Global Weather Patterns

Hurricanes

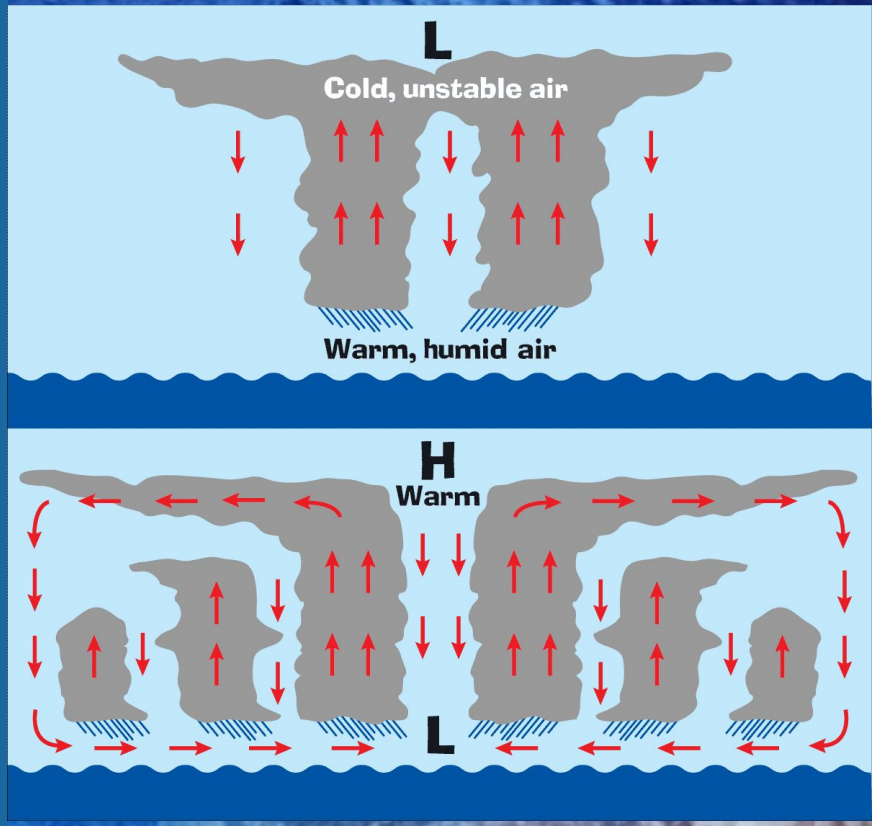

Hurricane
Season
June 1 - November 30

Hurricane Ingredients

- warm tropical water - at least 80° F
- high humidity
- light wind
- low pressure area
- form between 5° and 20° latitude

Hurricane Formation

As water evaporates from warm ocean waters this warm, moist air (less dense) rises in the atmosphere, leaving less air near the surface, and forming a low pressure area

