

Tropical Cyclone Weather Support and Education at Embry-Riddle Aeronautical University

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1. Introduction

Embry-Riddle Aeronautical University (ERAU), a coed residential university of approximately 5000 students located in Daytona Beach, Florida, is uniquely vulnerable to tropical cyclone activity occurring in the Atlantic basin. When threatened with a tropical cyclone, ERAU not only has to take steps to protect its people, grounds, and physical structures, but also needs to take unique actions to protect its fleet of approximately 60 general aviation aircraft. This creates the need for both specialized weather support when threatened and a more general program of tropical cyclone education.

2. Program Overview

Given this, the Applied Meteorology Group within the Applied Aviation Sciences Department at ERAU has developed a program to address this need. This program consists of two parts and is summarized in Table 1.

Table 1.

ERAU Tropical Cyclone Weather Support and Education

- I. Education and Awareness Activities
 - Hurricane Preparedness Seminar
 - Annual Briefing to ERAU EOT
- II. Operational Weather Support Activities
 - Tropical Meteorological Watch
 - Weather Briefings

The first part of this program addresses tropical cyclone education and awareness. Included in this part is a hurricane preparedness seminar developed for ERAU and the local community. The purpose of the seminar is to increase the general understanding of tropical cyclones, their effects, forecast products, what should be done to prepare, and how to respond when threatened. This seminar is presented on an as-needed basis and speakers include ERAU meteorology faculty, National Weather Service meteorologists, and local emergency managers.

Another activity associated with the education aspect of this program is an annual briefing given at the beginning of the

hurricane season to the Emergency Operations Team (EOT) at ERAU. The EOT consists of key ERAU decision-makers such as the Director of Campus Safety and Security, the Director of Facilities, and the Chancellor's Office. This briefing includes the outlook for the upcoming season, general reminders on the nature of tropical cyclones, and a review of the National Hurricane Center (NHC) products.

The second part of our program (i.e., the weather support portion) includes a tropical meteorological watch and customized weather briefings when a tropical cyclone threatens. These activities are currently handled by the Applied Meteorology faculty and support not only the ERAU community but other education, government, and business organizations in the area.

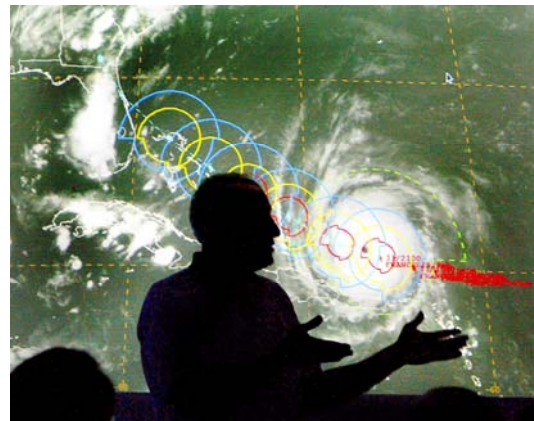


Figure 1. Richard Theokis, Director of ERAU's Flight Line in 2004, comments on Hurricane Frances during the weather briefing taking place in ERAU's Weather Center on Tuesday 31 August 2004. Source: The Daytona Beach News Journal

The meteorological watch occurs throughout the hurricane season and customized weather briefings, when threatened by a storm, can be as frequent as three times per day. These briefings typically occur within the hour after the NHC forecast is issued and make extensive use of ERAU's state-of-the-art Weather Center. The briefings use in-house visualization products such as NMAP and GARP to display model analyses and forecasts and real-time satellite and RADAR data. The content of the briefing generally includes items such as a

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synoptic overview (e.g., real-time satellite imagery with GFS analyses and short term forecast fields overlaid), the NHC forecast track, and a discussion of forecast uncertainty. Weather information is also provided to support any aircraft evacuations that may have to occur.

3. An Example of Our Experience

The recent active hurricane seasons have tested this program. This was especially true during the 2004 Hurricane Season when four named storms (Charley, Frances, Ivan, Jeanne), to some degree, affected operations and activities at ERAU and within the surrounding community. During that time, 15 formal weather briefings took place as well as many informal discussions with a variety of individuals and organizations. These briefings and discussions ultimately supported two campus closings, two aircraft evacuations from Daytona Beach, one aircraft repositioning after being evacuated, and two aircraft recovery back to Daytona Beach. A detailed chronology of this activity appears in Table 2.

Table 2.

Chronology of Weather Support Activities During the 2004 Hurricane Season

Wed. 11 Aug: (~11 a.m.) *Briefing* to flight line; Charley threatening.

Thur. 12 Aug: (~11 a.m.) *Briefing* to flight line, security, safety, facilities, and other organizations; Charley threatening.

Fri. 13 Aug: (8:30 a.m.) *Briefing* to flight line personnel, Chancellor's office, security, safety, facilities, and other organizations; Charley threatening (decision to stay in place due to presence of TS Bonnie to the NW).

Mon. 30 Aug: Discussions begin with flight line on Frances.

Tues. 31 Aug: (1 p.m.) *Briefing* to flight line, Chancellor's office, security, safety, facilities, and other organizations; Frances threatening.

Wed. 1 Sep: (1 p.m.) *Briefing* to flight line, Chancellor's office, security, safety, facilities, and other organizations; Frances threatening (decision to move aircraft).

