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TAMEST NATURAL HAZARDS SUMMIT

Responding to and Mitigating the Impacts

PART I: VIRTUAL SUMMIT
10.19.2021

#NATURALHAZARDSSUMMIT

Theme One:

PREDICTION, WARNING AND RESPONSE TO ALERTS AND WARNINGS

Moderated by:
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P.W. Horn Professor of Civil, Environmental and Construction Engineering
Texas Tech University

Plenary:

Advances in Hurricane and Weather Forecasting

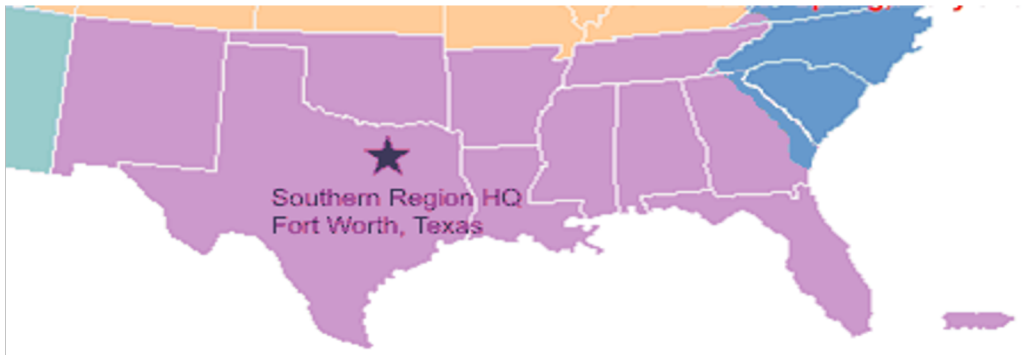
MICHAEL COYNE

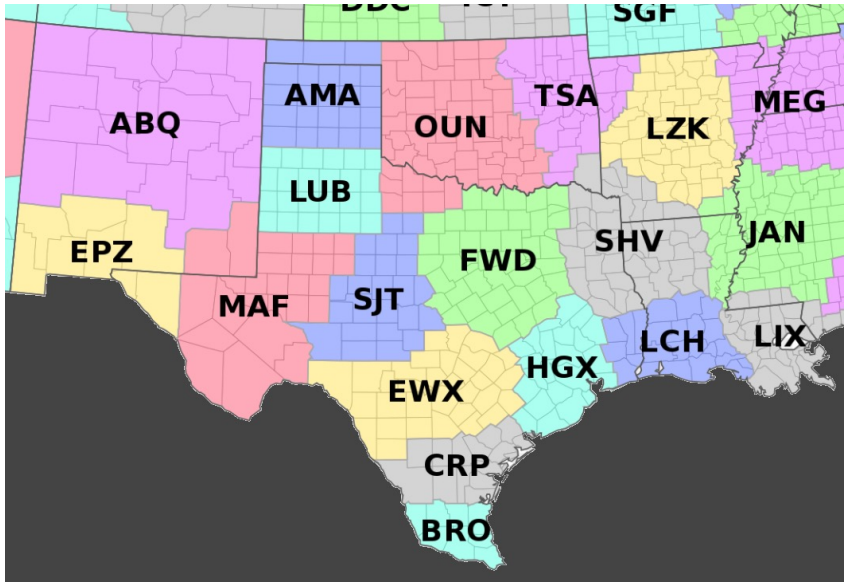
Regional Director
National Weather Service, Southern Region

Advances in Hurricane and Weather Forecasting

Michael Coyne, Regional Director
Southern Region
National Weather Service

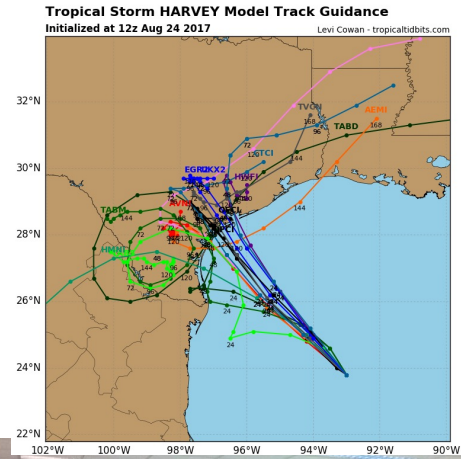
NWS Southern Region





- 45 offices across the Southeast US, Puerto Rico and USVI
- 850+ employees
- Headquarters in Fort Worth
- Responsibility in Texas:
  - 13 WFOs
  - 2 RFCs
  - 3 CWSUs