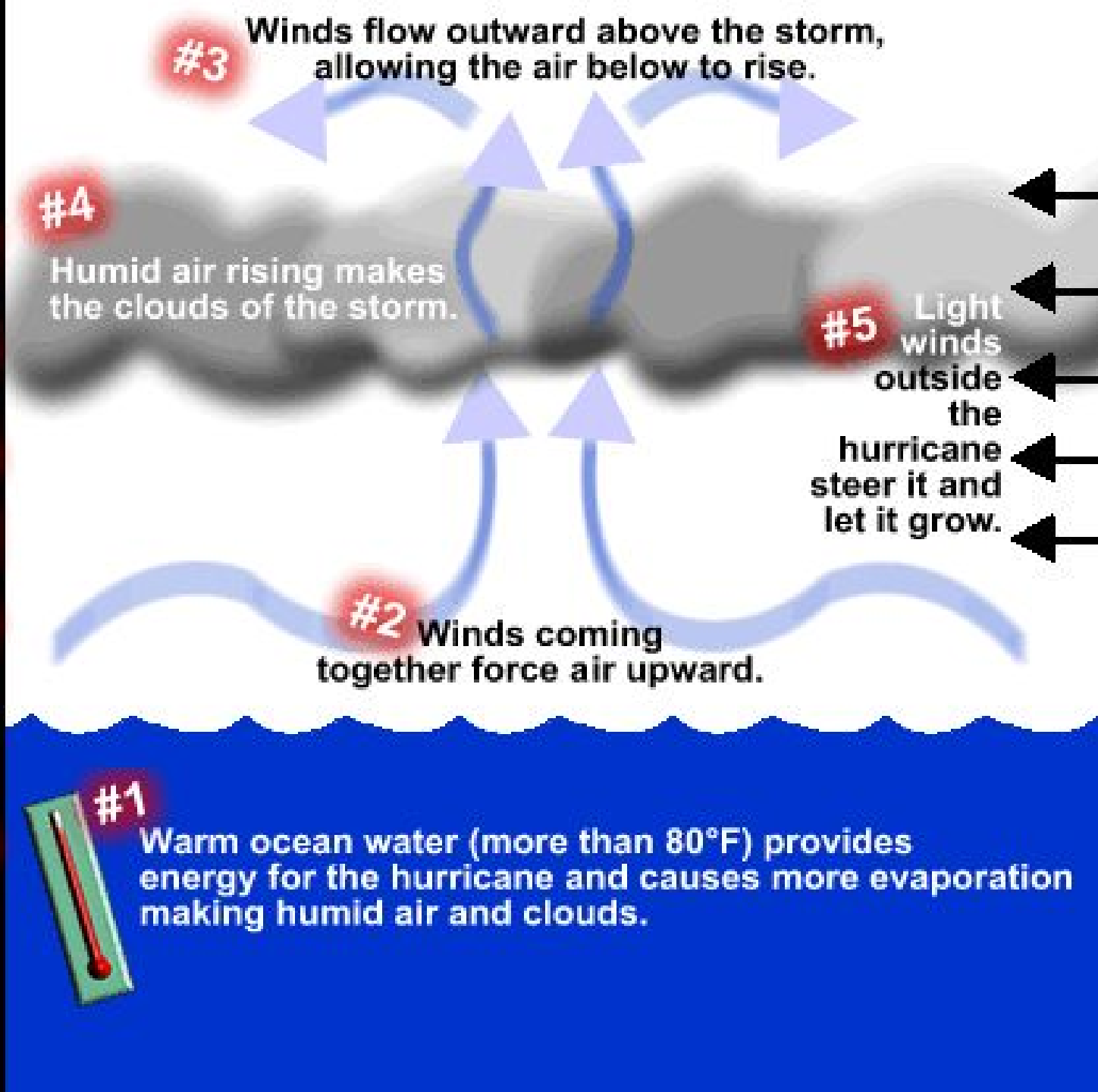


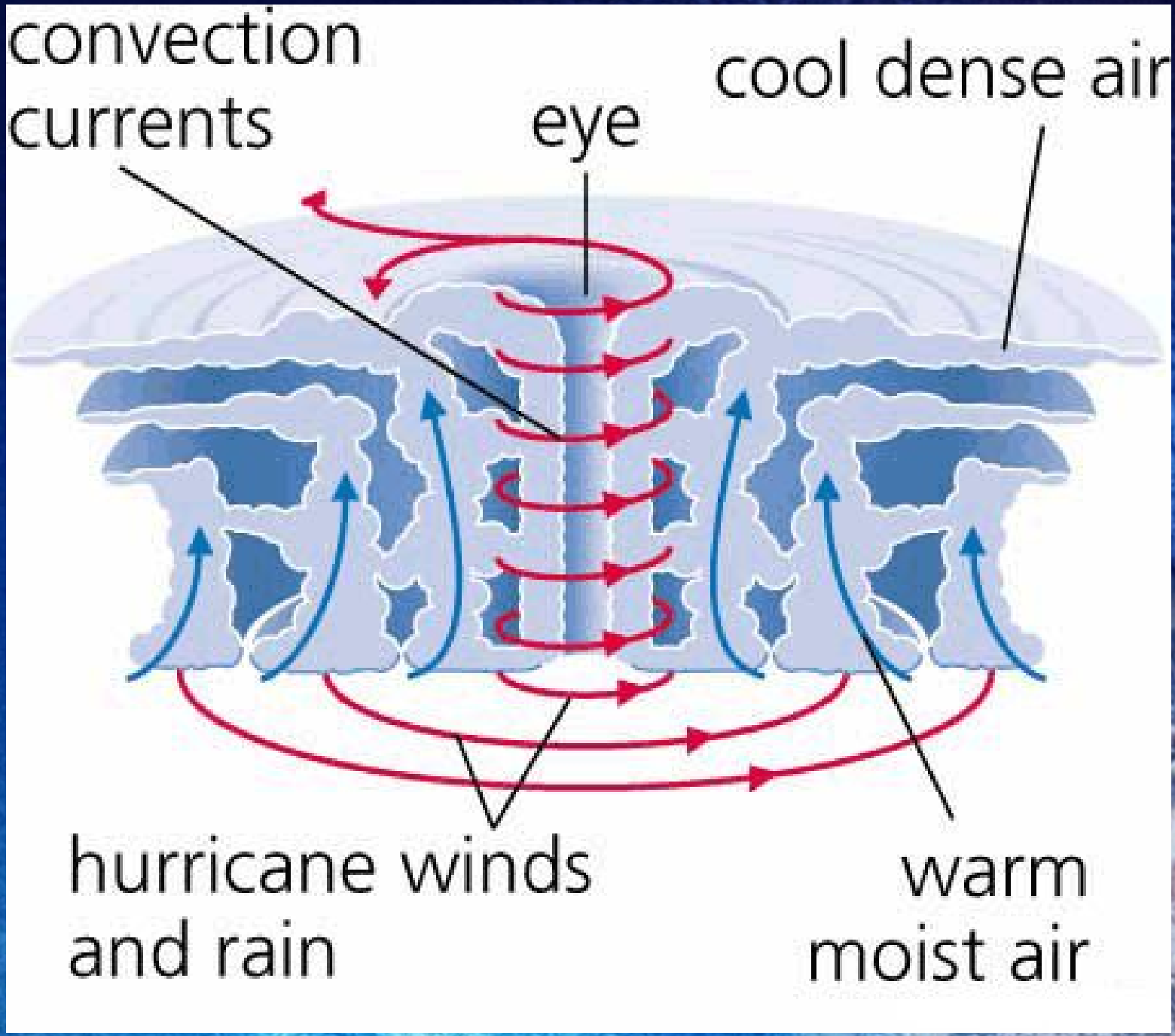
Hurricane Formation

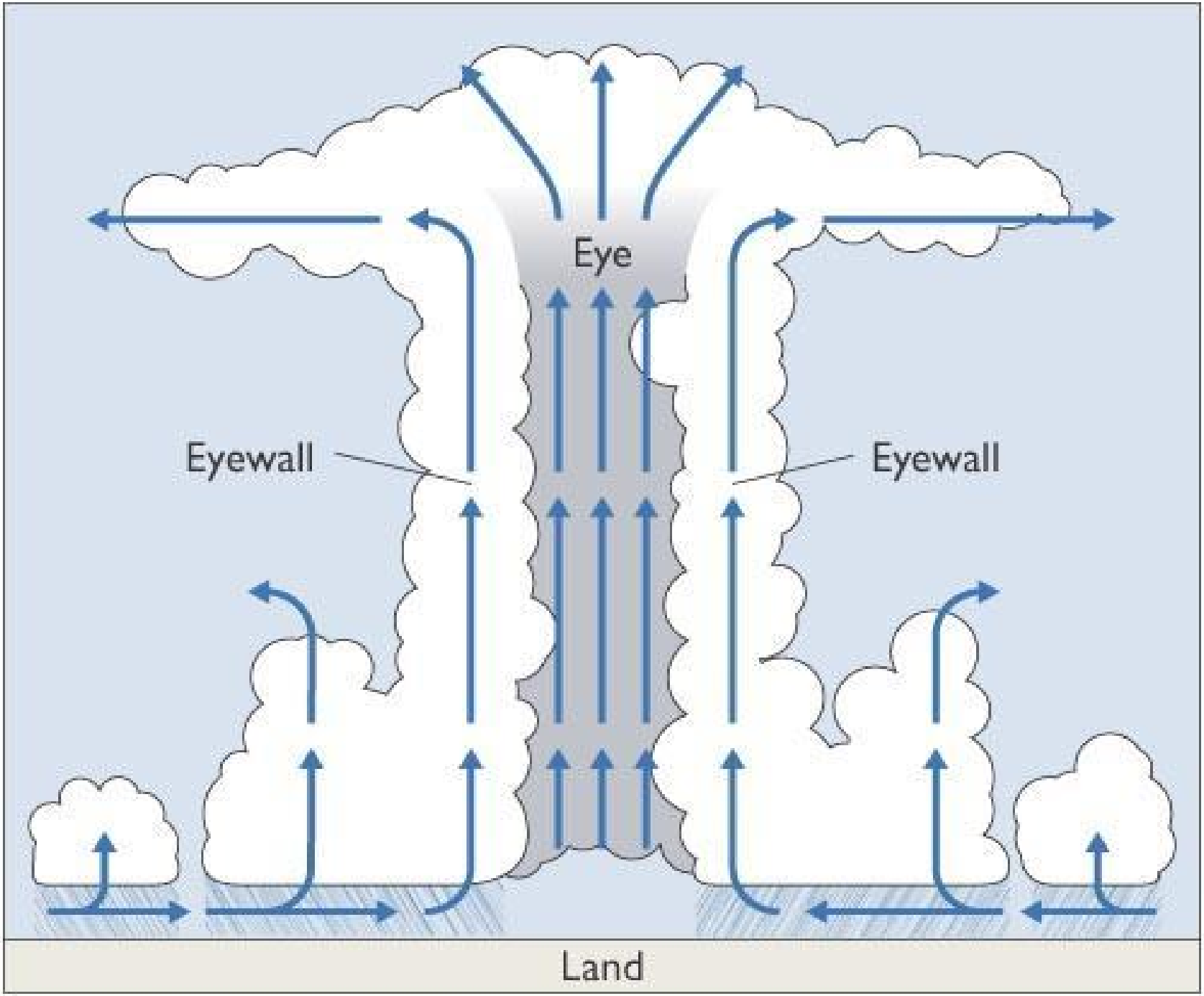
Hurricane Formation

As more ocean water evaporates and fuels the hurricane, the low pressure at the surface will get stronger and it will spin faster, leading to higher sustained wind speeds

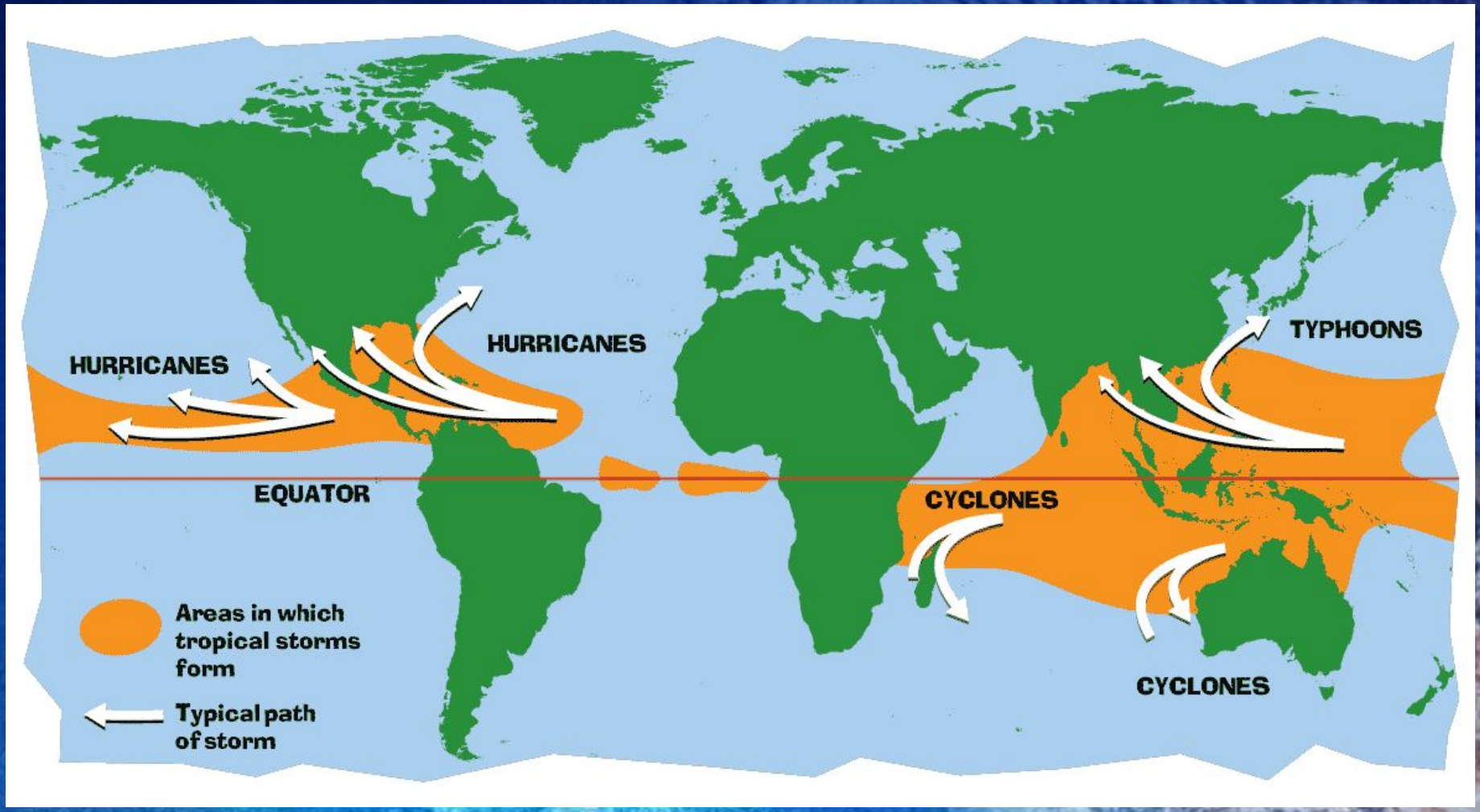
WHAT DOES A HURRICANE NEED?




