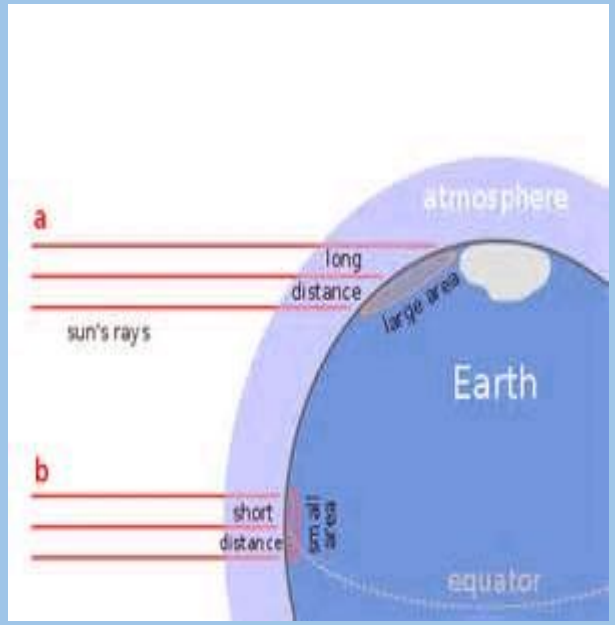
Explaining the Circulation of Air

Objectives: describe how the rotation of Earth affects patterns of atmospheric wind circulation

Wind Formation

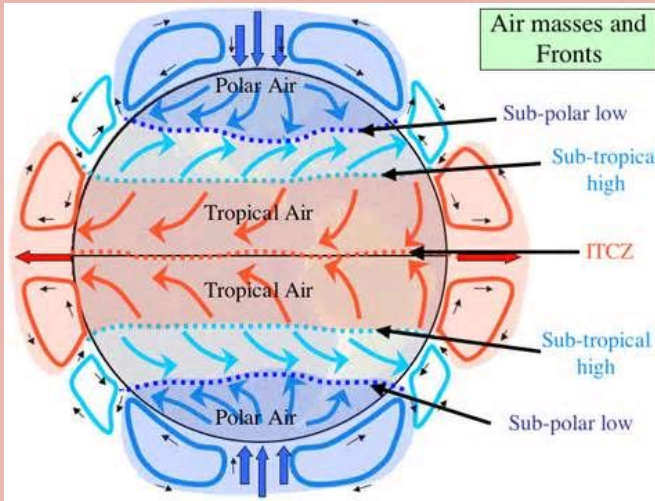
Temperature differences on Earth's surface are caused by Earth's tilt in its orbit around the sun, and by the Earth's curved surface.



Areas of Earth receive different amounts of solar radiation because some areas receive direct rays and in other areas the

Wind

Wind is caused by the uneven heating of Earth and its atmosphere. It is the movement of air from high pressure areas into low pressure areas. This causes circulation.




SCIENCE FACTION SHOW


EPISODE 34.1
CURRENT EVENTS
KIDS

I. The Effect of Earth's Rotation

II. Wind and the Coriolis Effect

The effect of Earth's rotation on the pathway of wind - Coriolis Effect - as Earth spins, wind in both hemispheres curves.

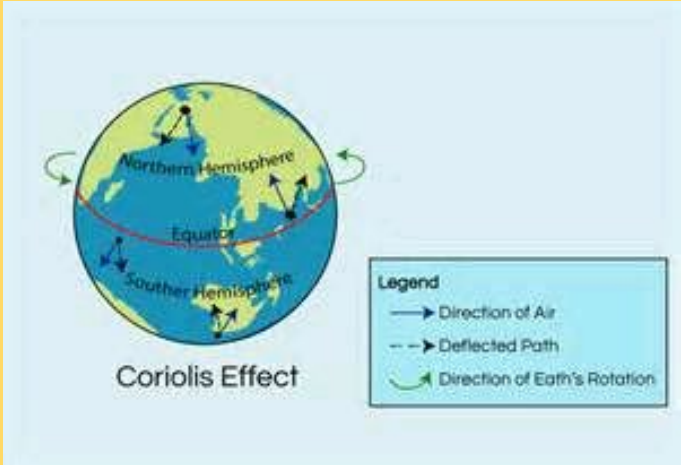
At the poles where the air is cooler there are high pressure bands.