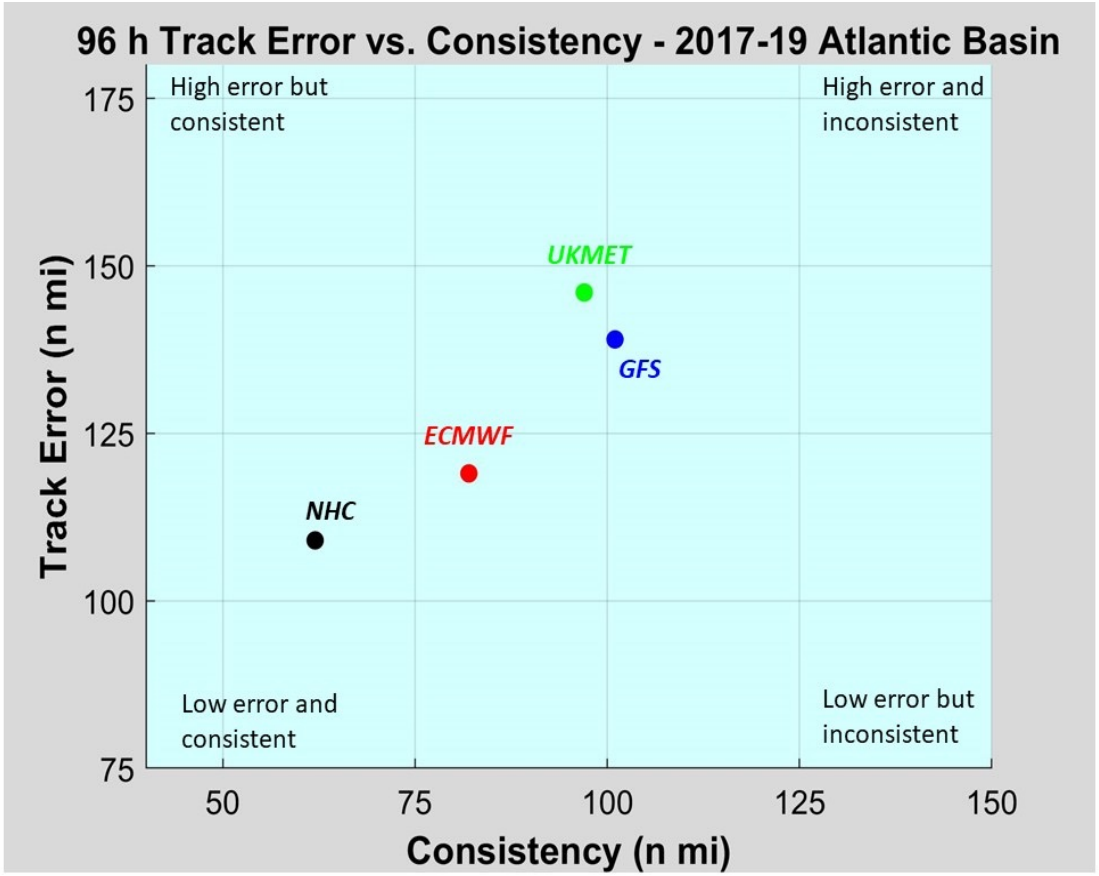
How Hurricane Forecasts Are Made



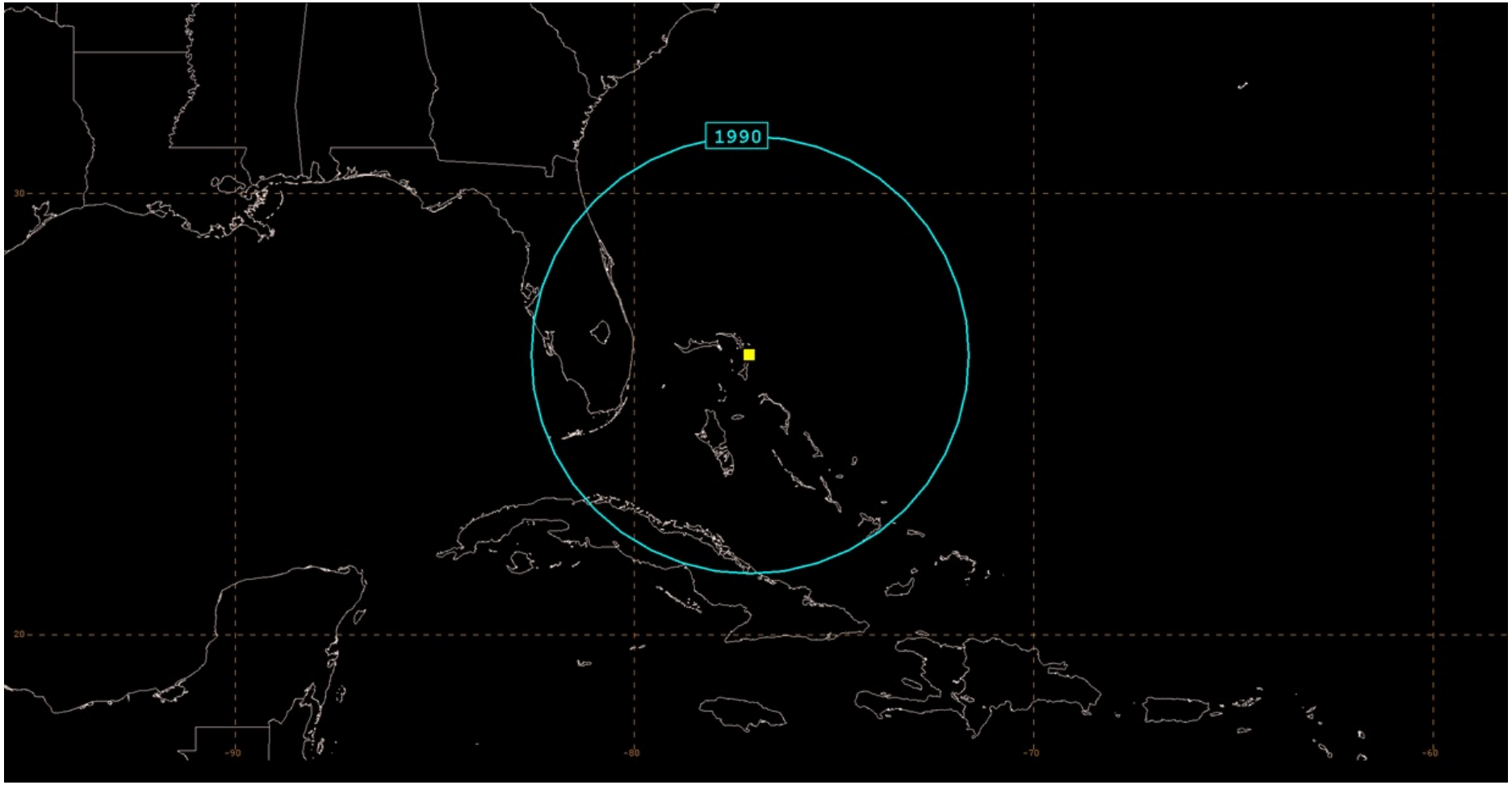
- Observations fed into national models
- Model forecasts are produced and analyzed
- Collaboration/Coordination
