Common Oceanic Phenomena

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Introduction

There to many phenomena's in the ocean to Count, but in this Lecture we will cover the common oceanic phenomena like:

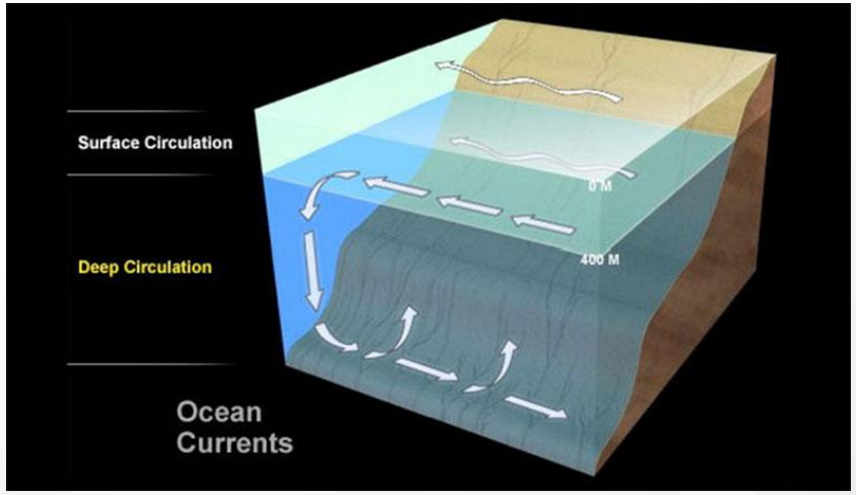
Waves and currents
Swell
Gyers
Eddies
Upwelling and downwelling
Red Tide

Waves and currents

What is the different between waves and currents?

- Waves are caused by energy passing through the water, causing the water to move in a circular motion.

- Ocean currents can be caused by wind, density differences in water masses caused by temperature and salinity variations, gravity, and events such as earthquakes or storm

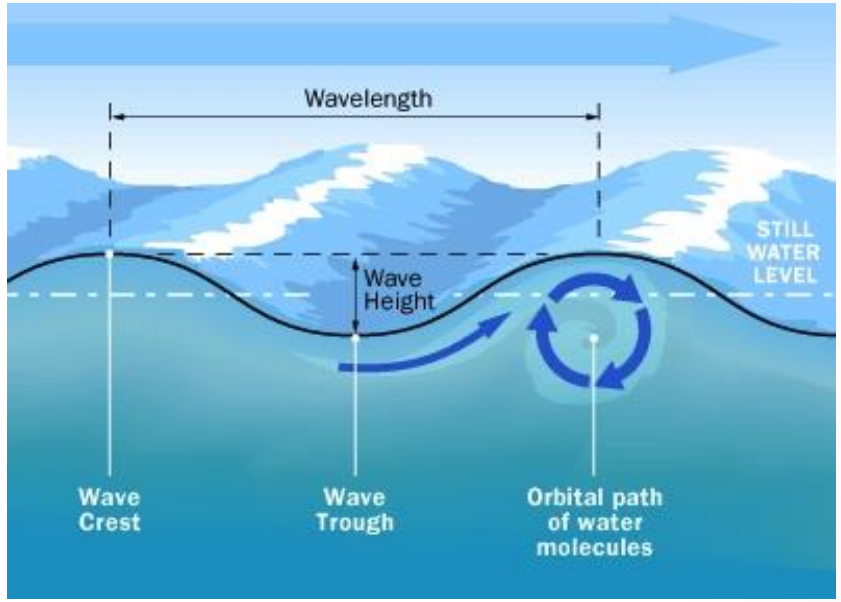


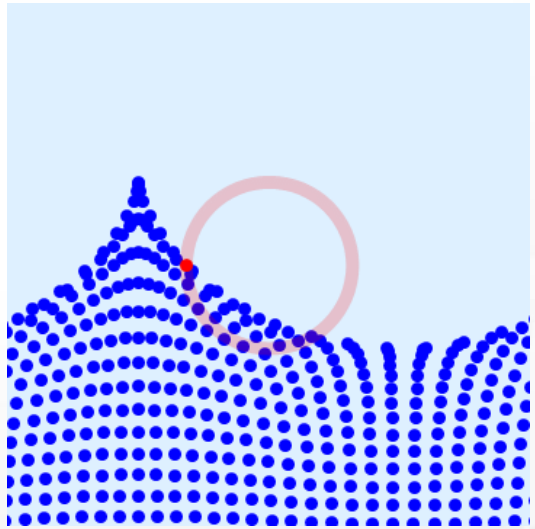
Waves and currents

A wave is an oscillation of water particles around a position of equilibrium.

