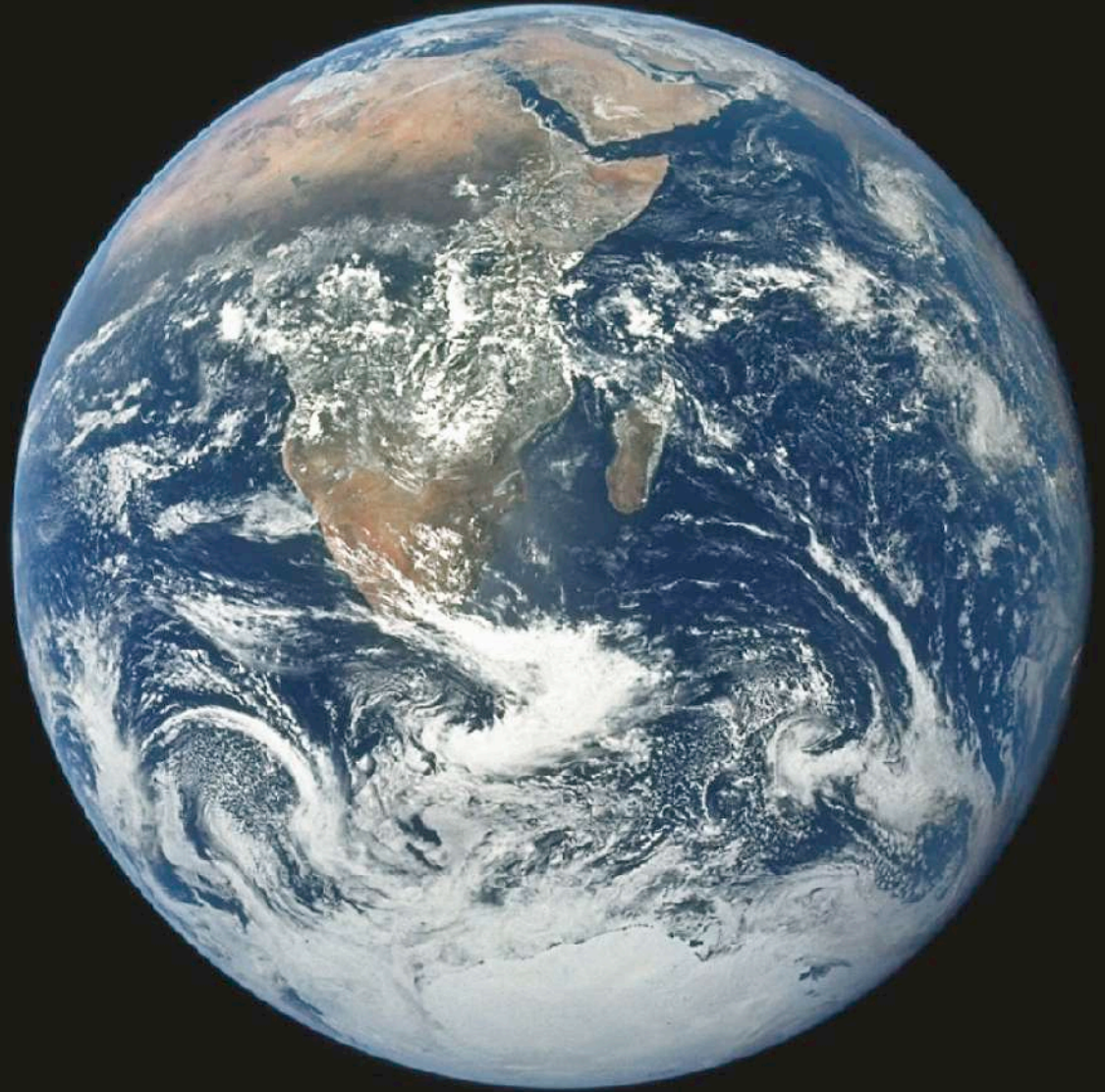


EAS 4300: Introduction to Oceanography, FALL 2009

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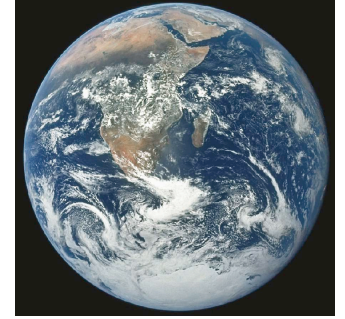
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Course Website <http://ocean3d.org/eas-4300>

Questions for you:



Why do we care about Oceanography?

Things to think about:



