Experiential Learning: Training Forecasters to Communicate Tropical Cyclone Impacts by Simulating a Hurricane Event

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The COMET Program

UCAR | COMMUNITY PROGRAMS

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NOAA USAID FROM THE AMERICAN PEOPLE WMO

Revamping a Tropical Cyclone Forecasting Course

Course Overview

- Run by the National Hurricane Center (NHC) and World Meteorological Organization (WMO).
- Participants from weather services across the Atlantic, Caribbean, North America, and Europe.
- Bilingual (English & Spanish).
- Various skill levels: New to experienced forecasters.
- Objective: Improve skills in forecasting and communicating TC impacts.

Revamping a Tropical Cyclone Forecasting Course

Goal: Transition the course from lecture-based to an active-learning experience focused on the decision support that TC forecasters provide.

New Course Structure

Prerequisites		
Variety of MetEd modules focused on TC forecasting concepts.		
Mon/Tue/Wed	**Thu**	**Fri**
Three days of interactive sessions on TC forecasting concepts. Games, discussions, and exercises.	**One-day educational simulation of TC forecasts and communications.**	**Overview, feedback, and reflection.**

Instructional Design Practices

Framework that allows an educator to build effective and meaningful learning activities.

Context: A meaningful and realistic scenario. Helps engage and motivate learners while triggering recall.

Challenge: Interactions with difficulty and risk. Support engagement and motivation.

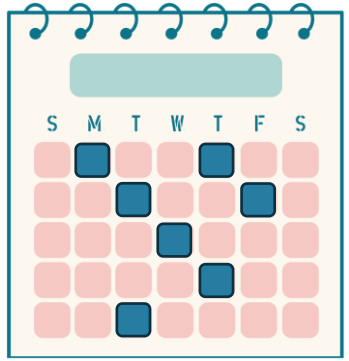
Feedback: Consequences and guidance. Help the learner assess and improve their capabilities.

Activity: An interaction that closely simulates the actions of the job. Provides practice.

Instructional Design Practices

Spaced practice: Revisiting various materials across time (hours, days, weeks, months)

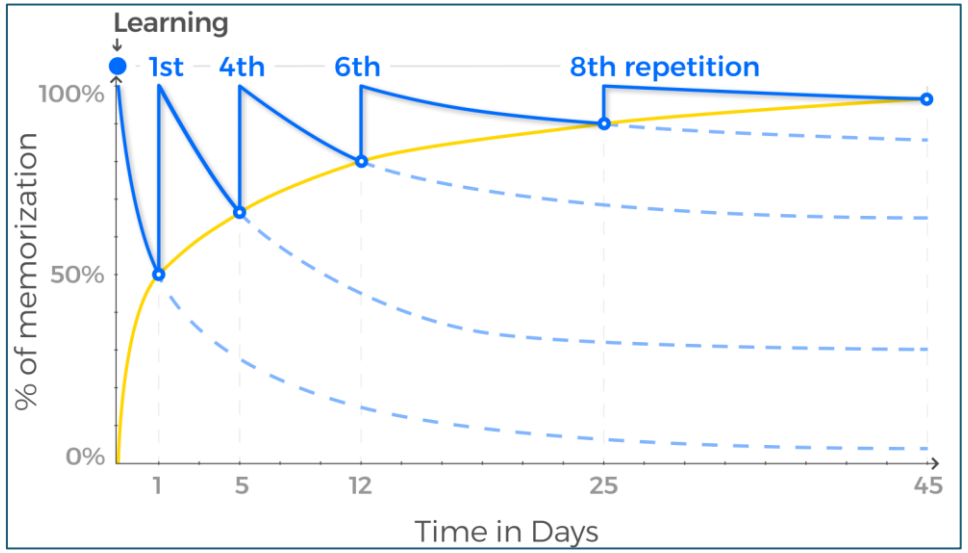
Topic A repeatedly revisited with gaps in between



