

Topic 19: Hurricanes

<https://geowiki.ucsd.edu/sio15>

Weekly test #6 (due Tue 11/12 **noon**)
opens Sun 11/10 at 9 am
 will include homework 4!
 Questions on geowiki under 'tests' tab

SIO15 2024: Topic 19 - Hurricanes

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Hurricanes

short videos 15a,b

Ike, Aug 2006

- rel. large and long-lived
- hurricanes are 100-1500 km across
- strictly storms of tropical origin
- form in open ocean between 20° lat.
- summer – early fall
- classified into 5 categories

Ida, Aug 2021

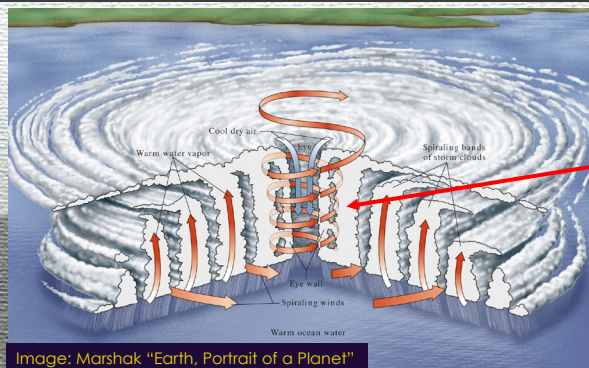
Batsirai, Jan 2022
 off Madagascar

Ike, 2008

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The Features of a Hurricane



thunderstorms

25% hurricanes
Spawn tornadoes

Image: Marshak "Earth, Portrait of a Planet"

- Hurricanes are 100 -1000+ km across
- eye in center (calm, dry air sinks) (35-60 km across)
- eye wall around eye: most intense winds
- spiraling arms: rain bands (speed ++ toward center)

the latent heat of a hurricane = U.S. electrical needs of 1/2 year

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Conditions for a Hurricane to Form

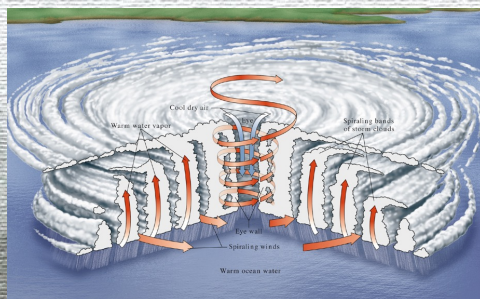


Image: Marshak "Earth, Portrait of a Planet"

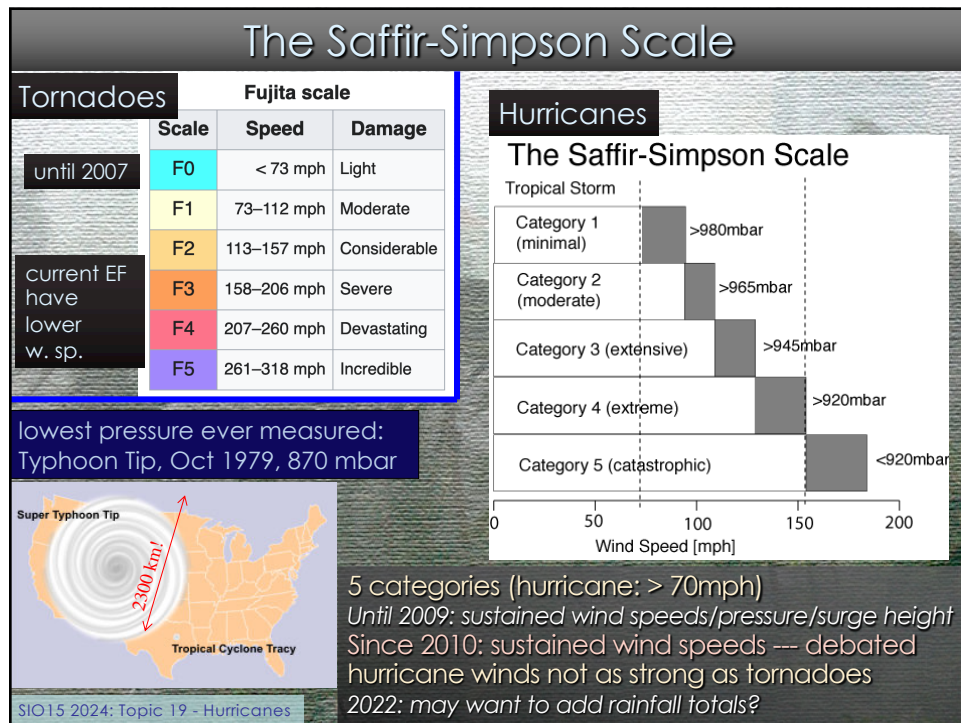
- tropical ocean
- low high-altitude winds

- evaporation of tropical water -> store latent heat
- air rises in L system
- condensation -> release of latent heat
- drives air even higher
- enhances surface L
- **rapid intensification over warmer oceans**

similar to
thunderstorm
but longer time scale

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What Makes Hurricanes Destructive?

hurricanes are destructive:

- high wind speeds
- large waves in open ocean
- storm surge approaching coast
- intense rainfall



Long Beach Island; Hurricane Sandy 2012 (wikipedia)



Katrina makes landfall in Florida, captured by EARTH15-2005 student David Nourani

STORM SURGES

(up to more than 6m)

- high winds push waves to pile up
- low pressure pulls sea surface up
- concurrent high tide enhances

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Galveston, TX Sep 8, 1900

The Deadliest Natural Disaster in U.S. History

- Galveston lies on barrier island
- port
- wealthiest TX town at time
- 38,000 people
- 6000 people perished

hurricane surge
(winds, low pressure, high tide)
- waves 1ft higher than highest point

See Topics 13/14
(Floods)



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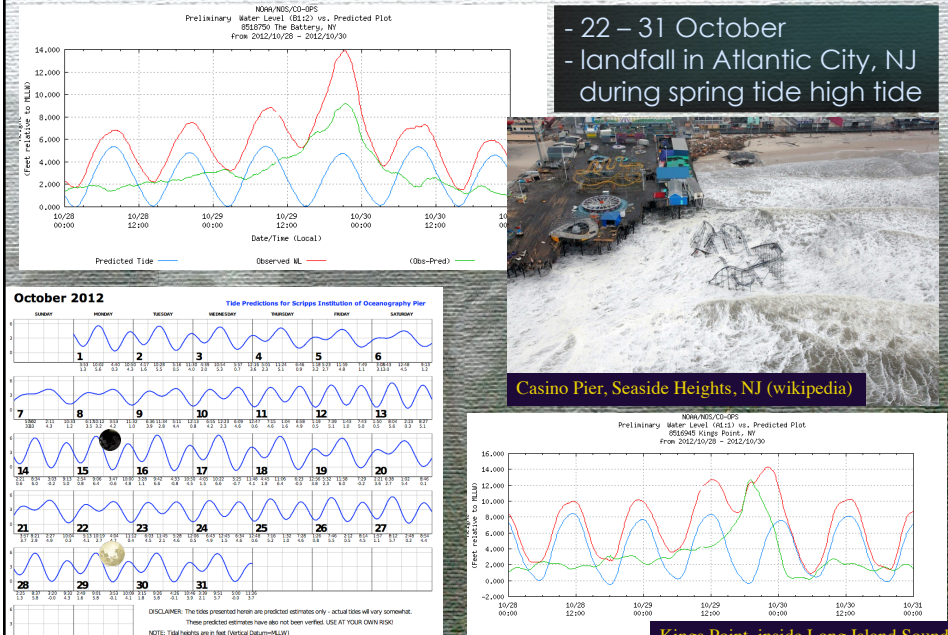
Superstorm Sandy 2012