- NHC Forecast released
- Offices disseminate impacts
- Repeat every 6 hours

The Great News

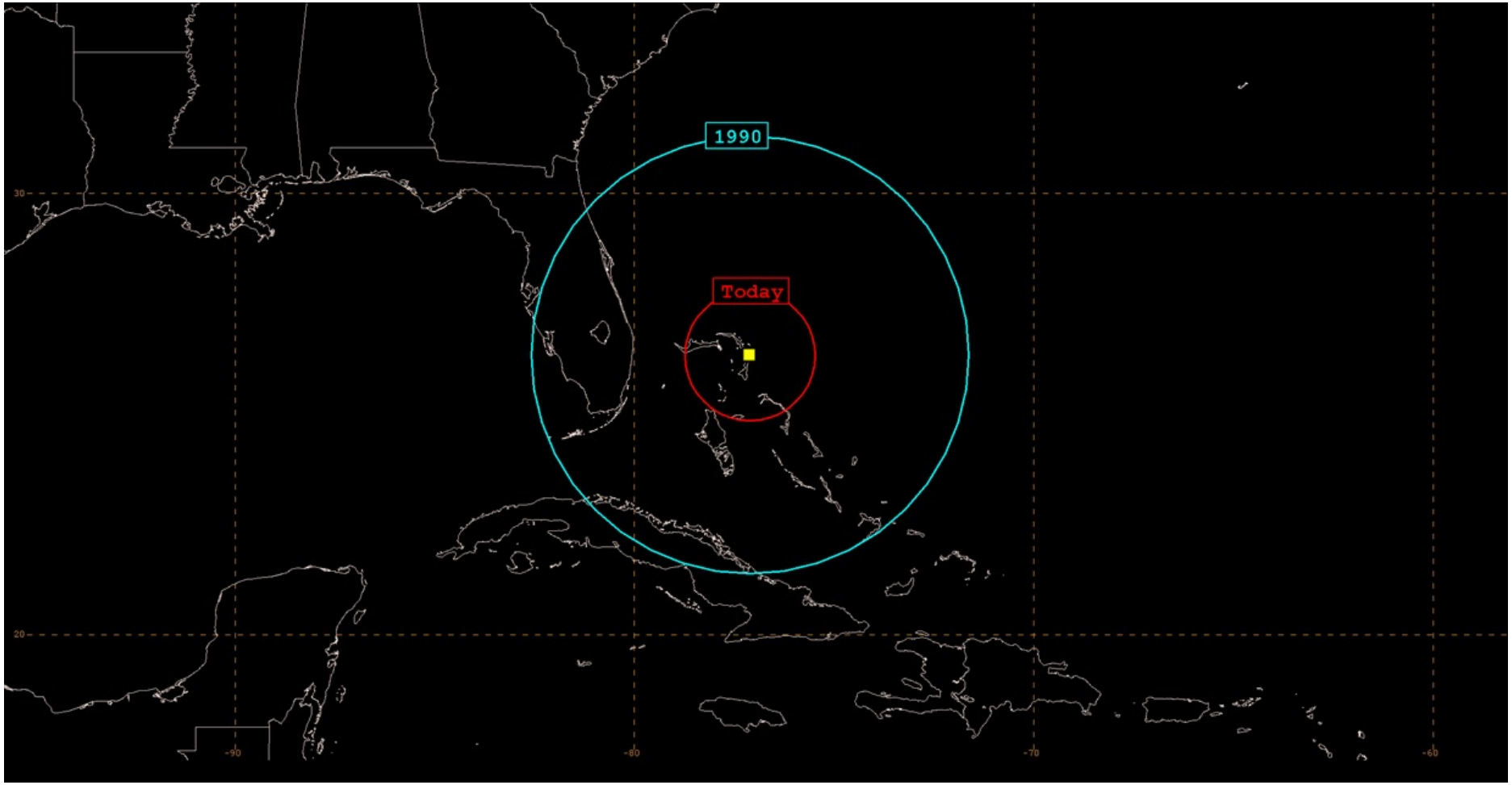
- The forecast from NHC has a lower average track error and is more consistent than any individual model overall