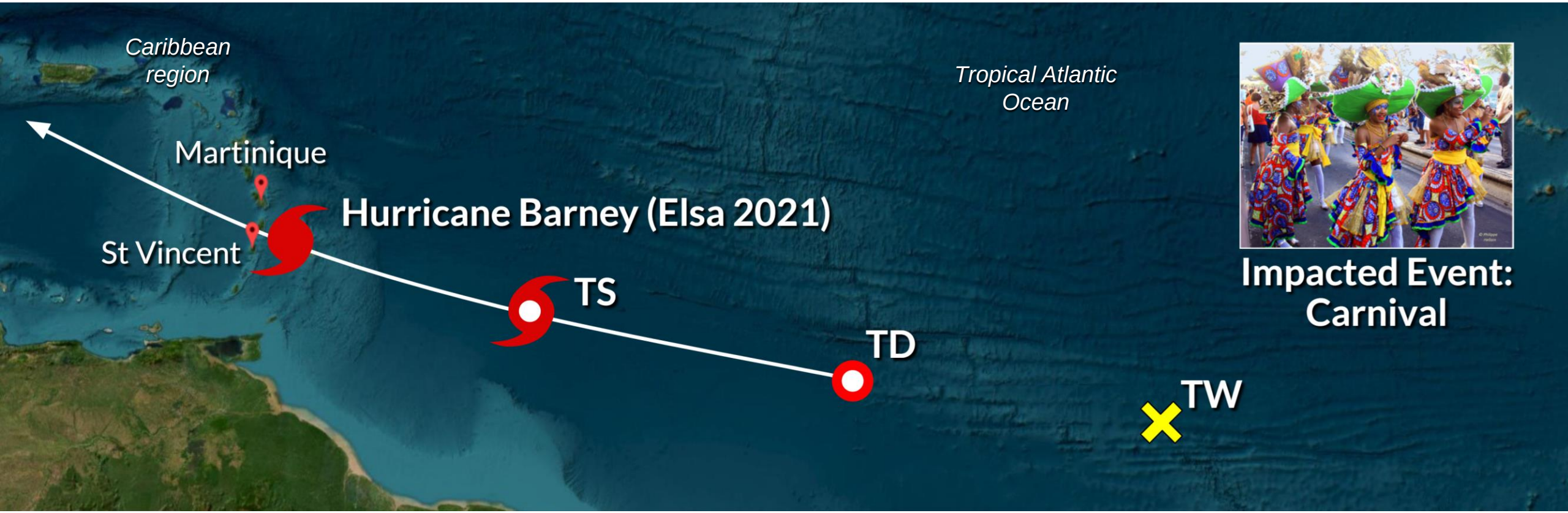
Varied (or interleaved) practice: Switching between (related) topics in a single practice session

Alternating practice between topic A and topic B

Space and varied practice help retention (limit the forgetting curve!).



Educational Simulation: Scenario



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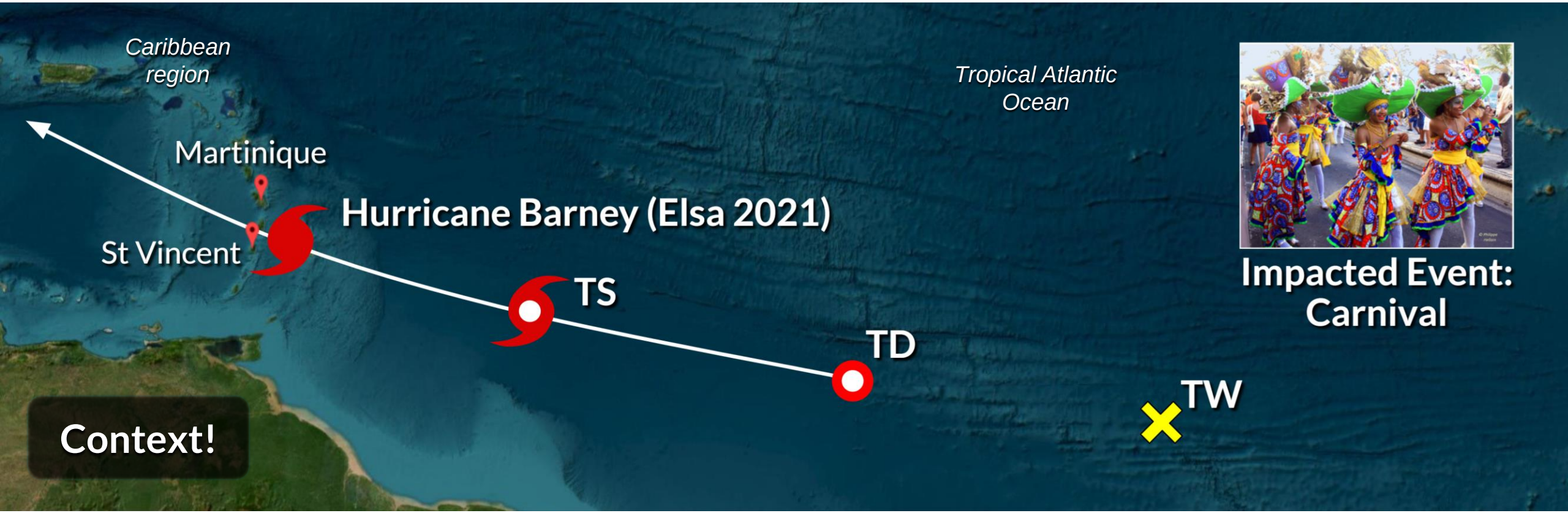

