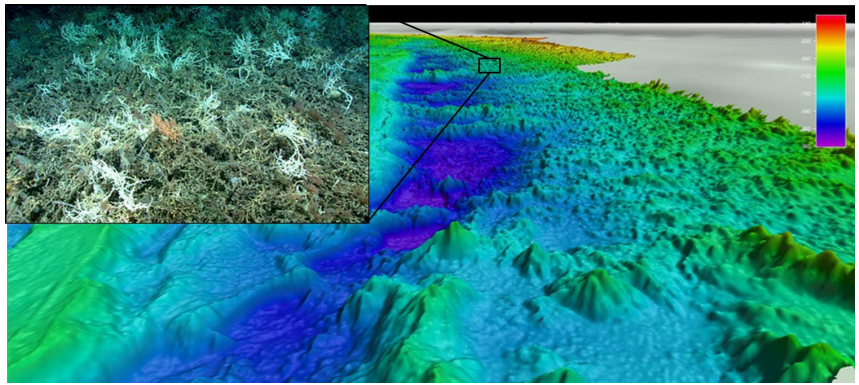
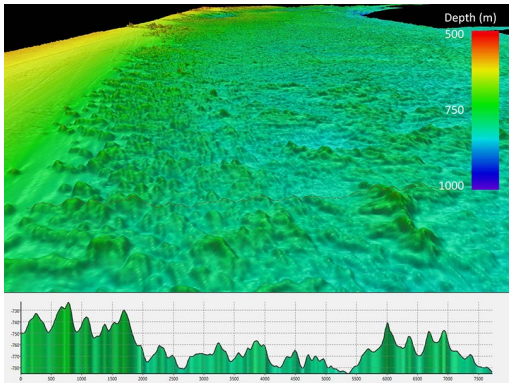
Million Mounds of Deep-Sea Coral

About a hundred miles off the coast of Georgia and Florida lies a strange ecosystem at the bottom of the sea. It's an underwater landscape of coral mounds that stretch as far as the eye (or at least the camera on a remotely operated vehicle) can see. For thousands of years, corals have been growing and dying in this region that lies 600 to 800 meters (1,970 to 2,625 feet) below the ocean's surface. This region provides important habitat, protection, and food for a variety of marine life. Now identified as one of the largest, continuous stretches of deep-sea corals on Earth (*that we know of*), and accessible only by submersible or autonomous vehicles, the "Million Mounds" region has drawn scientists to try to understand ***why do the corals live here?***





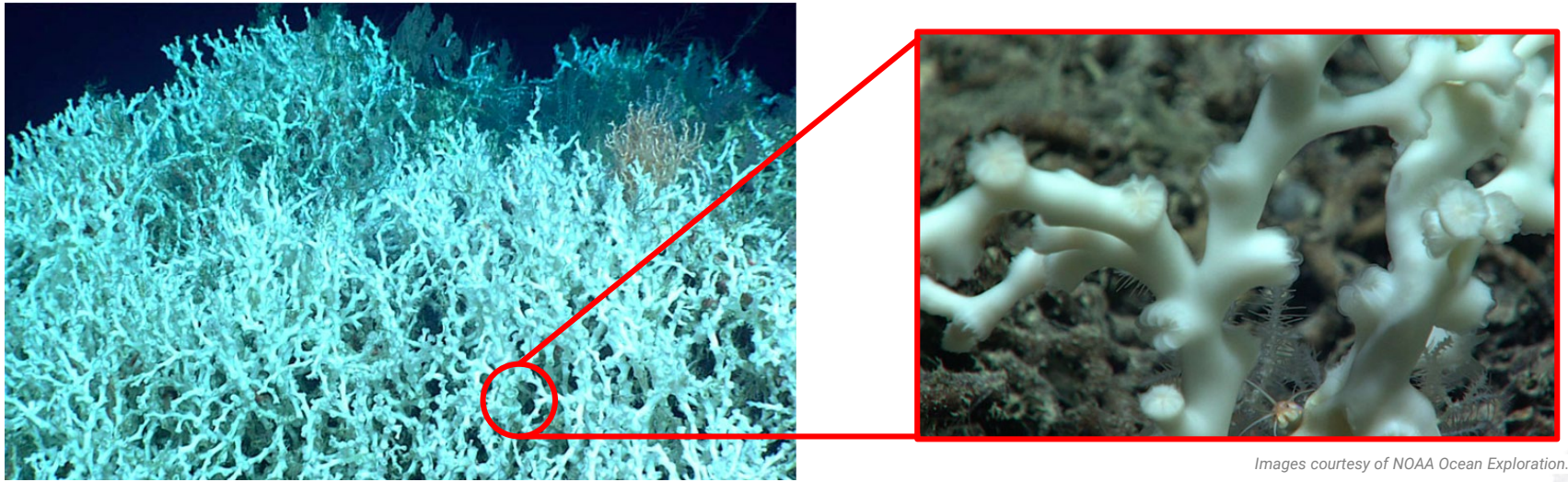
Multibeam bathymetry data collected by NOAA Ship *Okeanos Explorer* showing the three-dimensional topography and profile of Million Mounds, and an image of the Lophelia coral habitat (top left). *Image courtesy of NOAA Ocean Exploration.*


