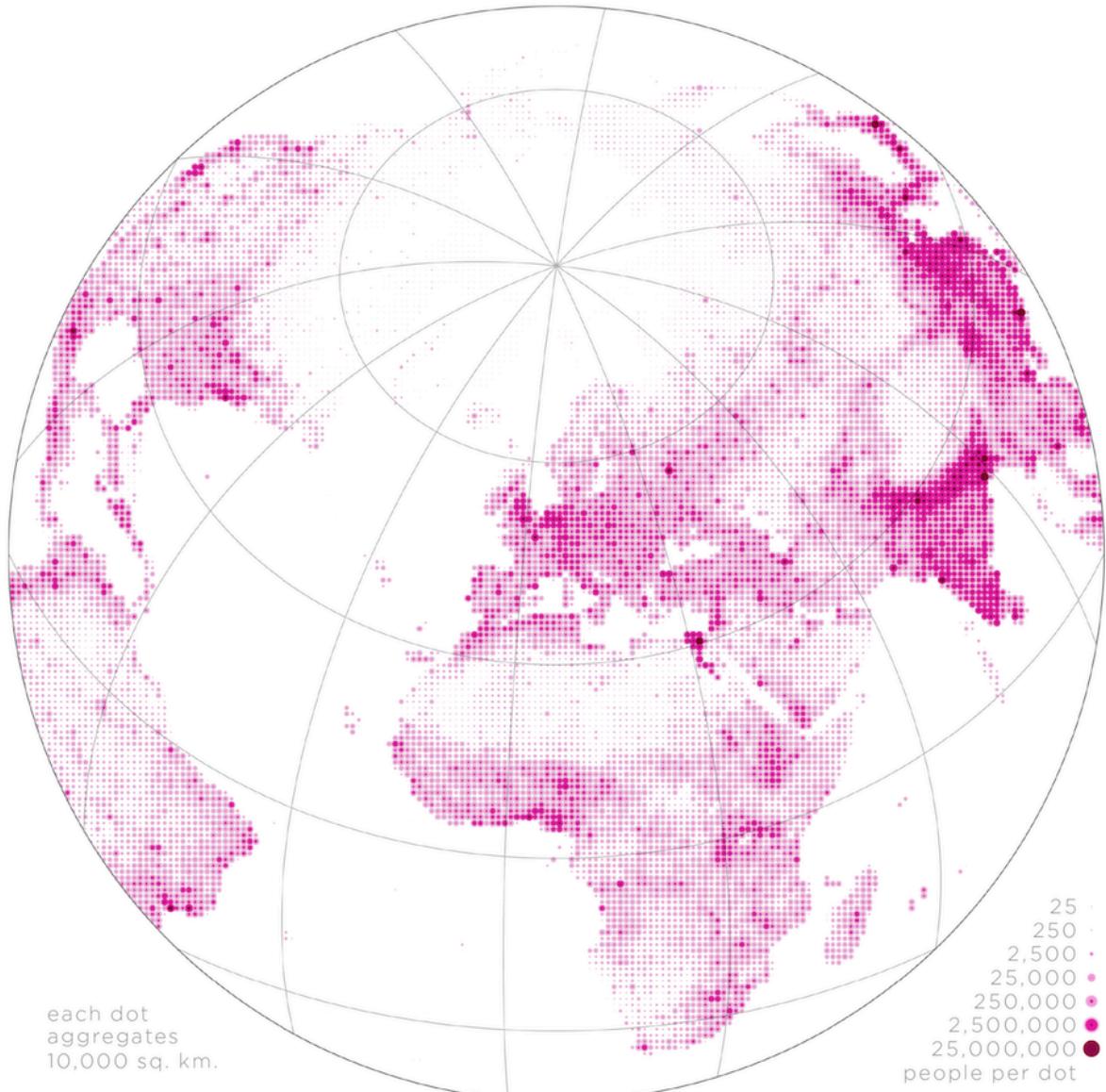
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