(3 p.m.) *Briefing* to Instructor Pilots (IPs) for deployment to AL (KHSV, KGAD, KANB, KMGM) and GA (KRMG).

Thur. 2 Sep: (~5 a.m. to 11 a.m.) Was available during deployment with weather updates.

Tues. 7 Sep: Discussions begin with flight line on recovery of aircraft; Frances affecting recovery of deployed aircraft.

Wed. 8 Sep: (1 p.m.) *Briefing* to flight line personnel; Frances affecting recovery, Ivan threatening. (decision made to bring IPs back to KDAB by bus).

Fri. 10 Sep: (1 p.m.) *Briefing* to flight line, Chancellor's office, security, safety, facilities, and other organizations; Ivan threatening. Also advised flight line to move aircraft at KMGM northward to

Table 2. (Cont.)

avoid possible threat from Ivan (aircraft moved Sat. 11 Sep).

Sun 12 Sep: (1 p.m.) *Briefing* to flight line; Ivan threatening affecting possible recovery.

Mon 13 Sep: (1 p.m.) *Briefing* to flight line; Ivan threatening aircraft in AL, GA and possibly affecting recovery back to KDAB (decision made to get IPs back in place in AL, GA).

Tues 14 Sep: (10:30 a.m.) *Briefing* to IPs on Ivan and overall weather for possible recovery/redeployment actions.

(1 p.m.) *Briefing* to flight line on Ivan.

Wed. 15 Sep: (~7 a.m.) *Briefing* to flight line; Ivan threatening aircraft in AL, GA and not allowing recovery back to KDAB (decision made to move aircraft in KGAD, KANB, KRMG to AR, KHSV hangered); (during a.m. hours) provided weather updates to flight line for redeployment to AR.

Thur. 16 Sep: (1 p.m.) *Briefing* to flight line on recovery weather (forecast indicated probable recovery back to KDAB on Fri 17 Sep).

Fri. 17 Sep: (7a.m.) *Briefing* to flight line on recovery weather (decision made to recover aircraft from all locations; all aircraft recovered to KDAB by p.m.).

Mon. 20 Sep through Wed 22 Sep: Discussions with flight line personnel on Jeanne.

Thurs. 23 Sep: (9:30 a.m.) *Briefing* to flight line, Chancellor's office, security, safety, facilities, and other organizations; Jeanne threatening.

Fri. 24 Sep: (8 a.m.) *Briefing* to flight line, Chancellor's office, security, safety, facilities, and other organizations; Jeanne threatening (decision made to move aircraft to AL (KHSV, KANB, KGAD) and GA (KRMG)).

(11 a.m.) *Briefing* to IPs for deployment to AL, GA

Sat. 25 Sep: (4 a.m. to 8 a.m.) Was available during deployment with weather updates.

Mon. 27 Sep: (1 p.m.) *Briefing* to flight line on recovery back to KDAB (aircraft recovered Tues. 28 Sep).

4. Response to the Program

The response of ERAU and the local community to what has been developed has been very positive. What follows are sample quotes from e-mails and letters commenting on various aspects of the program:

"I really enjoyed your presentation and observing the audience, they were obviously captivated. I think that ERAU is onto a very exciting concept and hope the University continues to provide the workshop on an ongoing basis."

- taken from an e-mail to the author from Richard Moore, Volusia County Division of Emergency Management after taking part in the ERAU hurricane preparedness seminar in May 2006

"I want to tell you how much we appreciate the service you give the University with your weather

briefings regarding Hurricanes. ... You have also taught many of us more about meteorology than we had ever expected to know. ... You've handled some of our silly questions with humor and grace."

- taken from a letter written in October 2005 to the author from Dr. Irwin Price, Chancellor, ERAU Daytona Beach Campus after two very active hurricane seasons

"It has come to my attention that the meteorological information provided in numerous forums conducted by your department in advance of Hurricanes Francis, Ivan, and Jeanne were invaluable in assisting Daytona International Speedway and International Speedway Corporation (ISC) in their storm preparation. Your invitation and inclusion of ISC's Emergency Services Coordinator and other ISC staff members serve as a shining example of community organizations working together in trying times."

- taken from a letter written in October 2004 to the Applied Meteorology Group from Lesa Kennedy, President of International Speedway Corporation

As evidenced by the second quote from above, one aspect of the program that is especially well received is the "one to one" contact of the meteorological faculty with the ERAU and local communities. For example, the customized weather briefings that are given when a hurricane has the potential to threaten central Florida provide the attendees the opportunity to ask questions and get needed clarification. The briefings can also address issues unique to the individuals in the room. And overall, they serve as an opportunity to educate the community on hurricanes, their behavior, and the forecast process in general.

5. Future Plans

While the program has been successful thus far, changes are planned. These changes include greater student involvement. Though our undergraduate students have observed real-time tropical weather support and education activities over the recent years, they, for the most part, have not been formally involved in the activities described here. Greater involvement will enrich the undergraduate meteorology experience at ERAU. Specific ways of increasing student involvement will be turning a large portion of the meteorological watch activity over to our student Weather Center employees and getting greater student involvement in briefing and seminar preparations. This, too, will alleviate some of the time demand on the Applied Meteorology faculty

which can be rather large when the tropics are active.