convection currents
eye
cool dense air
hurricane winds and rain
warm moist air


Eye
Eyewall
Eyewall
Land

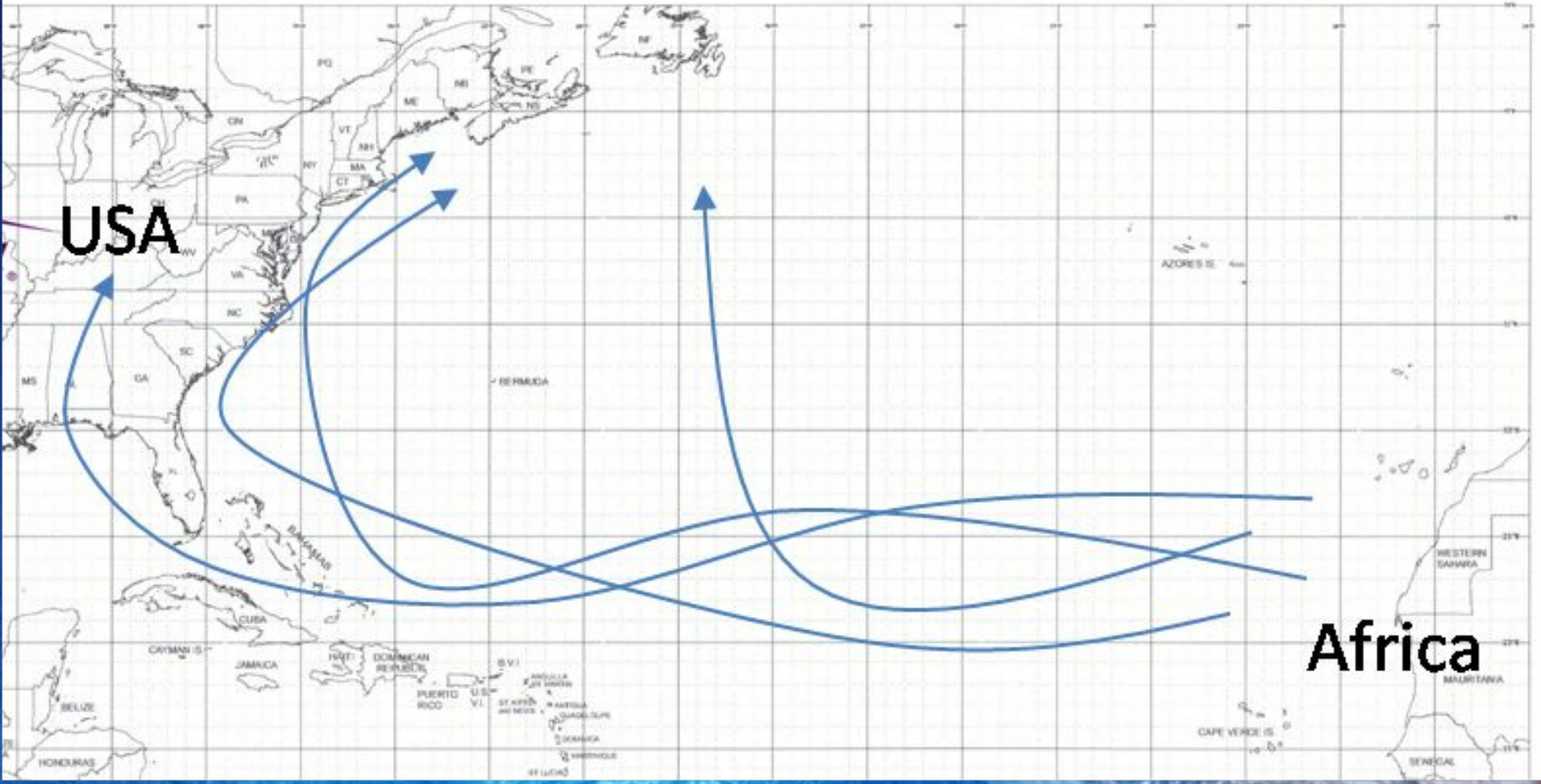
Hurricanes need warm water to form so they form near the equator, but not on it.