Educational Simulation: Initial Exercises

Jun 29: Tropical Wave (TW)

- Forecast
- Brief a Mayor

Educational Simulation: Activities

Situation | Satellite | **TC outlook** | TCLOGG | GFS Winds | ECMWF Winds | Shear | Wind Impacts | Rainfall Impacts

Tropical Weather Outlook

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ZCZC MIATWOAT ALL

TTAA00 KNHC DDHHMM


Tropical Weather Outlook

NWS National Hurricane Center Miami FL

800 AM EDT Tue Jun 29


For the North Atlantic...Caribbean Sea and the Gulf of
Mexico:

The National Hurricane Center has issued the last
advisory on the remnants of Tropical Depression Danny,
located inland over eastern Georgia.


1. Disorganized showers and thunderstorms continue in
association with a tropical wave located over the
tropical Atlantic, about 850 miles east of the Lesser
Antilles.  Some slow development of this disturbance
is possible later this week and this weekend while the
system moves westward to west-northwestward at 15 to
20 mph, likely reaching the Lesser Antilles by
Wednesday night.

* Formation chance through 48 hours...low...30
percent.

* Formation chance through 5 days...medium...40
percent.
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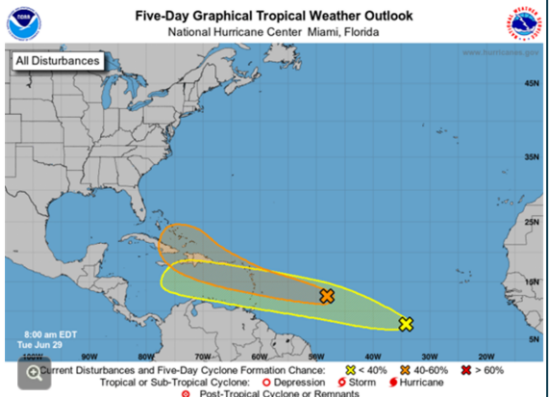
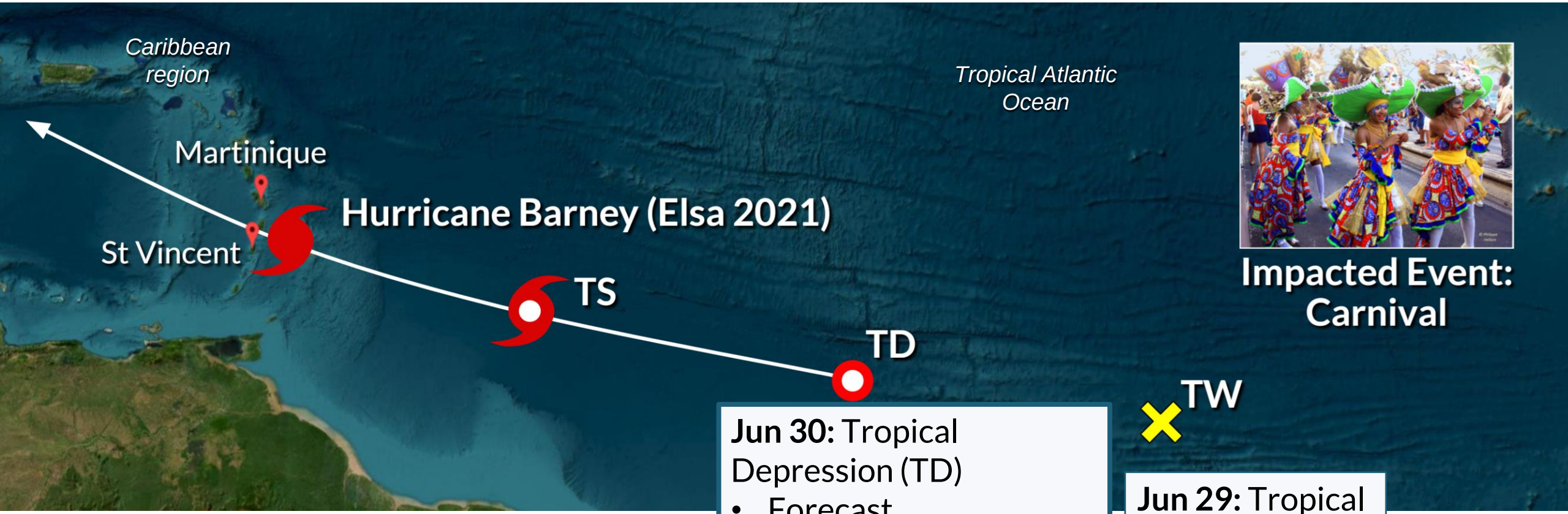