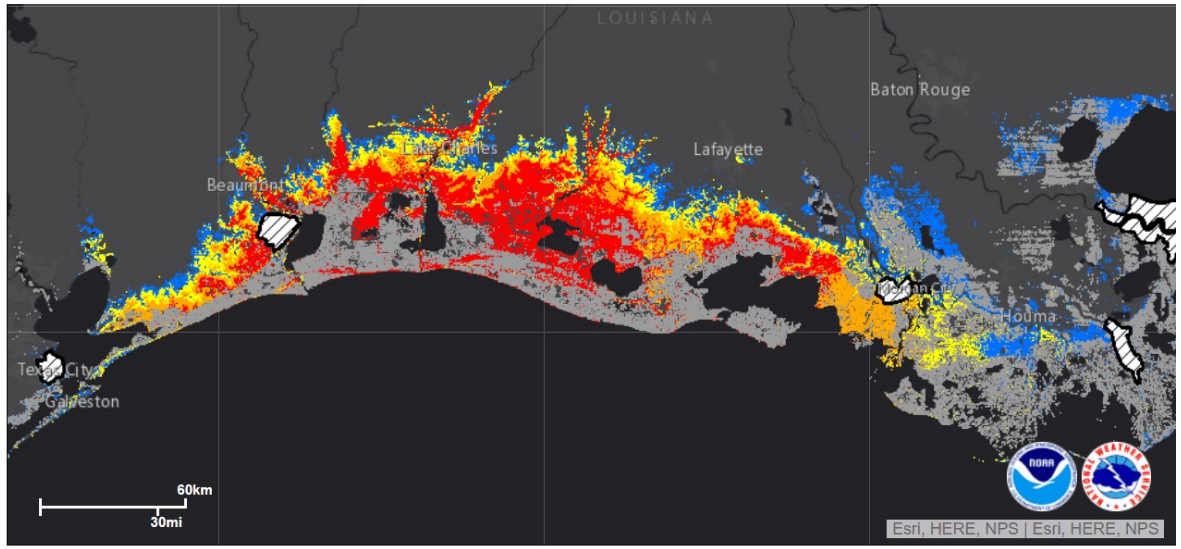
Great News – Lower Uncertainty



Great News – Lower Uncertainty



Great News - Storm Surge Modeling



Potential Storm Surge Flooding*

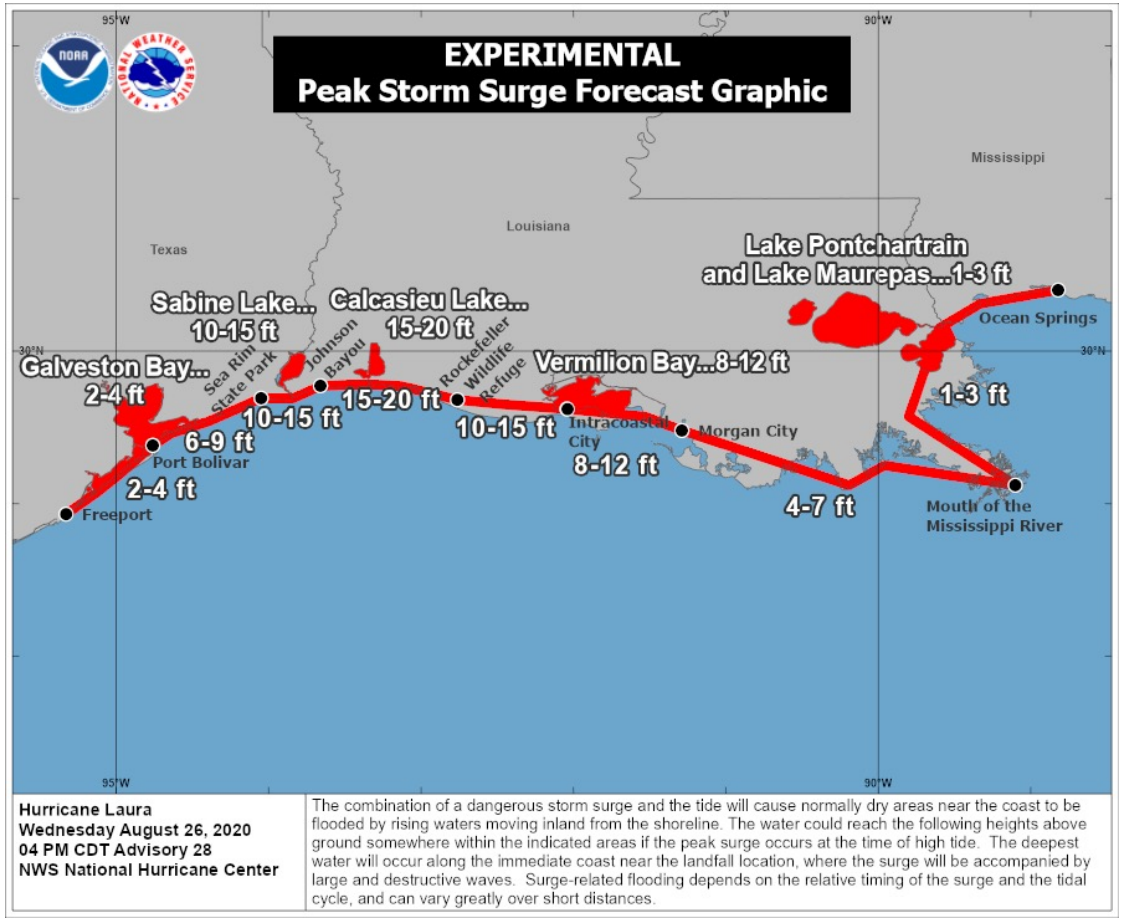
- Intertidal Zone/Estuarine Wetland
- Greater than 1 foot above ground
- Greater than 3 feet above ground
