

# HURRICANES

A satellite image of Hurricane Hugo, showing a well-defined eye and a dense, swirling cloud structure. The hurricane is positioned over the Atlantic Ocean, with the eastern coast of North America visible in the lower-left quadrant. The image is colorized, with the eye appearing as a bright yellow-green spot, surrounded by white and light blue clouds, and the outer rings of the storm in darker shades of blue and purple. The surrounding ocean and landmasses are shown in various shades of green and brown.

**Hurricane Hugo**

2:44 p.m. EDT  
September 21, 1989

# Tropical Cyclone

A tropical cyclone is a **rapidly rotating storm system** characterized by a **low-pressure center**, **strong winds**, and a spiral arrangement of thunderstorms that produce **heavy rain**.

- Formed from organized groups of thunderstorms.
- Classified depending on its location and strength:
  - Cyclonic storm (general term)
  - Tropical Depression
  - Tropical Storm
  - Tropical cyclone (Southern Hemisphere and Indian Ocean)
  - Typhoon (Northwestern Pacific)
  - Hurricane (Northeast Pacific or North Atlantic)

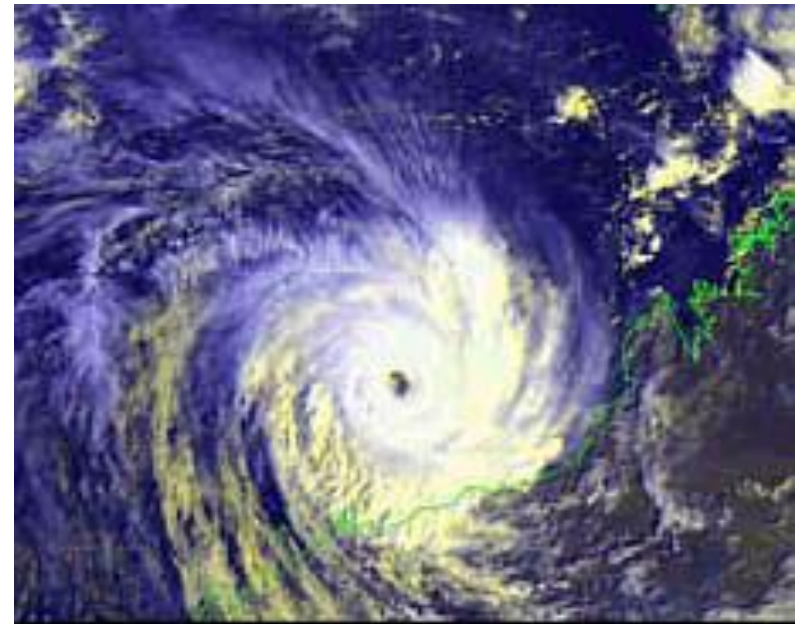


# Winds, Pressure, Rotation

- Hurricane strength wind speeds **> 74 mph**.
- Barometric pressure inside the hurricane is **LOW**.
- In which direction does a hurricane rotate?