Biodiversity

Medical potential/drug discovery

New models of life

Climate

Fisheries

Recreation

Fossil fuel resource

Ocean energy

Navigation/transportation

Carbon cycle

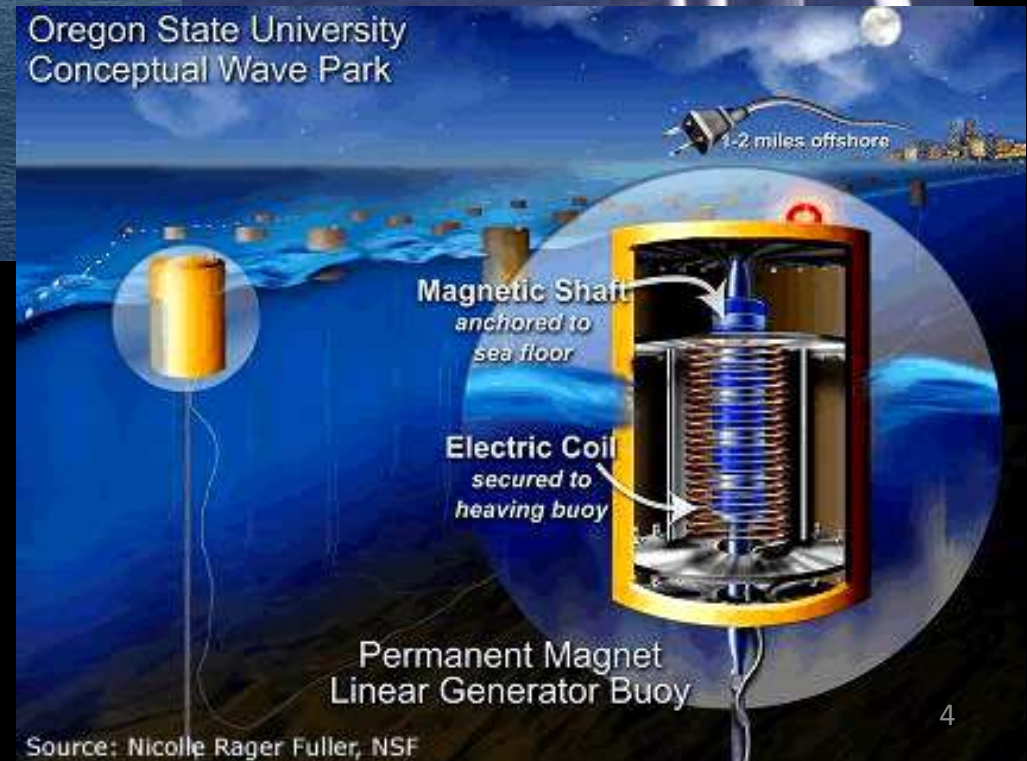
Marine biology

Hazards

Ocean & Energy

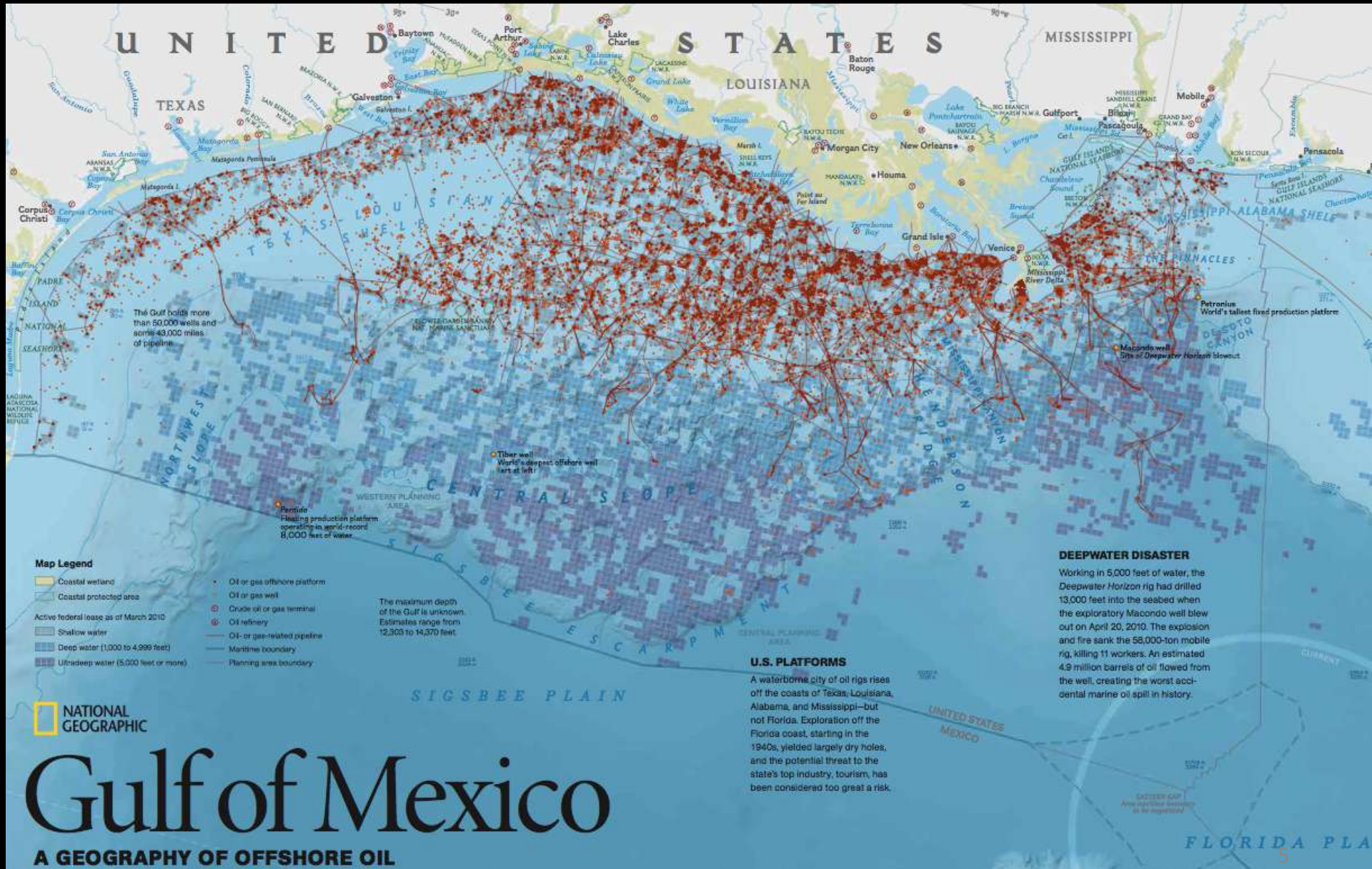


Oregon State University
Conceptual Wave Park



Source: Nicolle Rager Fuller, NSF

Ocean & Energy

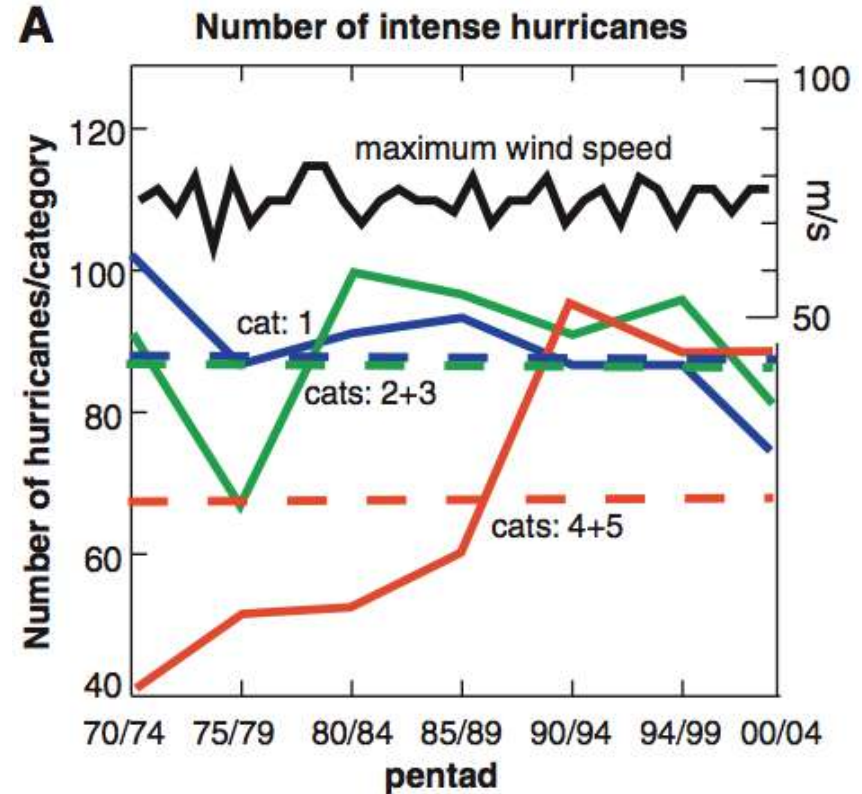
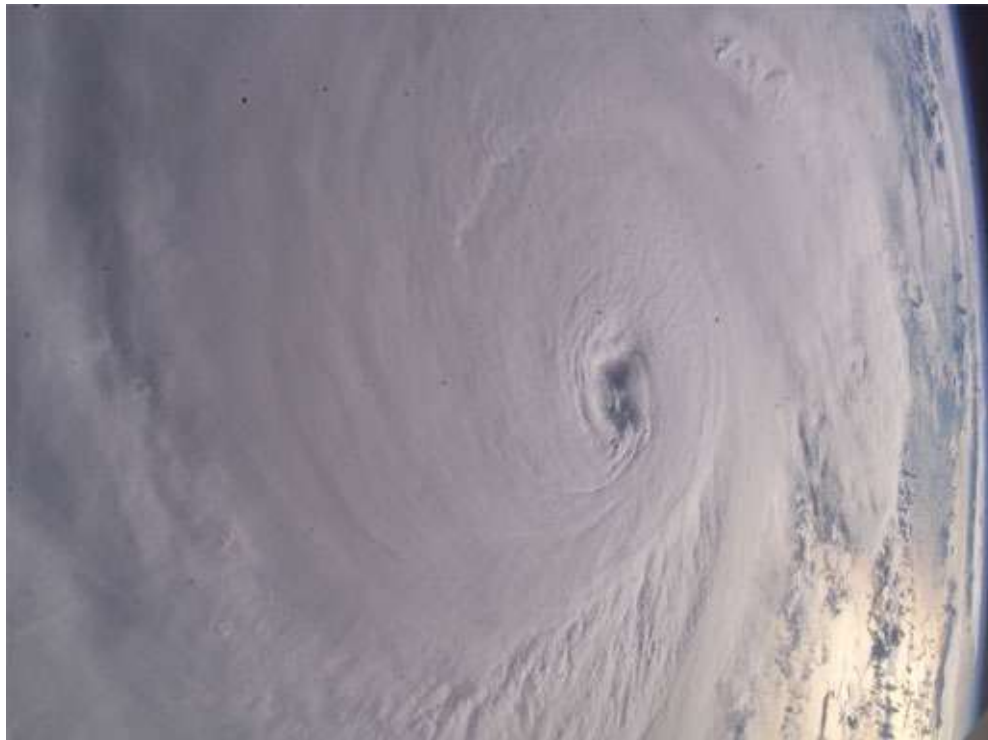