NOAA/NGS-CO-OPS
Preliminary Water Level: 08131 vs. Predicted Plot
081040 Kings Point, NY
From 2012/10/28 - 2012/10/30

- 22 – 31 October
- landfall in Atlantic City, NJ during spring tide high tide

Casino Pier, Seaside Heights, NJ (wikipedia)

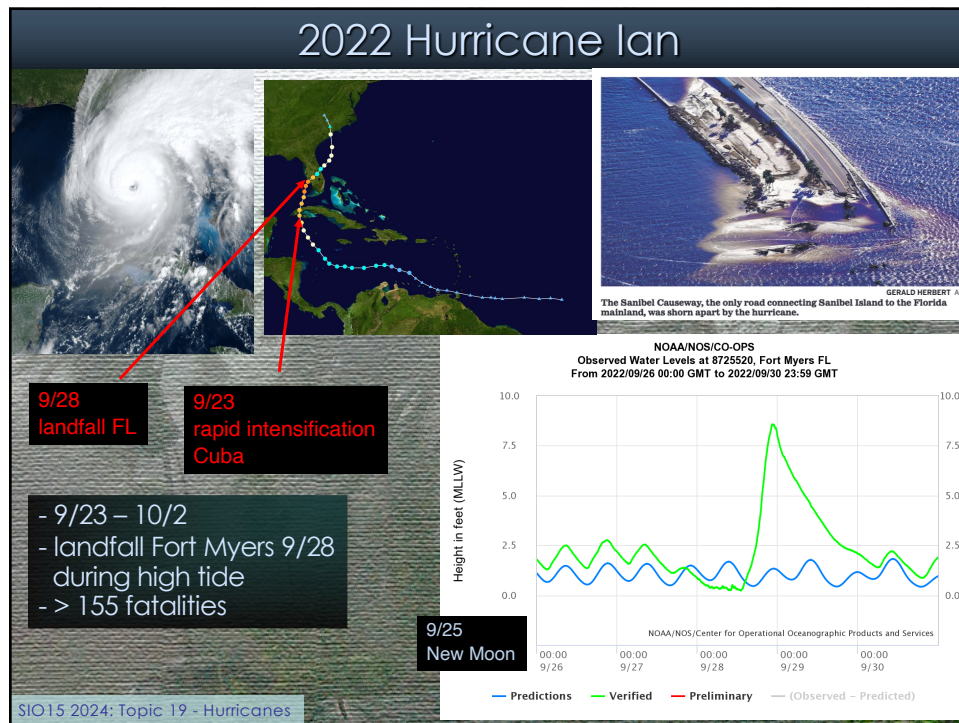
Kings Point, inside Long Island Sound



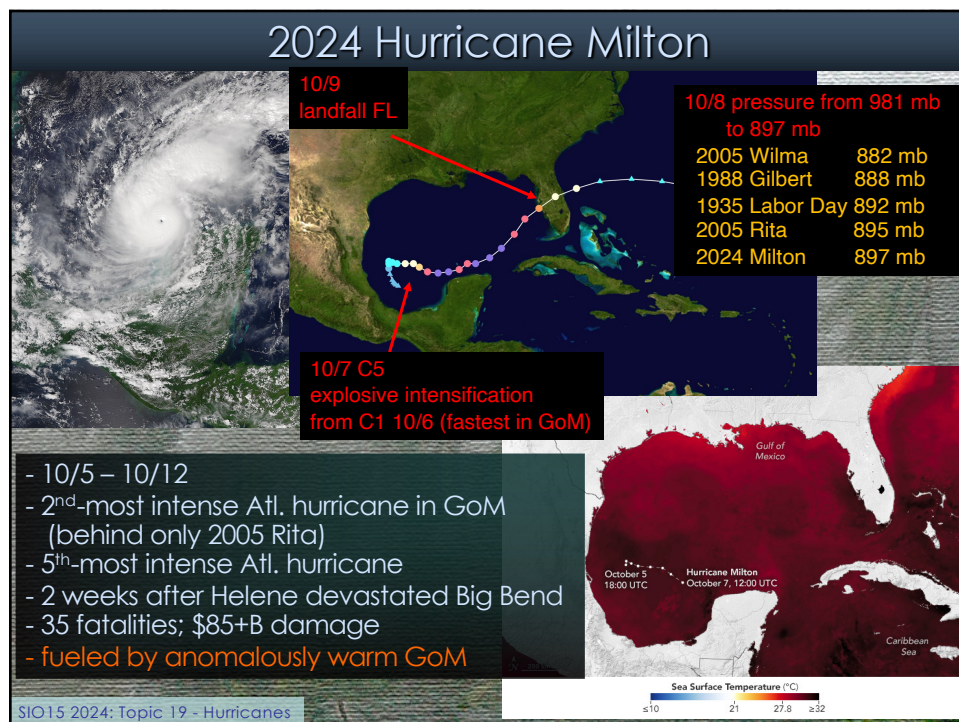
October 2012
Tide Predictions for Scripps Institution of Oceanography Pier

DISCLAIMER: The tide presented herein are predicted estimates only - actual tides will vary somewhat.
These predicted estimates have also not been verified. USE AT YOUR OWN RISK!
NOTE: Tide heights are in feet (Vertical Datum=MLLW)
©2012 - 50 Panel