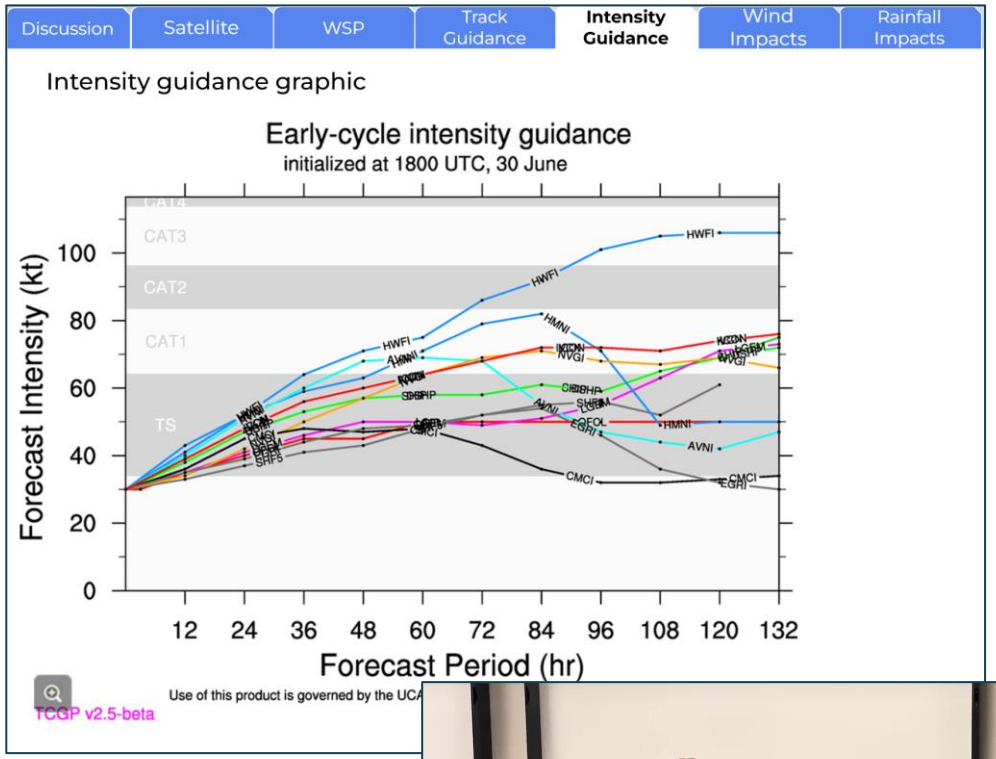
Educational Simulation

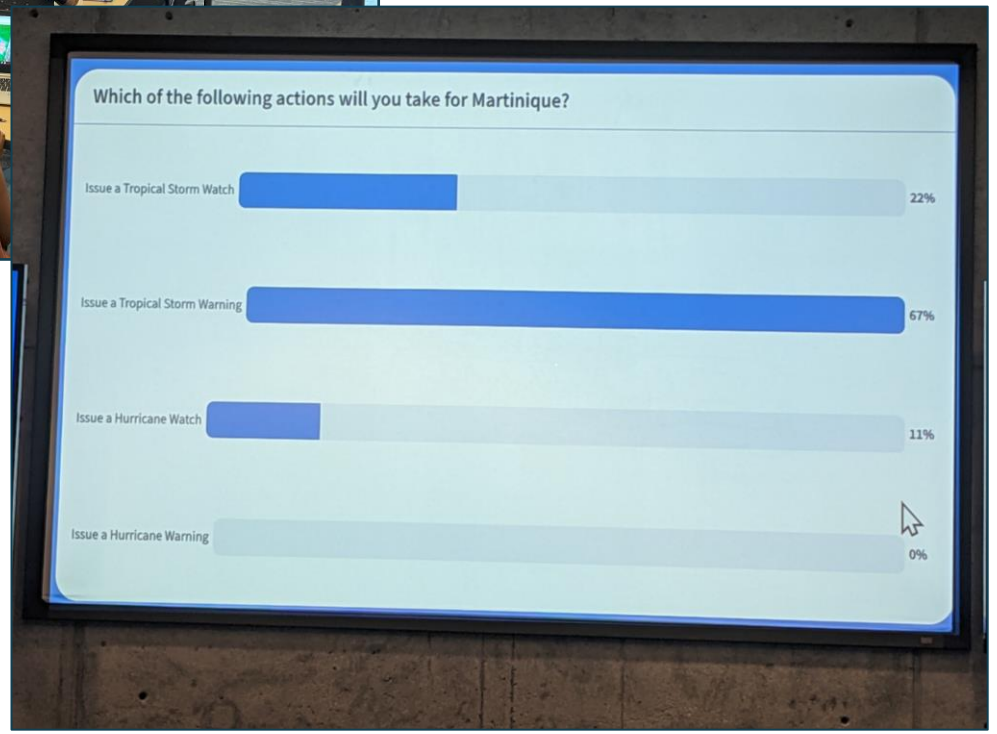


Jun 30: Tropical Depression (TD)
- Forecast