United States
Million Mounds
coral region
Gulf of California
Gulf of
Mexico
Mexico
Cuba
Puerto Rico

Image credit: NOAA

Lophelia pertusa

- Deep-sea corals are animals.
- The species of deep-sea coral we will focus on is *Lophelia pertusa*.
- A colony of *Lophelia pertusa* is made up of thousands of individual polyps (animals).
- *Lophelia pertusa* cannot move to another location (stationary/sessile).



Images courtesy of NOAA Ocean Exploration.

Lophelia pertusa

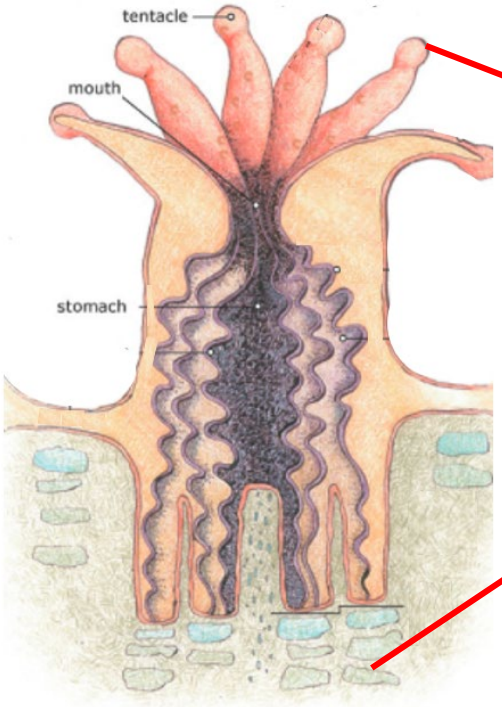
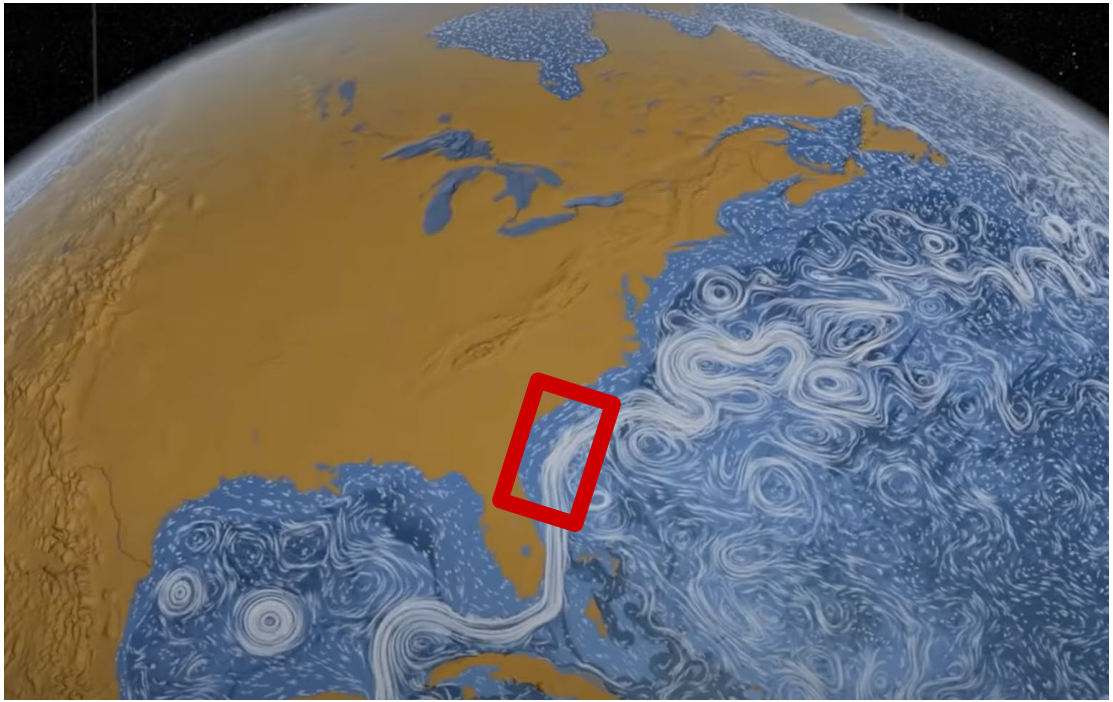