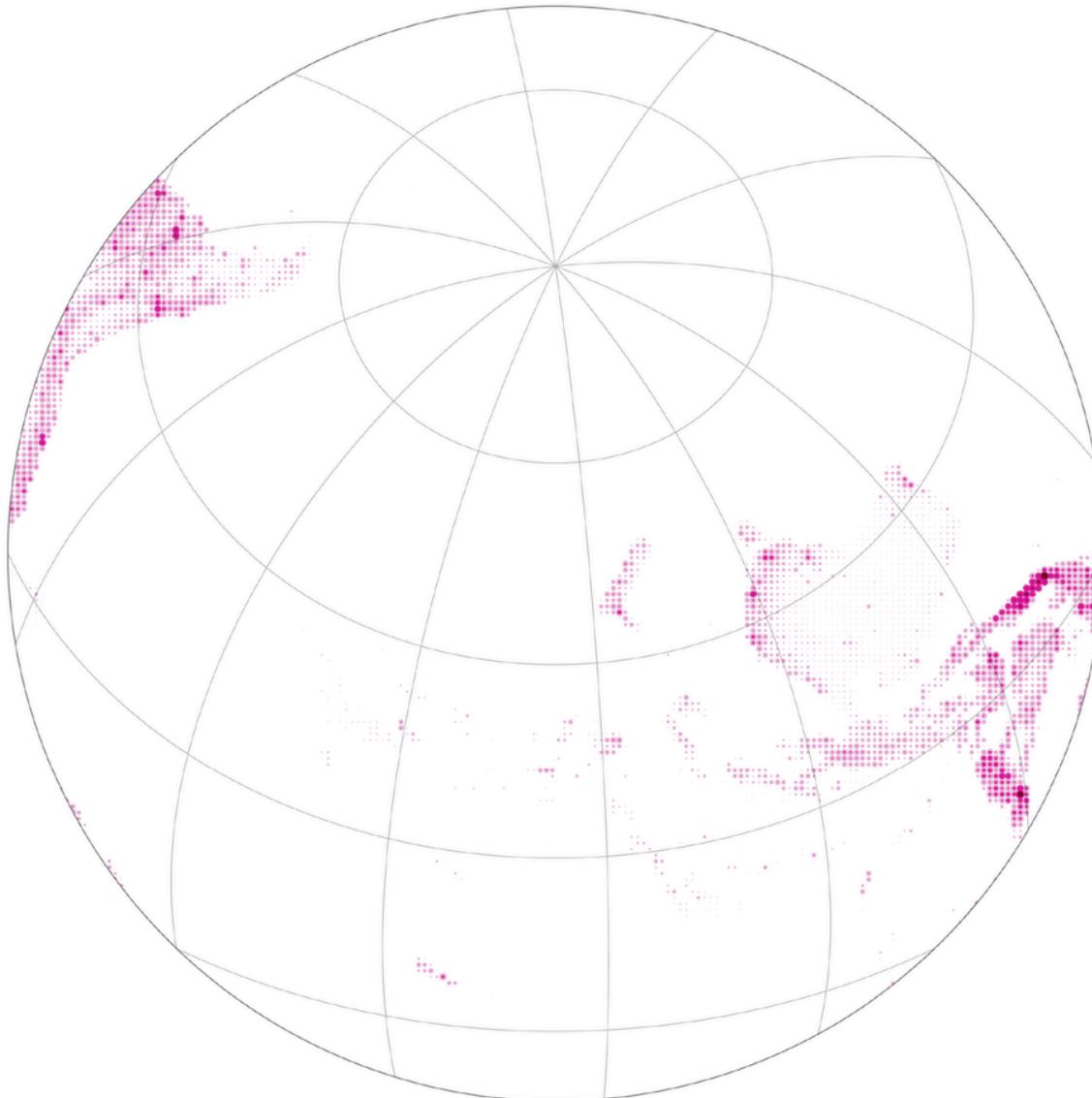
# Hemispheres