The individual particle remains roughly at its original position

A wave is a periodic process.
The most common waves we see are created by wind





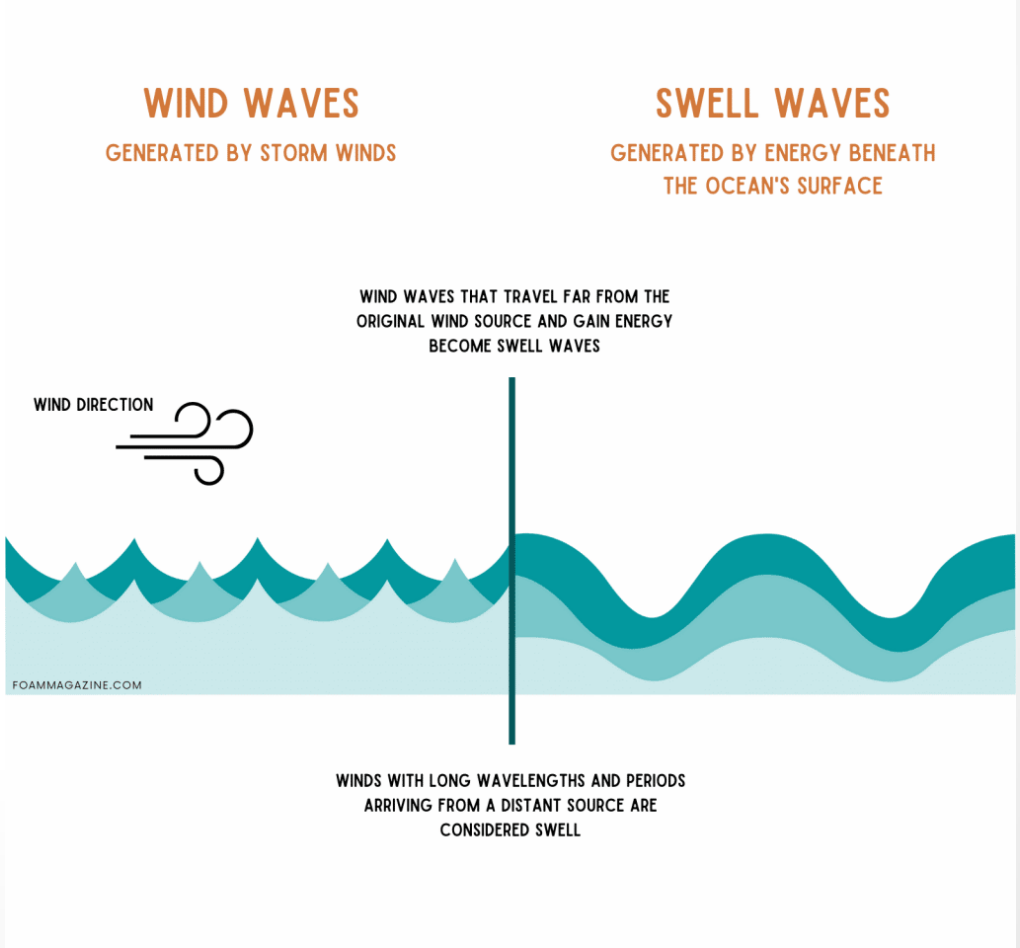
Swell

A swell is a series of mechanical or surface gravity waves generated by distant weather systems that propagate thousands of miles across oceans and seas.

Groups of waves with a period between crests of more than ten seconds

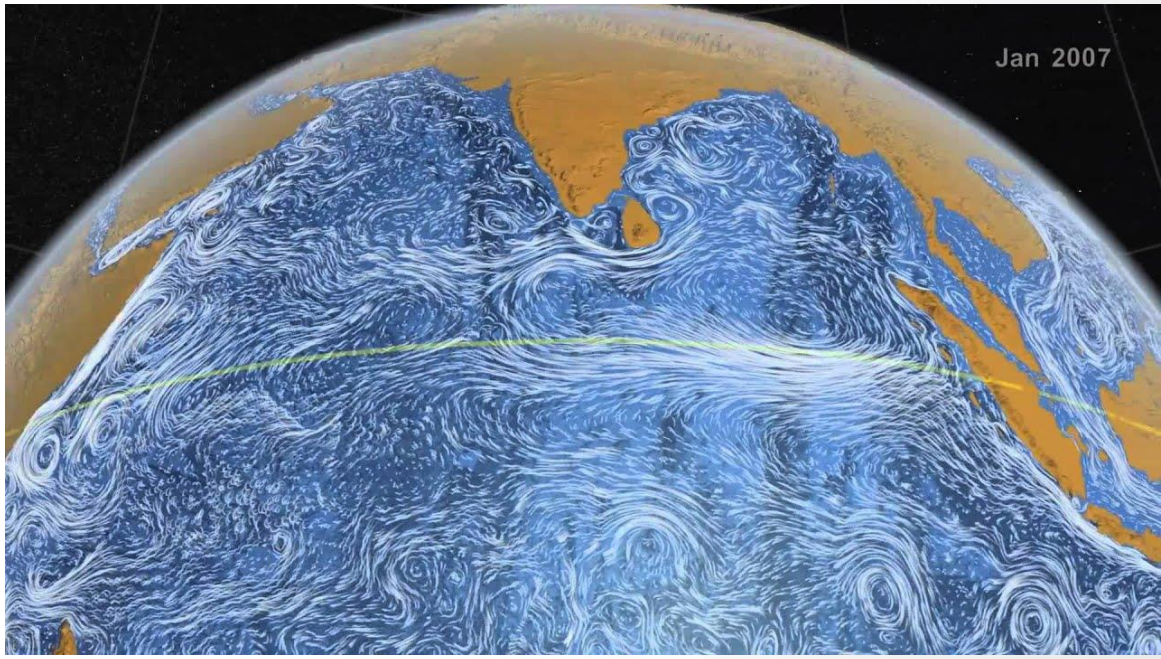
Swells are not generated by local winds blowing

result of the interaction of severe storms with a large fetch of water that takes place in the open ocean, thousands of miles away from landmasses



Currents

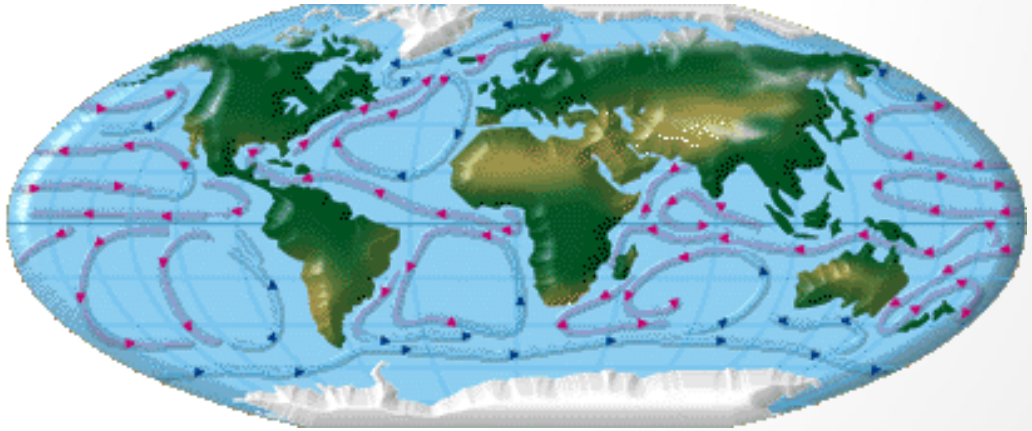
Current is the transport of water particles along stream lines.
Currents are cohesive streams of seawater that circulate through the ocean. Some are short-lived and small, while others are vast flows that take centuries to complete a circuit of the globe.
Types: surface circulation, which stirs a relatively thin upper layer of the sea, and deep circulation, which sweeps along the deep-sea floor.