Image courtesy of NOAA Coral Reef Conservation Program (adapted).

Image courtesy of NOAA Ocean Exploration.

Surface Ocean Currents

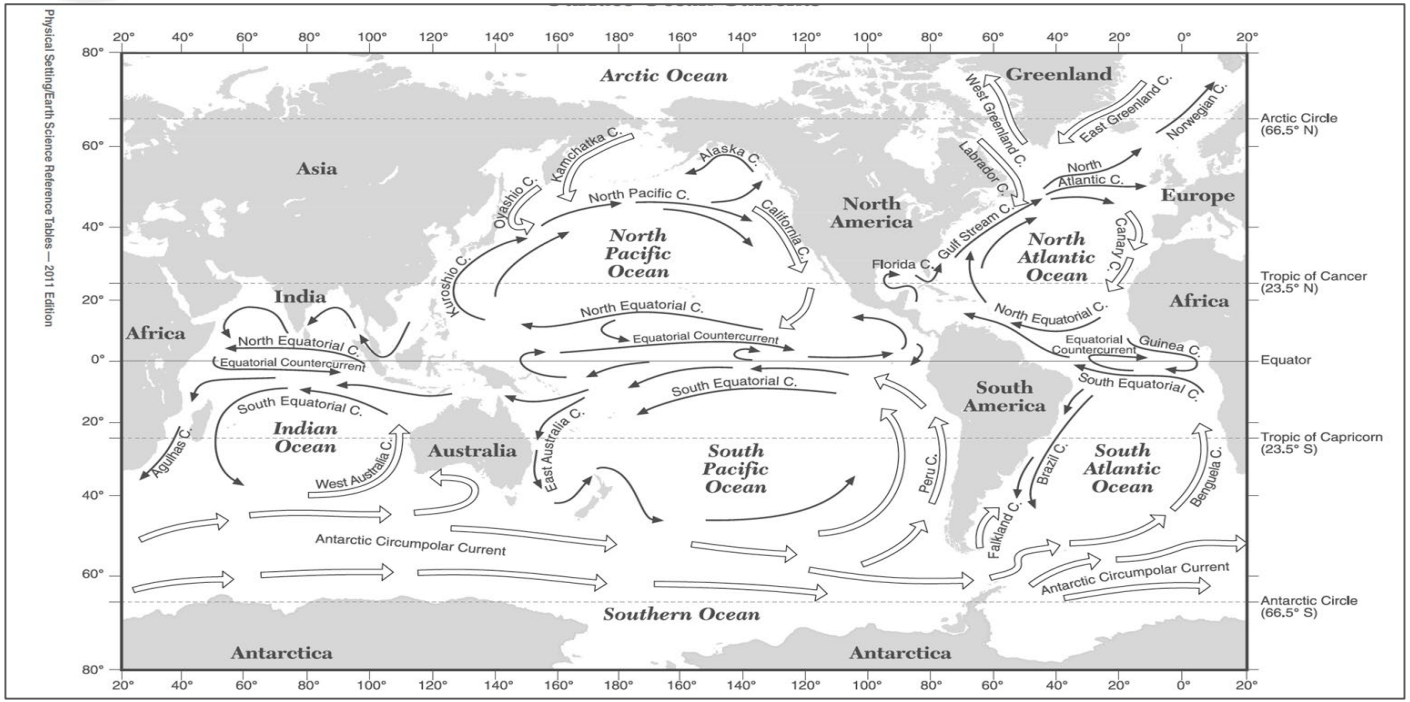


Surface ocean currents off the United States East Coast and Gulf Coast. Image adapted from NASA Views our Perpetual Ocean animation, as seen in NOAA Making Waves: Episode 123 -Motion in the Ocean.

Original animation courtesy NASA/SVS.
https://www.nasa.gov/topics/earth/features/perpetual-ocean.html

https://oceanservice.noaa.gov/podcast/apr14/mw123-currents.html

Global Surface Ocean Currents Map



KEY

Warm Water Currents

Cool Water Currents

**Note: Not all surface currents are shown.*

Map of warm and cool water global surface ocean currents. Adapted from Reference Tables for Physical Setting/ Earth Science. www.nysed.gov

Global Ocean Surface Current Properties

Current Name	Transport Rate (Sv)	Ocean Basin	Type (Temp.)
Agulhas	20-90	South Atlantic	Warm
Alaska		North Pacific	Warm
Angola	5	South Atlantic	
Antarctic CP	130	Southern	
Antarctic Coastal	10	Southern	
Antilles	2-7	North Atlantic	
Azores	8	North Atlantic	
Benguela	7-15	South Atlantic	Warm/Cool
Brazil	20-70	South Atlantic	Warm
California		North Pacific	Cool