93% of the world's population



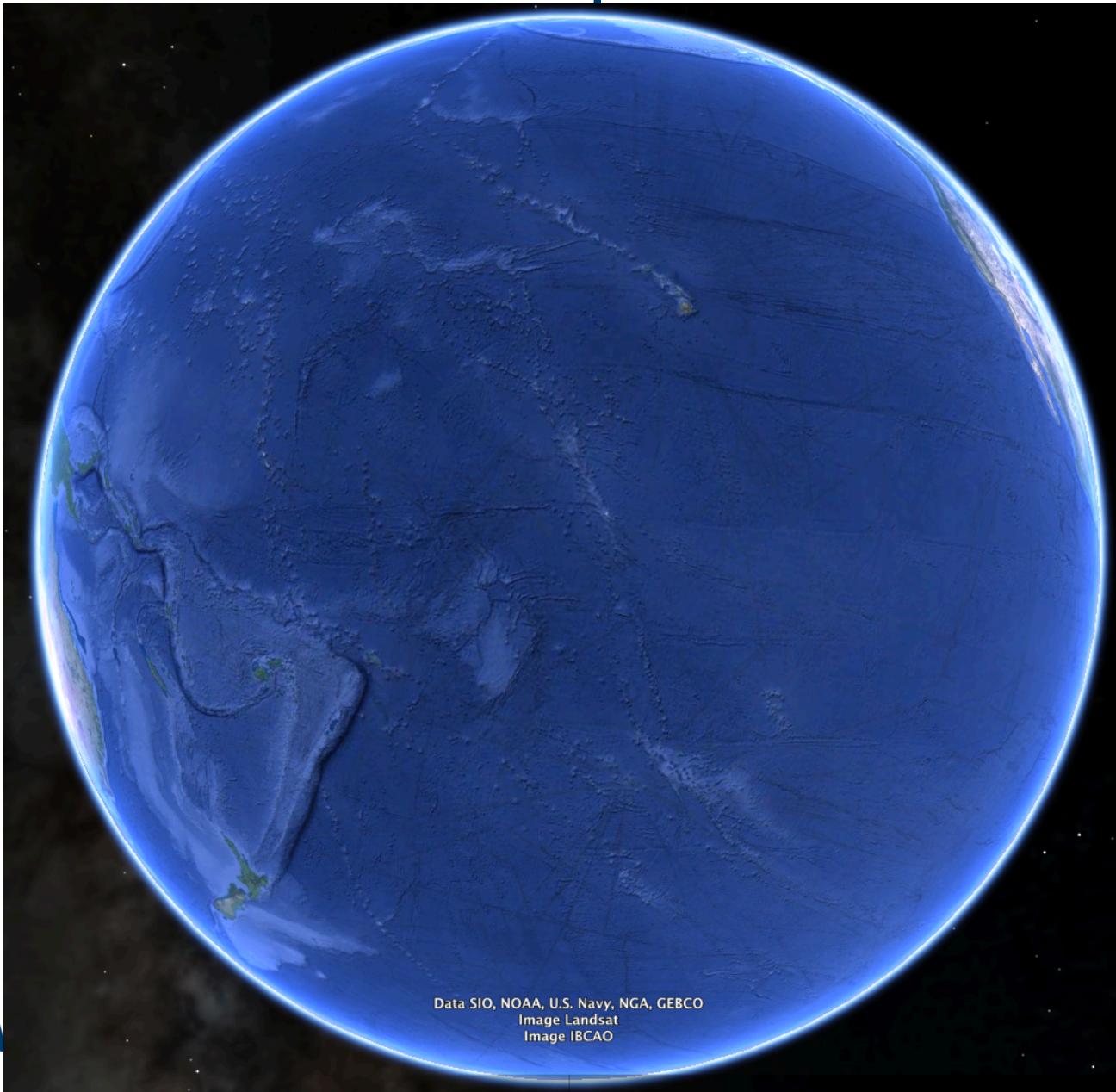
# Hemispheres

the other 7%



**Bigelow**

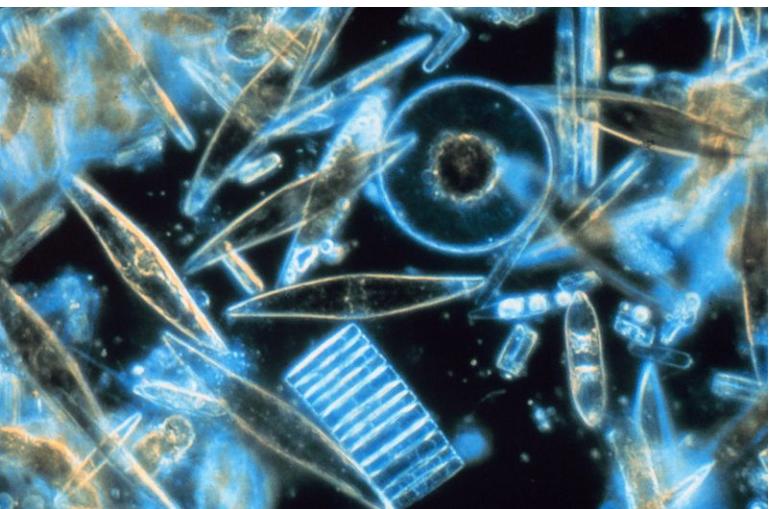
# Hemispheres



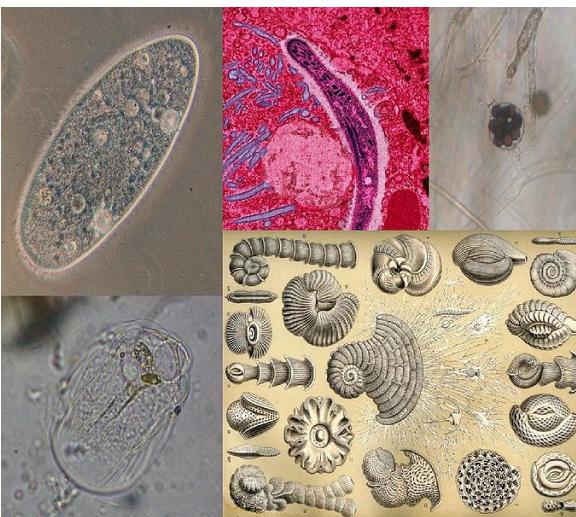
Bigelow