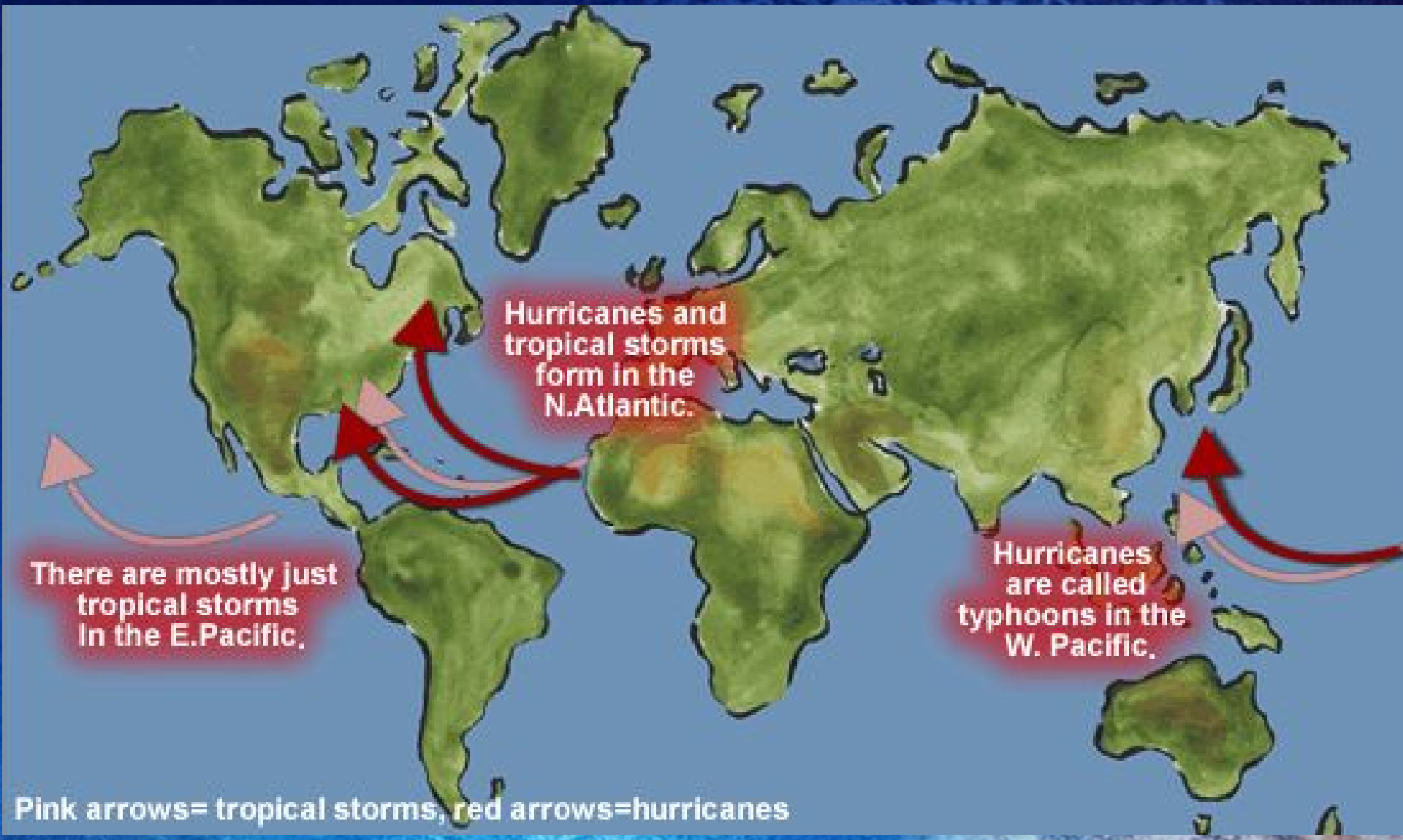



HURRICANE FORMATION
TYPICAL HURRICANE TRACKS
STORMS DEVELOP
AFRICAN WAVES

Atlantic Basin Hurricane Tracking Chart

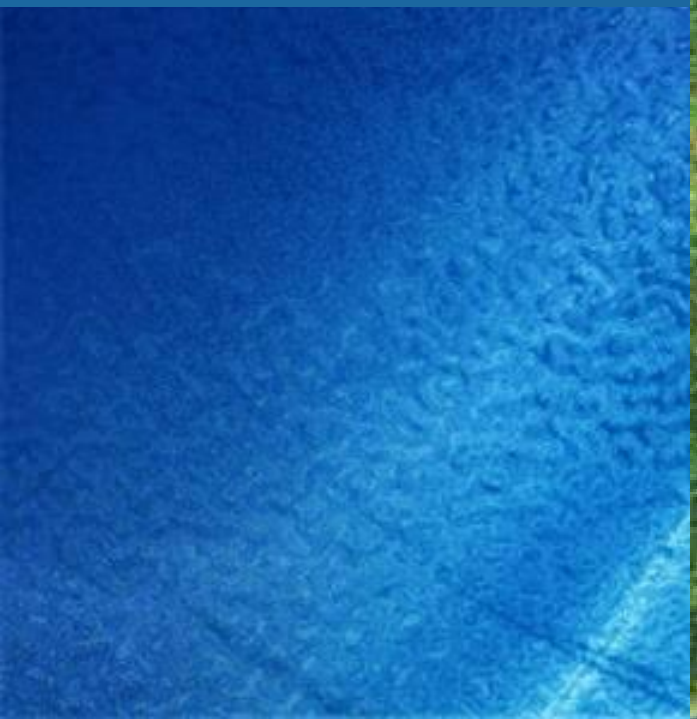
National Hurricane Center, Miami, Florida

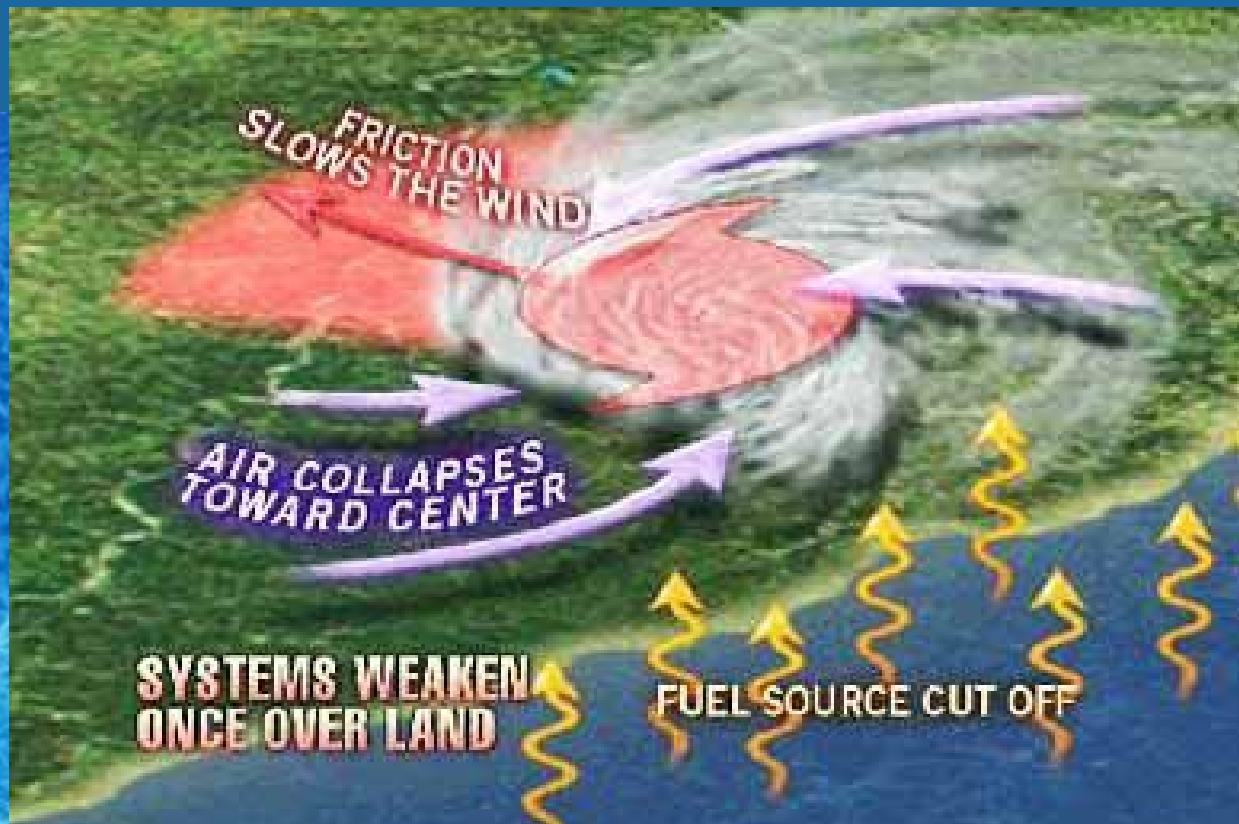



Hurricanes and tropical storms form in the N.Atlantic.
There are mostly just tropical storms In the E.Pacific.
Hurricanes are called typhoons in the W. Pacific.
Pink arrows= tropical storms, red arrows=hurricanes

Hurricanes weaken as they move over land

- they lose their source of heat and moisture
- friction over land also reduces the circulation of surface winds, weakening a hurricane