Canary	8	North Atlantic	Cool
Caribbean	26-33	Caribbean Sea	
East Australian		South Pacific	Warm
East Greenland	7-35	North Atlantic	
East Iceland		North Atlantic	
Florida	30	North Atlantic	
Guiana	10	North Atlantic	
Guinea	3	North Atlantic	
Gulf Stream	30-150	North Atlantic	Warm
Irminger	2-4	North Atlantic	
Kuroshio		North Pacific	Warm
Labrador	4-8	North Atlantic	Cool
Loop Current	30	North Atlantic	
Malvinas	10	South Atlantic	

Current Name	Transport Rate (Sv)	Ocean Basin	Type (Temp.)
Mexican	8-10	Caribbean Sea	
North Atlantic	35-40	North Atlantic	
North Atlantic Drift	30	North Atlantic	Warm
North Pacific Drift		North Pacific	Warm
North Brazil	10-30	North Atlantic	
North Equatorial	15	North Atlantic	
North Equatorial CC	18	North Atlantic	
Norwegian	2-4	North Atlantic	
Oyashio		North Pacific	Cool
Peru		South Pacific	Cool
Portugal		North Atlantic	
Slope		North Atlantic	
Slope Jet		North Atlantic	
South Atlantic		South Atlantic	
South Equatorial	15	South Atlantic	
Spitsbergen		North Atlantic	
Subtropical CC	4-10	North Atlantic	
Weddell Scotia CF	40-90	North Atlantic	
West Australian		Indian	Cool
West Greenland		North Atlantic	
West-Spitsbergen		Atlantic	
West Wind Drift		South Pacific	Cool
Yucatan	23-33	Caribbean Sea	