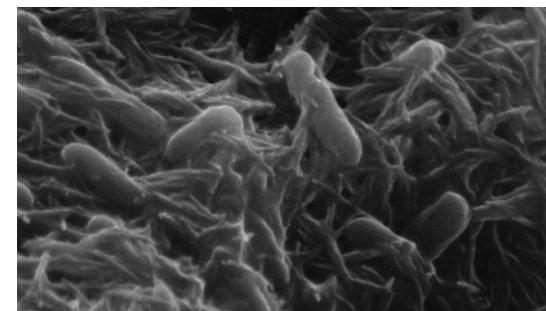
# One liter of seawater can contain:



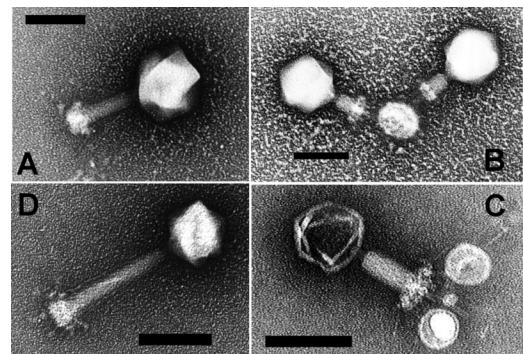
1,000,000 phytoplankton



1,000,000 protists



1,000,000,000 bacteria



10,000,000,000 viruses



And others...

