



Hunting Hurricanes: Heading Straight into the Eye of the Storm

Warren Madden, LtCol USAF (Ret.)
Chief, Aerial Reconnaissance Coordination, All Hurricanes
(CARCAH)



A Quick (Virtual) Survey to Get Us Started



Have you ever...



...traveled on an airplane?





...gone through a car wash?





...taken a ride on a roller coaster?





How many of you have done
all three at the same time?





Q: Where do you work?

A: Inside the eye of a hurricane



- How it all started
- Aircraft through the years
- Today's squadrons
- The mission
- There I was...
- Final Thoughts



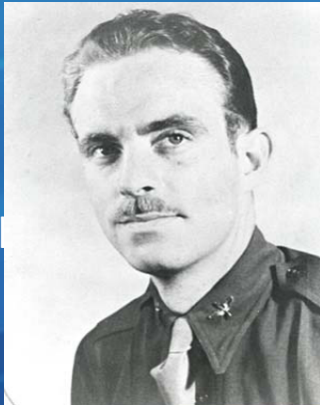
“Bet you can’t fly into that hurricane...”



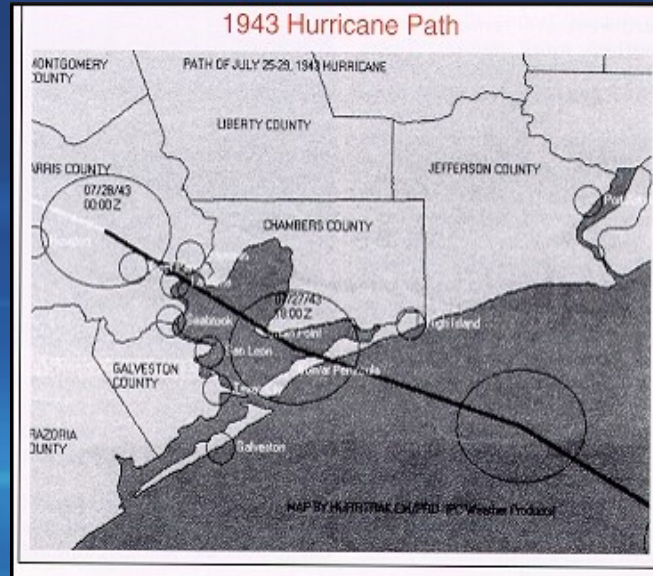
Colonel Joseph Duckworth



1st Lieutenant
William Jones-Burdick



2nd
Lieutenant
Ralph Jones



July 27, 1943



AT-6 Texan



Different Aircraft, Same Mission





Today's Aircraft



WC-130J



WP-3D



Gulfstream IV



Aircraft Then and Now





53rd Weather Reconnaissance Squadron



- Based at Keesler AFB Mississippi
- United States Air Force Reserve
- 10 WC-130J Hercules
- 20 crews (split between full-time and traditional reservists)
- Primary Mission: Tropical Weather Reconnaissance



NOAA Aircraft Operations Center



- Based at Lakeland Linder Regional Airport, Lakeland Florida
- Part of the National Oceanic and Atmospheric Administration
- 2 WP-3D & 1 Gulfstream IV
- Crews are members of the NOAA Corps
- Primary Mission: Science & Research into Tropical Systems



CARCAH



- 3 person Air Force unit, part of the 53 WRS
- Located inside the National Hurricane Center
- Responsible for coordinating all flights with NHC
- Receives all aircraft data, performs quality checks on it
- Provides data to NHC forecasters and rest of the world



A Brief Picture Interlude





A Brief Picture Interlude





The Mission



The Plan of the Day



NOUS42 KNHC 141443
REPRPD
WEATHER RECONNAISSANCE FLIGHTS
CARCAH, NATIONAL HURRICANE CENTER, MIAMI, FL.
1050 AM EDT TUE 14 OCTOBER 2014
SUBJECT: TROPICAL CYCLONE PLAN OF THE DAY (TCPOD)
VALID 15/1100Z TO 16/1100Z OCTOBER 2014
TCPOD NUMBER.....14-136