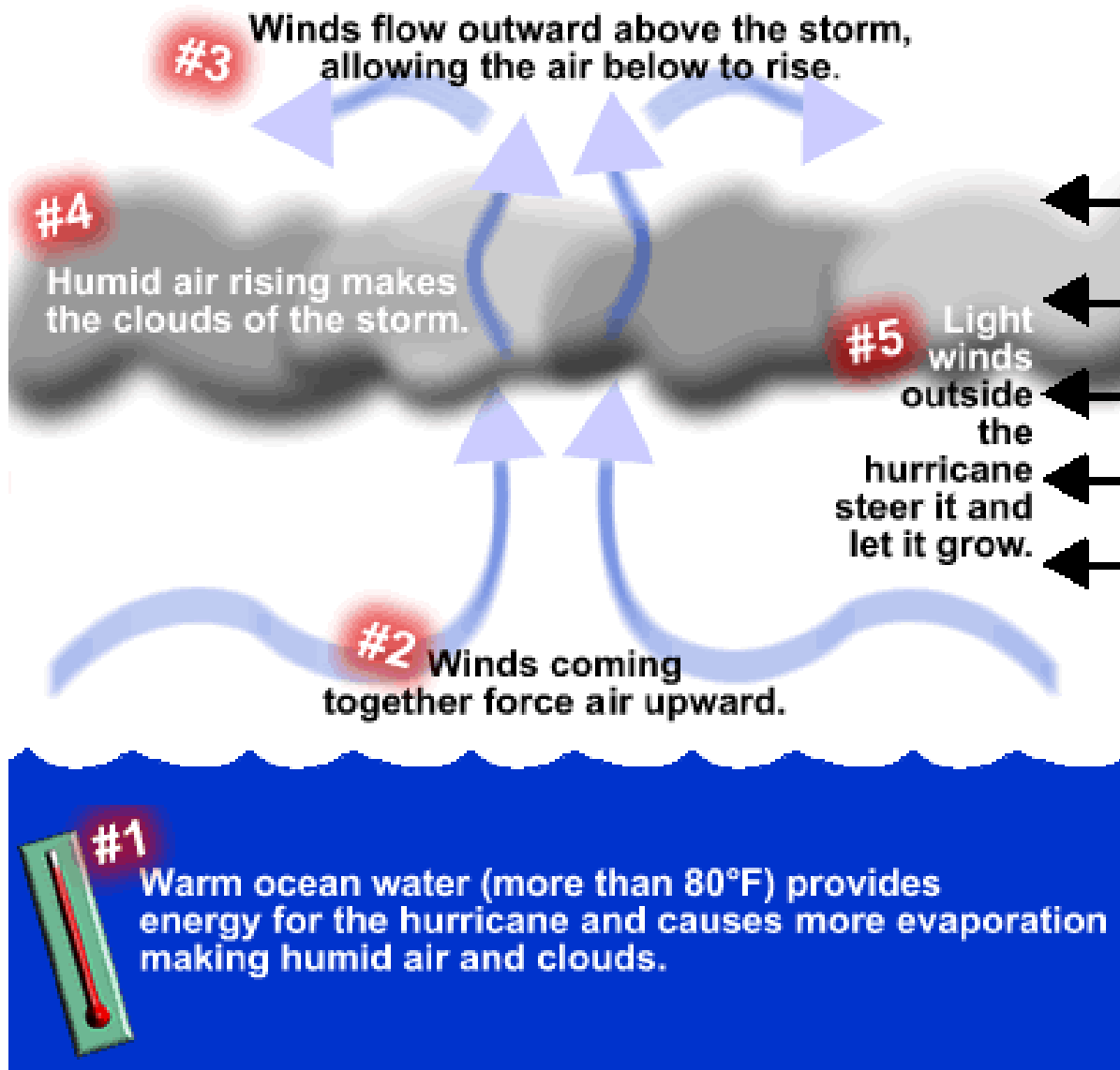


**COUNTERCLOCKWISE**  
in **Northern** Hemisphere