At the equator, where there is more solar energy, there are low pressure bands.

Coriolis Effect prevents winds from flowing directly from the poles to the equator.

Coriolis Effect

If the earth did not rotate, winds would blow in a straight line from the poles to the equator. However, because the earth turns it makes the wind curve. This curve is called the Coriolis Effect.

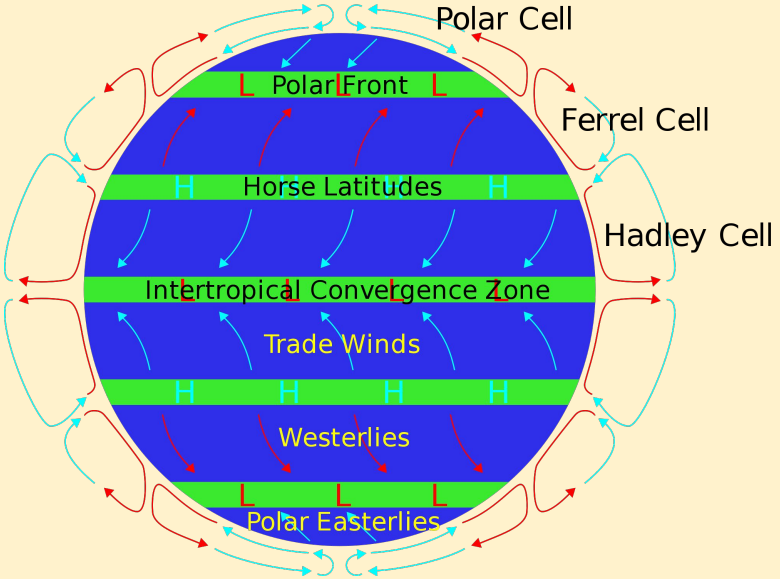



SIMPLY PUT:
CORIOLIS EFFECT


CORIOLIS
EFFECT
SciShow

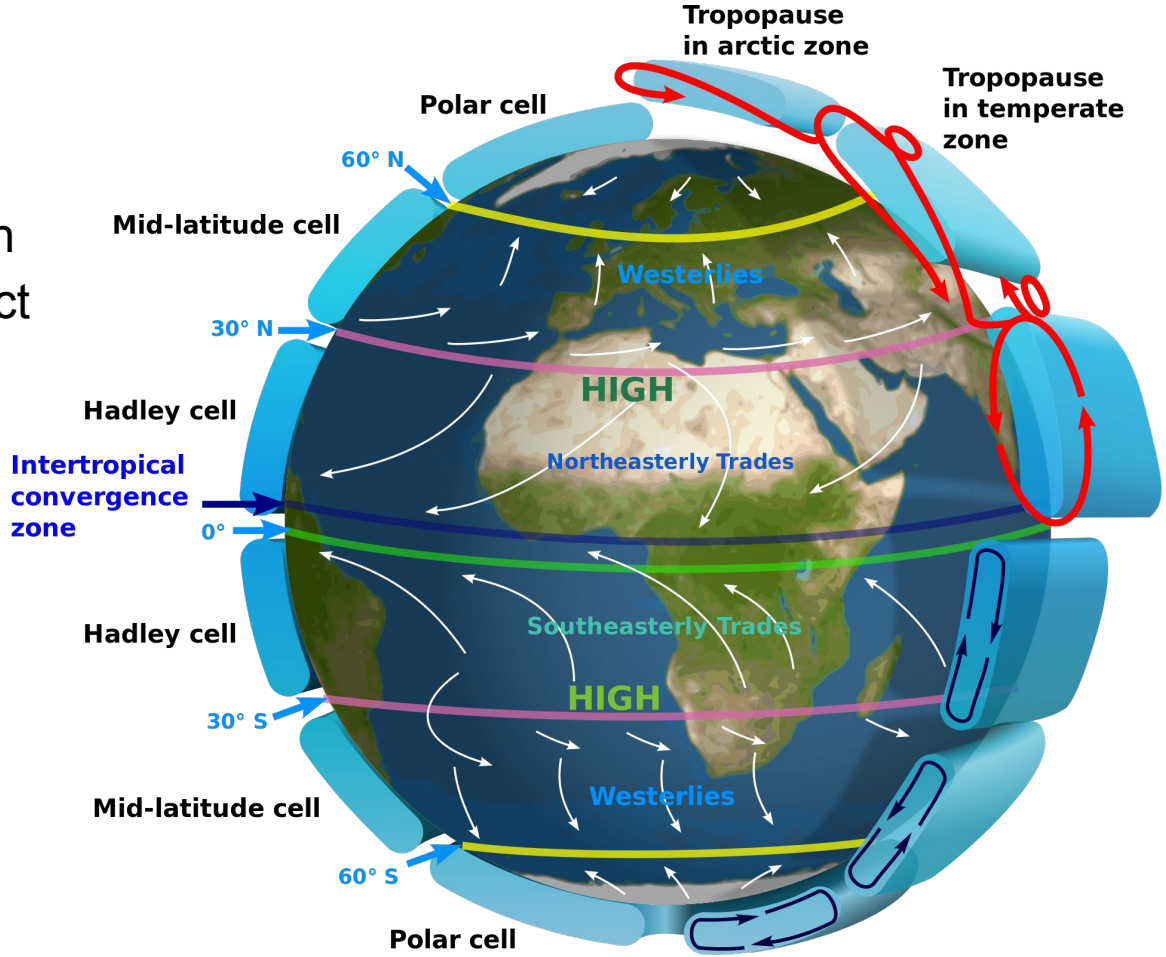
A. Formation of Wind Belts

Patterns of vertically moving air, curving horizontal winds, and bands of high and low pressure forms three wind belts in each hemisphere

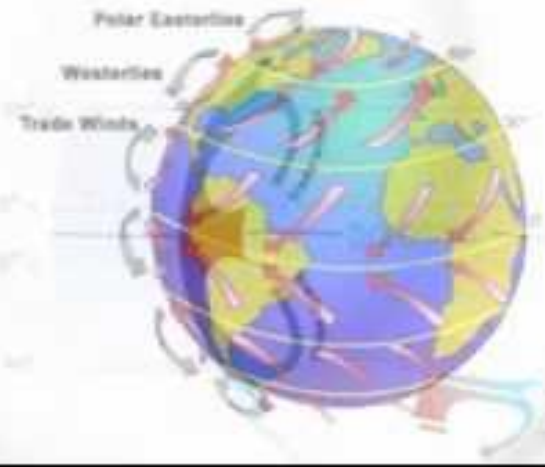


III. Global Winds

The unequal heating of Earth surface and the Coriolis effect causes distinct patterns of global winds.



This winds about to blow, blow
This winds about to blow, blow
This winds about to blow, blow
This winds about to blow, blow
This winds about to