Ocean & Hazards

Sea surface temperature in the tropical oceans fuel hurricanes

Changes in Tropical Cyclone Number, Duration, and Intensity in a Warming Environment
P. J. Webster,¹ G. J. Holland,² J. A. Curry,¹ H.-R. Chang¹

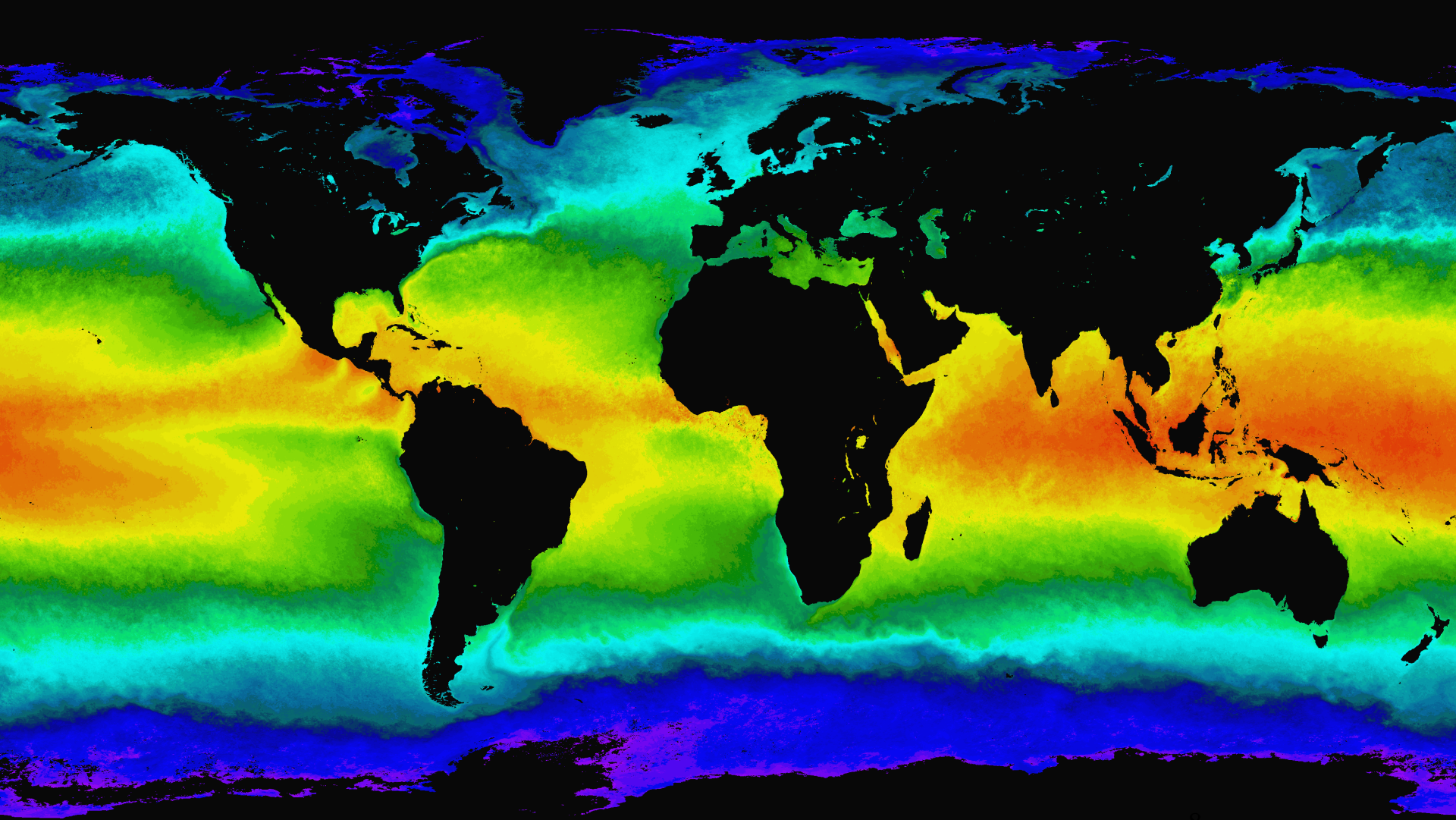
16 SEPTEMBER 2005 VOL 309 SCIENCE



Hurricanes becoming more intense as ocean warms?