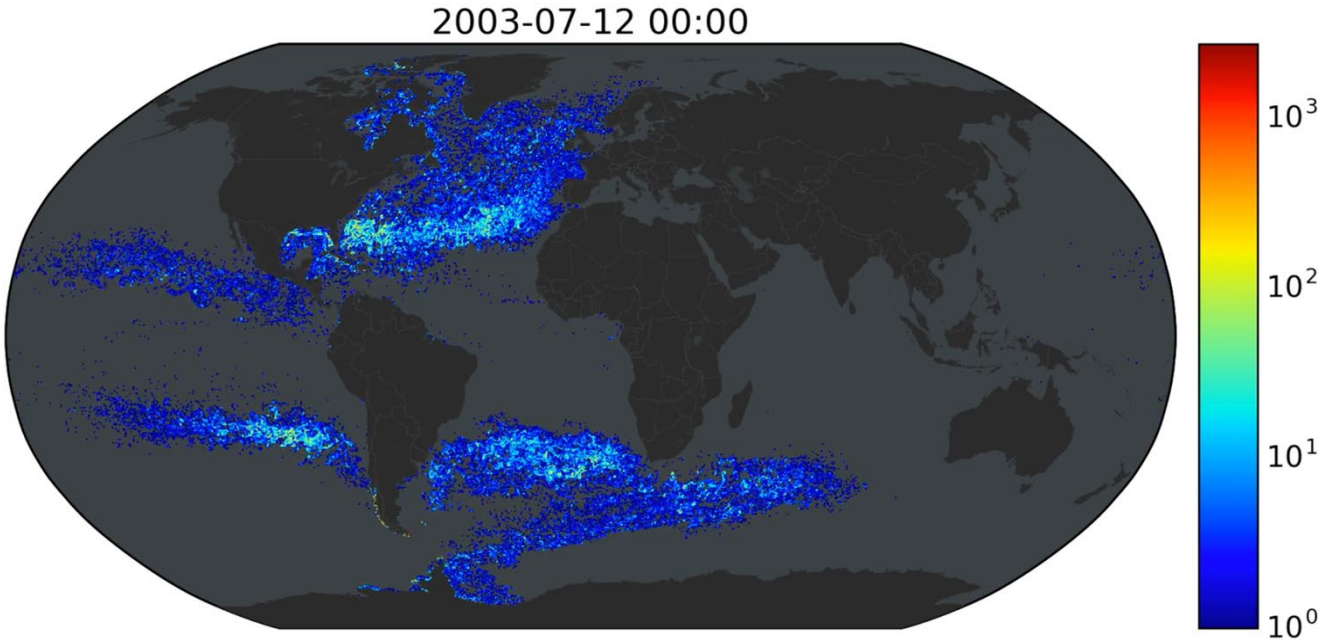
CC = Counter Current
CF = Confluence
CP = Circumpolar
Sv = Sverdrup (the unit for volume of water flowing through an area)

1 Sv = 1 million cubic meters per second (106 m^3/s)

Adapted from https://oceancurrents.rsmas.miami.edu/properties.html

Ocean Currents move plankton - and pollution – around the globe faster than thought

Princeton University researchers found that ocean currents can carry objects to almost any place on the globe in less than a decade, faster than previously thought. Pictured here is a still image captured from the Princeton model showing how phytoplankton traveling on ocean currents would spread over a three-year period. The researchers “released” thousands of particles representing phytoplankton and garbage from a starting point (green) stretching north to south from Greenland to the Antarctic Peninsula. The colors indicate low (blue) or high (red) concentration of particles. Over time, the particles spiral out to reach the North and South Pacific, Europe, Africa and the Indian Ocean.