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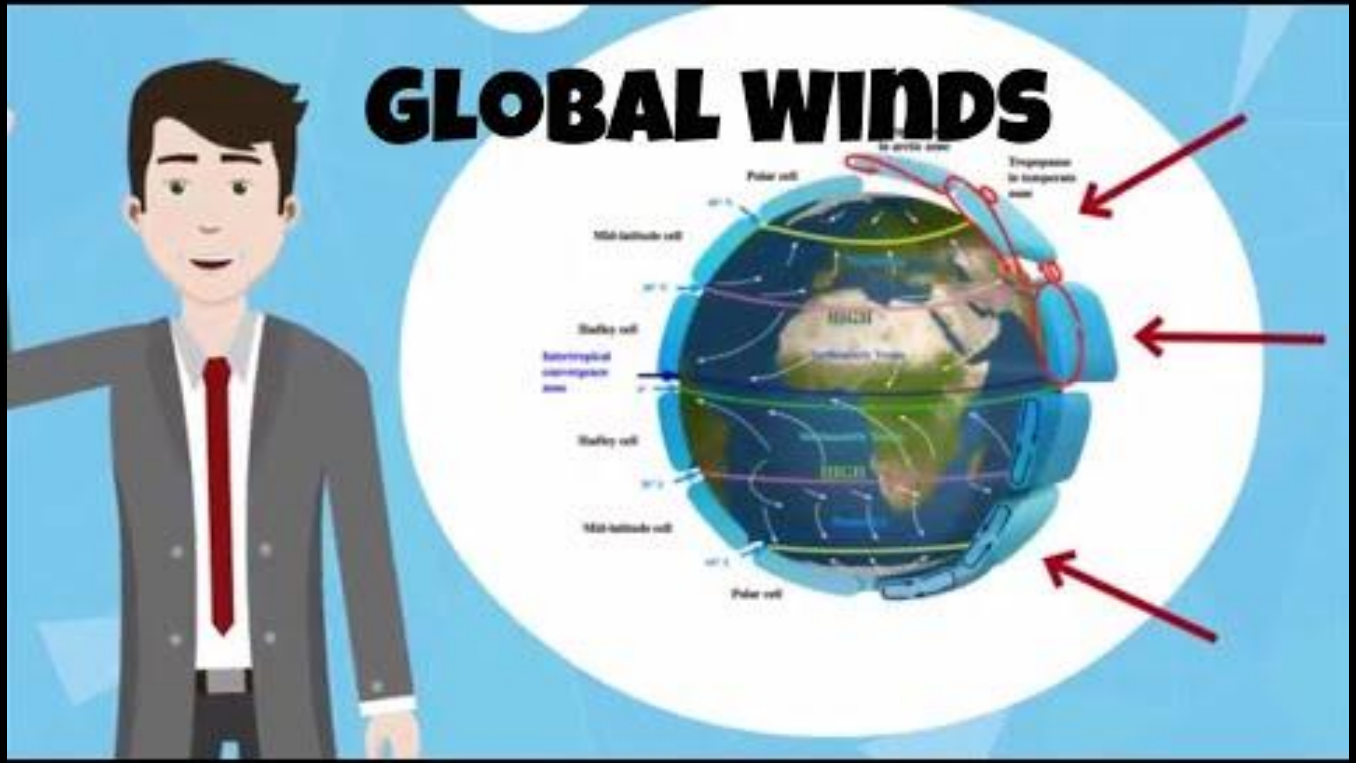
DIFFERENTIAL HEATING


Met Office
THE THREE CELLS


Met Office
CORIOLIS & WINDS


Met Office
WHAT IS THE JET STREAM?


GLOBAL WINDS
Polar cell
Mid-latitude cell
Hadley cell
Hadley cell
Mid-latitude cell
Polar cell

Doldrums

Air currents also leave an area of Earth unaffected by wind. This area is called the doldrums.

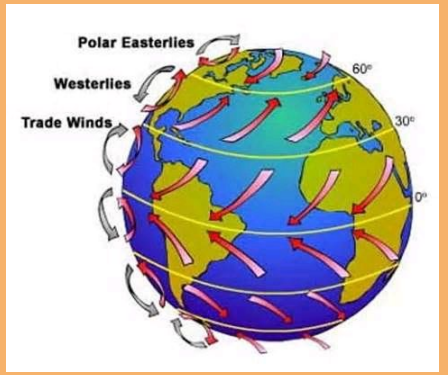
Trades Winds

For hundreds of years sailors depended on the winds to move ships carrying cargo to different points on the globe.

A constant convection current is located between the equator and 30 degrees latitude north and south of the equator.