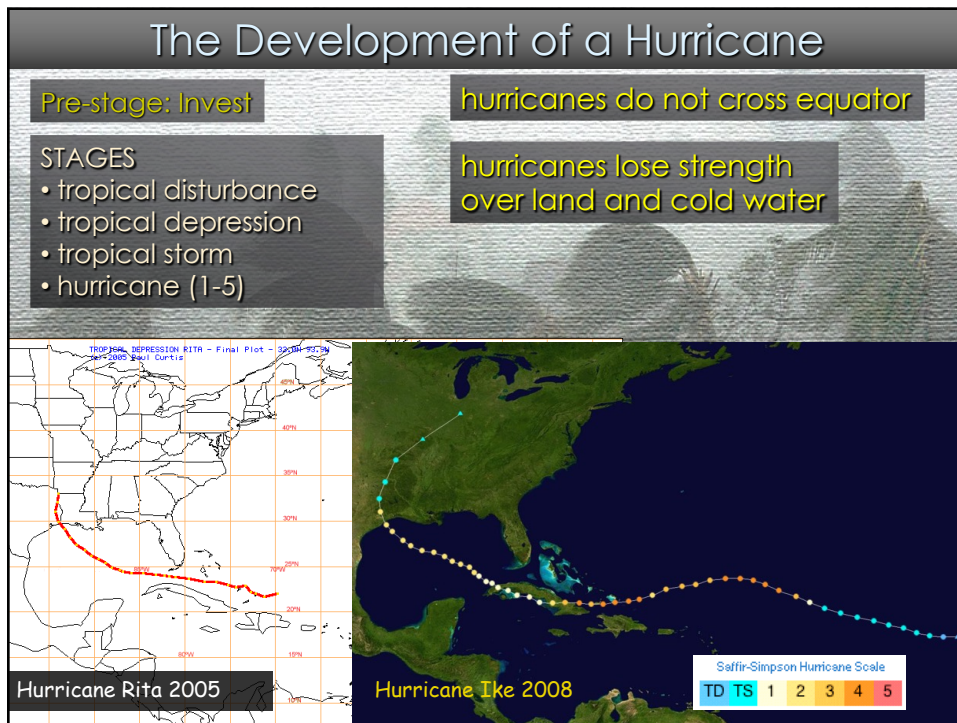
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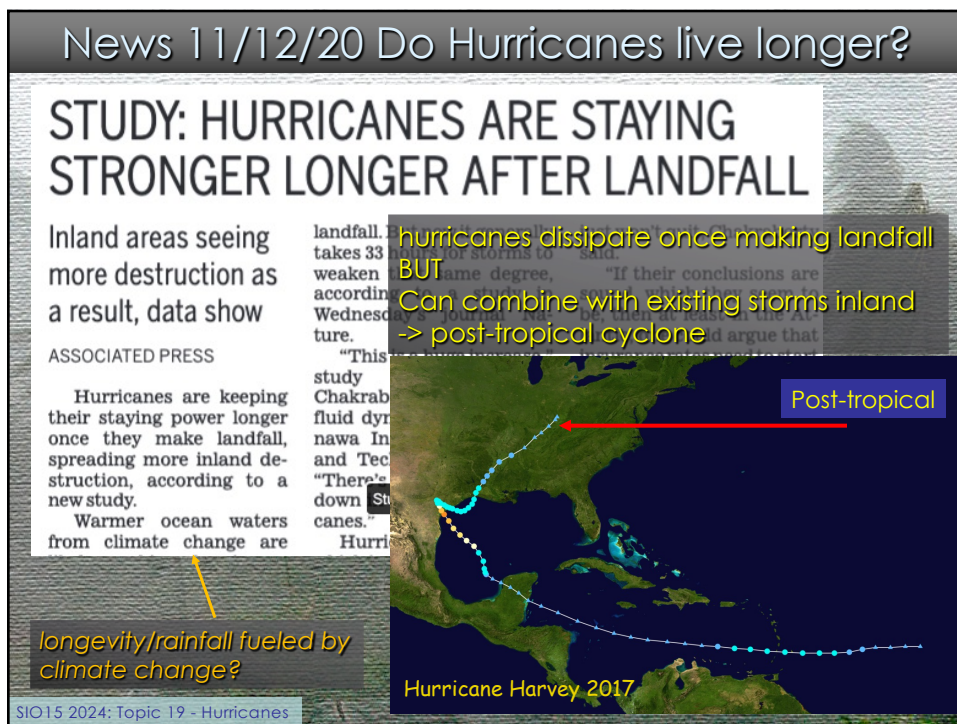
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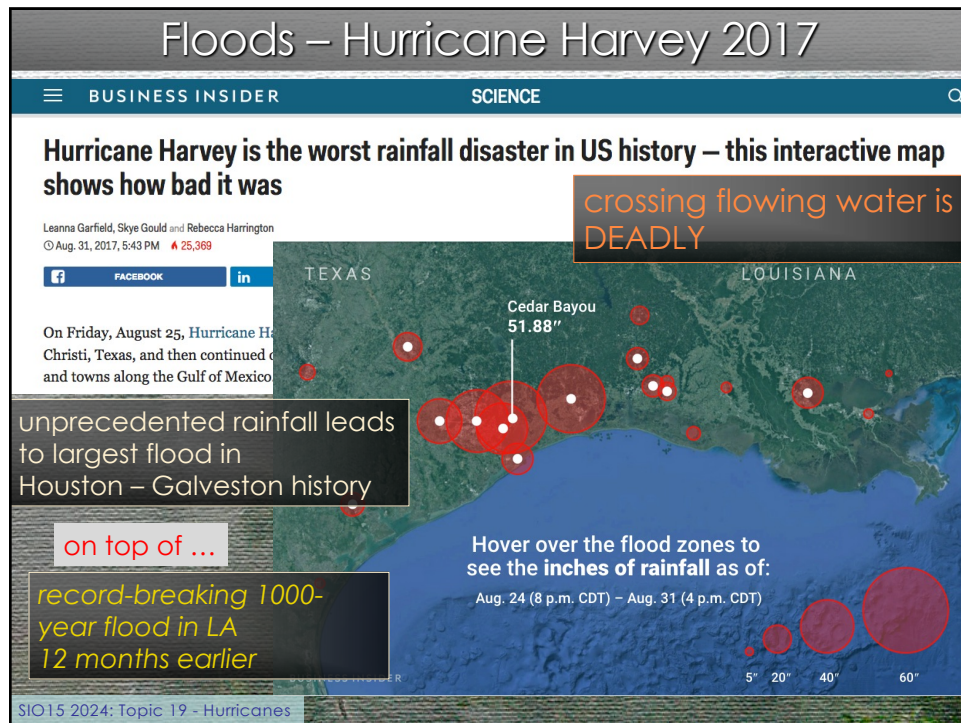
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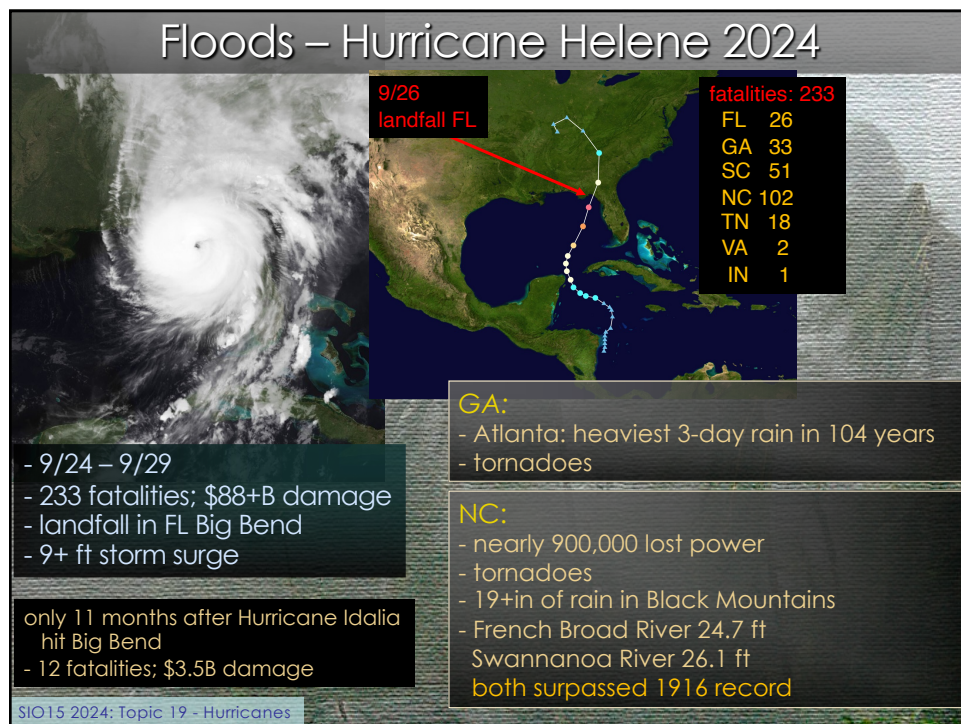