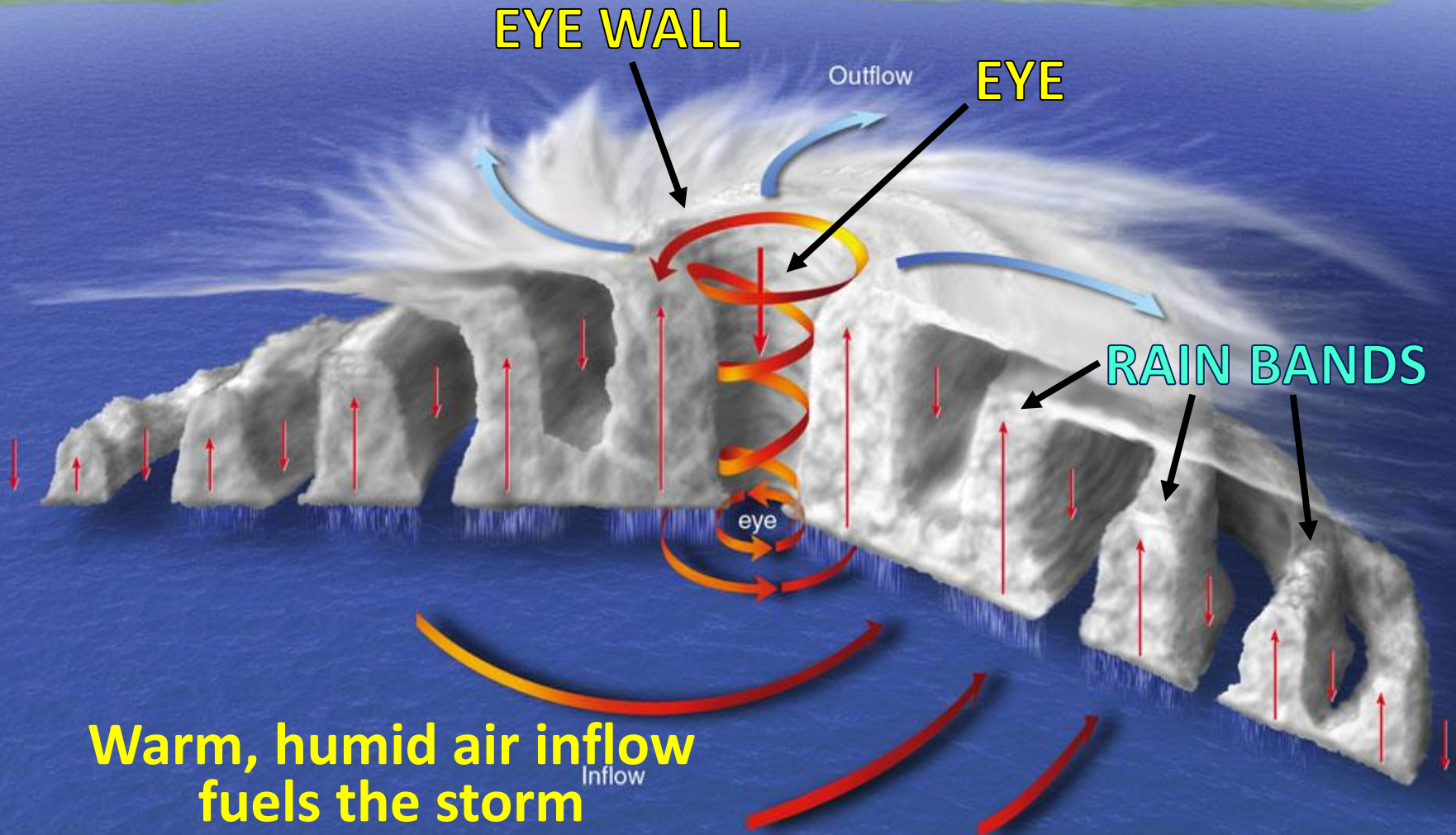
**CLOCKWISE**  
in **Southern** Hemisphere