- Greater than 6 feet above ground
- Greater than 9 feet above ground

Map Layer Options:

Inundation Layer Only | Inundation with Intertidal Layer

Map Opacity Slider

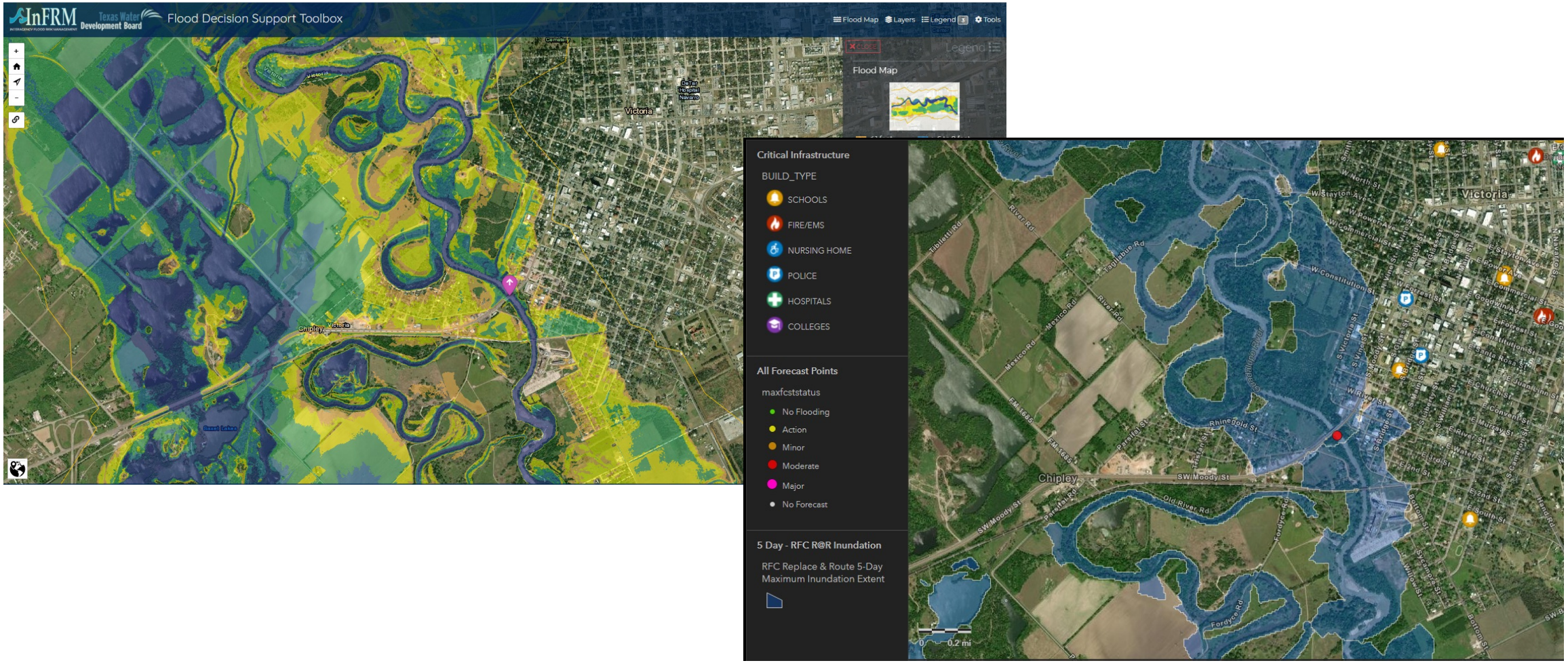
Download GIS data *(Instructions)*	Inundation Layer Only	Inundation with Intertidal Layer