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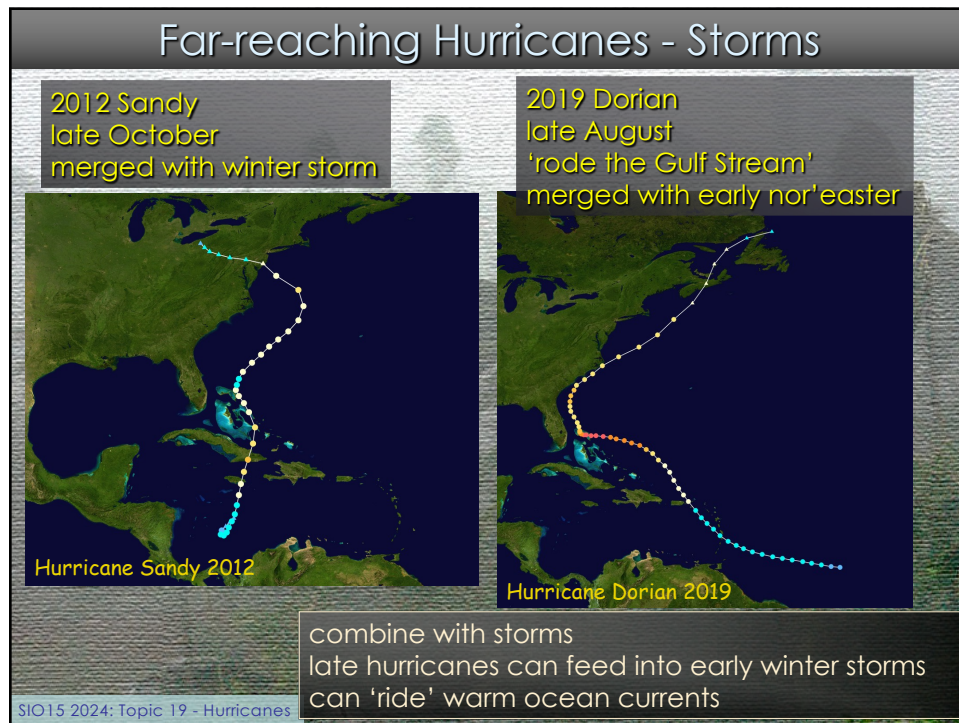
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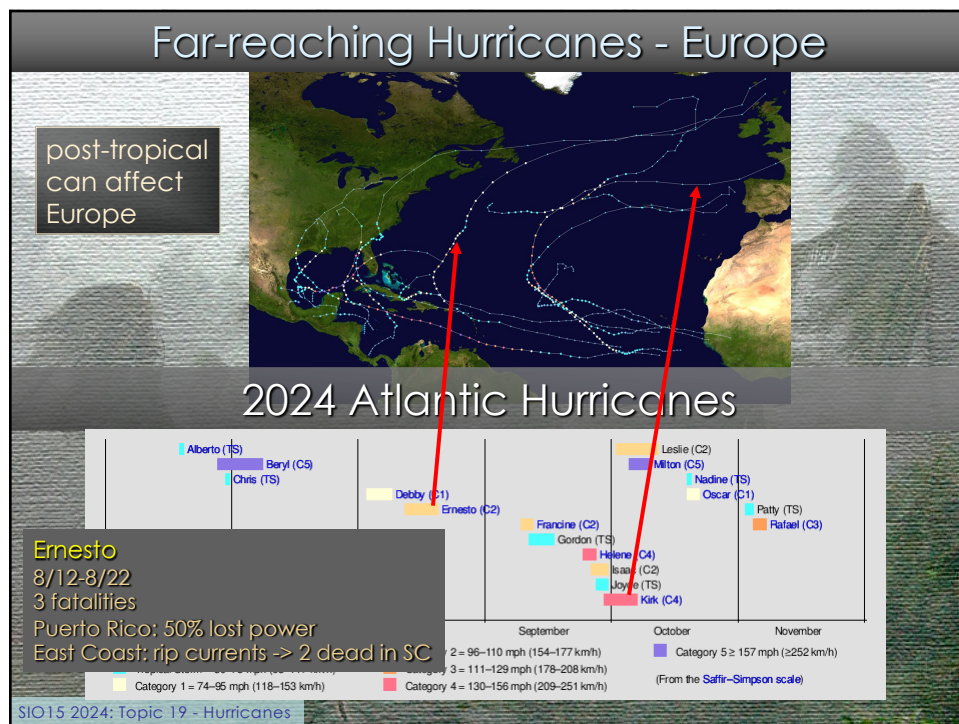
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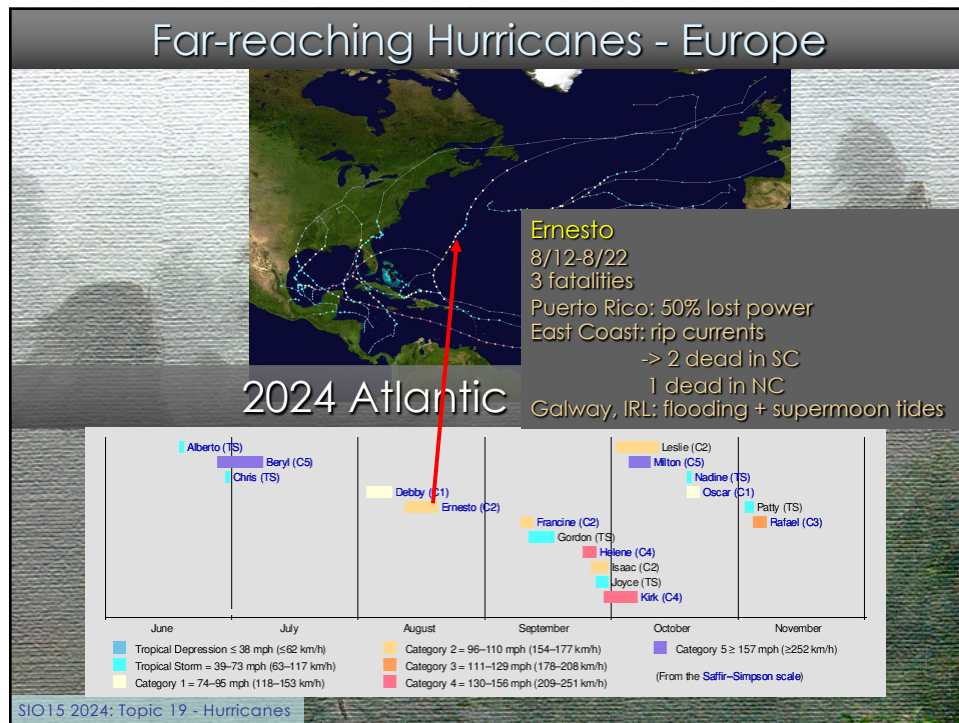
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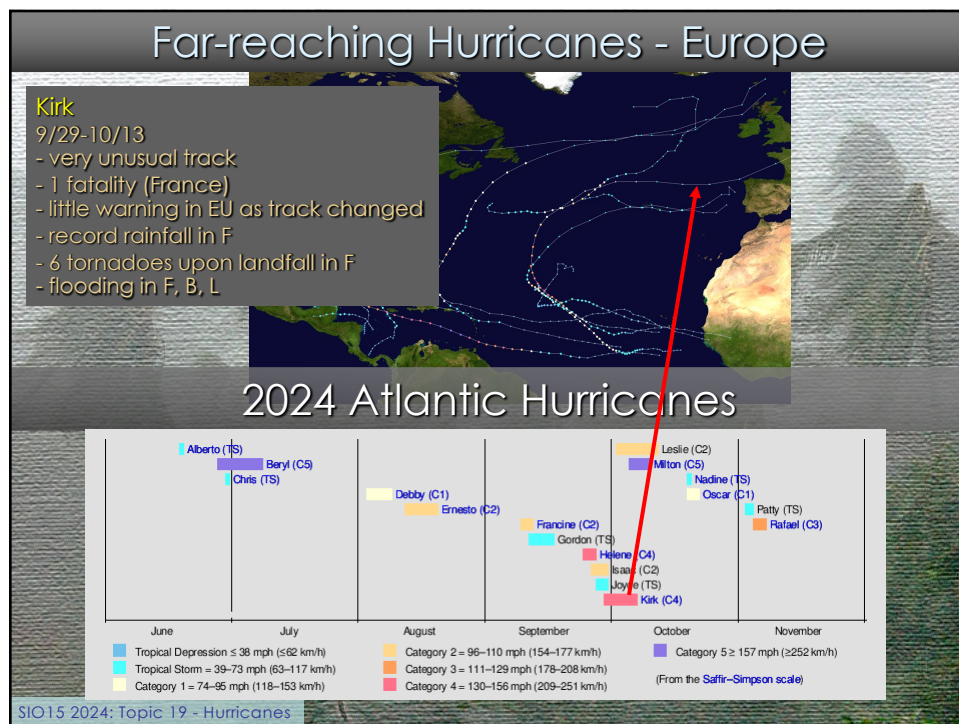
