

## Great Galveston Hurricane and the Early 20<sup>th</sup> Century

Saturday & Sunday  
8-9 September 1900



MET 4532  
Lecture 11  
15SEP17

A Man, a Time,  
and the Deadliest  
Hurricane in  
History

## ISAAC'S STORM

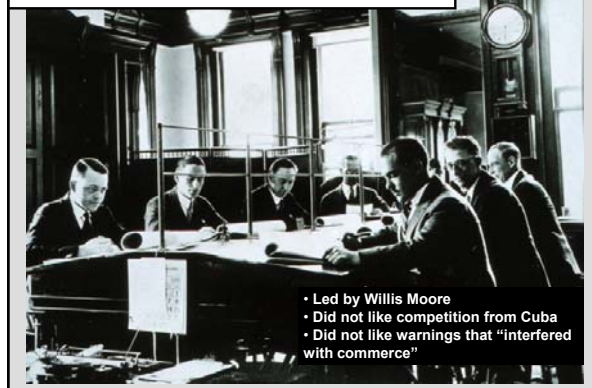
ERIK LARSON

## Galveston in 1900

- On an island between G. Bay and the Gulf
- Actually a sandbar
- Population 37,000
- On a par with New Orleans economically
- Competing successfully with Houston
- Thought to be invulnerable to hurricanes and storm surge
- Despite destruction of Indianola in 1875 and again in 1886 (Matagorda Bay)
- McKinley was President; OK, NM and AZ were still territories. Victoria was Queen in the UK



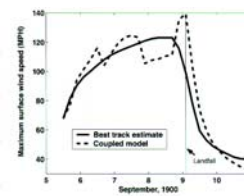
## Weather Bureau in 1900



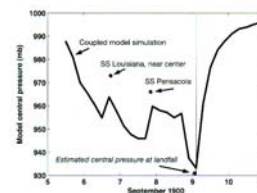
- Led by Willis Moore
- Did not like competition from Cuba
- Did not like warnings that "interfered with commerce"

## The Hurricane

- Formed as a Cape Verde Cyclone
- Struck Hispaniola and Cuba after passing through the Antilles
- Cuban forecasters knew it would menace the Gulf
- US forecasters relied on climatology that hurricanes W of 80° generally move north
- Warned New Jersey
- Cyclone passed near Key West
- Post-storm reports from SS *Louisiana* and SS *Pensacola*
- No marine radios in 1900
- Intensified rapidly over the loop current, weakened, and then (may have) intensified again just before landfall

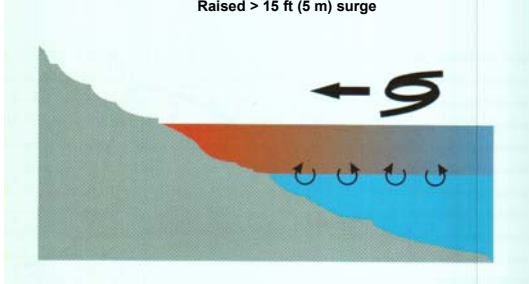


## Coupled Model Simulation



Intensification near landfall due to warm shallow water, or a warm eddy just reaching the coast

Struck as a strong CAT 4, 150 mph (130 kt)  
Raised > 15 ft (5 m) surge



## Isaac M. Cline

- Meteorologist in Charge at Galveston
- Also a physician
- Married with three daughters
- Forbidden to issue warnings by Bureau policy
- Saw some hurricane signs early on the 8<sup>th</sup>
- Legend (and Bureau spin) casts him as a meteorological Paul Revere who saved thousands
- His house was washed away and his wife, who was pregnant, drowned.