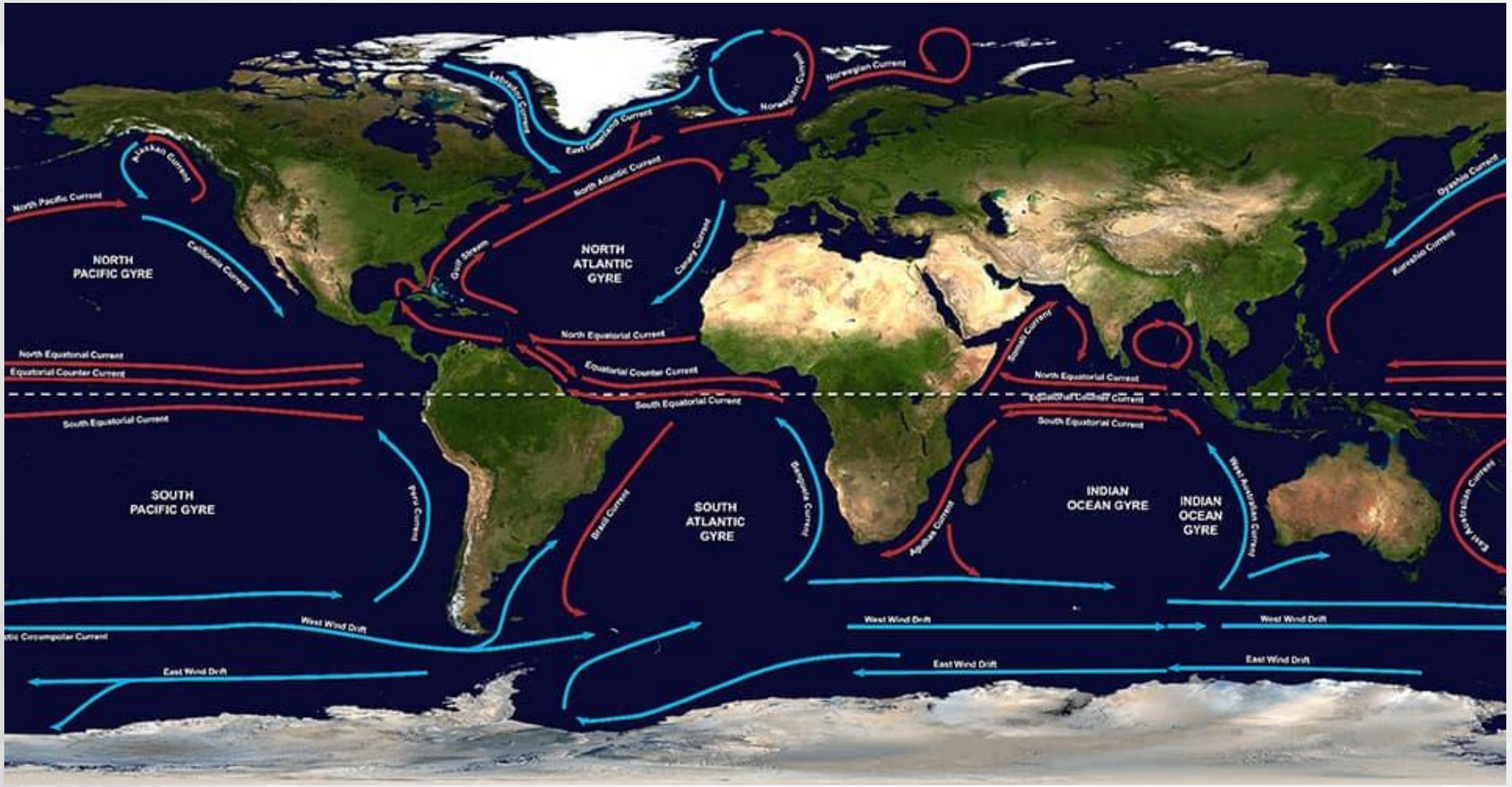


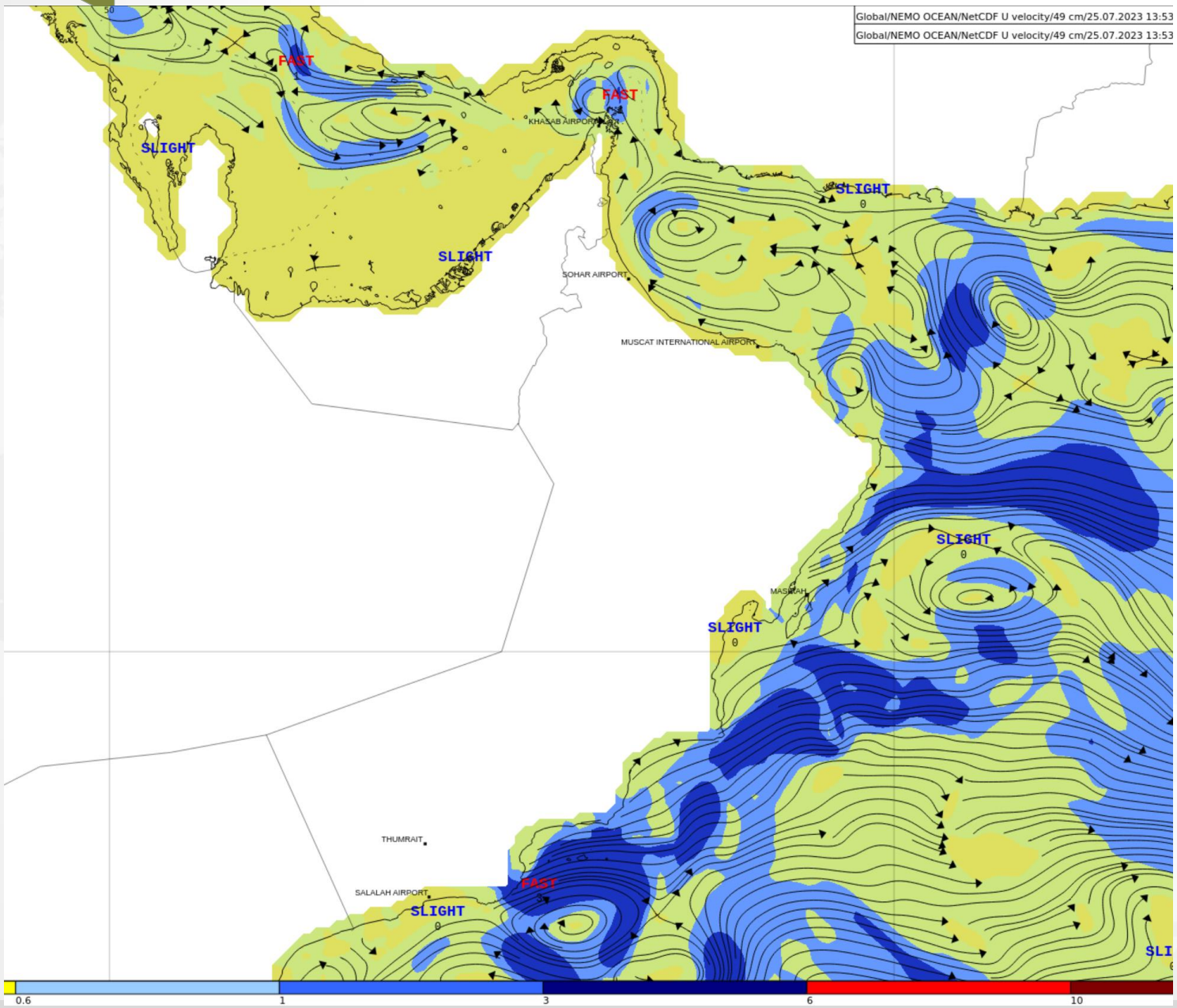
Gyres

A gyre is a circular ocean current formed by Earth's wind patterns and the forces created by the rotation of the planet.
Five major gyres:

North Atlantic
South Atlantic
North Pacific
South Pacific
Indian




NORTH PACIFIC GYRE
NORTH ATLANTIC GYRE
SOUTH PACIFIC GYRE
SOUTH ATLANTIC GYRE
INDIAN OCEAN GYRE
INDIAN OCEAN GYRE
North Pacific Current
California Current
North Atlantic Current
Gulf Stream
Canary Current
Labrador Current
East Greenland Current
Norwegian Current