Hurricane Laura
Wednesday August 26, 2020
04 PM CDT Advisory 28
NWS National Hurricane Center

The combination of a dangerous storm surge and the tide will cause normally dry areas near the coast to be flooded by rising waters moving inland from the shoreline. The water could reach the following heights above ground somewhere within the indicated areas if the peak surge occurs at the time of high tide. The deepest water will occur along the immediate coast near the landfall location, where the surge will be accompanied by large and destructive waves. Surge-related flooding depends on the relative timing of the surge and the tidal cycle, and can vary greatly over short distances.

Flood Inundation Mapping



Good News – Intensity Forecasts

- Rapid Intensifications are better anticipated
- In Hurricane Ida, the largest rapid intensification forecast was made by the NWS
- The conditions are better recognized and better anticipated

On Every Measure, We Are Doing Better

So Why Are People Still Dying?

Why Are People Not Making Good Decisions?

Where There Are Gaps?

- Forecast Interpretation
- Societal Actions

Societal Reaction

- People make rational decisions with the information they have at hand.
- Trust is needed for threats they have not personalized
- A large segment of society cannot evacuate, cannot harden their homes, as the threat to leave is greater than staying

Indirect Fatalities

- Historically, storm surge is the leading cause of fatalities in tropical systems.

- In the last 4 years, we've lost more people to carbon monoxide poisoning after a storm than we have storm surge.

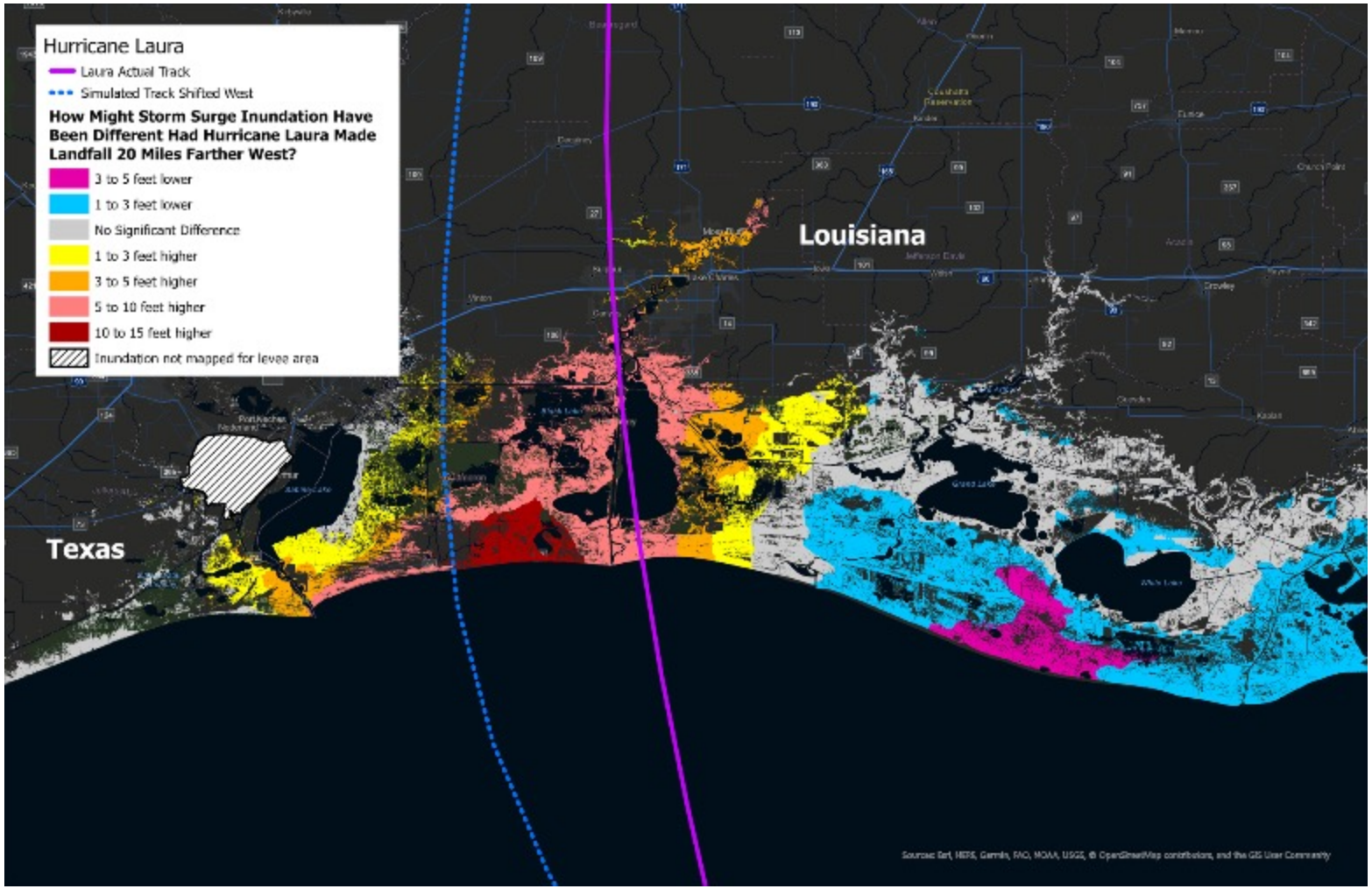
- Preliminary 2020: 46 Direct Fatalities (Rip Currents 16, Wind 14, Freshwater 9, Marine 3, Surge 2, Tornado 2) 51 Indirect, with at least 19 carbon monoxide.