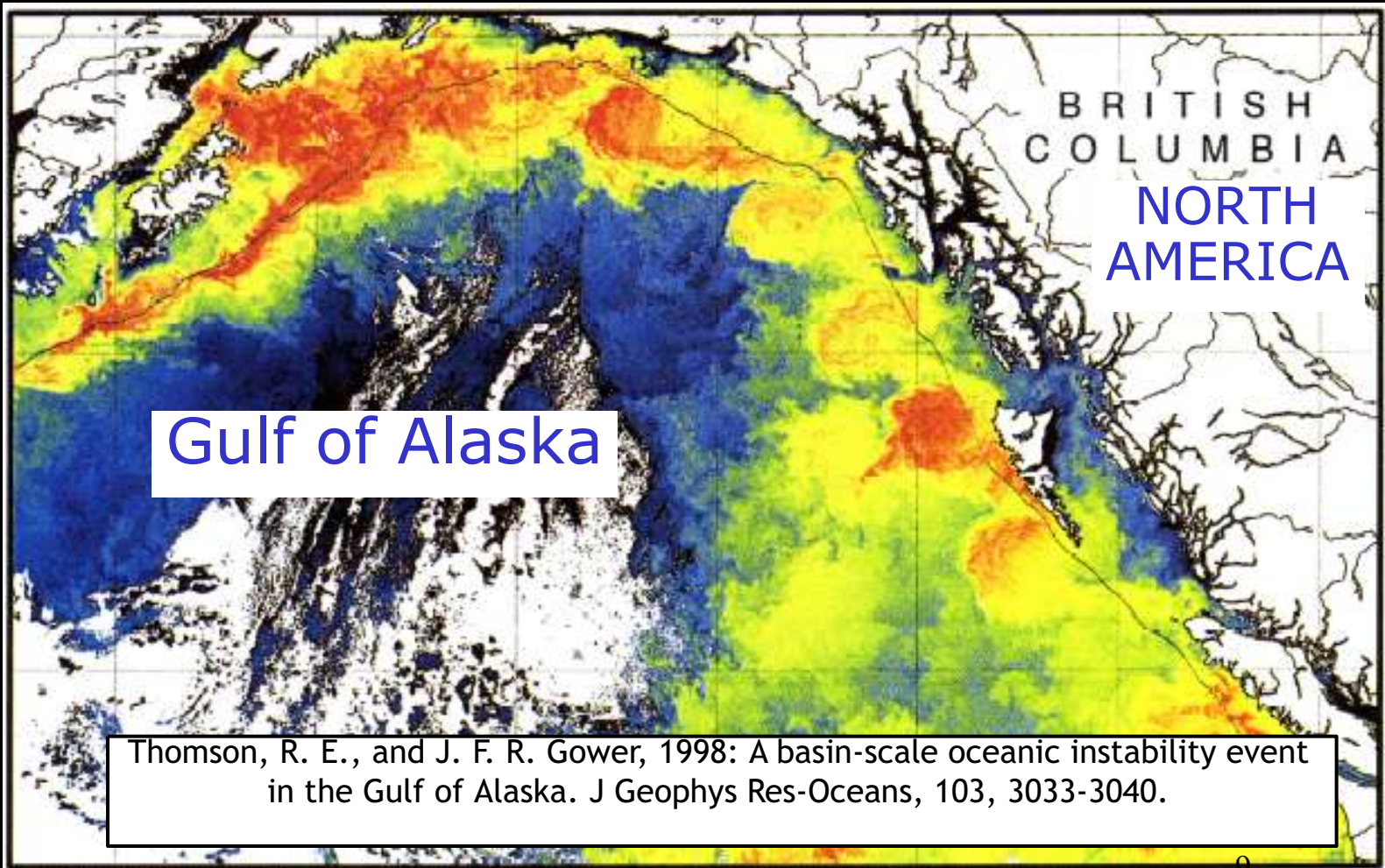
Ocean & Climate

The ocean plays a dominant role in heat transport and mixing



Ocean & Climate

Vortices are the strongest mixing agent in the ocean. They influence the ocean circulation and biology.

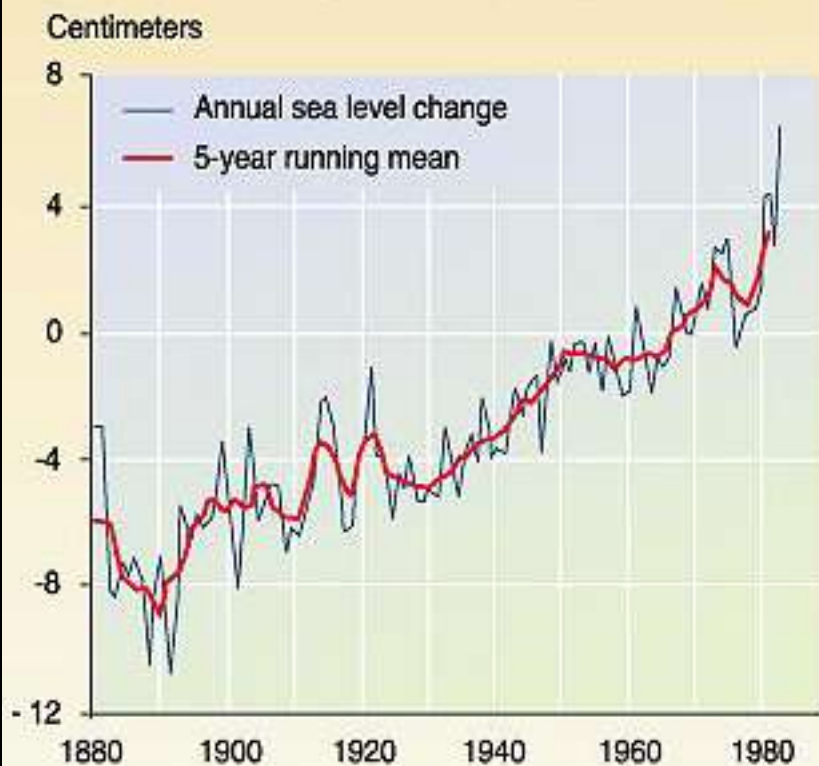


Ocean & Climate Change

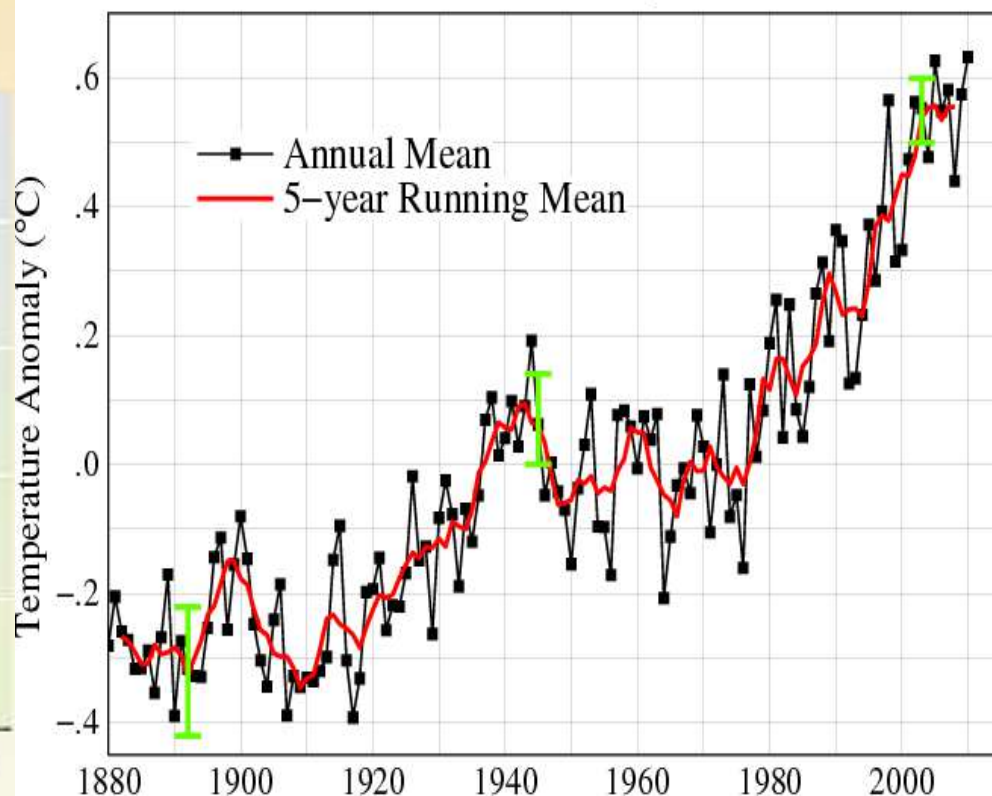
Global Surface Temperatures and Sea Level are rising