North Equatorial Current
Equatorial Counter Current
South Equatorial Current
Peru Current
Brazil Current
Benguela Current
Somali Current
Agulhas Current
West Australian Current
East Australian Current
Oyashio Current
Kuroshio Current
West Wind Drift
East Wind Drift
Circumpolar Current


Global/NEMO OCEAN/NetCDF U velocity/49 cm/25.07.2023 13:53
Global/NEMO OCEAN/NetCDF U velocity/49 cm/25.07.2023 13:53
FAST
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KHASAB AIRPORT
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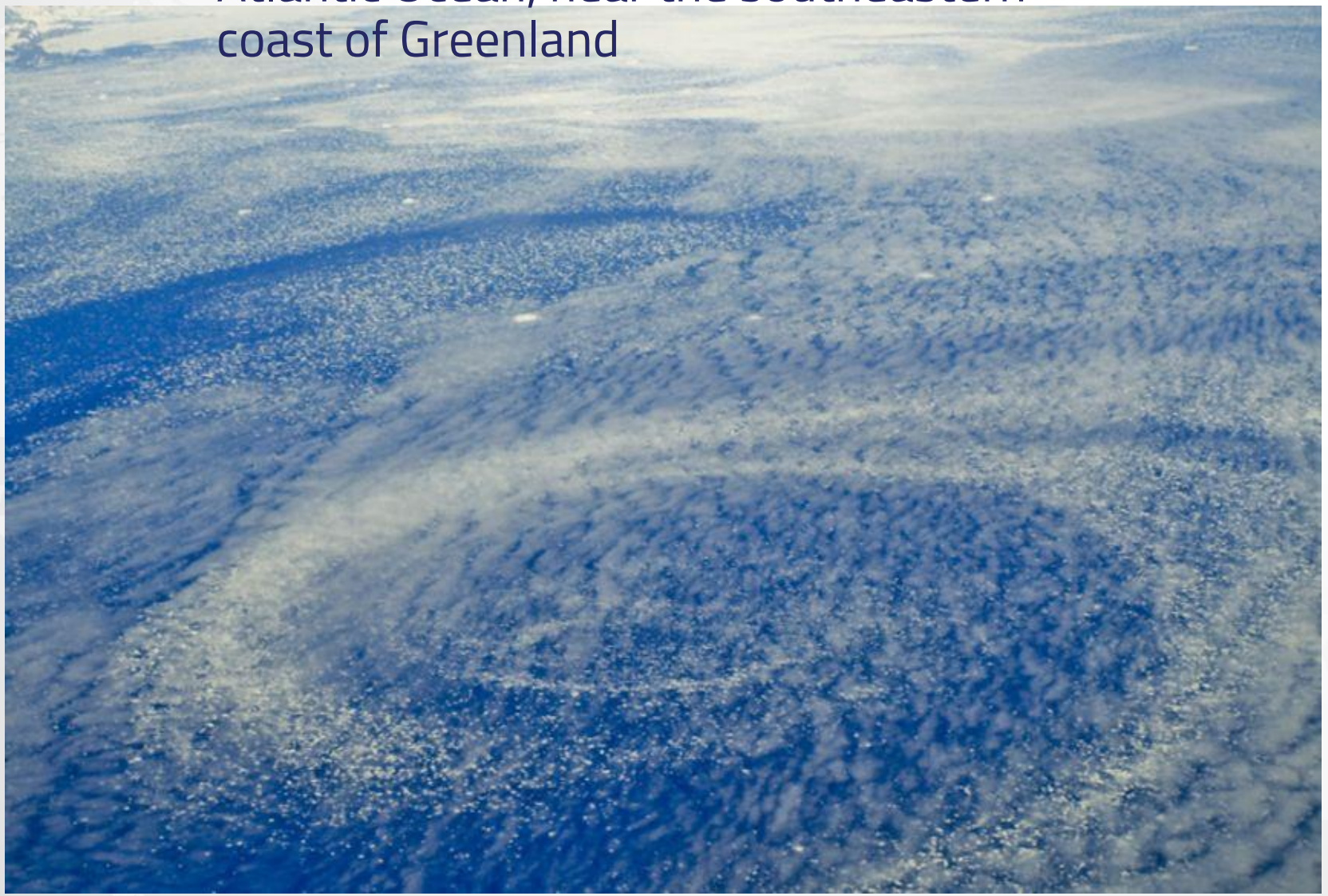
10