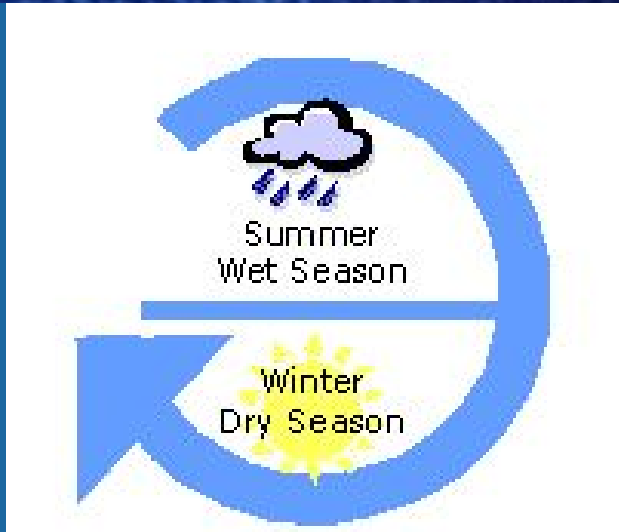


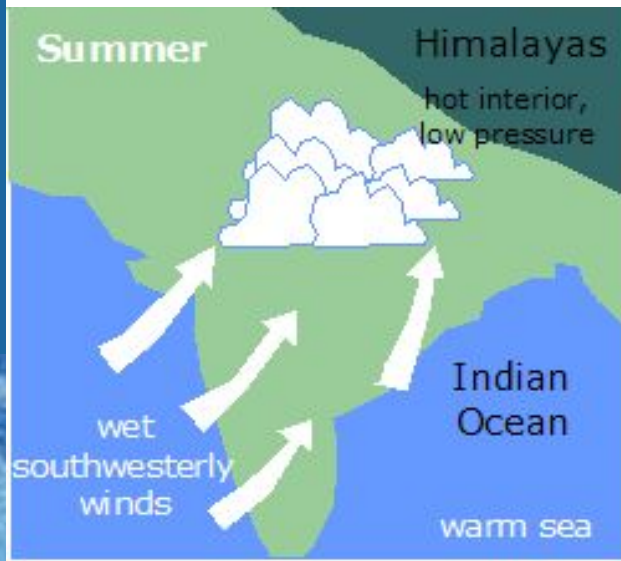

NASA

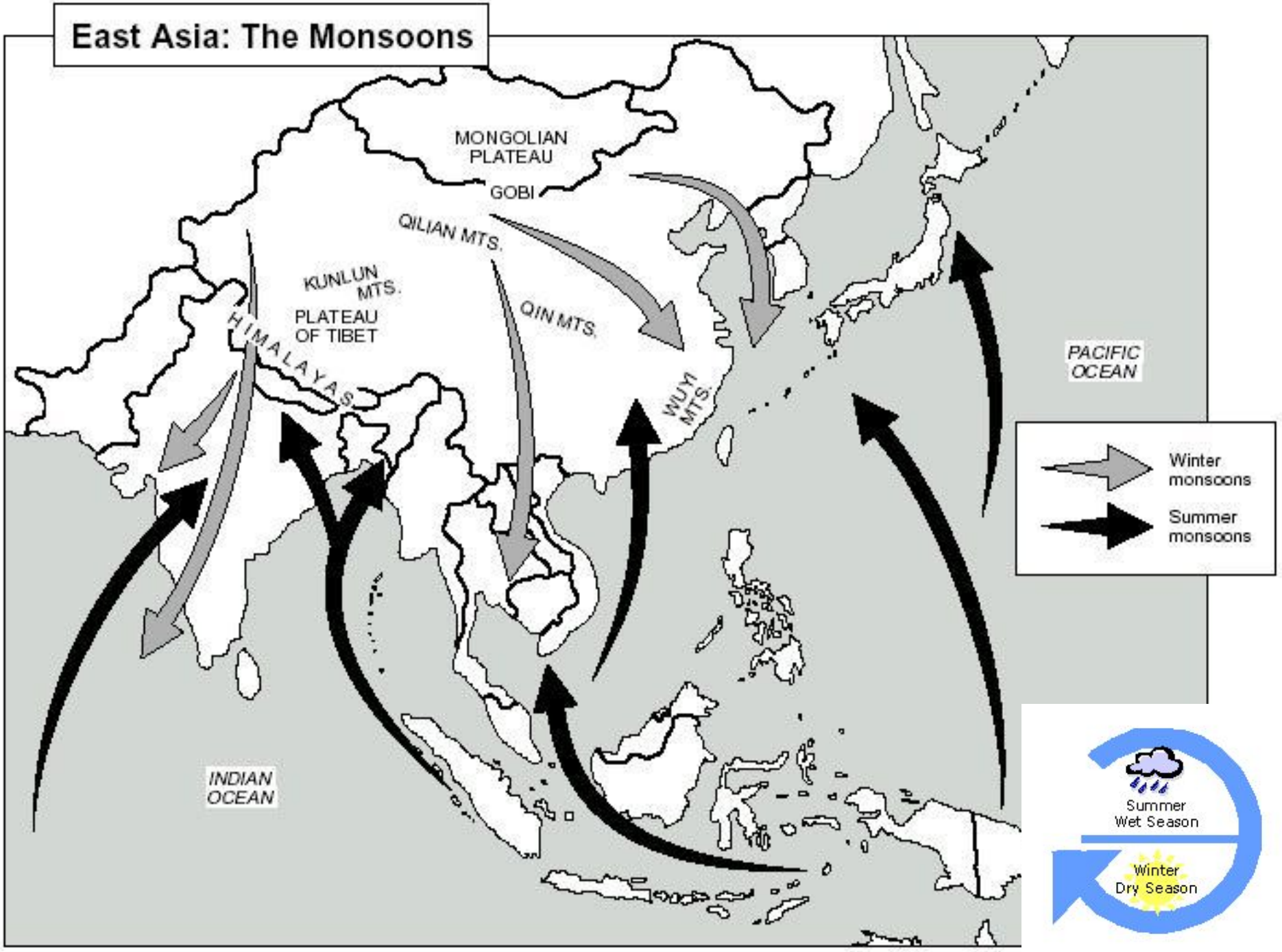
Monsoons

Monsoons blow from the land toward the sea in winter, and from the sea toward land in the summer

- Runs from June to September
- Intense period of heavy rain, booming thunder, and plenty of lightning

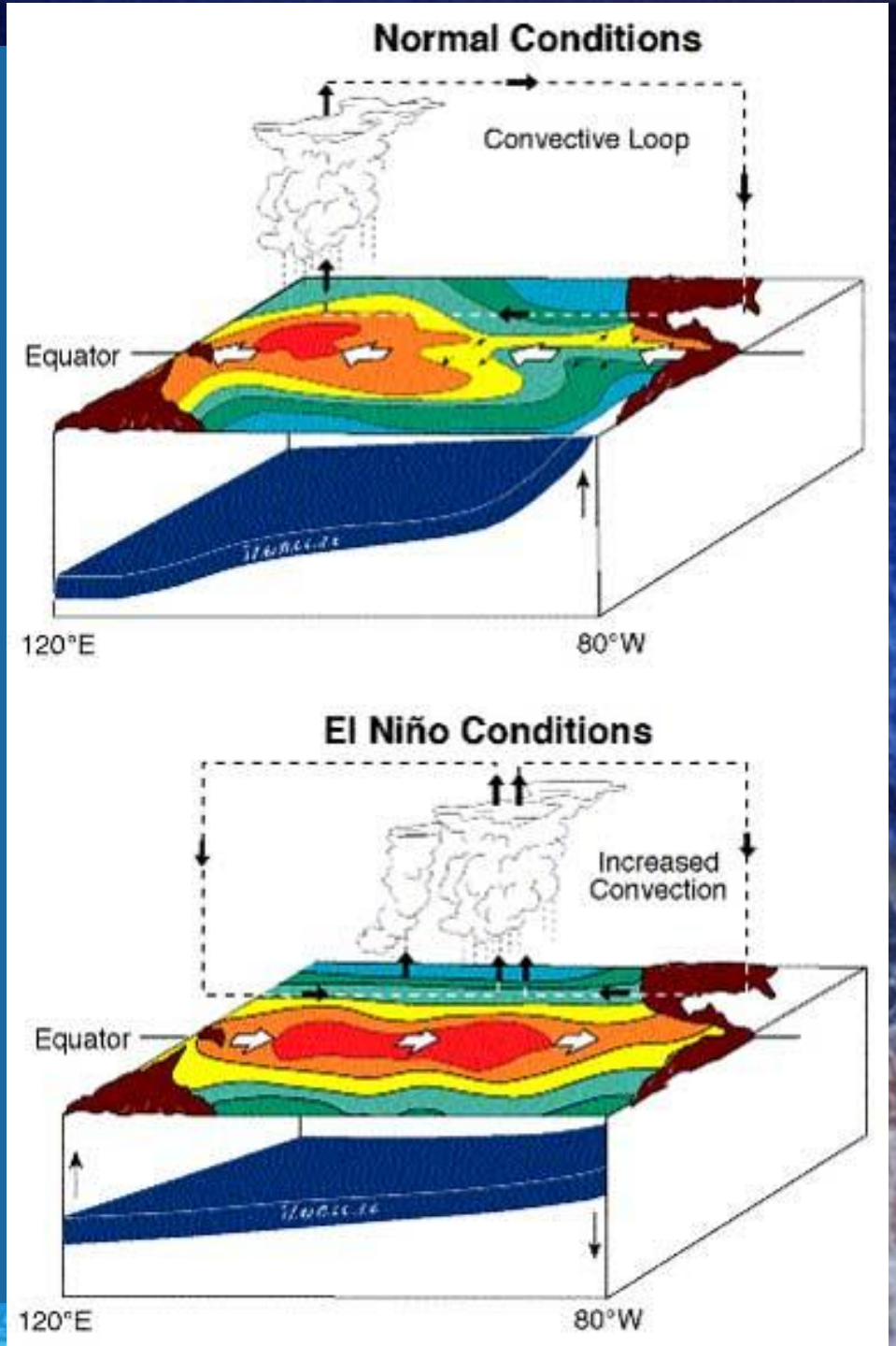





East Asia: The Monsoons
MONGOLIAN PLATEAU
GOBI
QILIAN MTS.
KUNLUN MTS.
PLATEAU OF TIBET
HIMALAYAS
QIN MTS.
WUYI MTS.
PACIFIC OCEAN
INDIAN OCEAN
Winter monsoons
Summer monsoons
Summer Wet Season
Winter Dry Season