Next Challenge – Understanding Information

- Even very robust users of our information can apply the forecast in the wrong manner

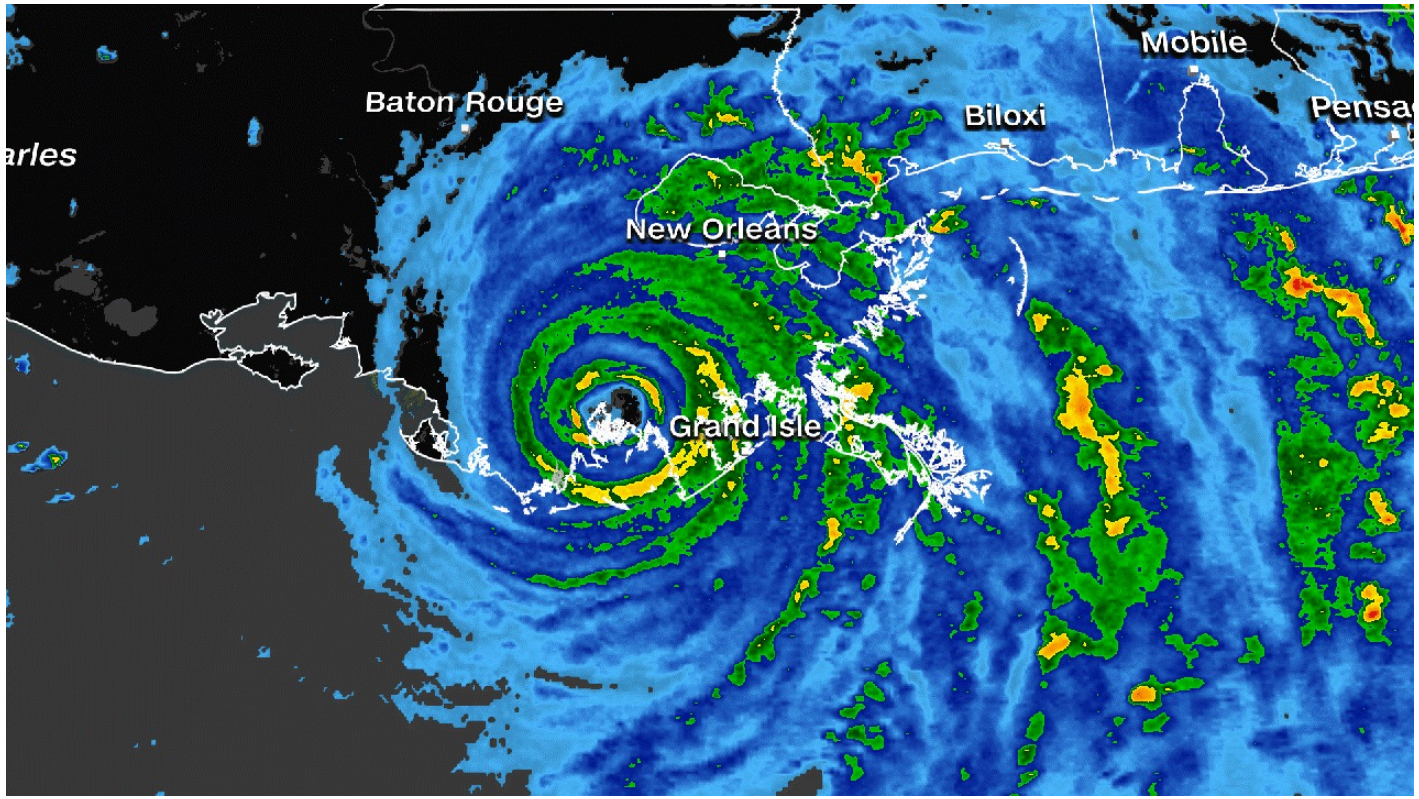
- To steal from a football cliché: “If there are two forecasts, you have no forecasts”

