CANES ON CANES PRESENTS: THE YIN AND YANG OF HURRICANES

Marybeth Arcodia
Kurt Hansen
James Hlywiak

UNIVERSITY OF MIAMI
ROSENSTIEL SCHOOL of MARINE & ATMOSPHERIC SCIENCE
Tropical Cyclones Around the World
Recipe For a Hurricane

LOW VERTICAL WIND SHEAR

MOIST ATMOSPHERE

DEEP LAYER OF WARM OCEAN
Into the Storm

~20 miles

~300-400 miles

Eye
Eyewall

Rainbands

~20 miles

~300-400 miles
Carnot Heat Engine
Balance

- All steps occurring at the same time
- Hurricanes rely on both
- 2 contrasting elements of the same system
TCs Versus Mid-Latitude Storms

Tropical Cyclones need warm waters, low shear, and a moist atmosphere. But other cyclones like blizzards don’t need these ingredients. Why?
What is the difference?
• Tropical Cyclone
  • Gets energy from warm ocean water
  • Winds are strongest at the surface
  • Storms are usually smaller, on average 230 miles across
  • TCs form at low latitudes (5-25 degrees north)

• Extratropical Cyclone
  • Gets energy from difference in temperature
  • Winds are strongest well above the surface
  • Usually larger
  • XTCs form at mid-latitudes (25-poles)
Hurricanes in the Northern vs Southern Hemisphere

- Angular Momentum

On a merry-go-round spinning counterclockwise, the Coriolis effect makes rolling balls deviate to the right.

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Coriolis Force

- Objects deflect to the right in the Northern Hemisphere and to the left in the Southern Hemisphere.
- Winds move from high pressure to low pressure.
Tropical Cyclones

- Counter-clockwise in Northern Hemisphere
- Clockwise in the Southern Hemisphere
- No hurricanes at the equator!
- ~5 degrees N&S
Conclusion

- Internal Circulation: In, up, out, repeat
- Tropical Cyclones and Mid-Latitude Storms are two sides of the same coin
- Mirror-image cyclonic spin across the equator