El Niño

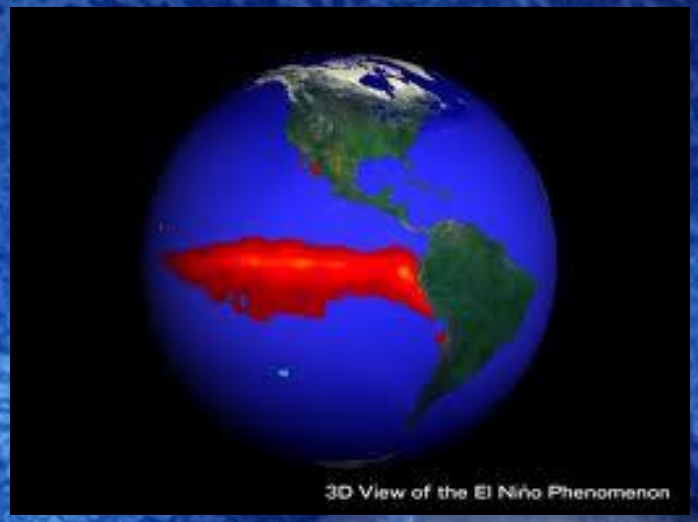
- abnormally high surface ocean temperatures off the coast of South America
- causes unusual weather patterns across the globe
- occur every 2 to 7 years



https://www.youtube.com/watch?v=0gPFu5xOoLQ

El Nino

Starts because the easterly trade winds weaken and allow the warm waters in the Western Pacific to move east toward South America



El Nino - animation of warm pool

Notice the eastward movement of warm water (shaded red) from the western equatorial pacific to the eastern equatorial pacific.

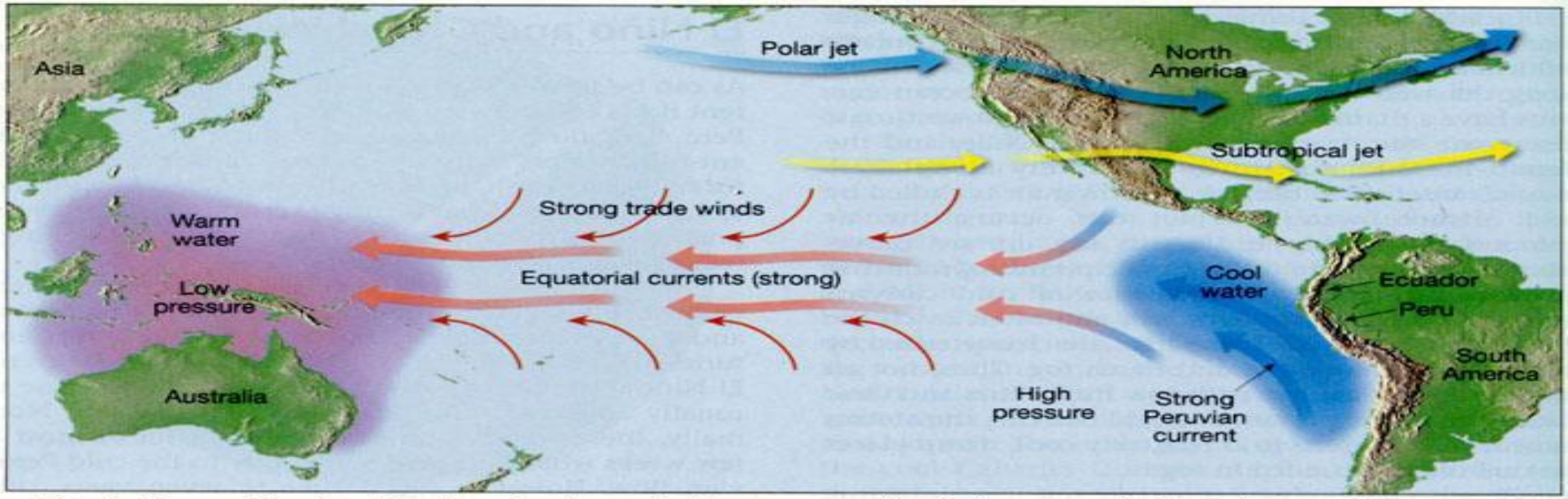


Fig.6 Normally, the trade winds and strong equatorial currents flow toward the west. At the same time, an intense Peruvian current causes upwelling of cold water along the west coast of South America.

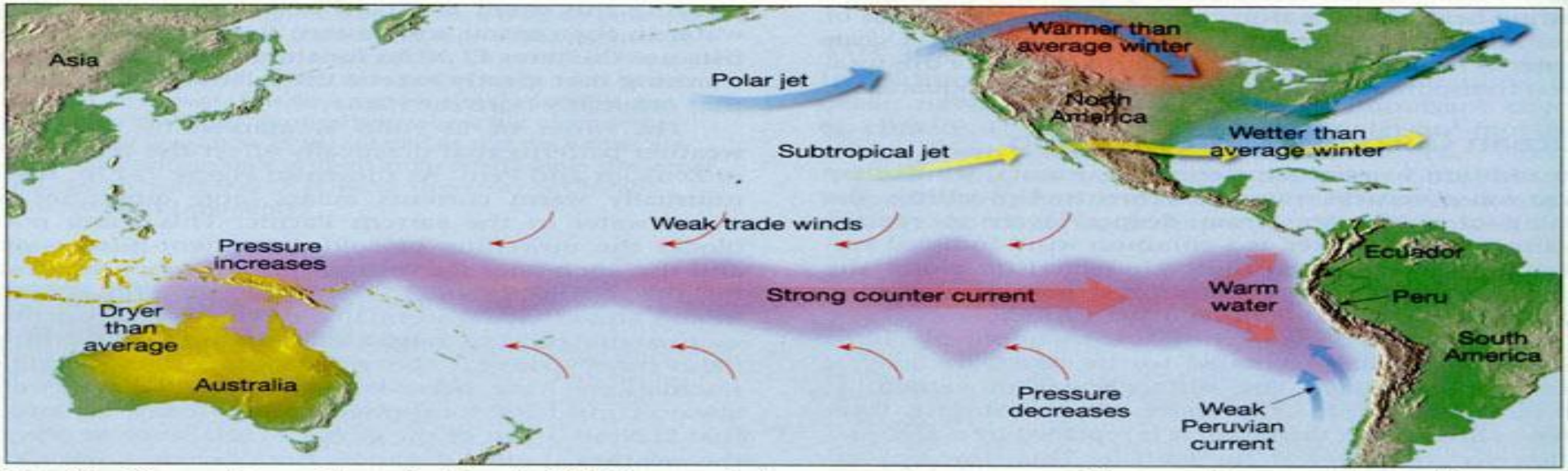
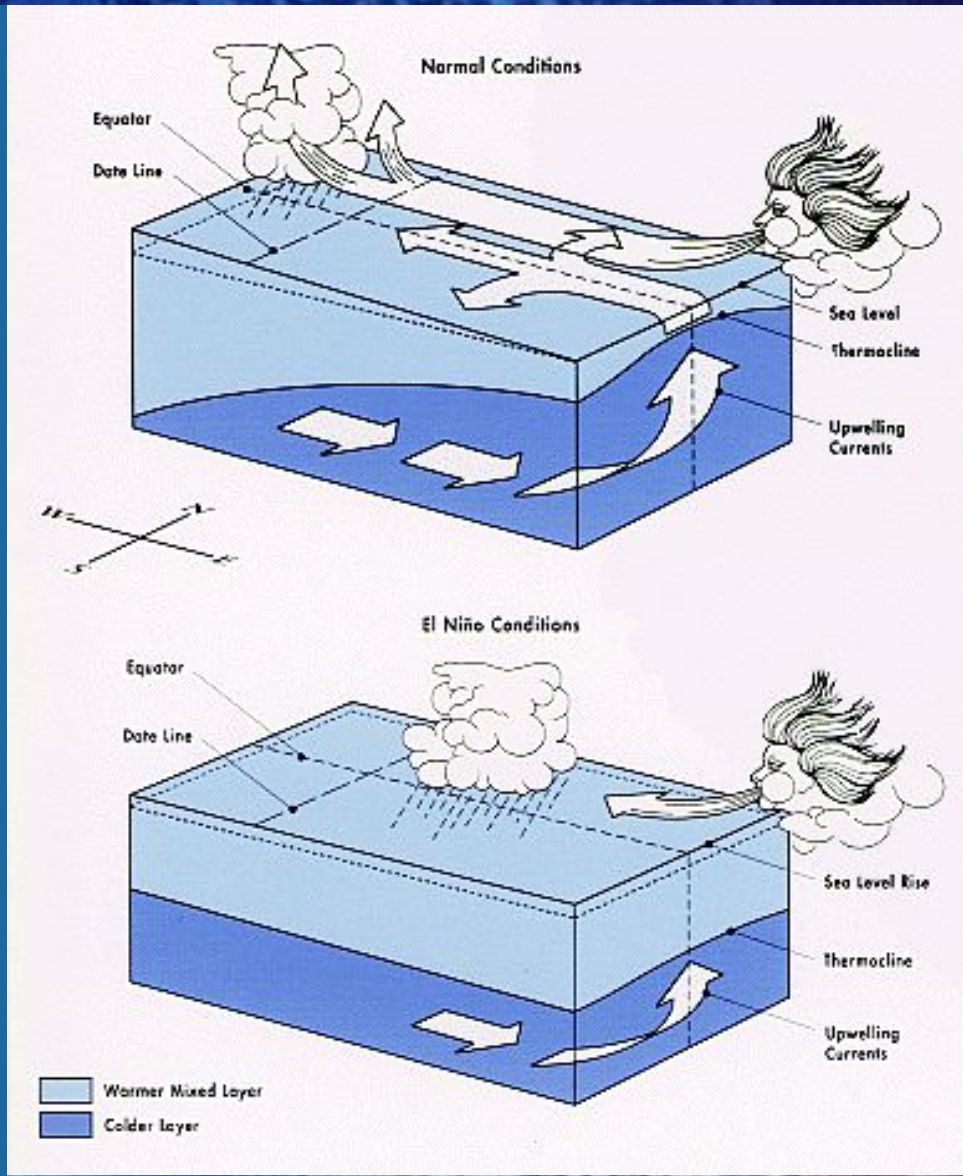