- NHC Coordination Call
- Brief an emergency minister

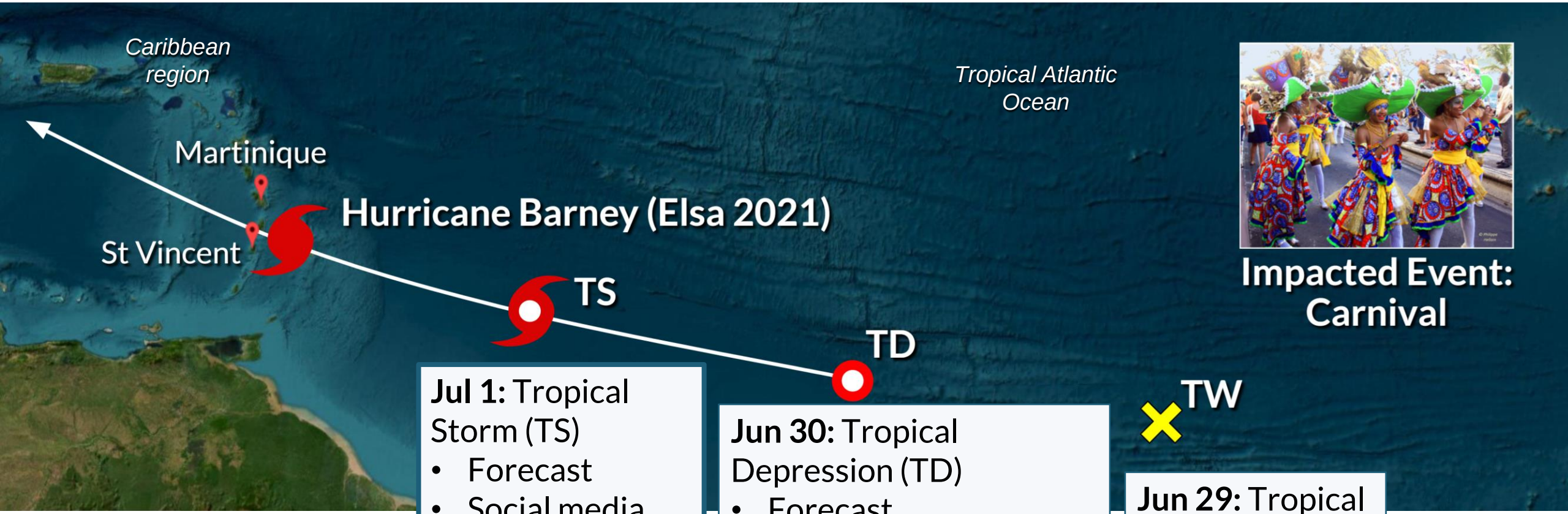
Jun 29: Tropical Wave (TW)
- Forecast
- Brief a Mayor