# Ingredients of a Hurricane

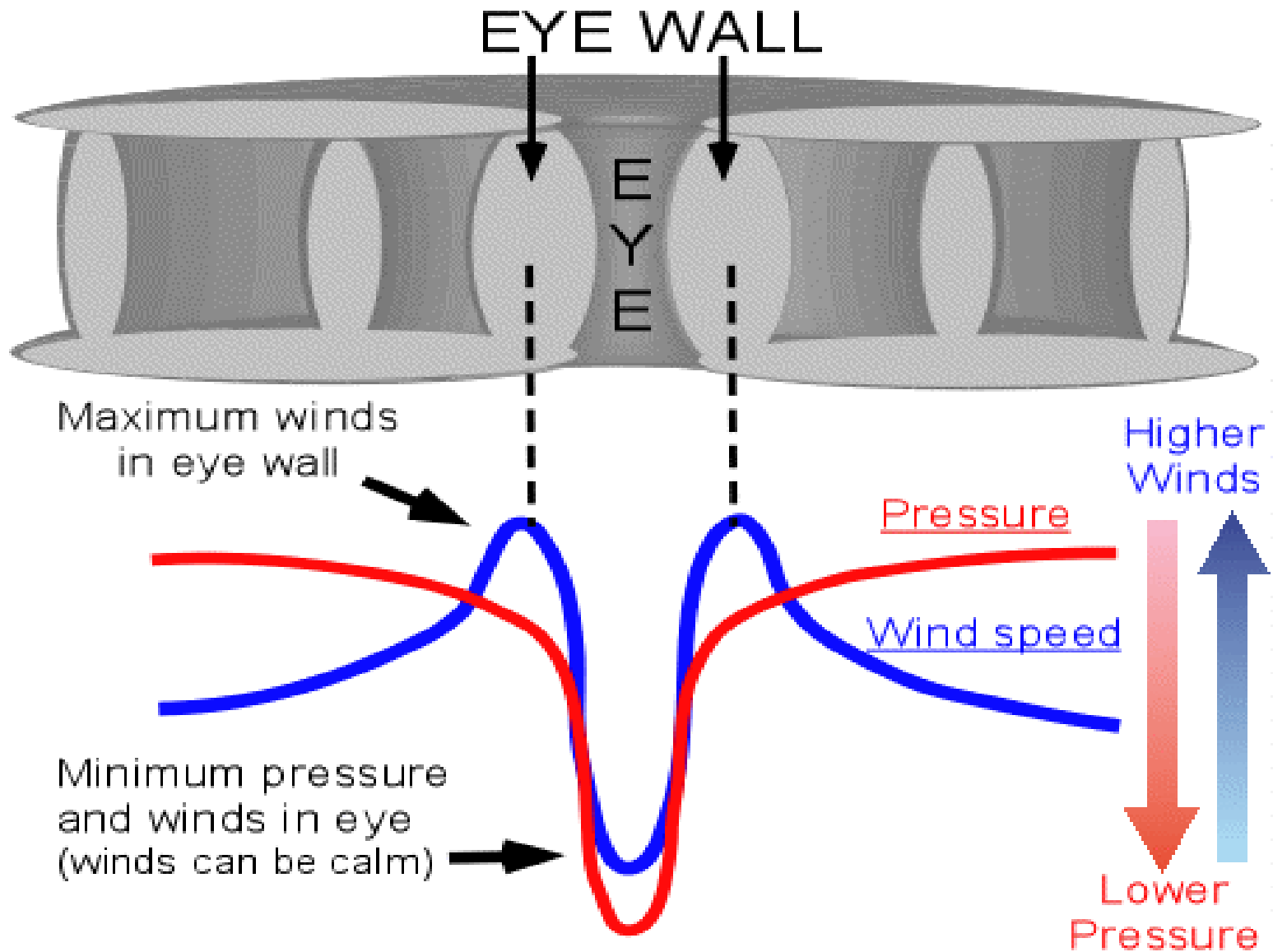


- **Warm water**  
(at least 26.5°C/  
79.7°F are needed  
down to a depth of  
at least 50 m/ 160 ft)
- **Time to grow**
- **Conditions  
to develop  
circulation**  
(location off equator)
- **Light upper  
level winds**  
(wind shear destroys  
thunderstorm  
organization)