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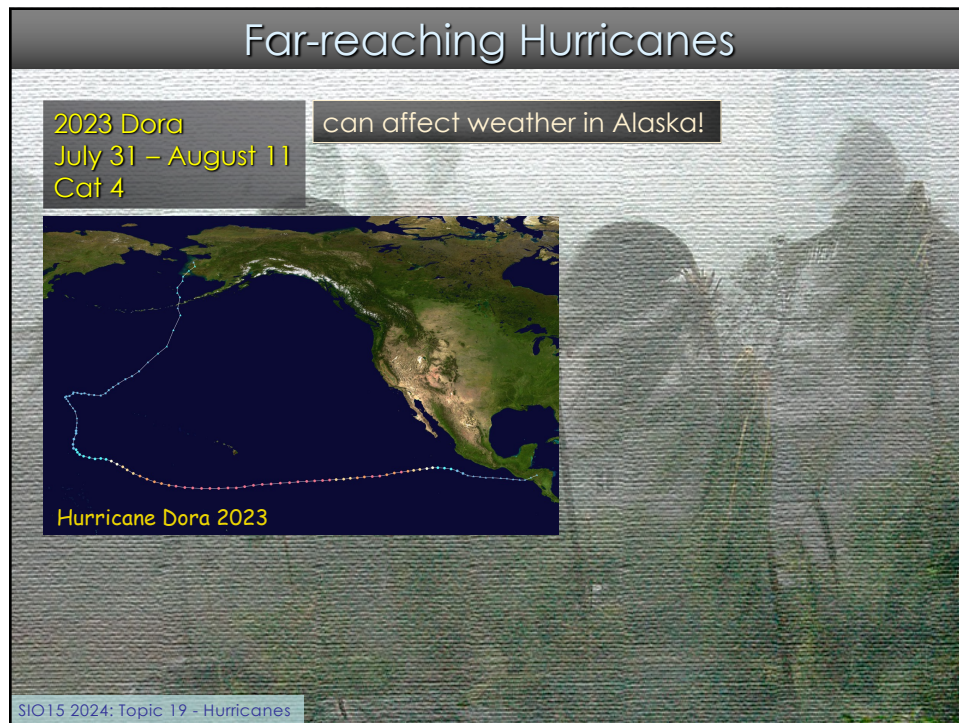
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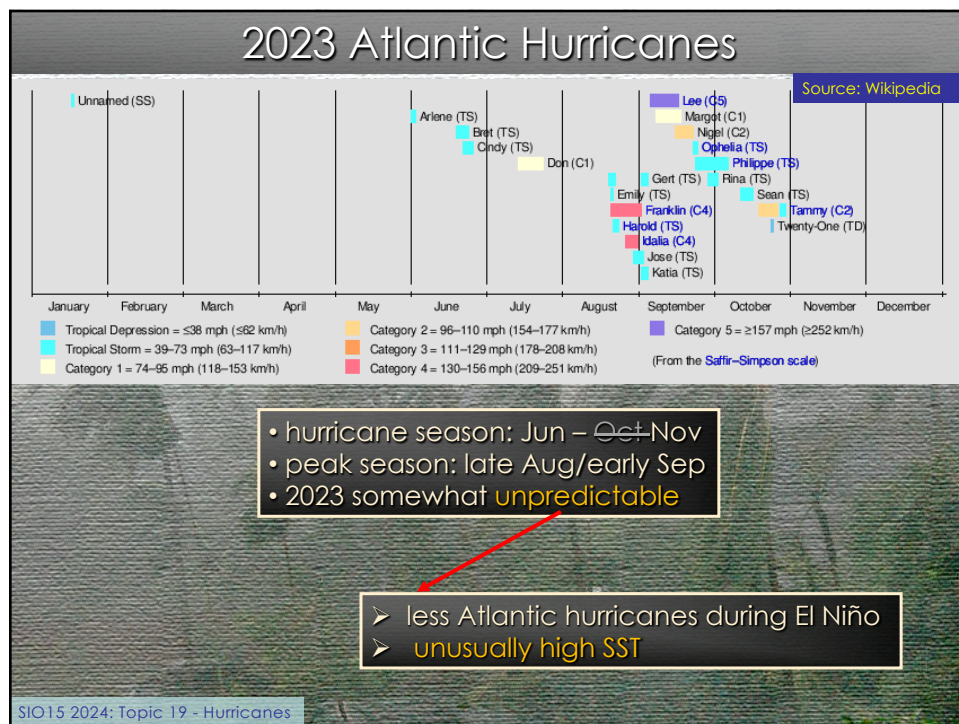
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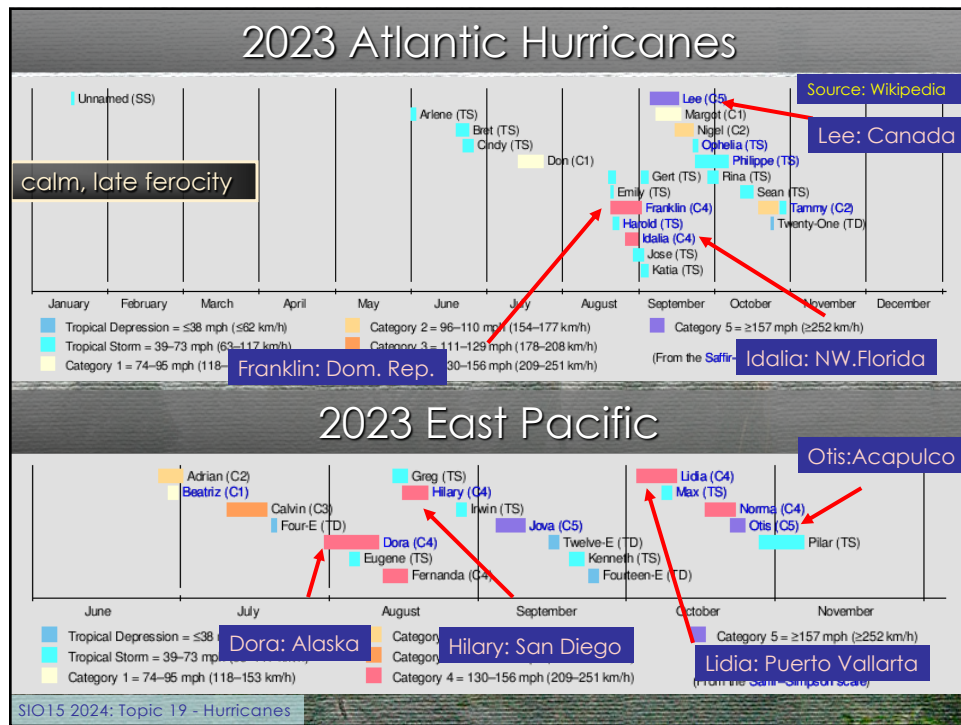