I. ATLANTIC REQUIREMENTS

1. HURRICANE GONZALO

FLIGHT ONE -- TEAL 75

A. 15/2330Z

B. AFXXX 0808A GONZALO

C. 15/2100Z

D. 24.6N 68.6W

E. 15/2300Z TO 16/0230Z

F. SFC TO 10,000 FT

FLIGHT TWO -- TEAL 74

A. 16/1130Z

B. AFXXX 0908A GONZALO

C. 16/0915Z

D. 26.1N 68.6W

E. 16/1100Z TO 16/1430Z

F. SFC TO 10,000 FT

2. OUTLOOK FOR SUCCEEDING DAY: CONTINUE 12-HRLY FIXES.

II. PACIFIC REQUIREMENTS

1. TROPICAL STORM ANA

FLIGHT ONE -- NOAA 49

A. 16/0000Z

B. NOAA9 0102C ANA

C. 15/1730Z

D. NA

E. NA

F. 41,000 TO 45,000 FT

2. SUCCEEDING DAY OUTLOOK: A G-IV FLIGHT DEPARTING AT 16/1730Z FOR 17/0000Z.

3. ADDITIONAL DAY OUTLOOK: FIX TS ANA AT 17/1200Z NEAR 15.6N 150.0W. 6-HRLY FIXES BEGIN 18/0000Z.