# Hurricane Structure



# Pressure and Wind Speed Profile

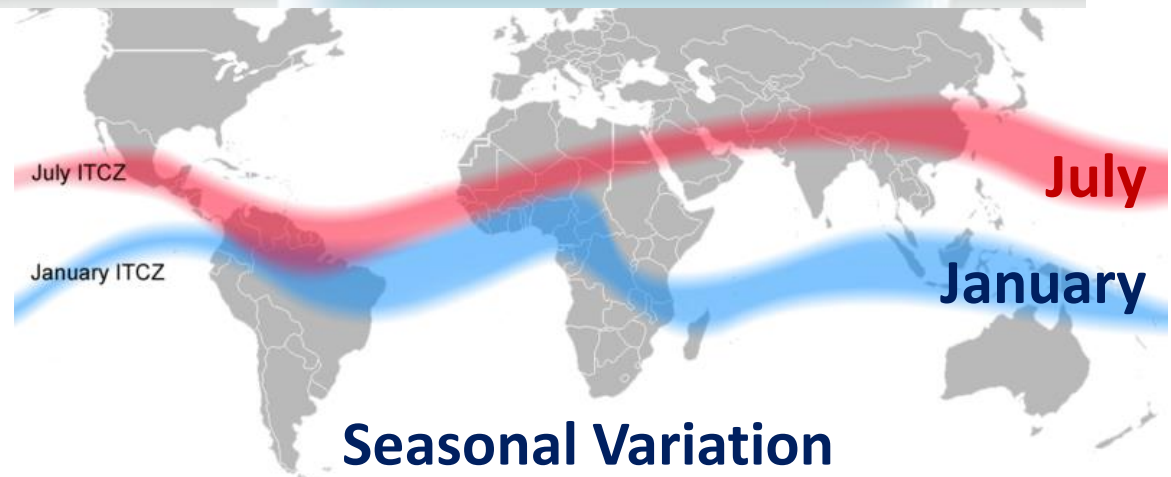


# Where are Hurricanes Forming?

## InterTropical Convergence Zone (ITCZ)



Area of low pressure near the Equator, a worldwide band of thunderstorm activity.



# When is Hurricane Season?

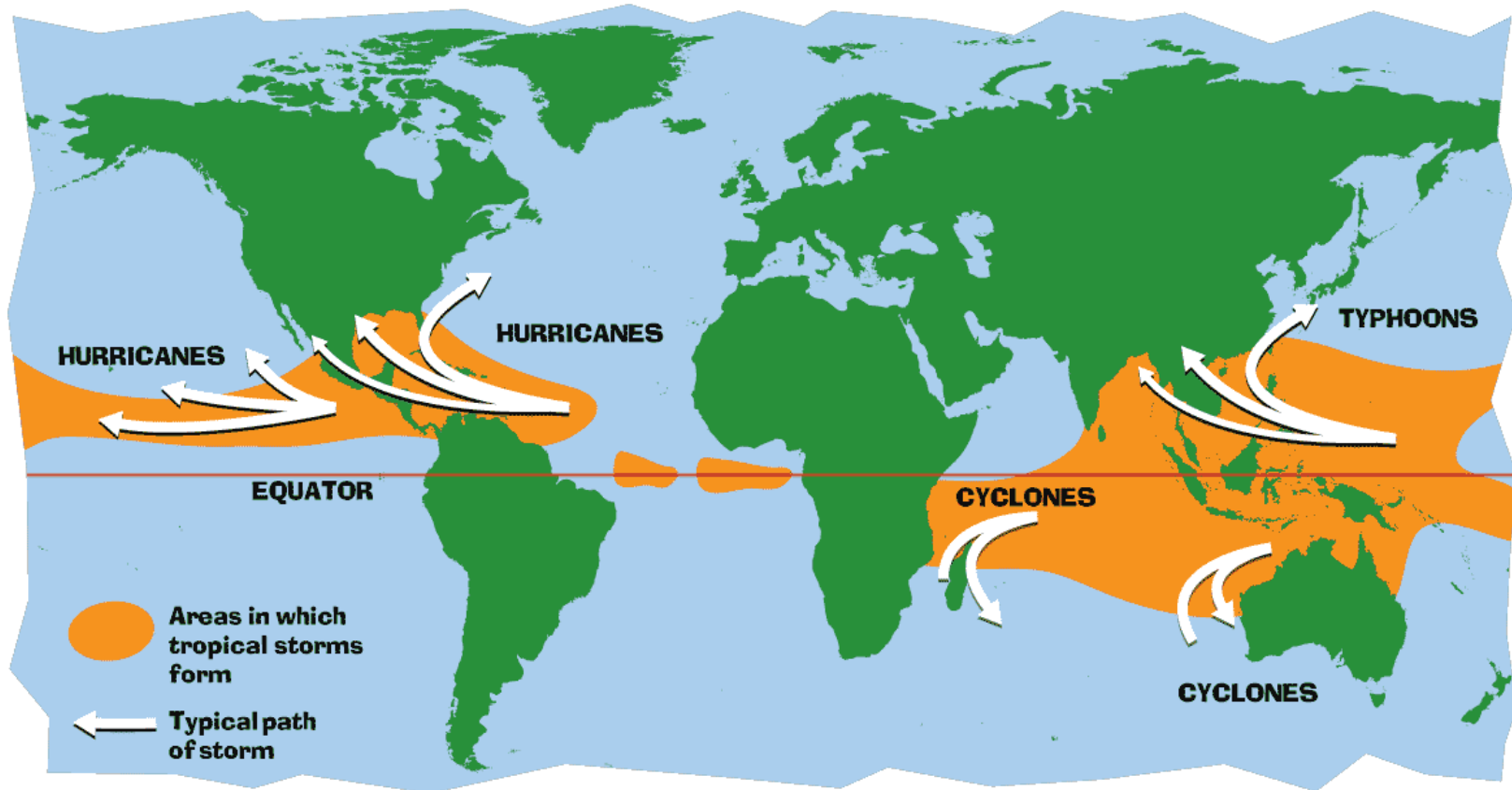
- Northern Atlantic Ocean: a **distinct cyclone season** occurs from **June 1 to November 30** (peaking from late August through September).