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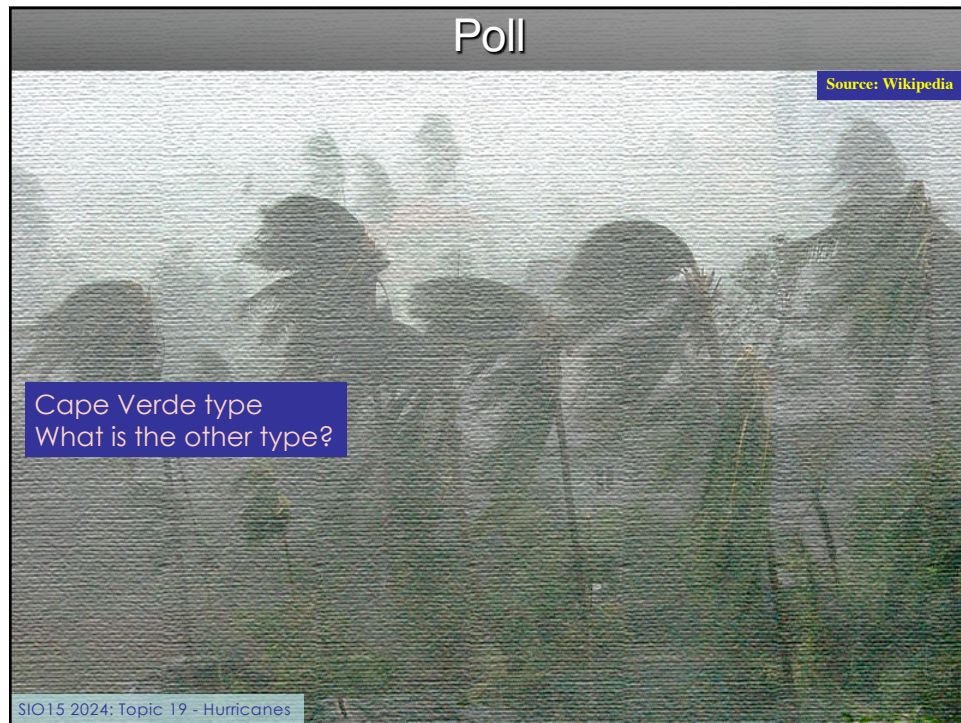
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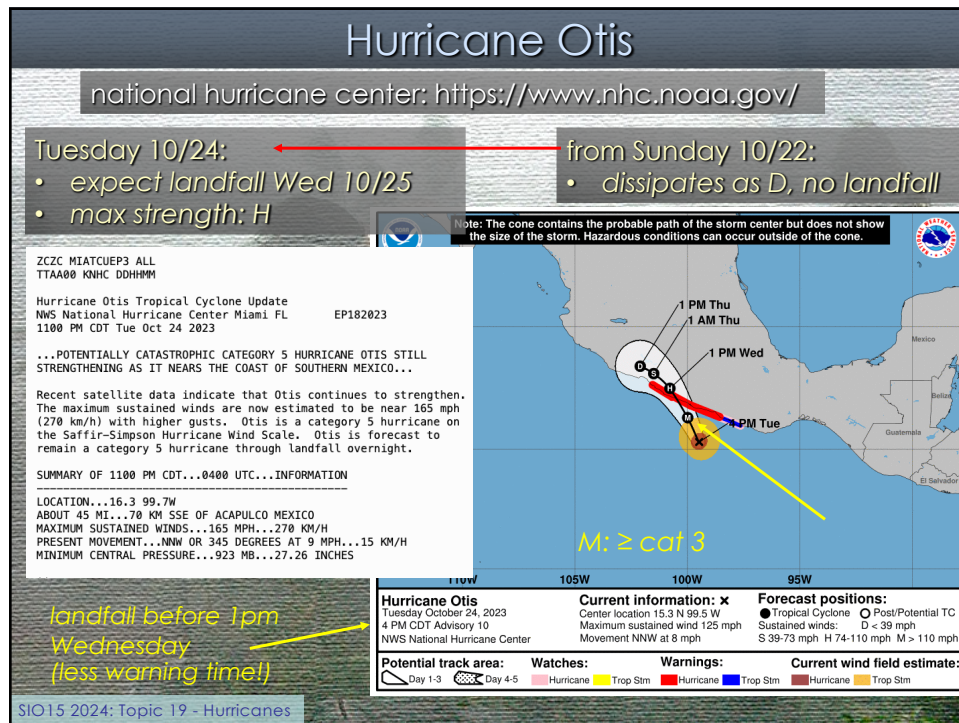
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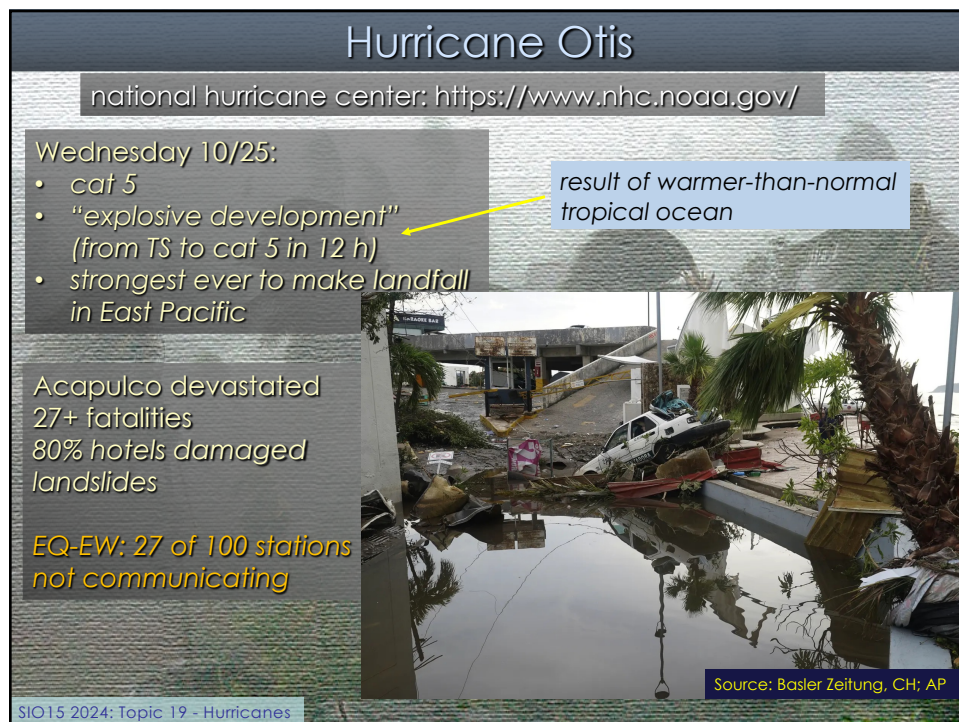