\$\$
JWP

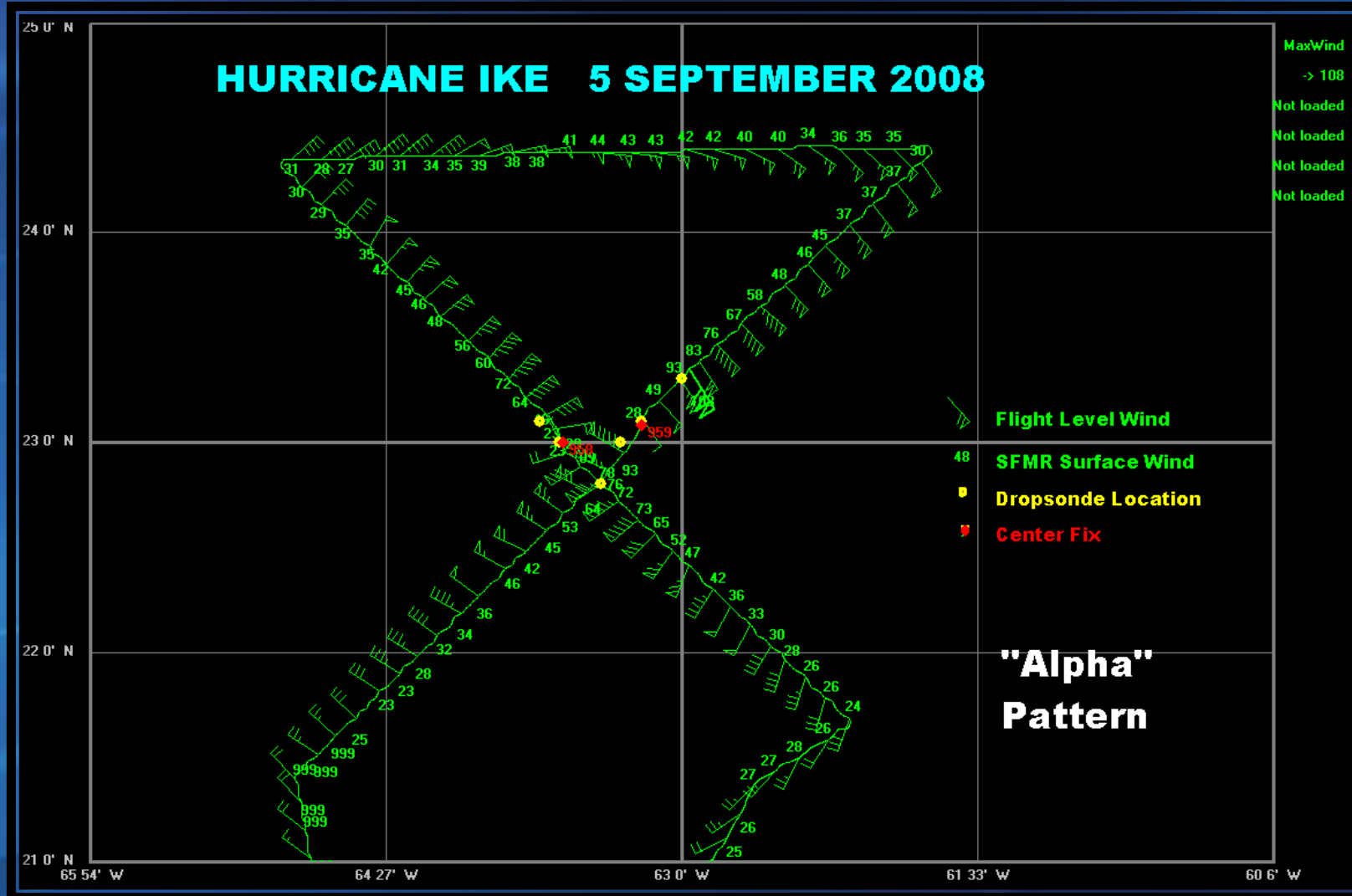


Area of Responsibility



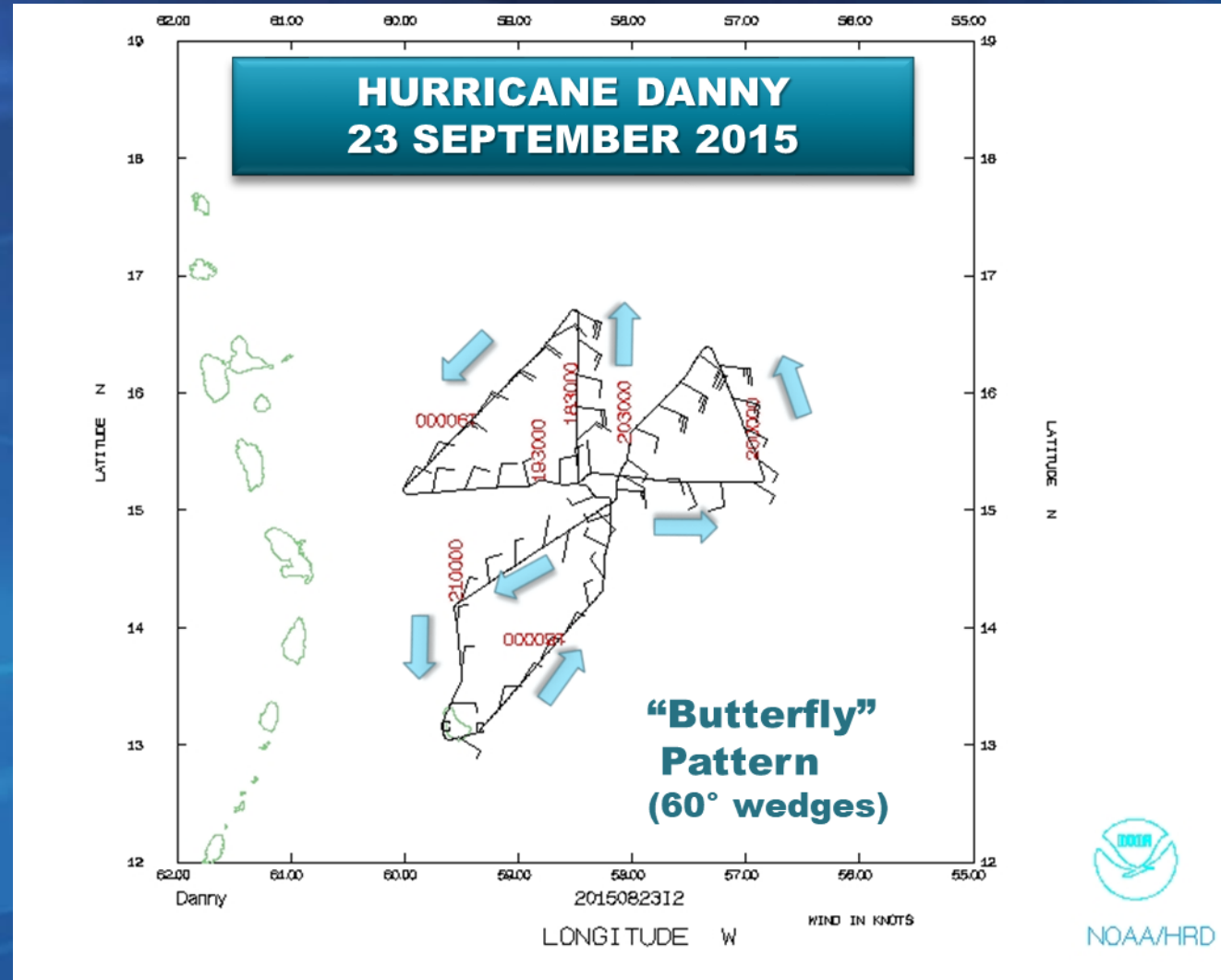


Typical WC-130J Track



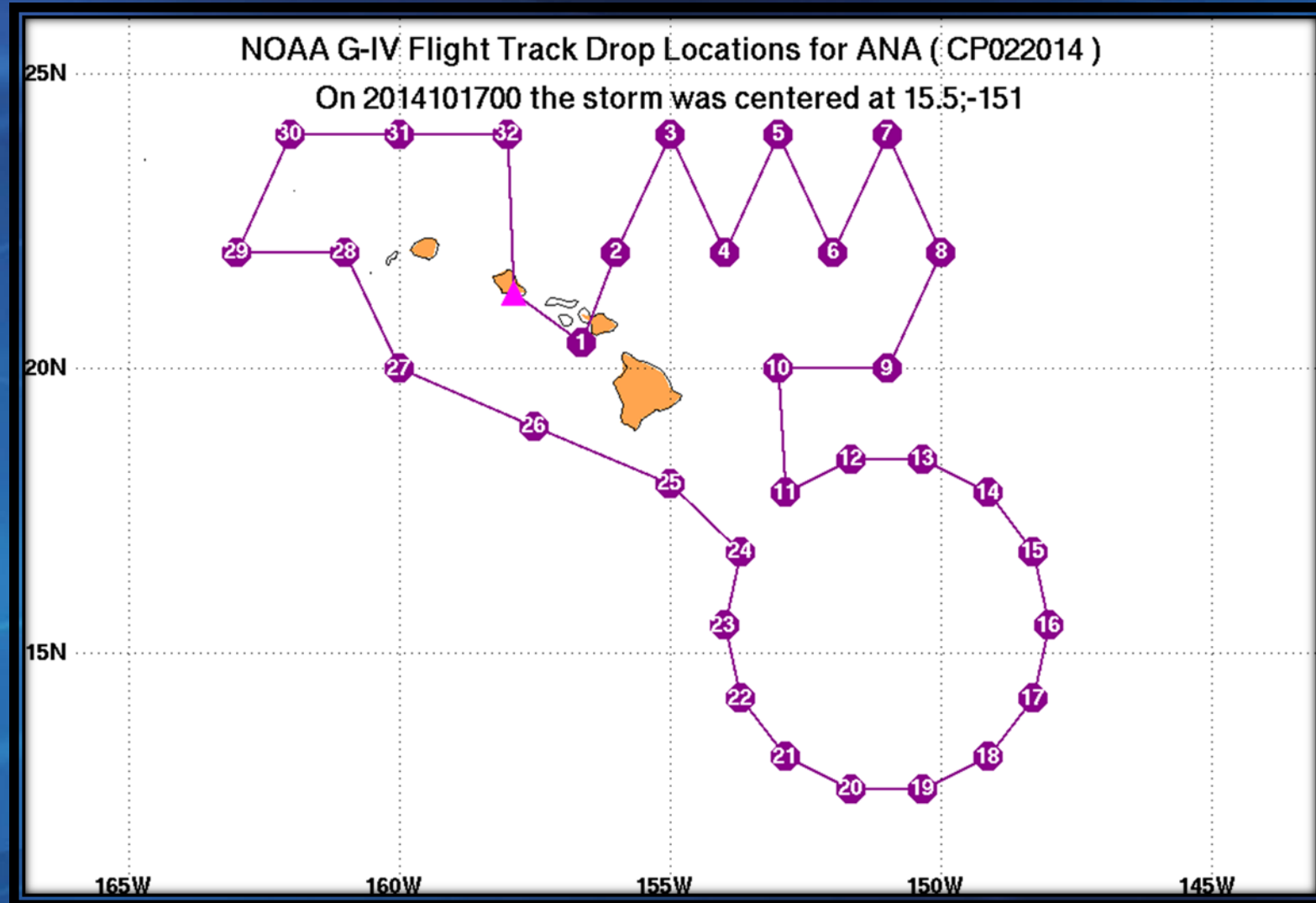


Typical WP-3D Track





Typical G-IV Track





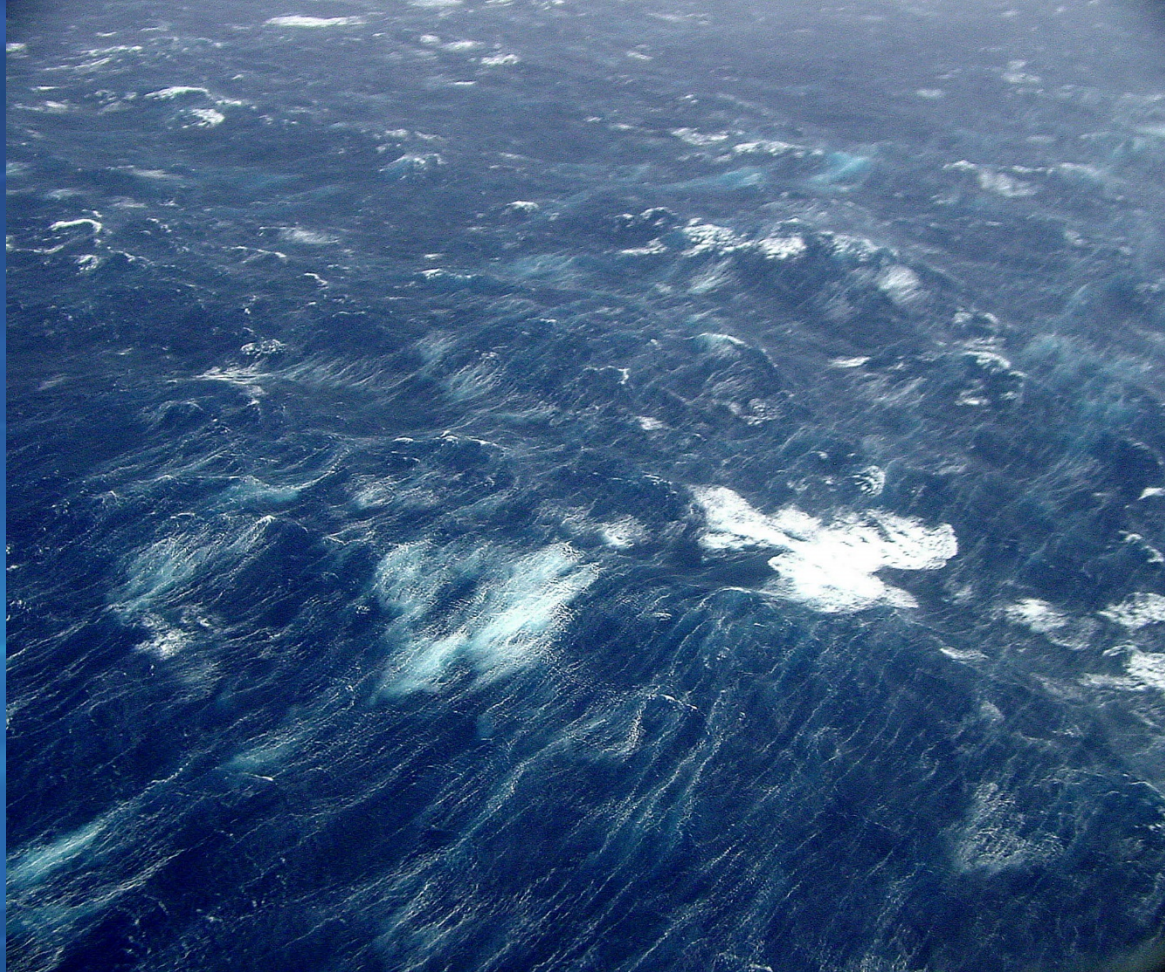
Data Collected: Aircraft



- Storm Position
- Winds at Flight Level
- Winds at Surface
- Temperature
- Humidity
- Rain Rate
- Extrapolated Sea Level Pressure
- Radar
- Human Observations (Turbulence, Lightning, etc)



Data Collected: Surface Winds





Data Collected: SFMR





Data Collected: Dropsonde



- Winds
- Temperature
- Humidity
- Barometric Pressure



There I Was...