Educational Simulation: Activities





Educational Simulation



Jul 1: Tropical Storm (TS)
- Forecast
- Social media communication
- Media interview

Jun 30: Tropical Depression (TD)
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Educational Simulation: Activities

Forecast & Discussion | **Satellite & Discussion** | WSP | Track Guidance | Intensity Guidance | Wind Impacts | Rainfall Impacts

Tropical Storm Barney Discussion Number 4

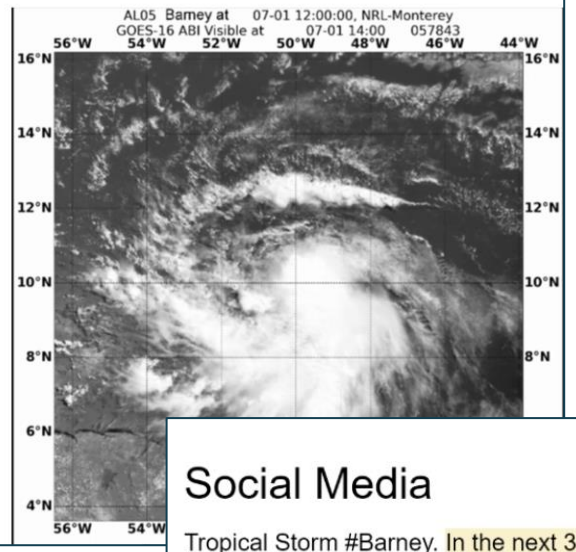
NWS National Hurricane Center Miami FL
AL05

1100 AM AST Thu Jul 01

Just-received scatterometer data showed 35-40 kt winds to the northeast of the center, so the initial intensity is increased to 40 kt. Some slight revisions were also made to the initial and forecast wind radii. Over all, the organization of the storm has changed little during the past several hours, with the low-level center partly exposed to the north and northwest of the primary convective band.

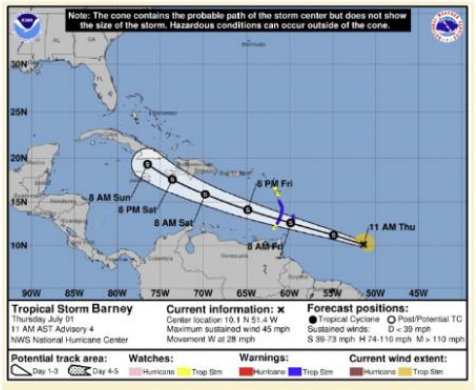
Barney continues to move a little faster with the initial motion now 280/24. A rapid west-northwestward motion is likely for the next 48 h or so as Barney is steered by the strong subtropical ridge to the north. After that time, the storm is expected to approach a weakness in the ridge caused by a mid-latitude trough over the eastern United states. The guidance becomes rather divergent as this happens, as the ECWMF and ECMWF ensemble mean forecast a turn toward the north while the