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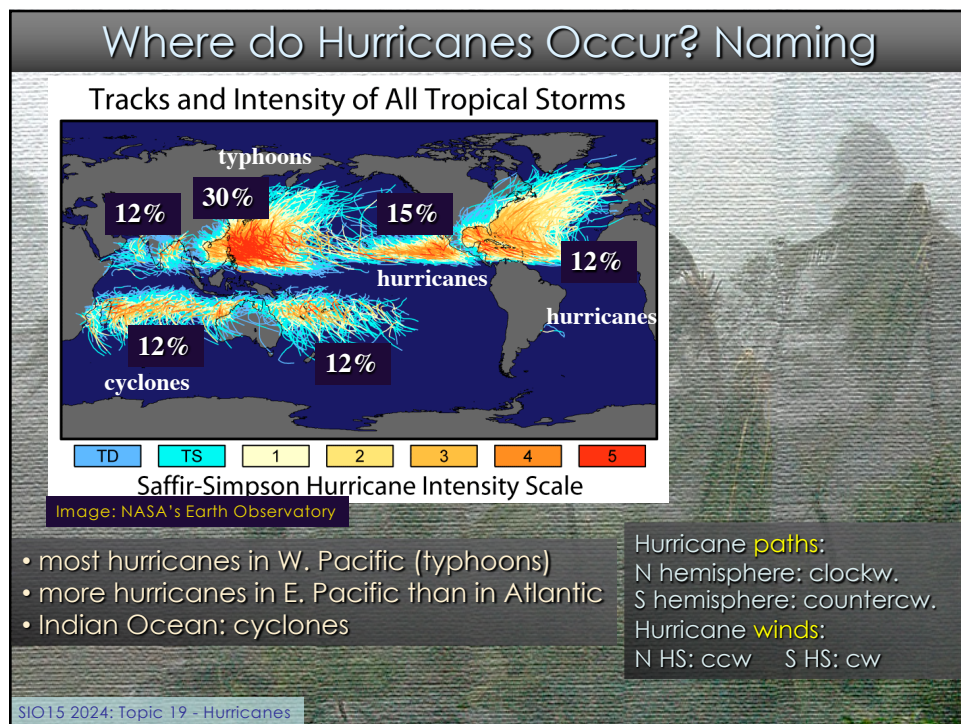
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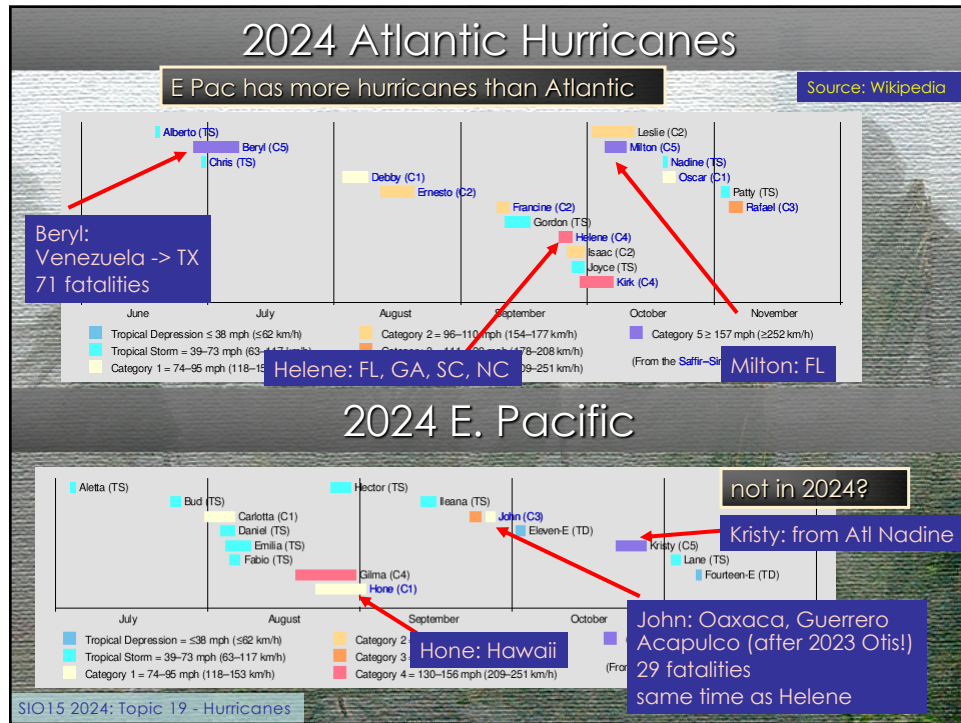
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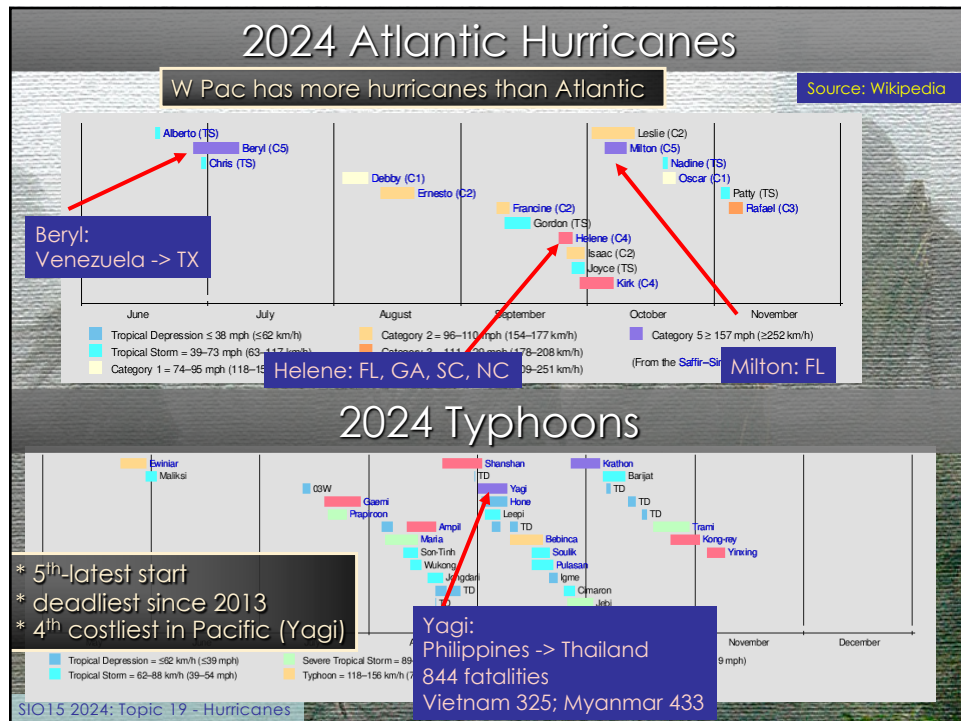
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8/25/17 **Hurricanes - Politics**