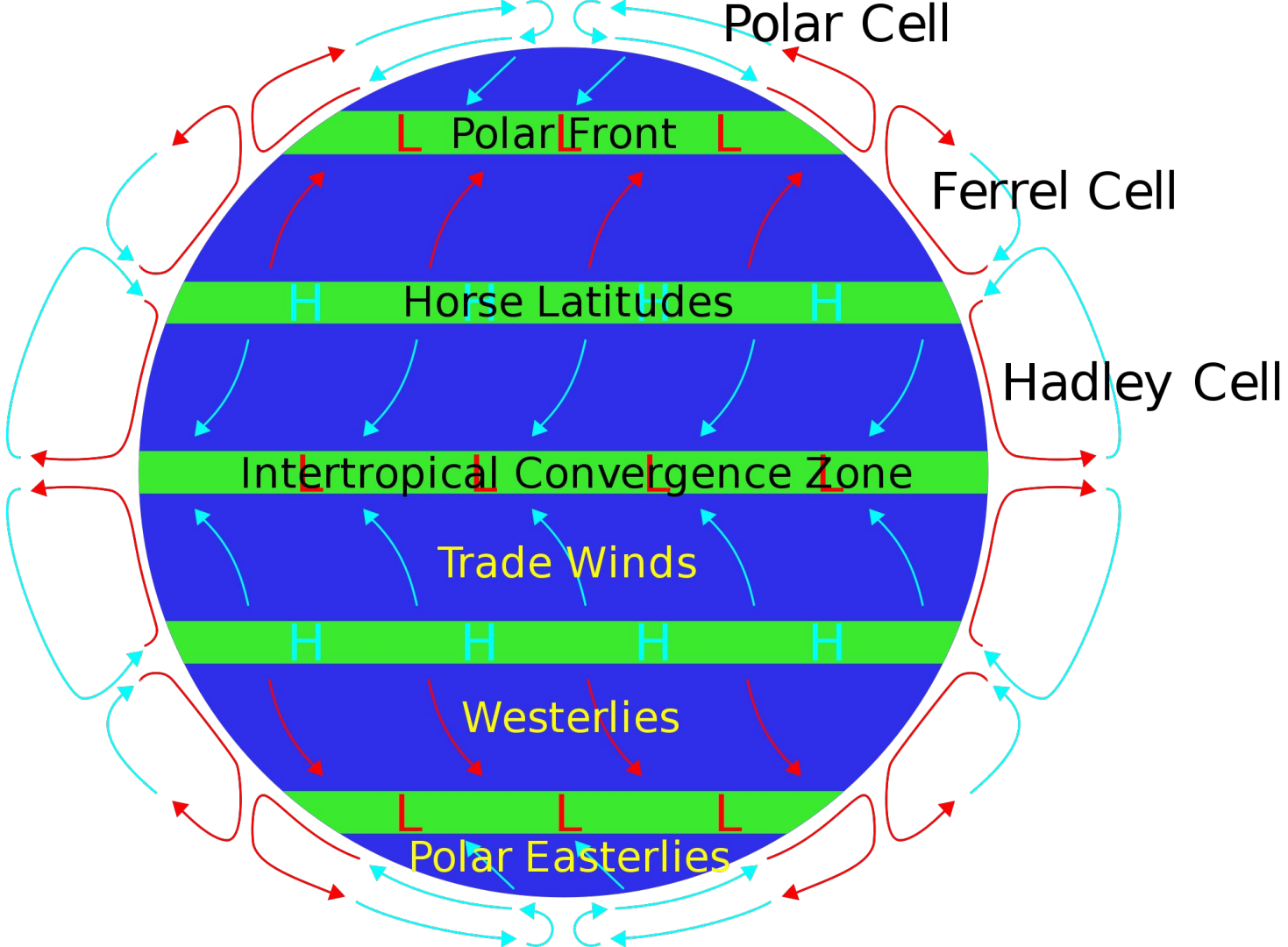
Polar Easterlies

Cold air near the poles sink and flow back toward the lower latitudes. This occurs between 60 degrees and 90 degrees latitude. They flow from east to west.



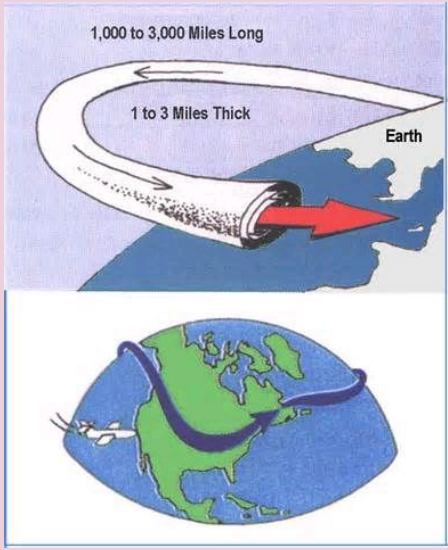
Horse Latitudes

Found between 30 and 38 degrees both north and south of the equator. An area where Earth’s atmosphere is dominated by the subtropical high, an area of high pressure which suppresses precipitation and cloud formation.