## 8000 Other Texans Drowned



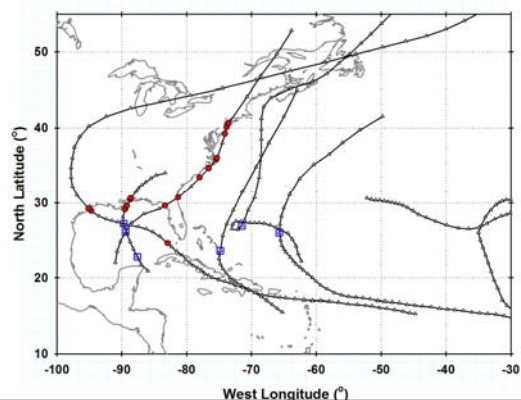
REMOVING DEAD BODIES TO THE BARGES FOR BURIAL AT SEA

Waves swept debris 1/3 of the way across the island and battered buildings flat



AFTER THE DISASTER

## 1900 Hurricane Season



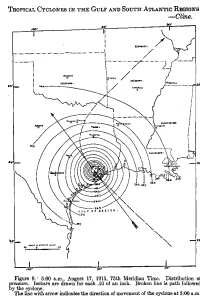
## What Became of Cline?

- Cora Bellew Cline's body was recovered more than a month after the hurricane
- Identified by her wedding ring
- Bureau moved Cline to New Orleans
- Suffered from Post-Traumatic Stress Syndrome
- Got his act together
- Took up art dealing & restoration
- Wrote *Tropical Cyclones*
- Died in 1955 in NOR, at 94
- Did he warn GLS? Perhaps.
- Did he get a bad deal from Larson? Yes, certainly.



## Cline's *Tropical Cyclones*

- Published in 1926
- First to document deadliness of storm surge
- Pioneered composite analysis:
  - Positioned observations from different times relative to moving storm center
- Invaluable record of early 20<sup>th</sup> Century hurricanes, particularly in the Gulf
- First North American addition built upon Viñes's work.

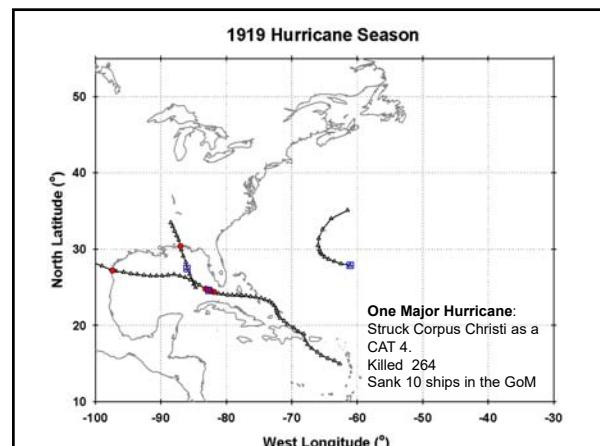
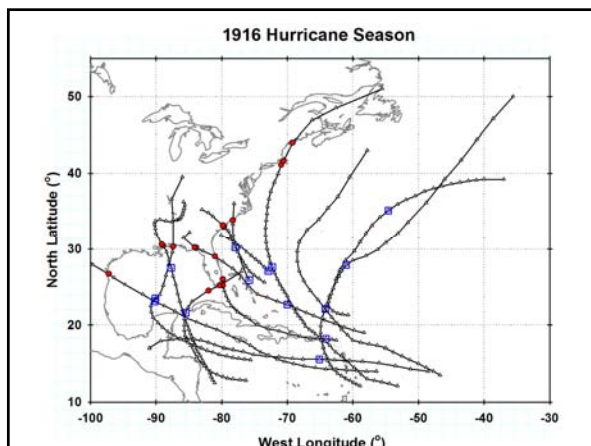
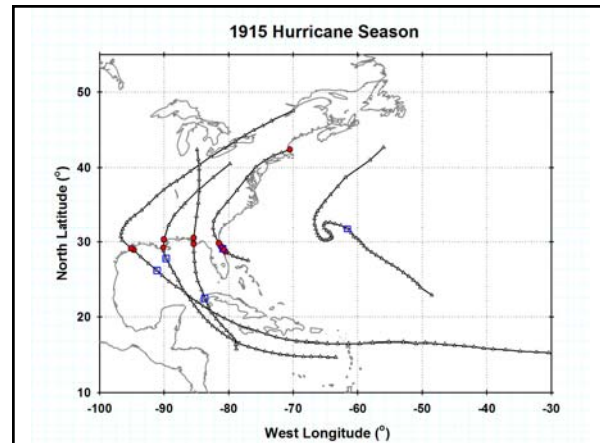