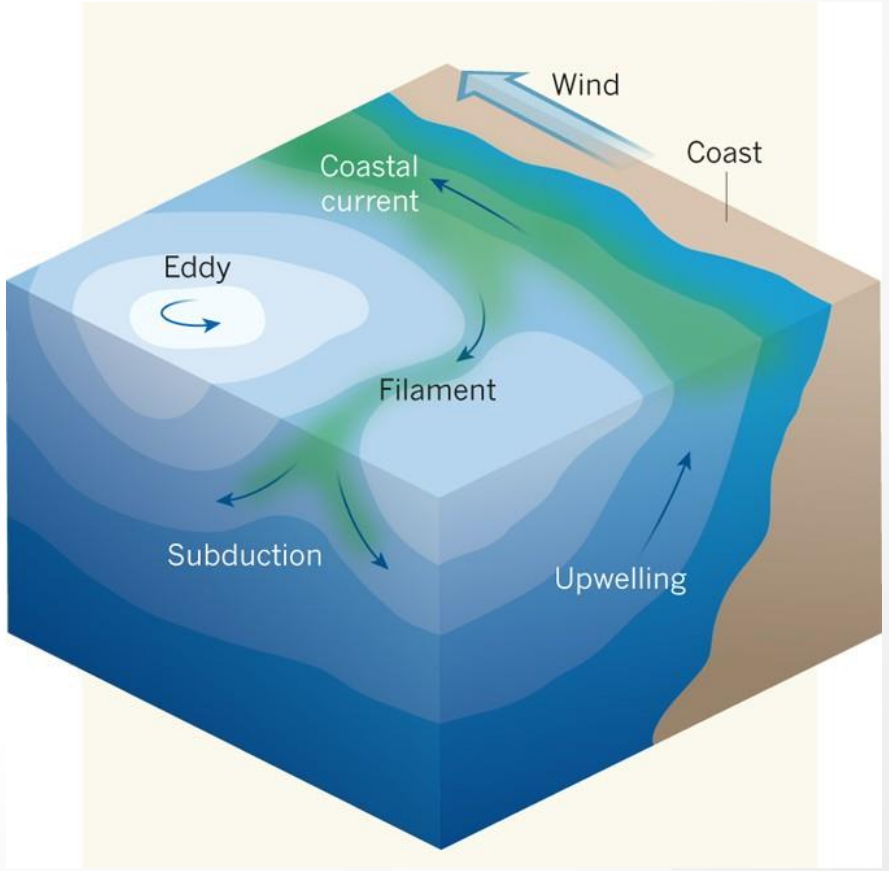
Icebergs form over this ocean gyre in the Atlantic Ocean, near the southeastern coast of Greenland



Eddies

Is a loop of current that is cut off from the main current, or a small, spinning current. They are comparatively small, short-lived circulation patterns in the ocean.

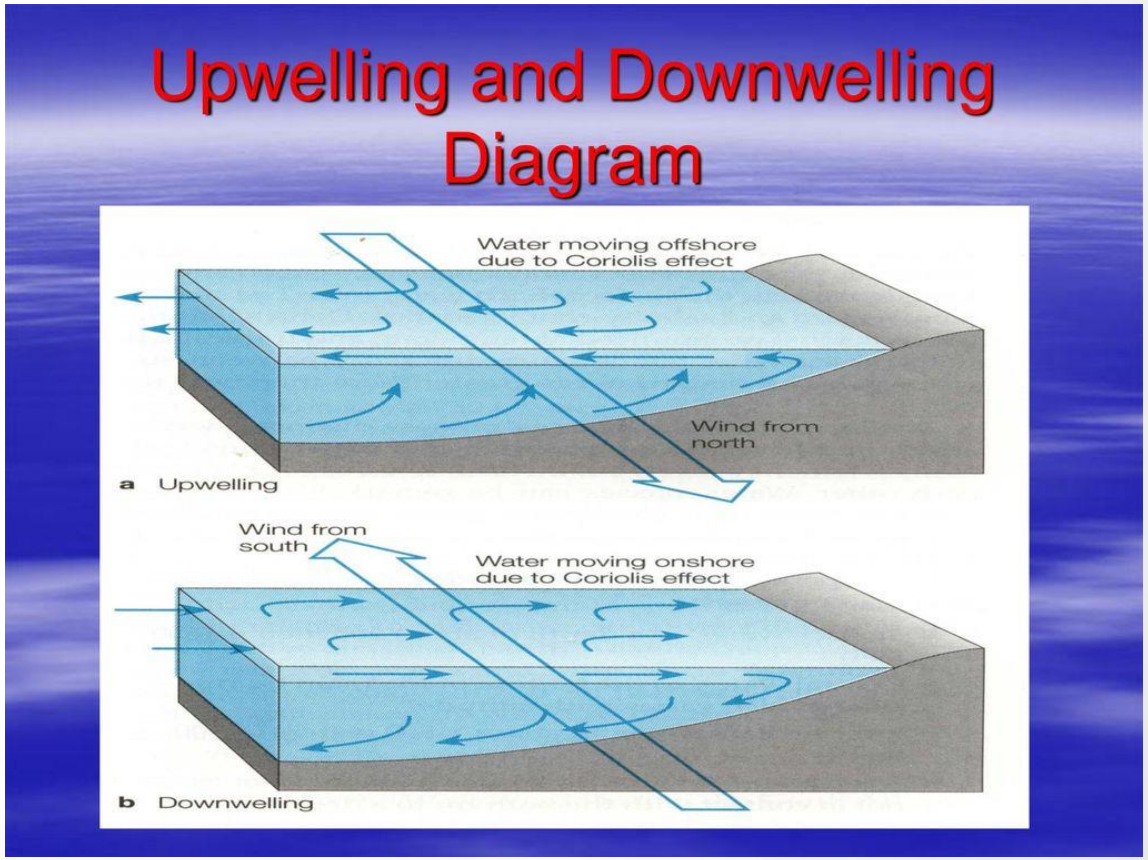
The swirling motion of eddies in the ocean cause nutrients that are normally found in colder, deeper waters to come to the surface