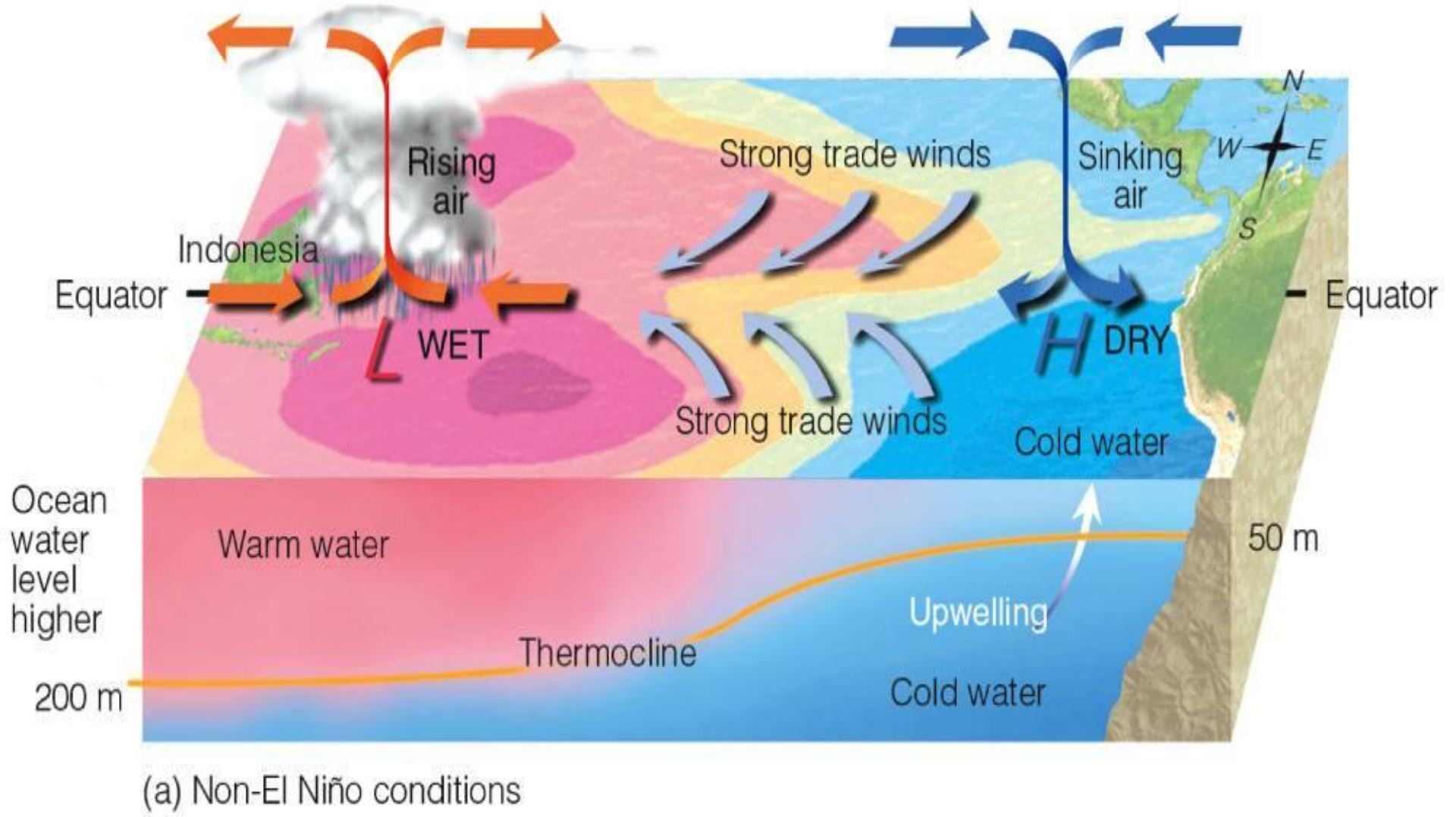
Fig.14 Upon the advent of an ENSO event, the pressure over the eastern and western Pacific flip-flops. This causes the trade winds to diminish, leading to an eastward movement of warm water along the equator. As a result, the surface waters of the central and eastern Pacific warm, with far-reaching consequences to weather patterns.

El Nino

- changes where the convection current occurs
- causes rain where it usually doesn't occur and drought where it usually rains