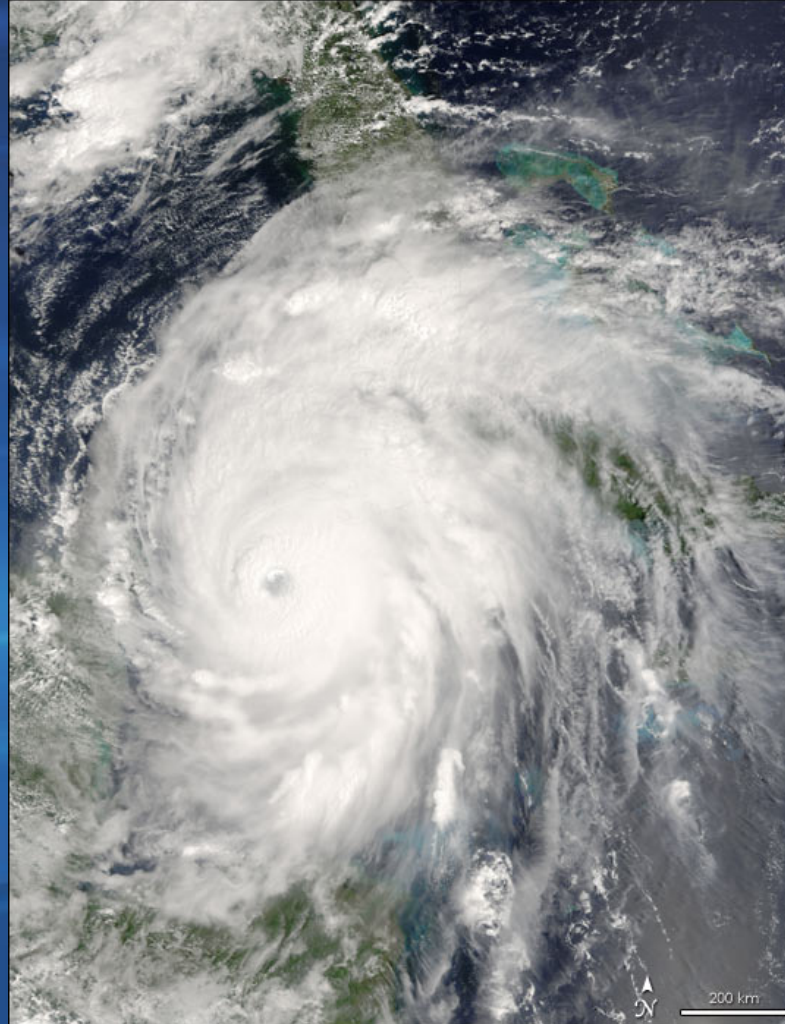


Hurricane Ivan 2004



Q: What is the only US military aircraft allowed to fly over Cuba?

A: An Air Force Hurricane Hunter (with approved clearance)



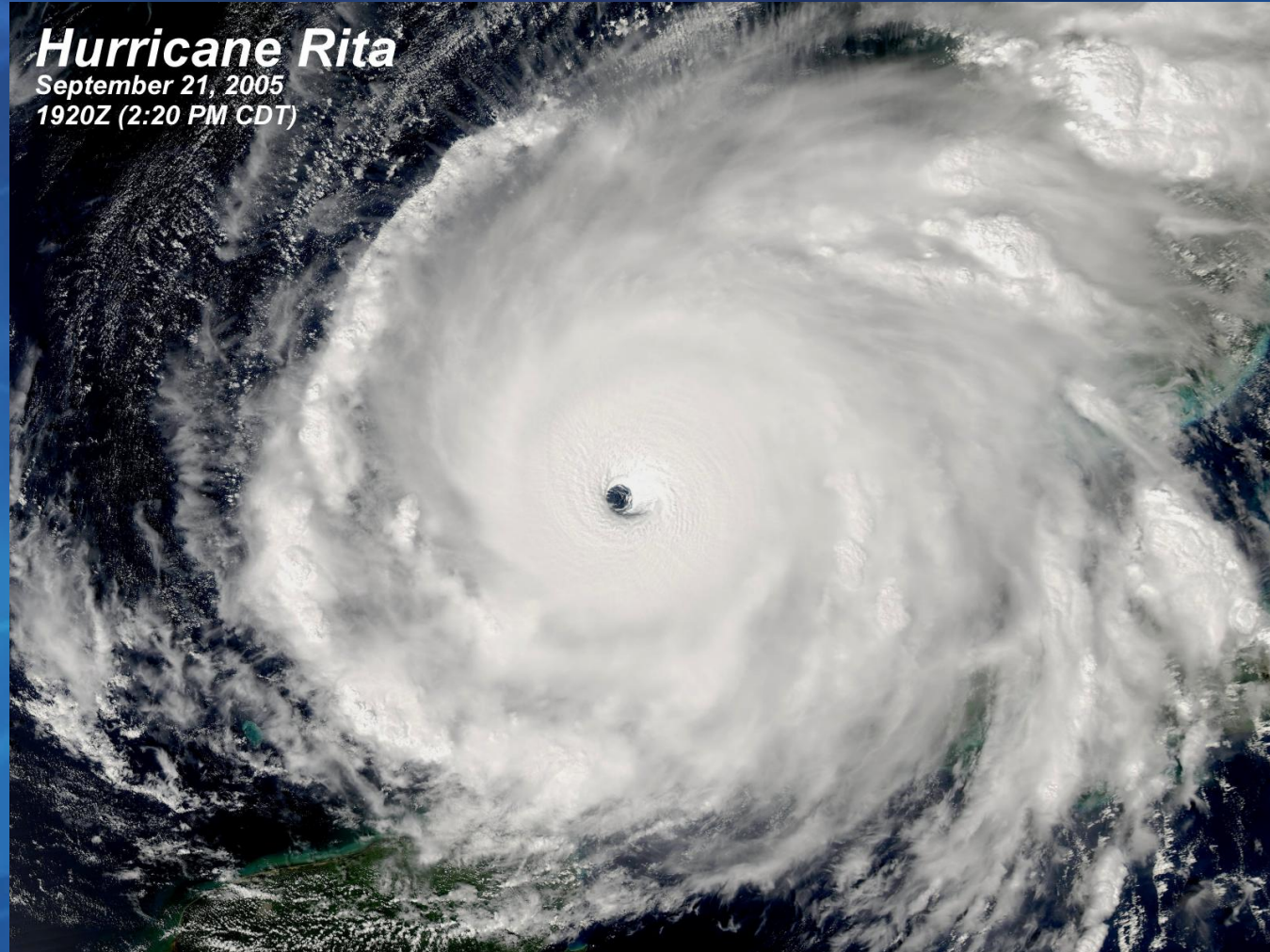
Q: What Hollywood star has flown through a Category 5 hurricane?