Sea level rise due to global warming

Sea level rise over the last century



Global Land–Ocean Temperature Index

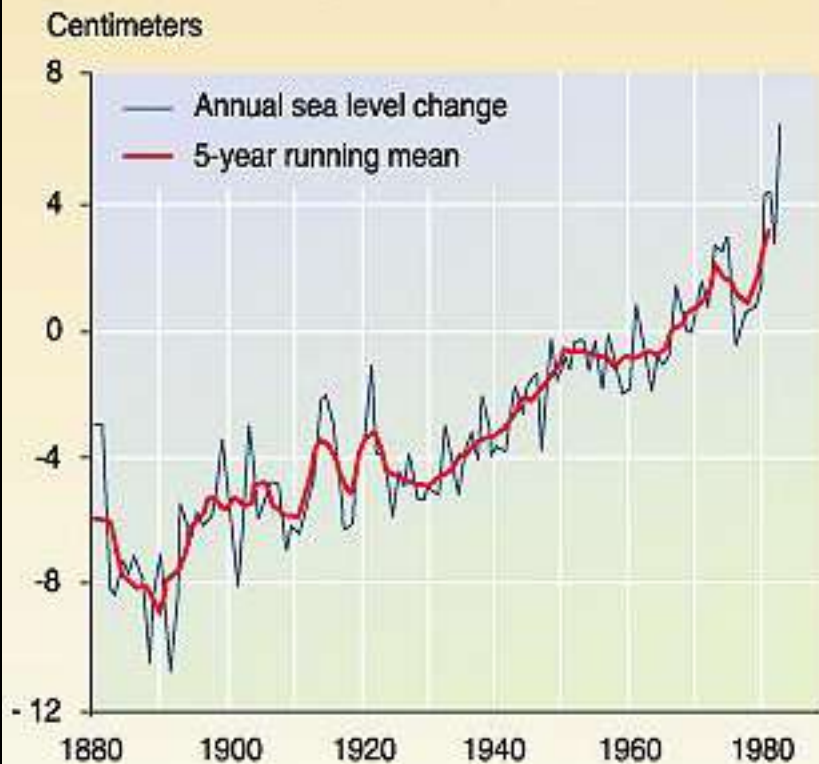


Ocean & Climate Change

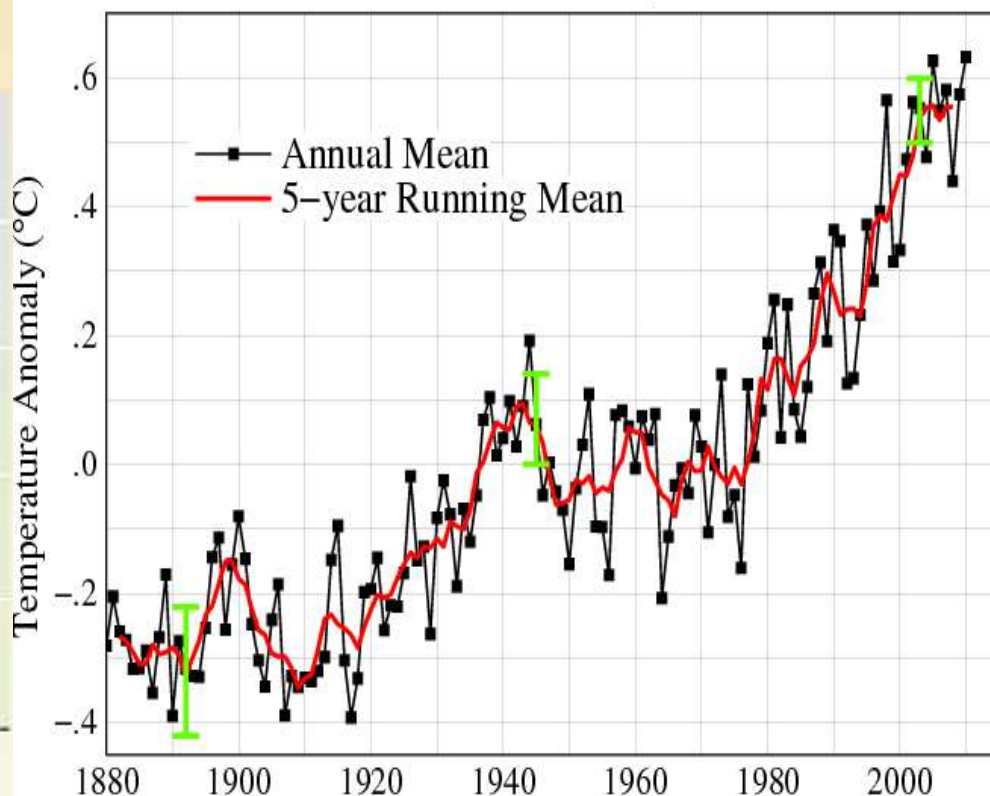
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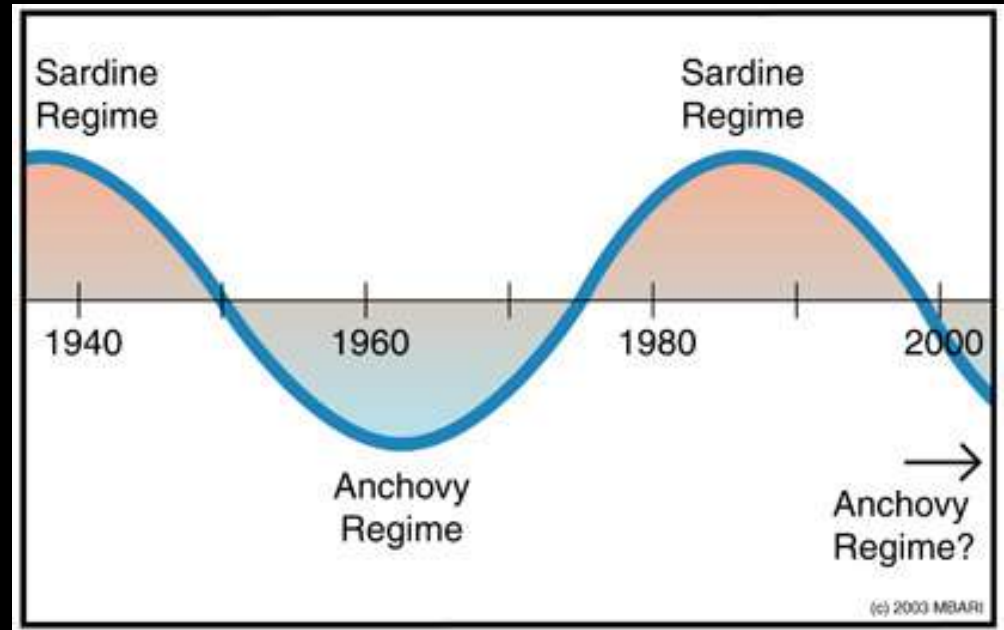
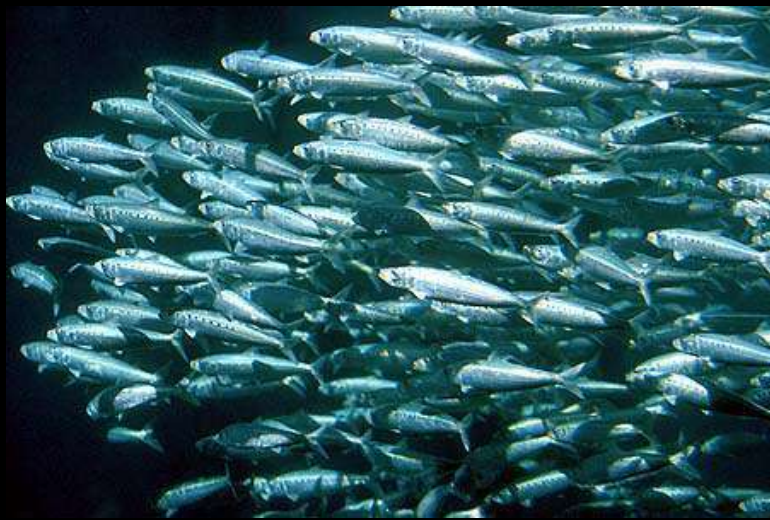
Global Land–Ocean Temperature Index