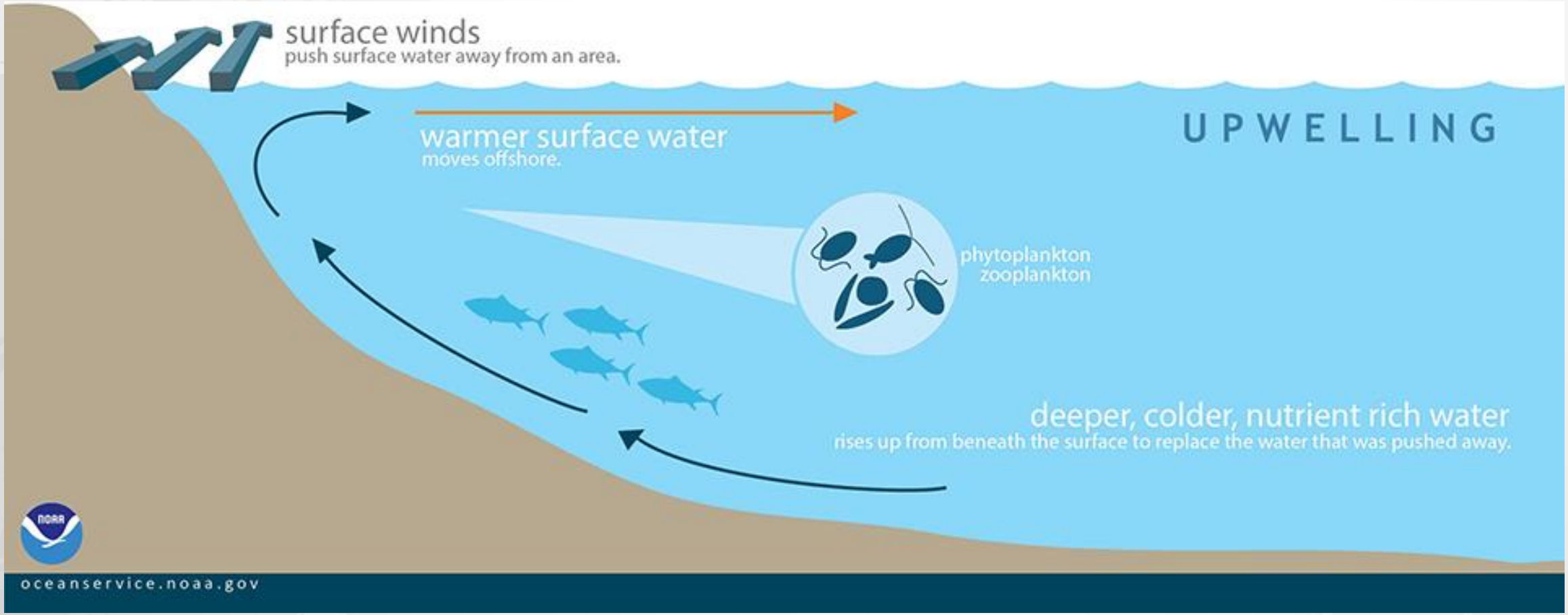
UPWEELING AND DOWNWELLING

Upwelling occurs when winds push surface water away from the shore and deeper water rises to fill the gap.

Downwelling occurs when the water on the surface of the sea becomes denser than the water beneath it and so it sinks. Seawater gets denser when it gets colder or saltier.



Upwelling is a process in which deep, cold water rises toward the surface.



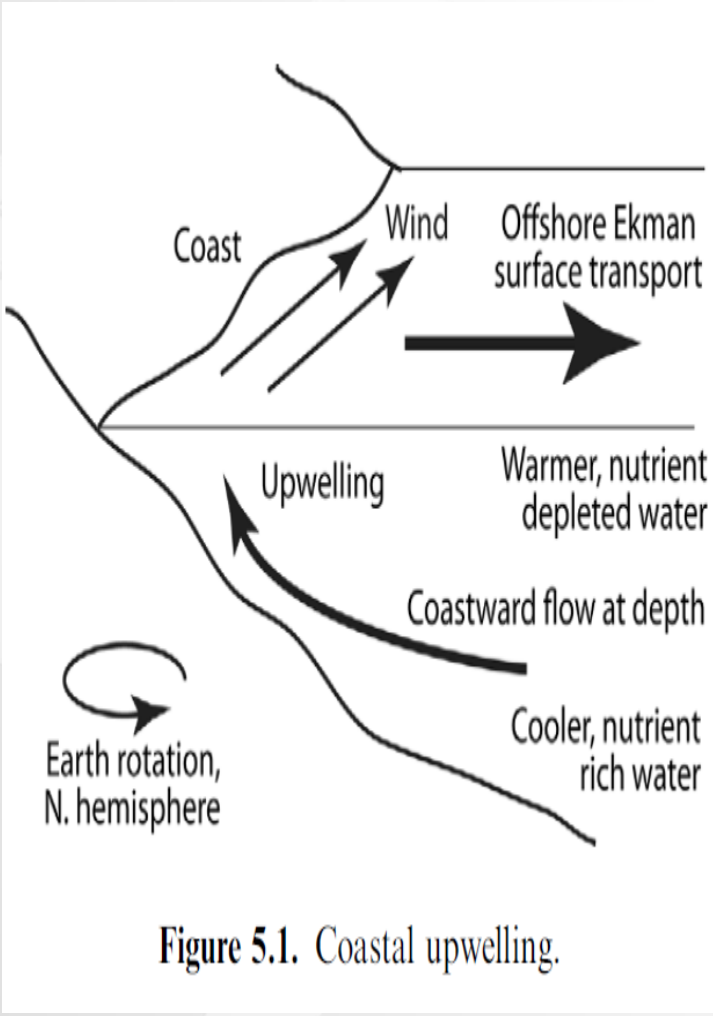
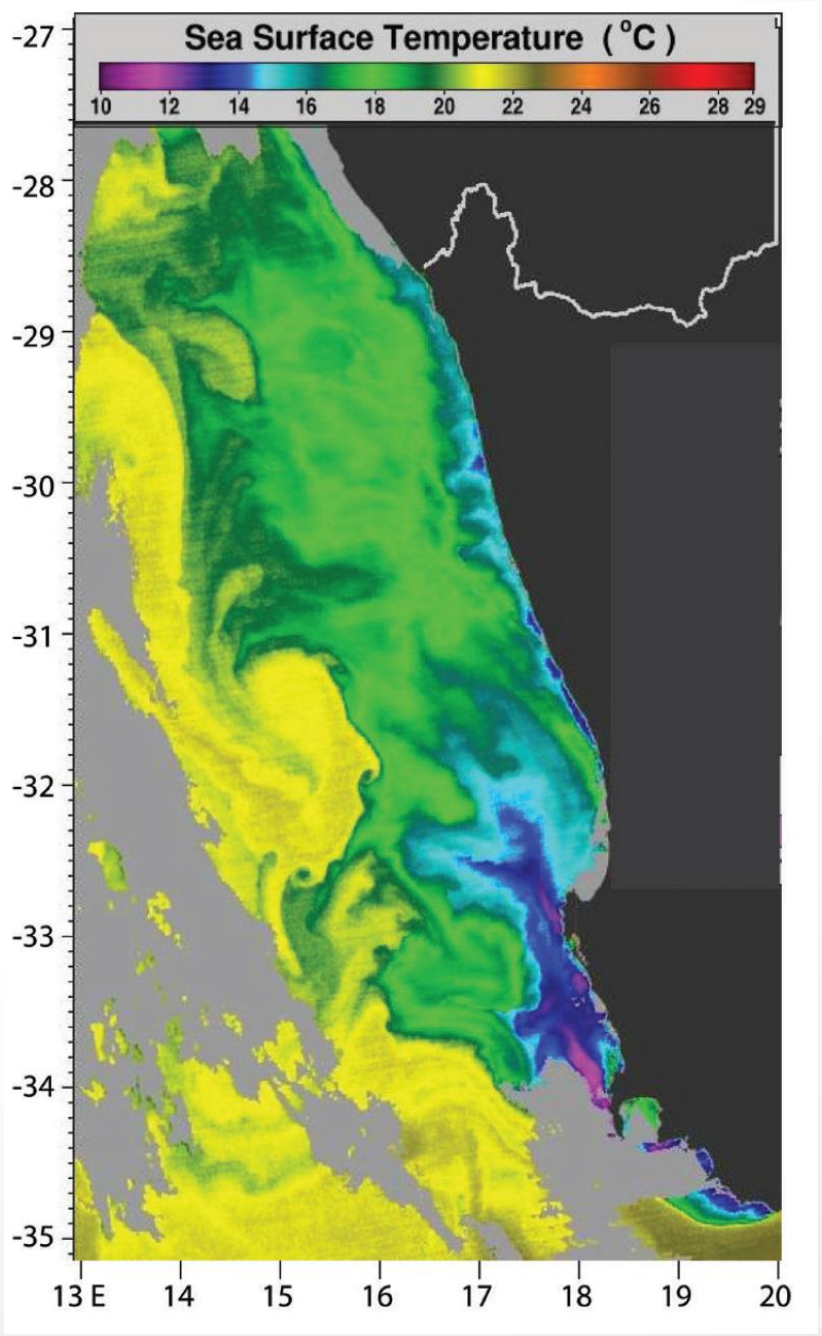