Satellite loop

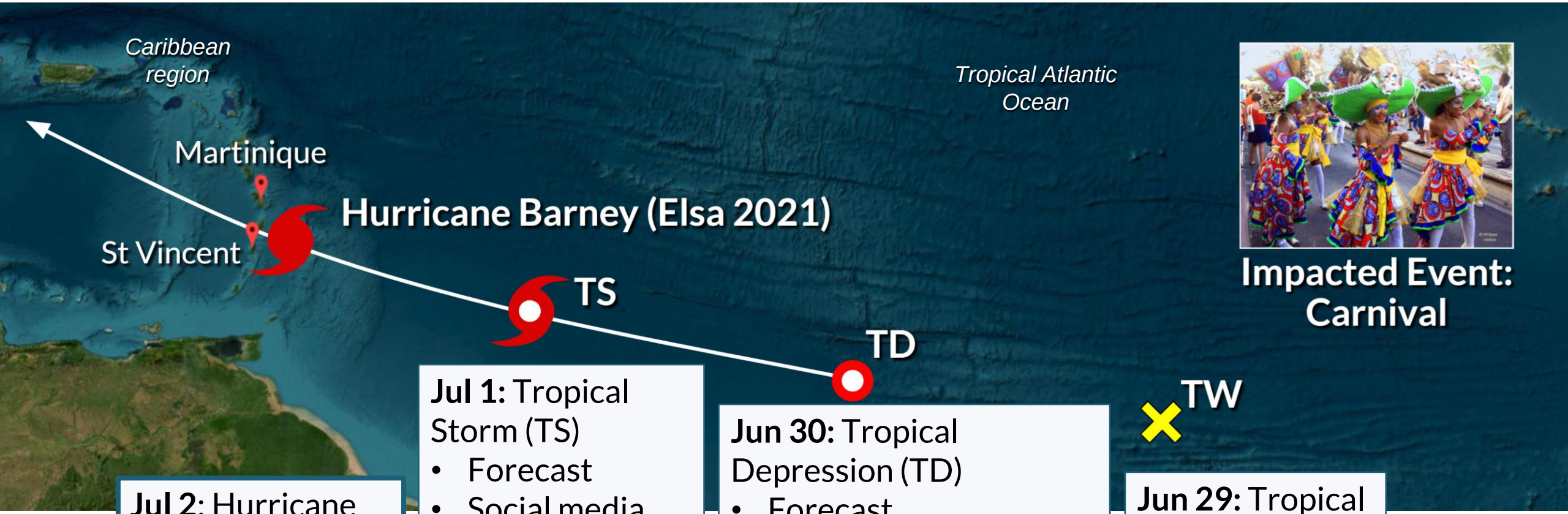


Social Media

Tropical Storm #Barney. In the next 36 hours Martininque will be under the inf
storm #Barney, which is travelling to the W at a speed of 44km/h and is expec
During this period, the winds are expected to intensify, reaching up to 50 kts,
occurrence of 3 to 6 inches of rain.
Monitoring and updating the progress of #Barney continue to be made.



Educational Simulation



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Jul 1: Tropical Storm (TS)
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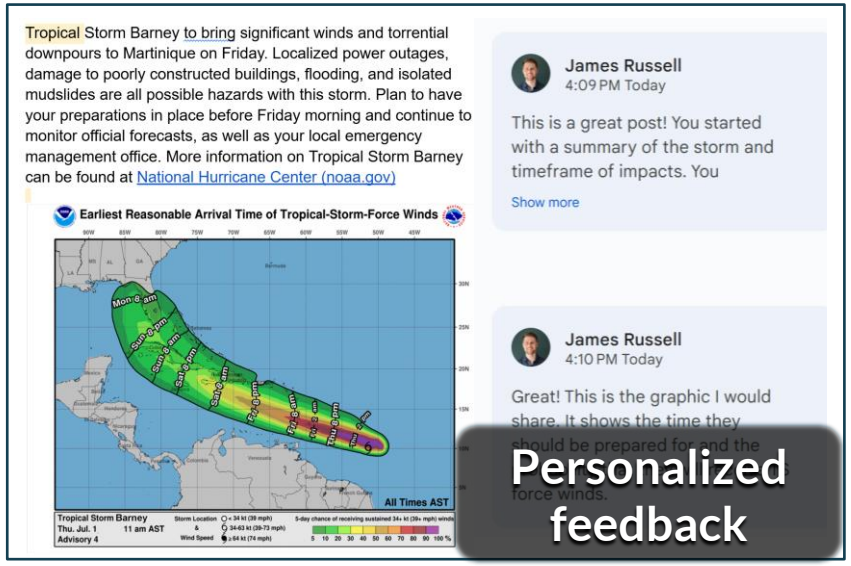
Jul 2: Hurricane
- Overview
- Reflection
- Discussion