Polar Cell
Ferrel Cell
Hadley Cell
L
Polar Front
L
L
H
H
H
H
Horse Latitudes
L
L
L
L
Intertropical Convergence Zone
Trade Winds
H
H
H
H
Westerlies
L
L
L
Polar Easterlies

Jet Stream

Winds also blow at higher altitudes. Narrow belts of strong winds called jet streams blow at speeds of 200-400 mph. Just as the sailors used the trade winds to push them alone, pilots use jet streams to save fuel and time.



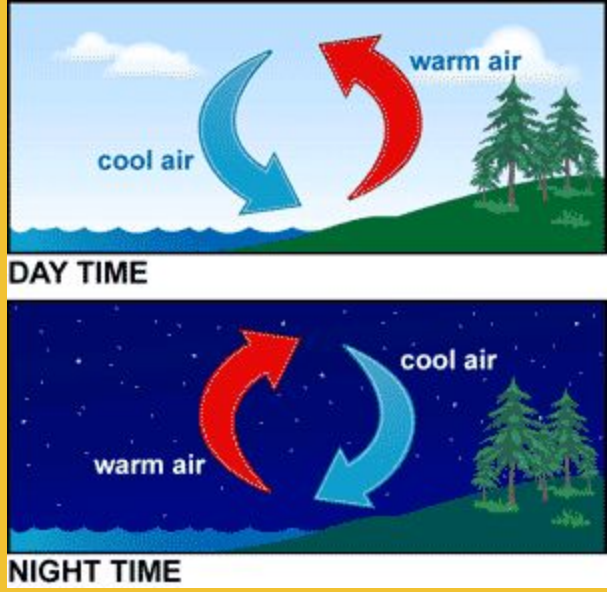
Daily and Seasonal Winds

Smaller wind systems determine the local weather.

Sea Breezes and Land Breezes are named from where they blow from.