Ocean & Climate & Marine Ecosystems

Ocean climate affects fish distributions and abundance

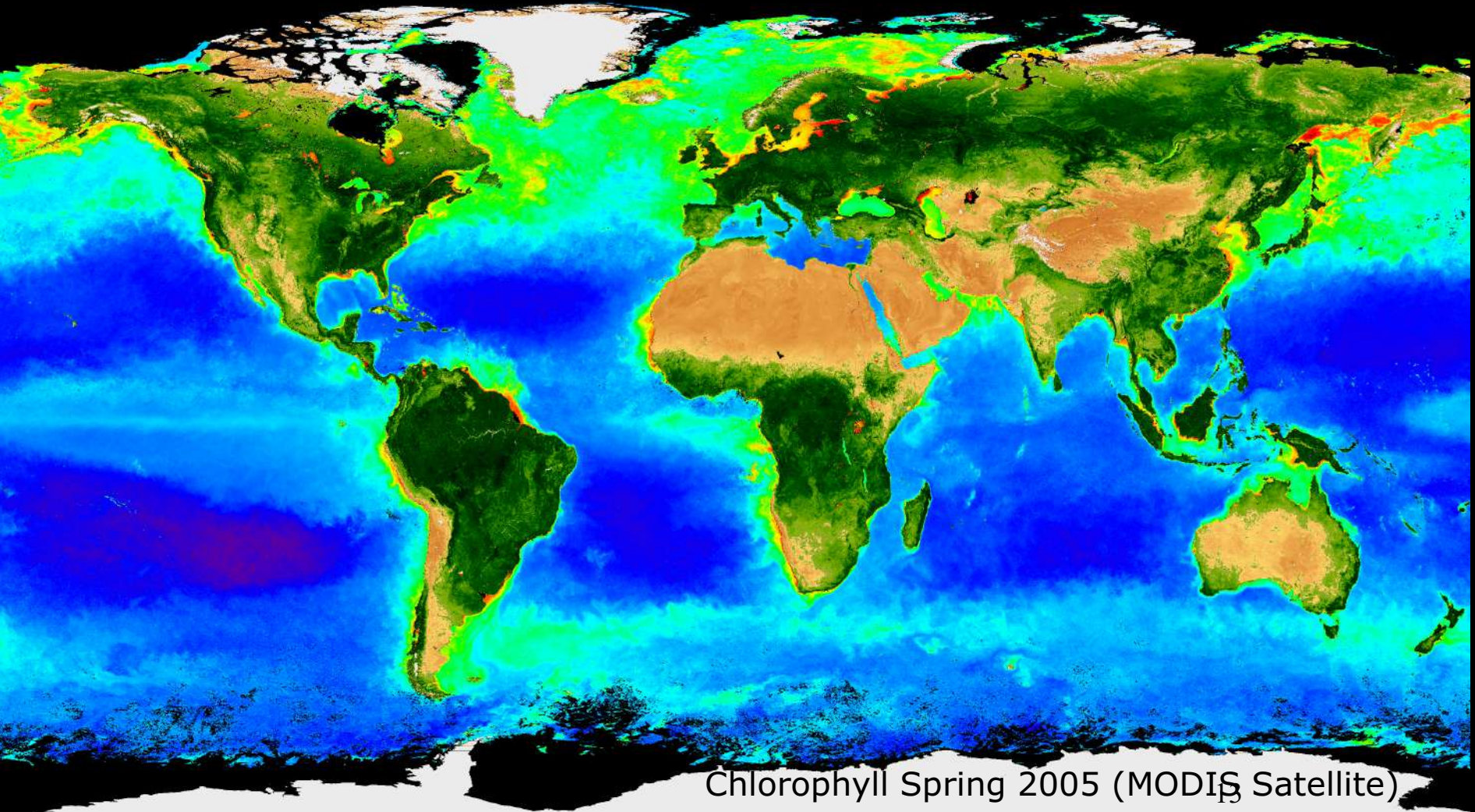
Sardines/Anchovies



synchronized alternations between sardines/anchovies over the entire Pacific Ocean?