Little Shifts Matter



Hurricane Ida Lesson

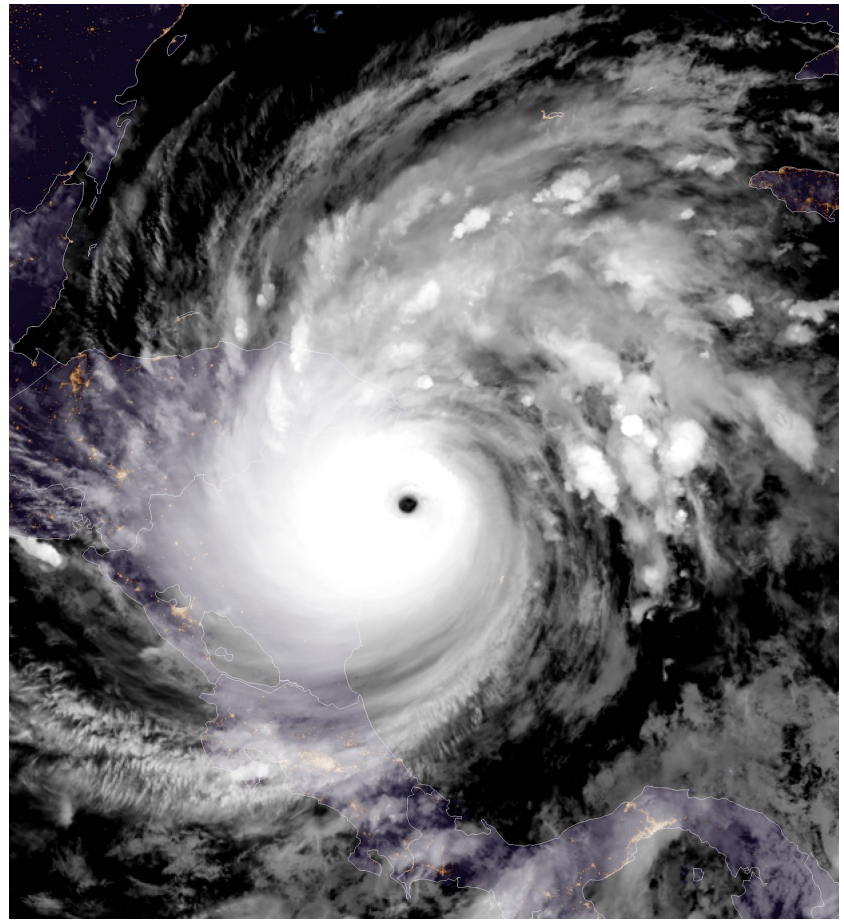
“We didn’t think it would be this bad.”



Compressed Timelines with RI

9 Atlantic TCs in 2020 underwent RI,
Largest 24-h intensity change:

- Hanna: 30 kt (50 -> 80 kt)
- Laura: 40 kt (90 -> 130 kt)
- Sally: 20 kt in 12 h (70 -> 90 kt)
- Teddy: 35 kt (85 -> 120 kt)
- Delta: 65 kt (55 -> 120 kt)
- Epsilon: 45 kt (55 -> 100 kt)
- Zeta: 40 kt (55 -> 95 kt)
- Eta: 70 kt (60 -> 130 kt)
- Iota: 70 kt (70 -> 140 kt)



Category 5 Hurricane Landfalls

- In the US: Michael, Laura, Camille, and the 1935 “Labor Day” Hurricanes
- All were tropical storms or depressions 72 hours before landfall
- The timeline to evacuate is also shortened, or worse, the messages are not heeded

Deterministic vs. Probabilistic Forecasts

- There appears to be usefulness in Probabilistic Forecasts
- “10% Chance of Exceedance”

- Helps decision makers understand error and risk

- MUCH more research is needed in this area

Some Final Thoughts

- While continued work to improve our warnings and forecasts remain, the understanding of the forecast is becoming a greater challenge

- Social Science needs a greater emphasis in our fields of study

Questions?

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