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Department of Industrial and Manufacturing Systems Engineering

The Hurricane Decision Simulator A Tool for Marine Forces in New Orleans to Practice Operations Management in Advance of a Hurricane

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U.S. Marine Forces Reserve (MFR)



Lt. Gen. Rex McMillian



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MFR Decision Support Matrix

Hours before arrival of 39-mph winds

- 96 hours: Send advance emergency relocation staff (ERS) to alternate headquarters
- 2. 96 hours: Send liaison officers to local municipal emergency operations centers
- 3. 72 hours: Send rest of ERS to alternate headquarters
- 4. 72 hours: Activate remain behind element to stay if evacuation ordered
- 5. 60 hours: Evacuate or shelter in place
 - 6. 48 hours: Transfer command and control to alternate headquarters

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Isaac 72 hours before landfall



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Every storm is different





Challenges in hurricane preparation

Progress: Errors and forecast products ≠ last season's

Updates: current forecast ≠ next forecast

Error: forecast ≠ outcome

Forecast variables ≠ impact variables

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Hurricane Decision Simulator

- Training tool to make hurricane preparation decisions
- Key characteristics
 - Simulated storms (storm and forecasts)
 - User decisions
 - Actions of other entities
 - Consequences of storm plus decisions

Storm model

- Synthetic storms
 - Realism storms should <u>feel</u> believable
 - Features should <u>span</u> realistic ranges
 - Unusual events <u>should</u> occur in synthetic storms
- Storm forecasts in 6-hour increments
 - Most likely path (forecast track)
 - Probability forecasts for next 120 hours
- Realistic forecasts: forecast errors consistent with recent National Hurricane Center forecasts



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Use by the Marines

- Individual training by crisis action team and emergency relocation team (almost 200 people) since Fall 2015
- Used in developing annual (team) specialized hurricane exercises

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Experience more simulated storms



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Focus on decision making with uncertainty



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Understand forecast products



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Develop simulation tool for other bases



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Conclusions

Hurricane Decision Simulator provides

- Experience that impossible to gain through real world
- Unique tool to help senior leaders practice making decisions in a dynamic an uncertain environment

"The Hurricane Decision Simulator provides the Marines with an important tool that we will continue to use to practice our preparation for hurricanes.... The simulator helps us to manage our operations more effectively both in terms of training and in readiness in the event that a hurricane hits New Orleans." Col Russel Mantzel, Operations, Marines Reserve Forces

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