- Northeast Pacific Ocean: May 15 to November 30.
- Northwest Pacific: **year-round** (a minimum in February and March and a peak in early September).
- North Indian basin: April to December (has two peaks - May and November).
- Southern Hemisphere: **year-round** (peaking mid-February to early March).



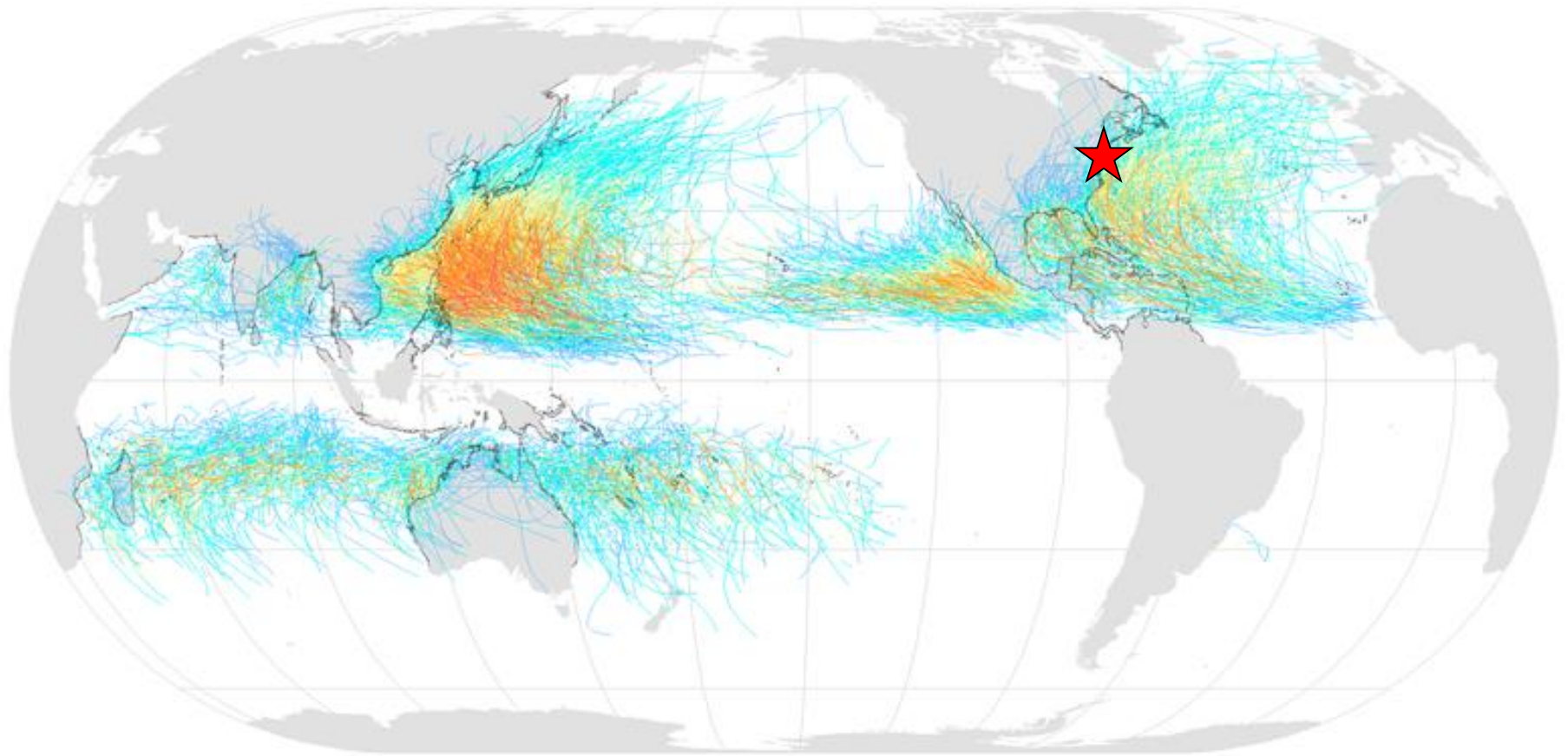
# Formation and Typical Paths



- The majority of tropical cyclones forms between 10 and 30 degrees of latitude away of the equator:
- 87% between 10-20 degrees north or south,
  - rarely form or move within 5 degrees of the equator where Coriolis effect (responsible for storm rotation) is low.

# Historical Data

## Tropical Cyclones, 1945–2006



Saffir-Simpson Hurricane Scale:

tropical  