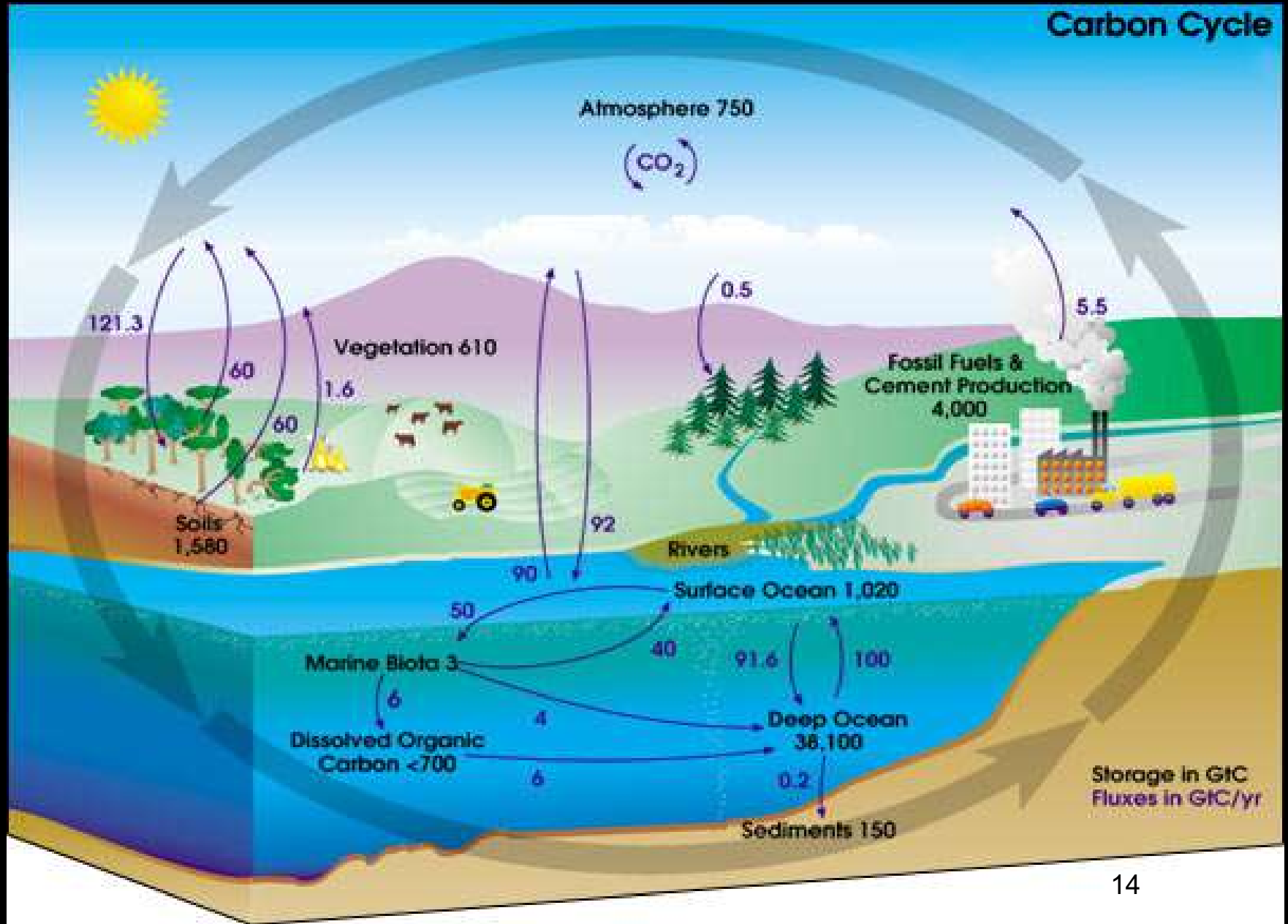
Ocean & Carbon Cycle

Marine Ecosystem regulate the cycling of chemical species relevant to climate (e.g. Carbon Dioxide)

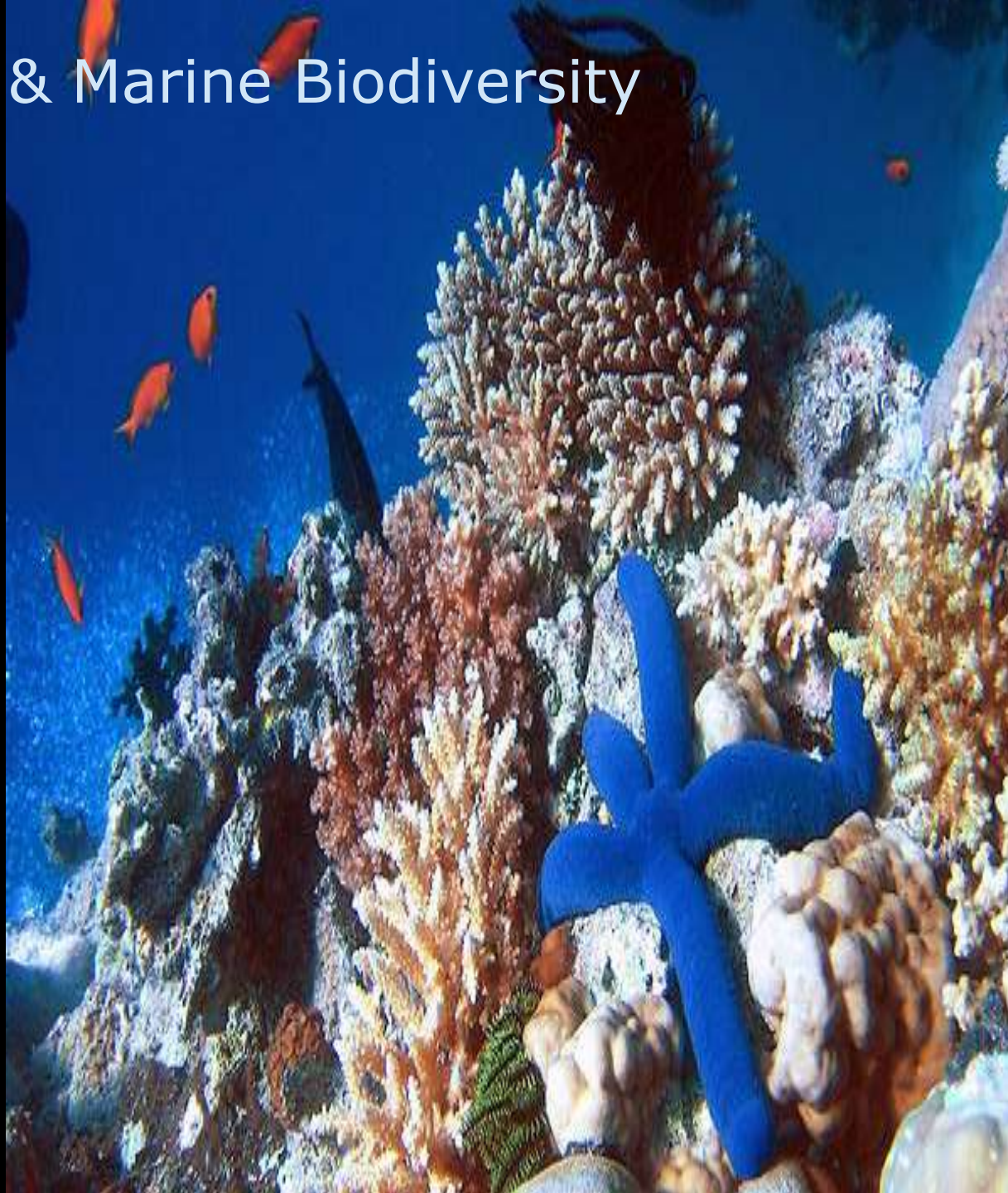


Chlorophyll Spring 2005 (MODIS Satellite)