Figure 5.1. Coastal upwelling.



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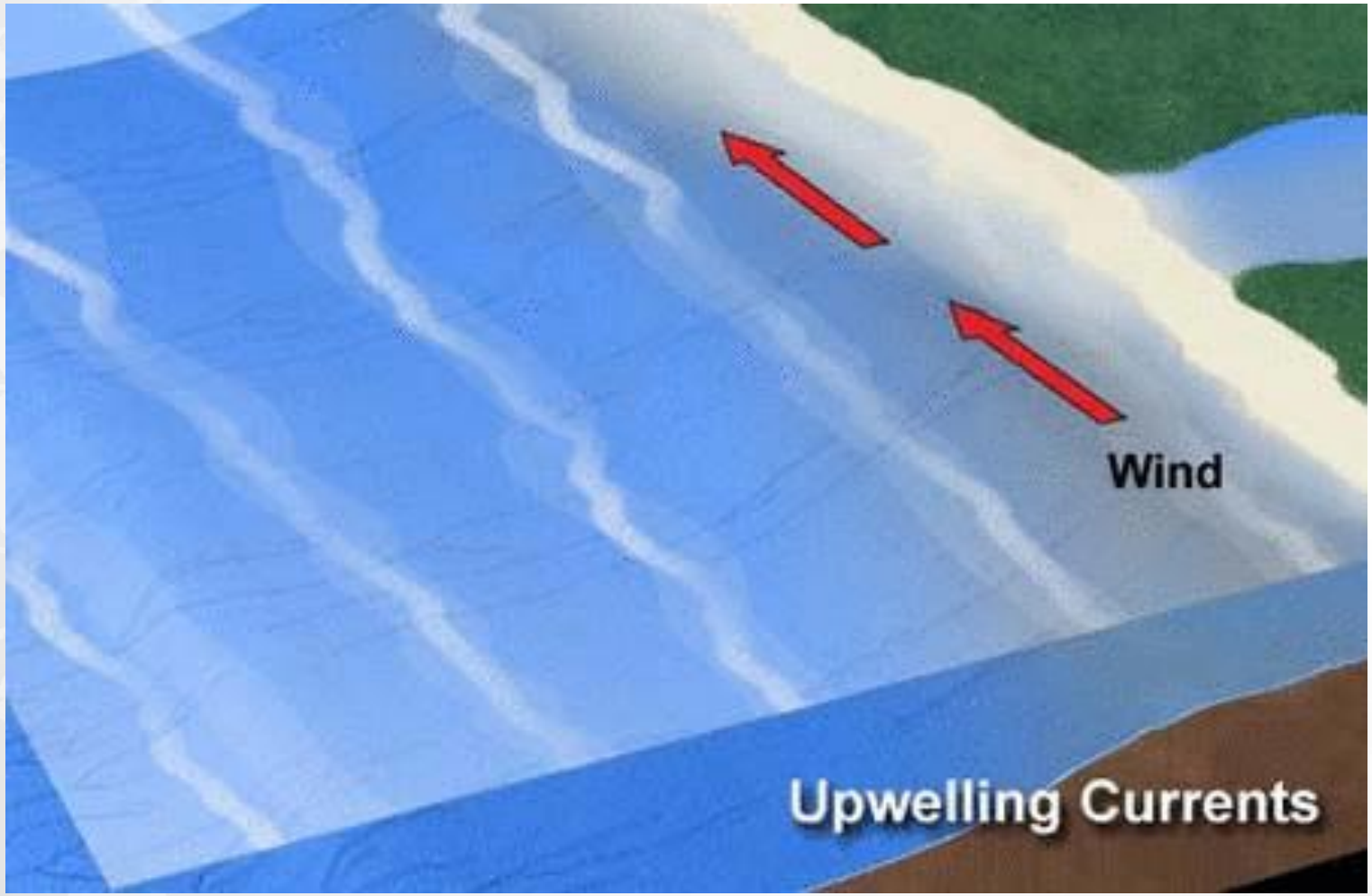


Red Tide

Red tide is a common name for a phenomenon known as an algal bloom (large concentrations of aquatic microorganisms)
The bloom takes on a red or brown color.