Feedback & Reflection



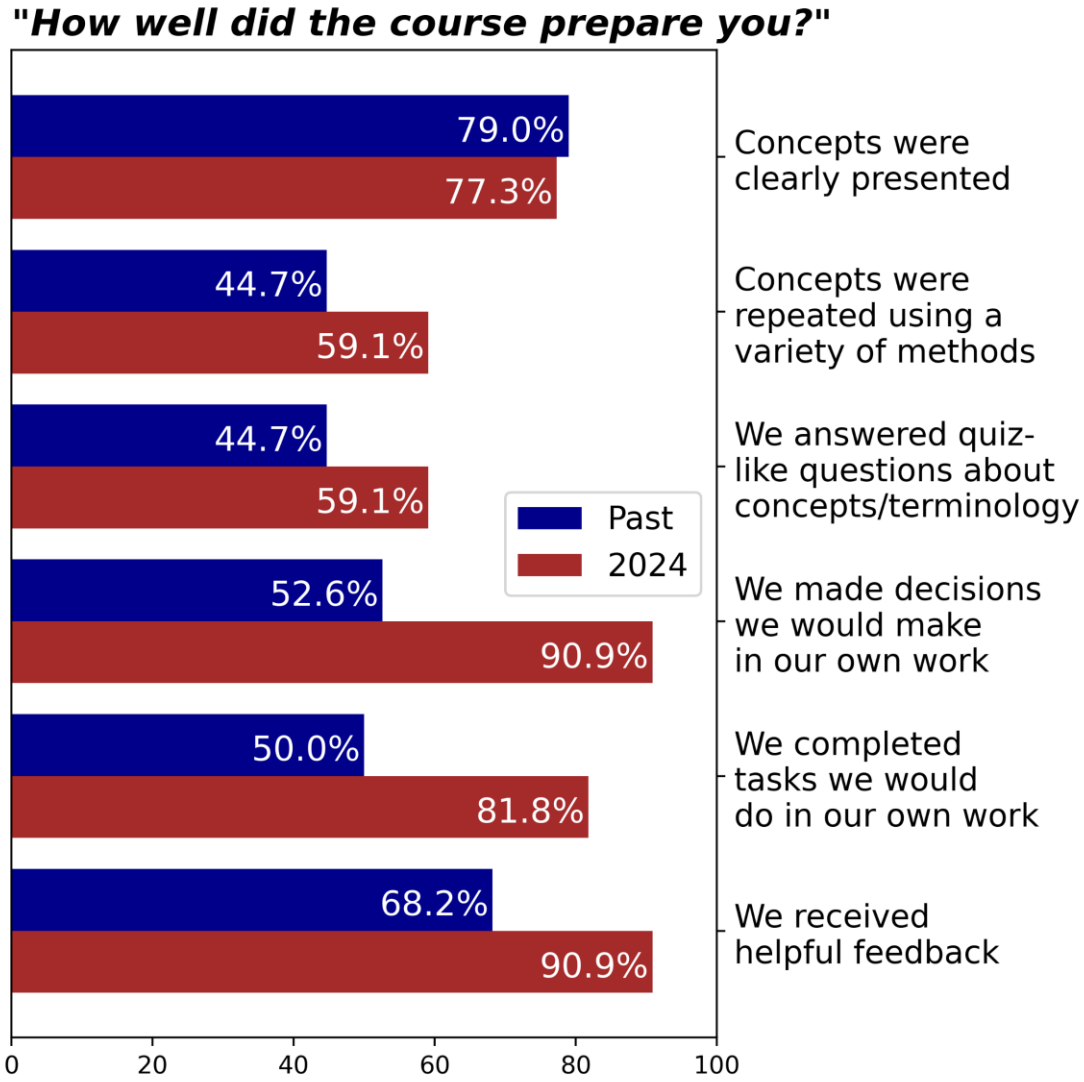
Impact

Surveys

Results showed significant content delivery improvements from previous years and that activities were primarily used for critical thinking, analysis, and decision-making.

"The simulation was very effective. It challenged my analysis, decision making, and communication skills when under pressure."

"The communication exercises provided a great simulation of a busy day on the desk and helped us apply all that was learned throughout the week."



Key Points

- Staff from the COMET Program transitioned the NHC-WMO TC Forecasting Course from lecture-based to active-learning focused.
- A key component of the refreshed course is a full day simulation that takes learners through realistic forecast and communication exercises at various stages in a tropical cyclone's life cycle.
- The simulation implements educational practices such as spaced and varied practice and context-challenge-activity-feedback.
- Learners given regular and varied feedback with reflection opportunities.
- Implementing active-learning strategies with the simulation at the core of the course led to significant improvements in learner engagement.