depression

tropical  
storm

hurricane  
category 1

hurricane  
category 2

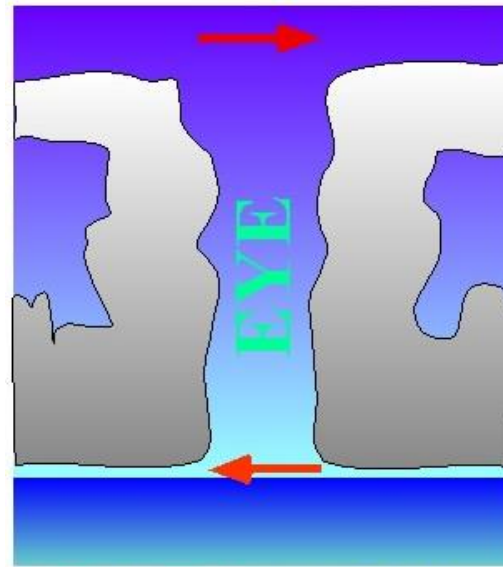
hurricane  
category 3

hurricane  
category 4

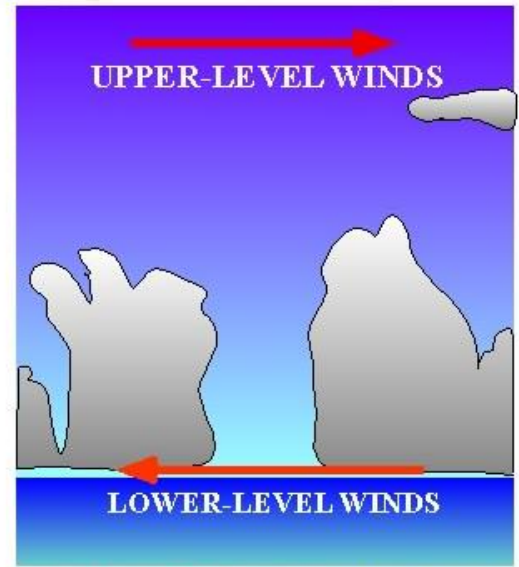
hurricane  
category 5

# What destroys a hurricane?

- **Strong vertical wind shear** causes convection and loss of vertical storm organization.
- **Cold water** (moving over waters significantly below 26.5 °C/79.7 °F).



**WEAK SHEAR = FAVORABLE**



**STRONG SHEAR = UNFAVORABLE**



- **Movement over land** - most strong storms lose their strength very rapidly after **landfall** and become disorganized areas of low pressure within a day or two as a result of **friction** and **lack of moisture**.

# North Atlantic Hurricane Lifecycle