Red Tide

Red Tide have two major causes

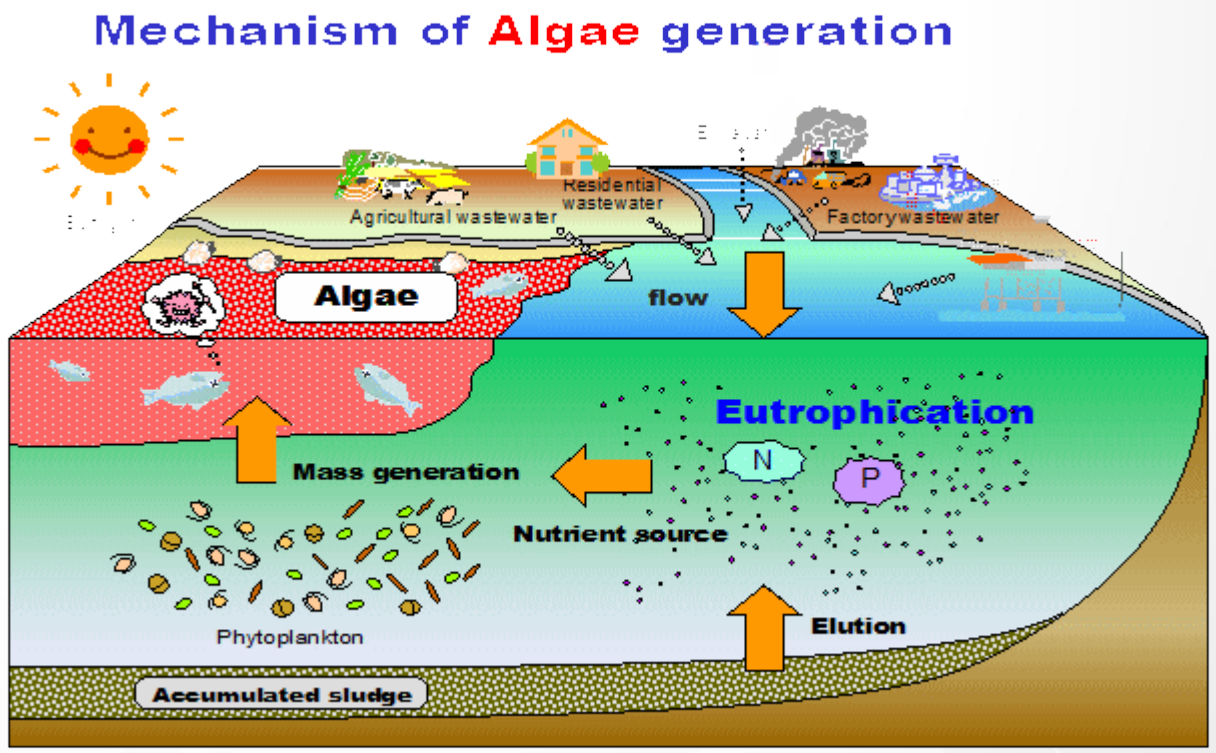
- Natural

-Global warming.

- Human activities

-Ballast Water.

-Sewage .



Red Tide In Oman

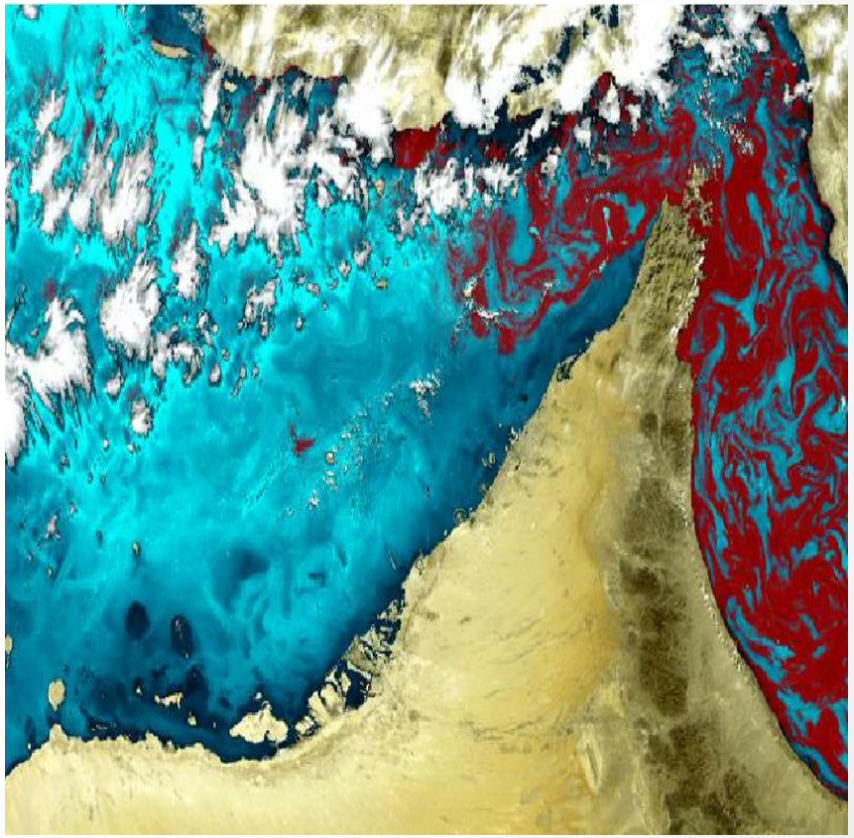
Red tides were recorded 138 times in Omani waters between 1976 and 2019

- Aug 1976 - Salalah 7000-1000 tons of fish.
- Sep 1988 , Seeb to Qurum Mass mortality of marine organisms
- Aug-Sep 2000 Barka 15-30 tons of fish Mar 2001 - Sur 250 tons of fish Apr 2001.
- Massive fish kill August 2008-April 2009 Arabian Gulf , Sea of Oman and Arabian Sea 200 tons of fish and shellfish

Red Tide In Oman

During the C. polykrikoides blooms, 70 tons of Goldlined seabream were killed inside the cages in qurayat farm, Muscat.
The DO levels were drop suddenly.

All the fish were killed within 30 minutes as well as all other wild organisms in this area including shellfish and corals.



Large Red Tide in the Oman sea and Persian Gulf. Composite image resulting from the processing of a MERIS data acquired 22/11/2008

Thanks

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