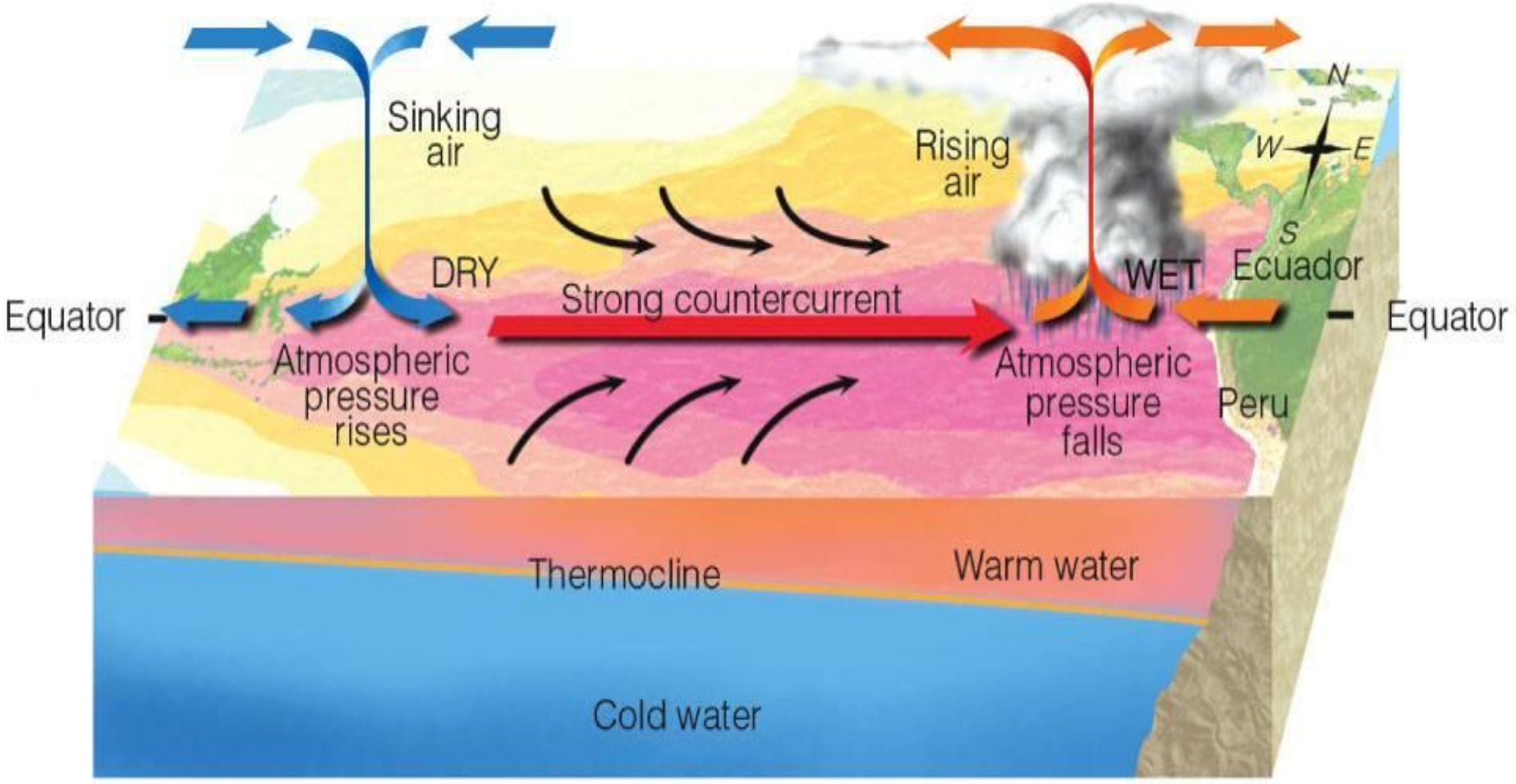


Normal year



(a) Non-El Niño conditions

El Nino year

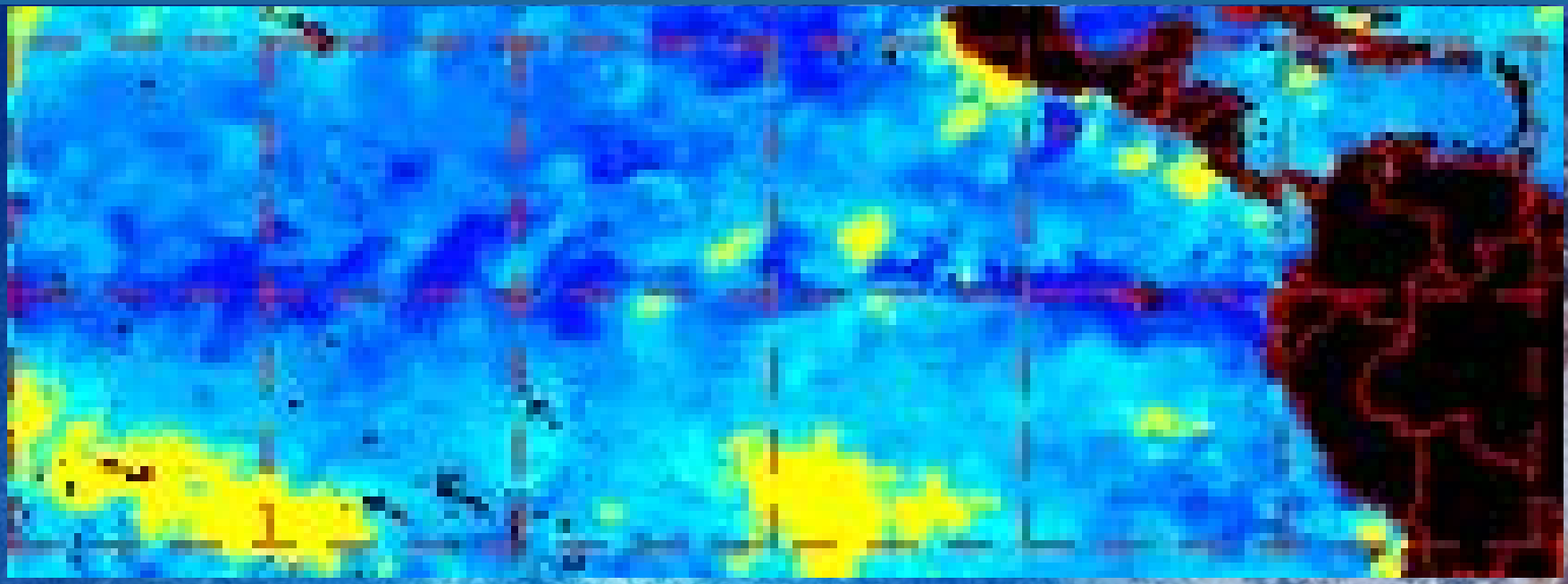


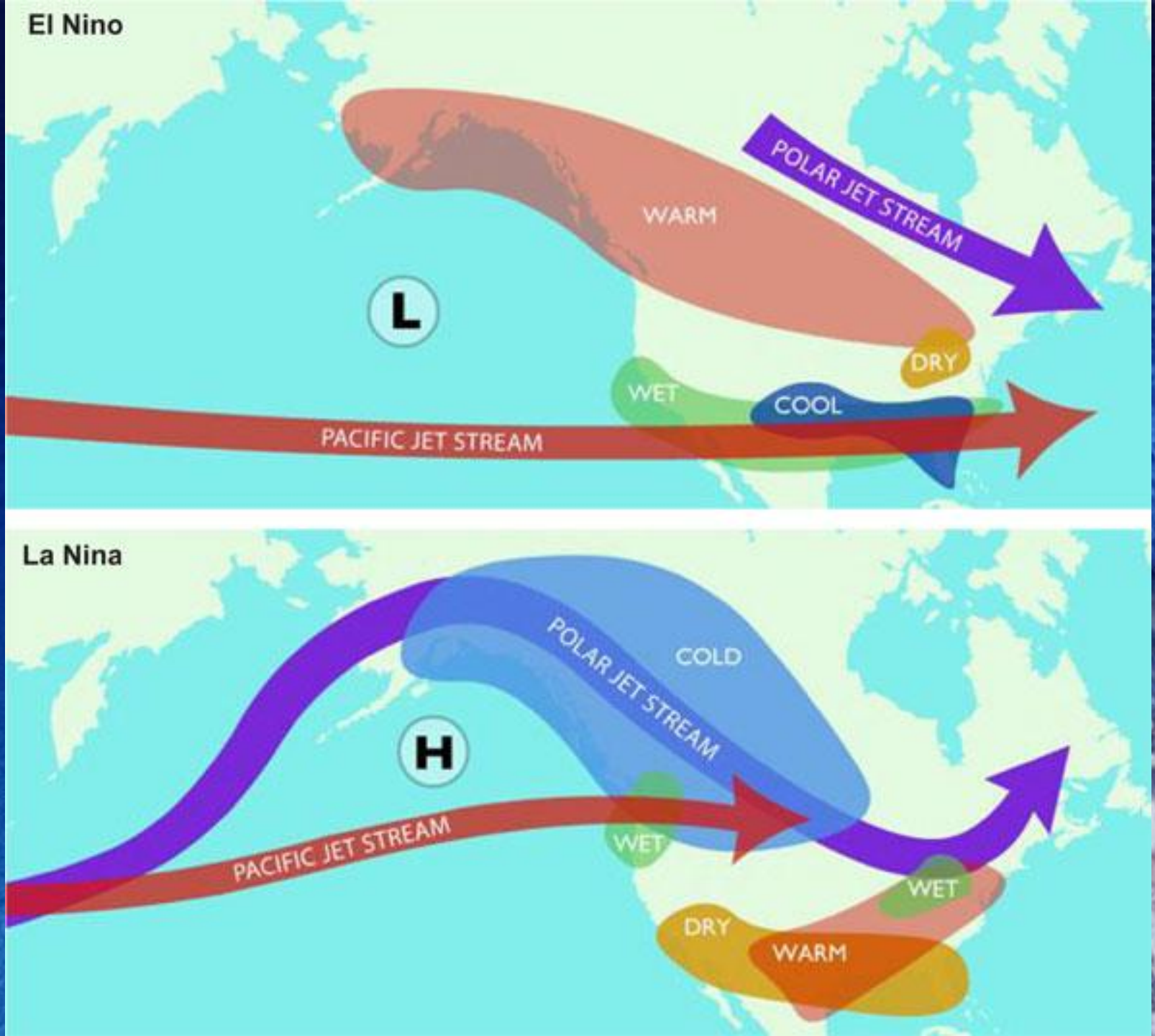
(b) El Niño Conditions

El Nino Years

La Nina

- after the El Nino phase, the La Nina follows
- abnormally Low surface ocean temperatures off the coast of South America
- causes unusual weather patterns across the globe




El Nino
WARM
POLAR JET STREAM
L
DRY
WET
COOL
PACIFIC JET STREAM
La Nina
COLD
POLAR JET STREAM
H
PACIFIC JET STREAM
WET
WET
DRY
WARM

Animation

EL NINO - Weaker Trade Winds

- warm water spreads out
- equal condensation & precipitation throughout
- compared to Normal, there is LESS precipitation near Asia and MORE by the Americas

NORMAL / LA NINA - Strong Trade Winds

- more warm water near Asia
- more condensation
- more precipitation