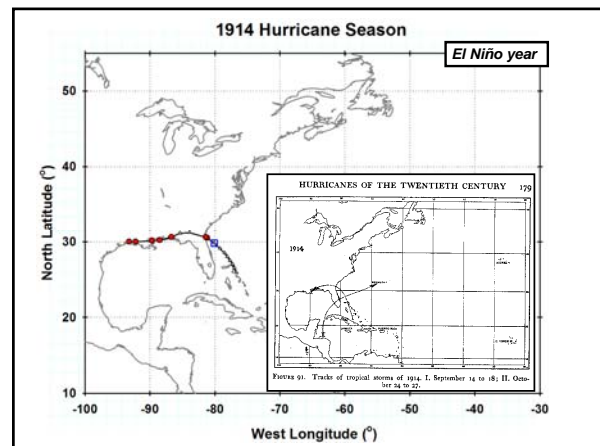
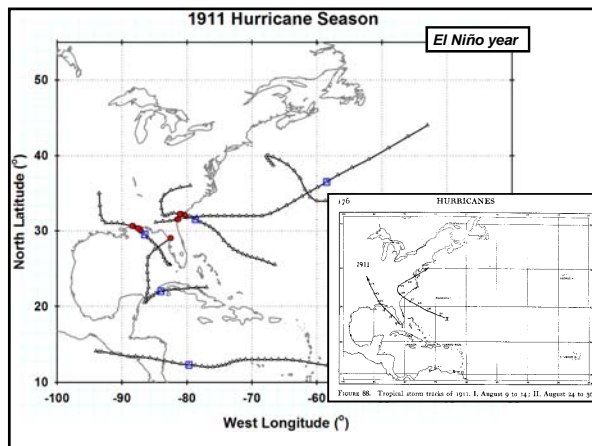
## Radio Ship Reports Began in 1905



## Other Early 20<sup>th</sup> Century Seasons

- 1915 :Major hurricanes struck Galveston and New Orleans
  - 5 named storms, including 4 hurricanes of which 3 were major
  - 3 US Landfalls
  - Seawall built after 1900 protected Galveston after a fashion
  - Still, 275 people died
  - Isaac Cline successfully forecast New Orleans/ Burrwood hurricane based upon swell and surge and reports from ships and island observers. Another 275 (?) lives lost
- 1916 Season
  - Three major hurricanes struck Mobile, Pensacola, and Corpus Christi
  - Total of 14 Named Storms, 11 Hurricanes of which 6 were major
  - 6 US Hurricane landfalls
- 1919 Season
  - Only 3 Hurricanes, of which one was major
  - Passed over Dry Tortugas as CAT 4
  - Sank 10 Ships in the Gulf of Mexico
  - Struck Corpus Christi, also as a CAT 4
  - Killed 284 in US, plus many more at sea
  - Most intense hurricane documented to date





## Summary

- Summer of 1900, US experienced a heat wave, implying a strong Bermuda High
- Weather Bureau's conflict with Cubans
- Cape Verde Hurricane
  - Passed along S coast of Cuba and into the Gulf over Dry Tortugas
  - Intensified rapidly in Gulf and maybe again at landfall
  - Struck Galveston as CAT 4, night of 8-9 SEP 1900
  - Weather Bureau in DC completely lost the picture, expected recurvature to threaten NJ
  - 8000 Texans died---worst US natural disaster
- Isaac Cline may or may not have warned city
- Cline recovered from trauma and wrote *Tropical Cyclones*
- Radio ship reports began in 1910
- Devastating 1915, 1916 & 1919 Season
- Suppressed 1911 & 1914 Seasons due to El Niño
- **PAPER TOPICS DUE MONDAY the 18<sup>th</sup>.**