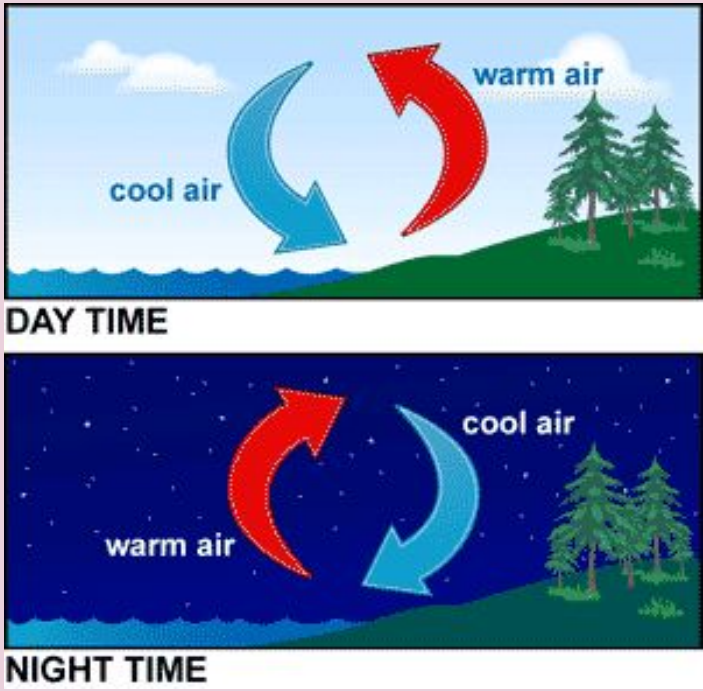
Sea Breezes

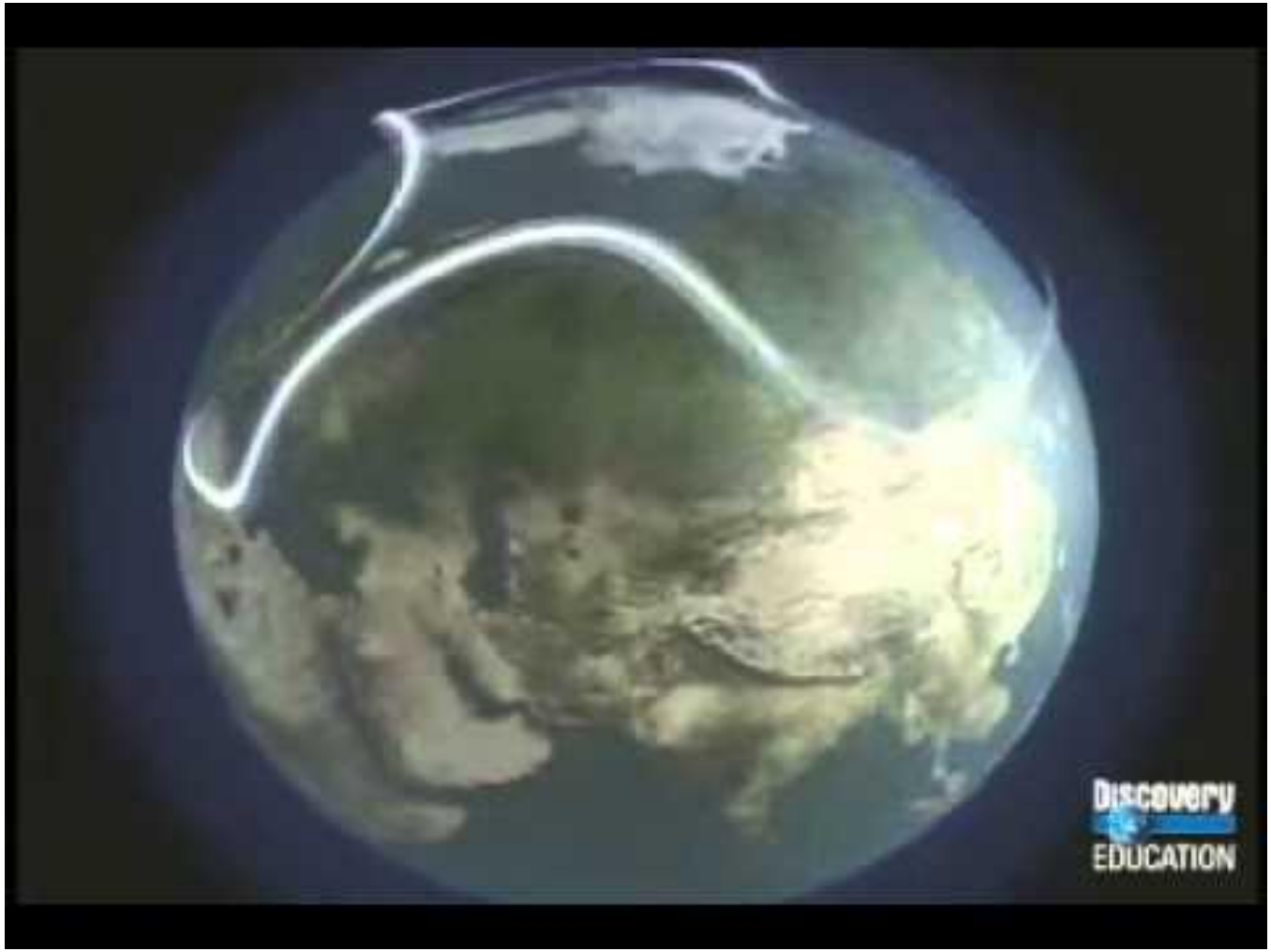
During the day, both the land and water absorb radiation from the sun. The land warms up faster than the water, The warm air over the land rises and the cool air from the water moves in causing a sea breeze.



Land Breeze

At night the land cools faster than the water. The air over the water rises, and the cool air from the land blows over the water causing a land breeze.

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