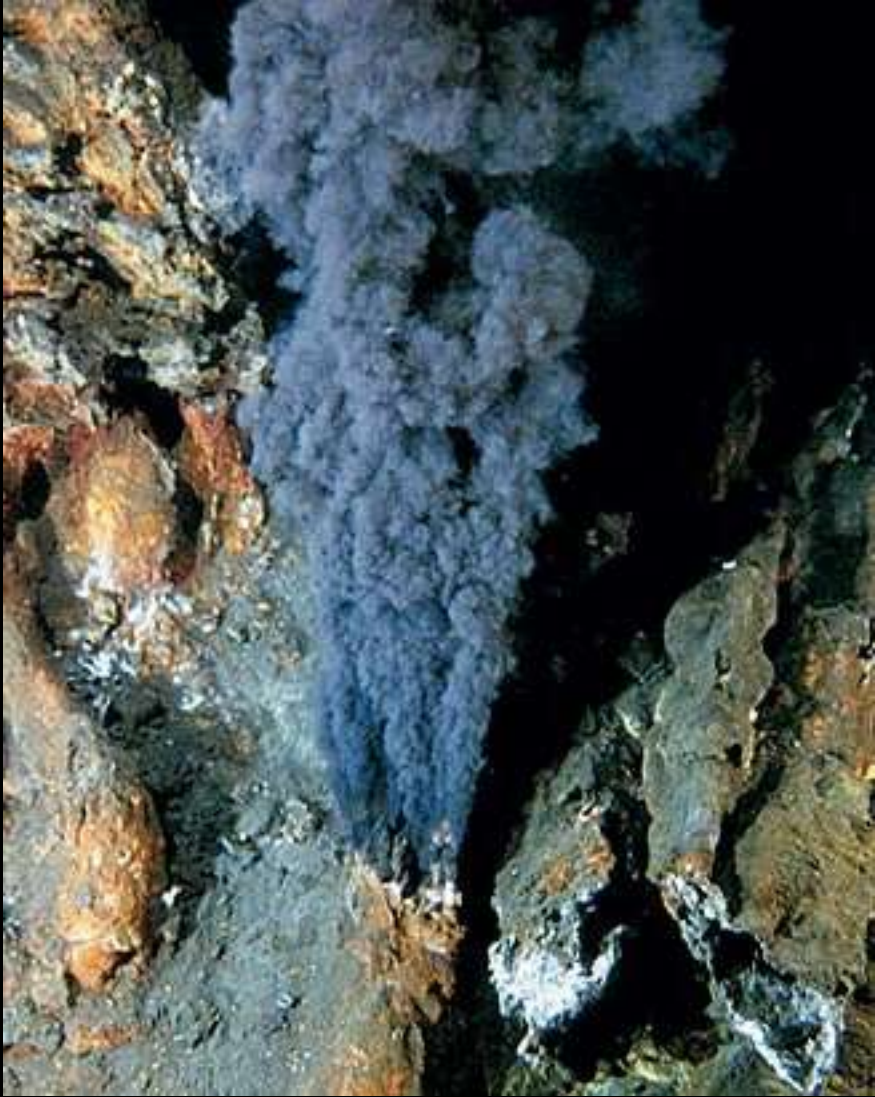
Ocean & Carbon Cycle



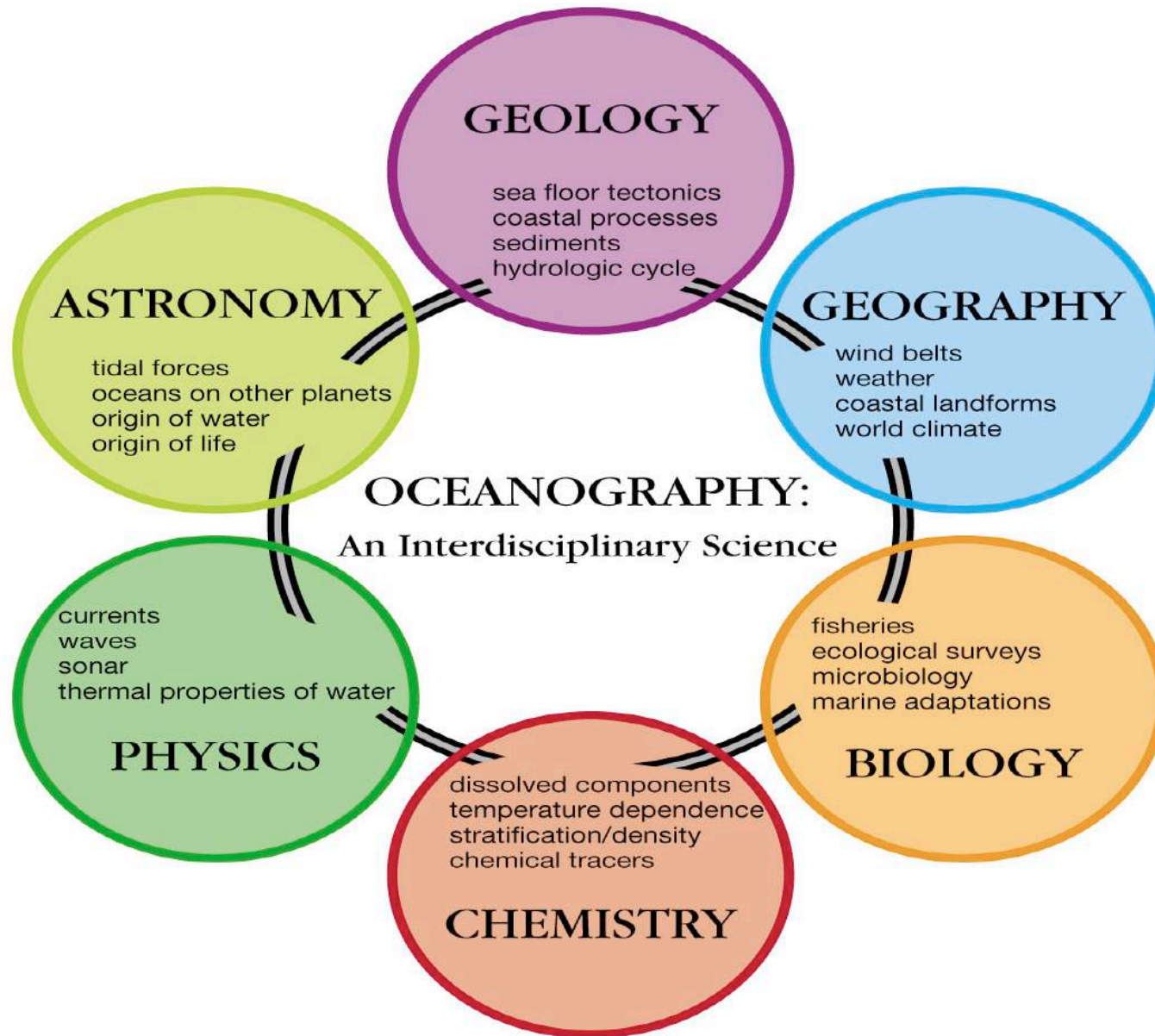
Ocean & Marine Biodiversity



Ocean & New Model for Life



How do we define the science of Oceanography?



We studied oceanography in San Diego at the Scripps Institution of Oceanography



Kim

Climate and paleoclimate
El Nino-Southern Oscillation

Manu

Ocean and climate dynamics
Physical-biological interactions in the ocean
Ocean Forecasting

The Scientific Method

Observation

Collection of scientific facts through observation and measurement



Hypothesis

A tentative, testable statement about the natural world that can be used to build more complex inferences and explanations



Testing

Development of observations, experiments, and models to test (and, if necessary, revise) the hypothesis



after much
testing and
experimentation



Theory

In science, a well-substantiated explanation of some aspect of the natural world that can incorporate facts, laws, logical inferences, and tested hypotheses