View the whole model in action: https://player.vimeo.com/video/163414696
(Princeton University). *Animation created by Bror Jönsson, Department of Geosciences.*

Global Deep-Sea Coral Observations Map

This map illustrates the known global distribution of deep-sea coral based on observations.

*Hexagon bins represent the number of observations in a 240 square kilometer (93 square mile) area. Warmer colors (reds) represent high numbers of observations and cooler colors (yellows) represent fewer observations. *Note: These records indicate observations only. No observation does not mean that deep-sea corals are not present in that area. There is still a large portion of the ocean that has not been explored in detail.*

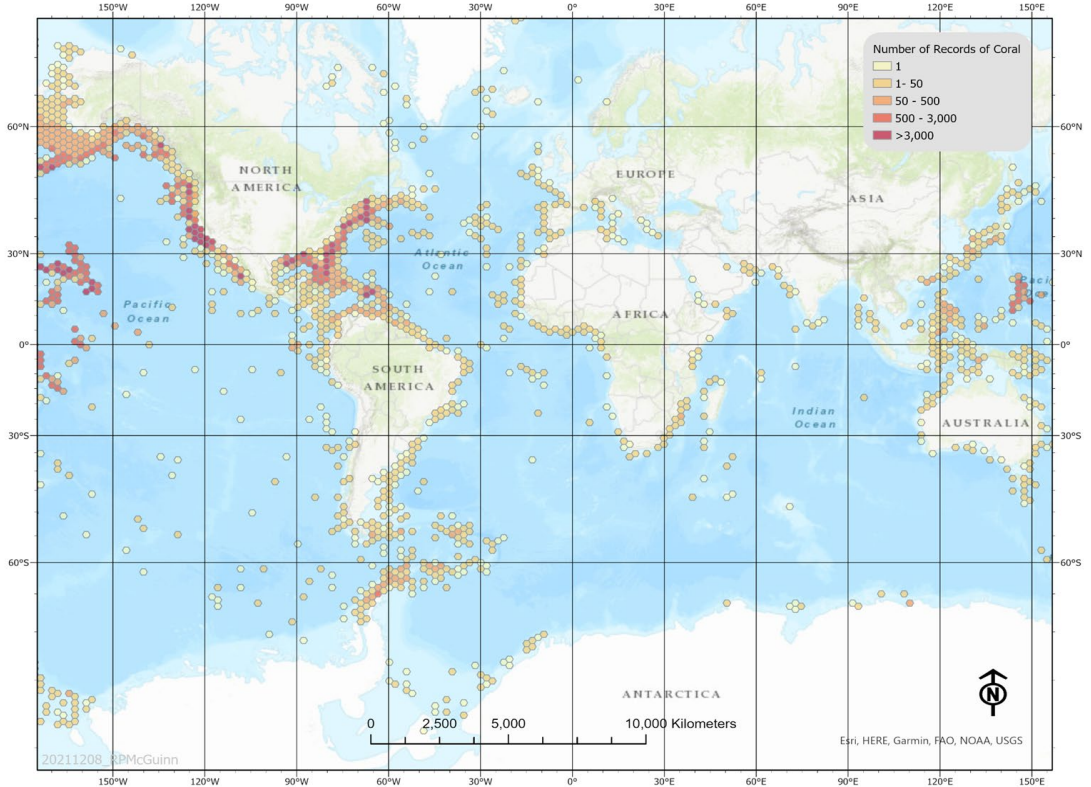


Image courtesy of Robert McGuinn, NOAA Deep-Sea Coral Research and Technology Program.
https://oceanexplorer.noaa.gov/edu/materials/dsc-observations-map.jpg