- Harvey: Category 4
- \$70B damage
- ... 3rd costliest on record
- 84 fatalities

Source: Wikipedia

8/28 12,000 National Guard Houston, TX

Politics:
TX governor: evacuate Houston!
Houston mayor: shelter in place!

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Politics: 2005 Hurricane Rita

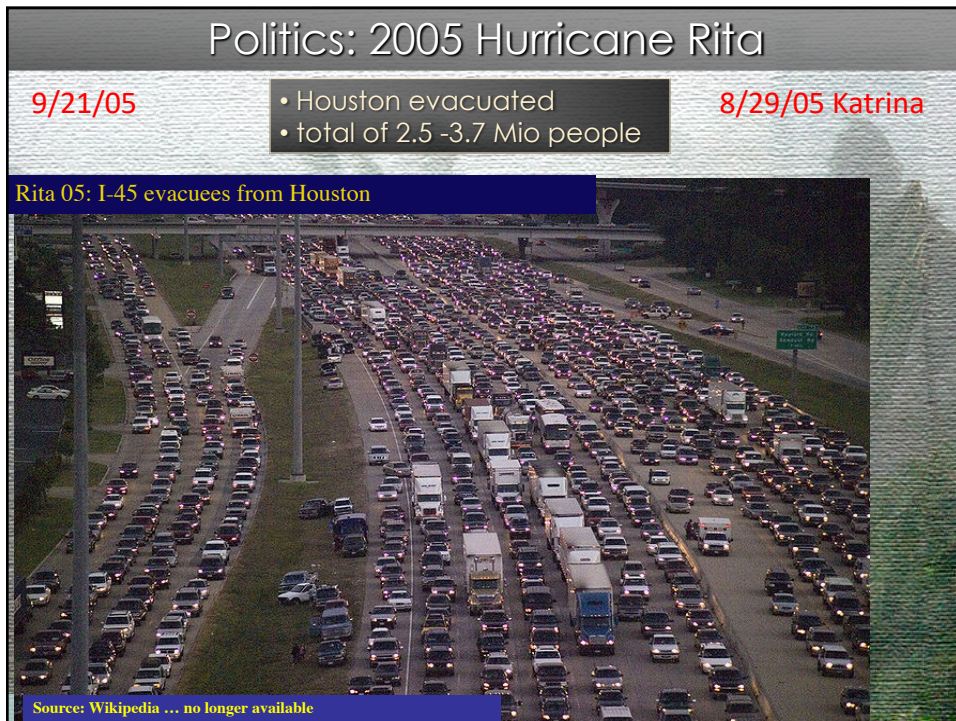
9/21/05

- Houston evacuated
- total of 2.5 -3.7 Mio people

8/29/05 Katrina

Rita 05: I-45 evacuees from Houston

Source: Wikipedia ... no longer available

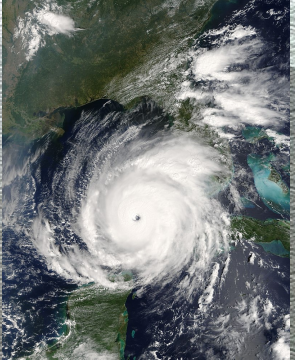
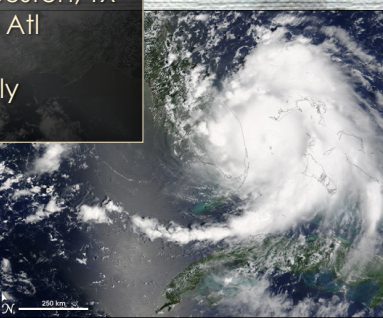


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Politics: 2005 Hurricane Rita

9/21/05

- Category 5
- stronger than Katrina
- Galveston and Houston, TX
- 4th most intense in Atl
- \$12B damage
- ~ 100 fatalities, only 7 direct

8/29/05 Katrina

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2017 Atlantic Hurricanes

9/8/17

MONSTER STORM IRMA HEADS TOWARD FLORIDA

Source: S.D. Union Tribune

Hurricane wreaks devastation on Caribbean islands

coming Hurricane Irma, which could make landfall Sunday and inflict destruction not state since Hur drew in 1992

About 95 percent of the tiny island of Barbuda suc...

Hispaniola and moved closer to a potentially disas...

- Category 5
- "2nd strongest on record in Atlantic" ... in terms of sustained wind speed (305 km/h) ...
- \$63B damage
- ... 4th costliest on record
- 124 fatalities (80 U.S.)



GERBEN VAN ES AP

Hurricane Irma flattened buildings and left thousands homeless on the Dutch territory of St. Maarten. The storm crumpled islands better known as beach paradises into half-habitable emergency zones.

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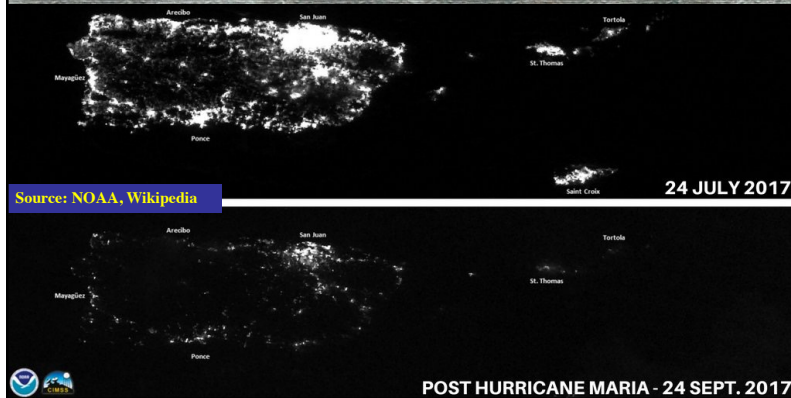
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Politics: 2017 Hurricane Maria

9/19/17

Category 5 ... *explosive intensification in 24 hours ...*

- hit Puerto Rico as Cat 4; worst since 1928
- > \$50B damage; 97+37 fatalities (as of 11/16)
- \$92B final
- 70% without power on 10/30; power not restored until 6 months later
- full death toll (~3000) finalized only in early 2019



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2018 Hurricane Walaka – Hawaiian Nature Reserve

hurricanes and low-lying sandbar islands or atolls

- 2nd Cat 5 in C. Pacific in 2018
- 2nd-strongest in C. Pacific by central pressure (after 2006 Ioke)
- East Island (French Frigate Shoals) swept away
- majors nesting ground for endangered Green sea turtle and critically endangered Hawaiian monk seal



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