A: John Cusack



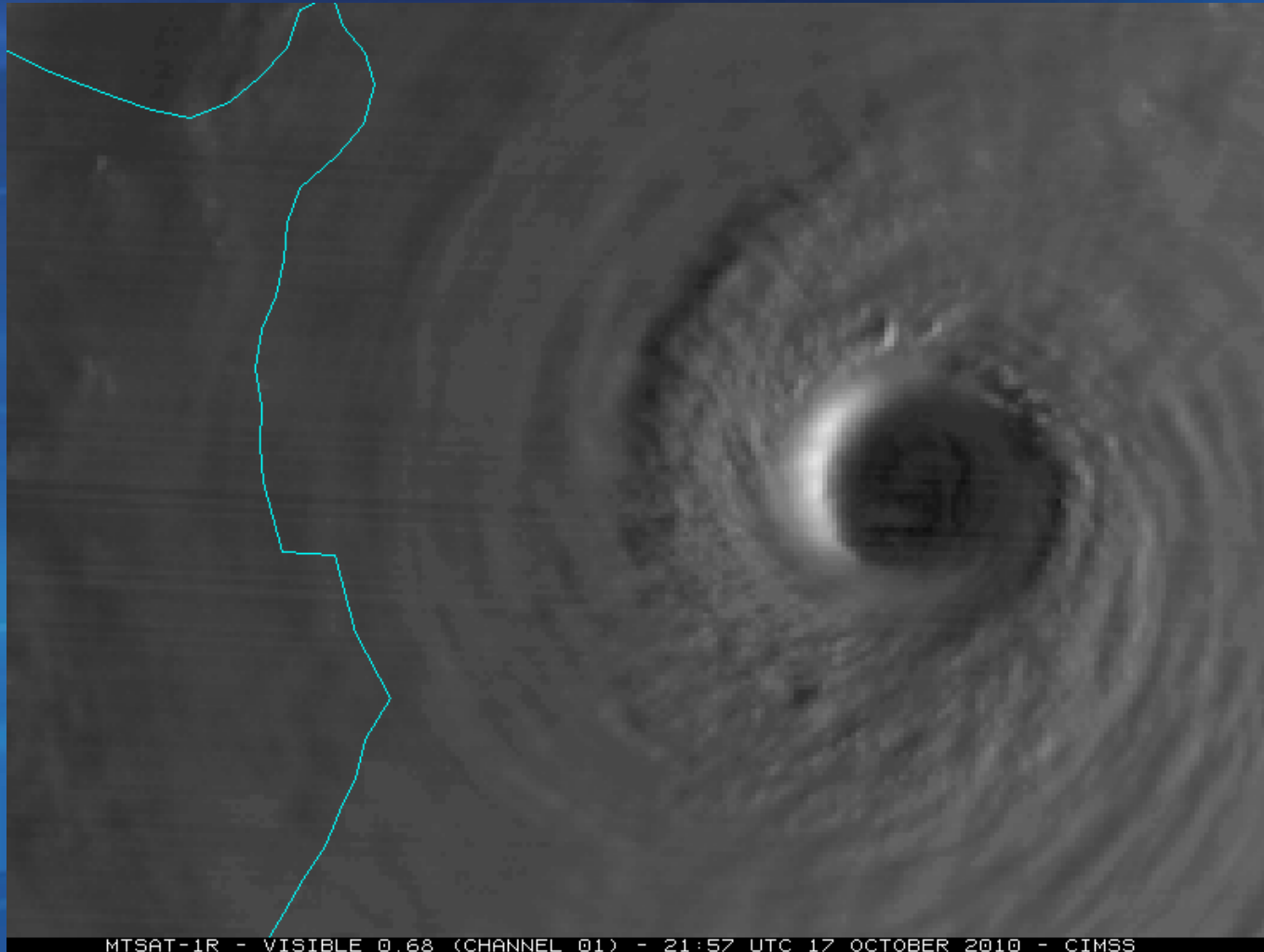
Hurricane Rita

2005





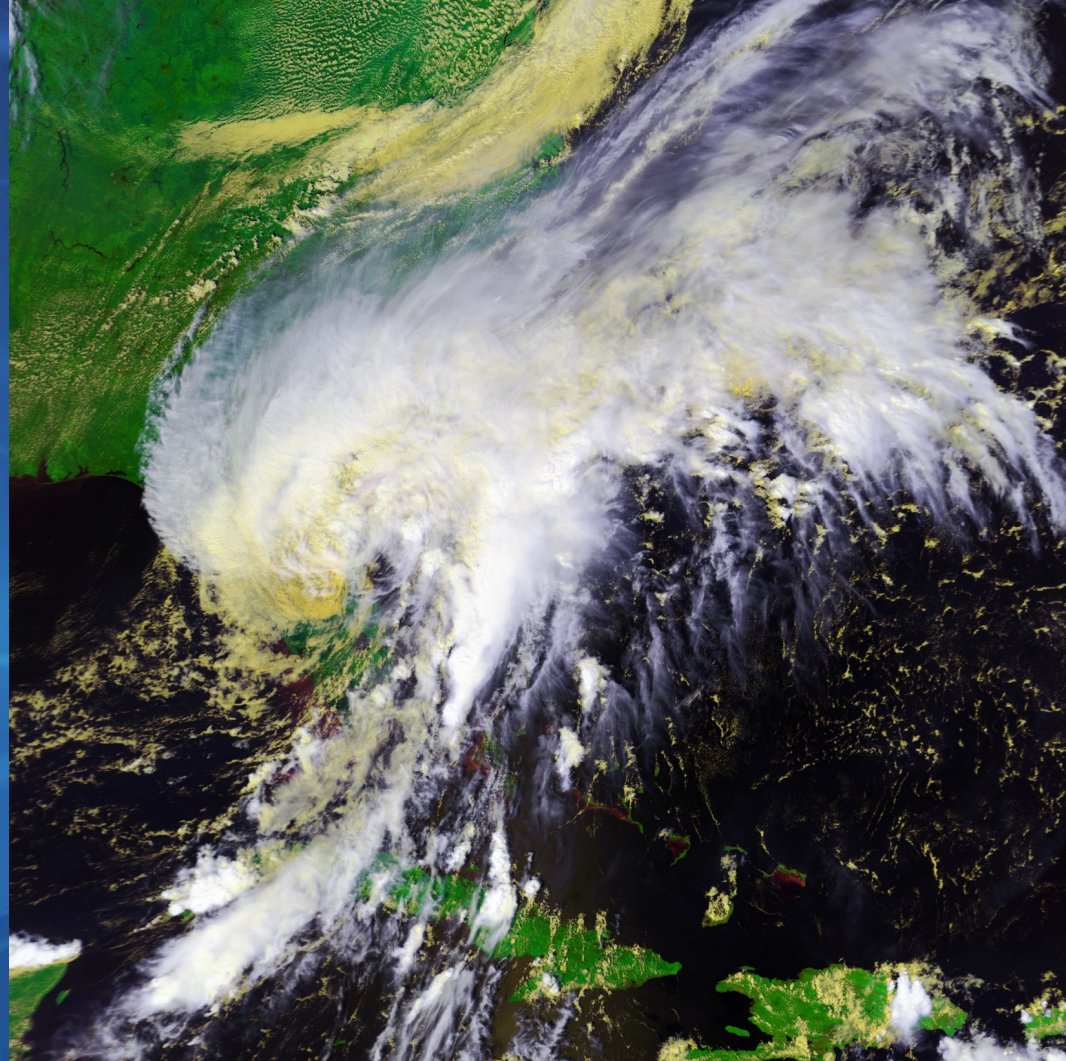
Typhoon Megi 2010



MTSAT-1R - VISIBLE 0.68 (CHANNEL 01) - 21:57 UTC 17 OCTOBER 2010 - CIMSS



Tropical Storm Gabrielle 2001





Final Thoughts



- When? (did we start flying into hurricanes)
- What? (planes have been used)
- Who? (the 53rd WRS and NOAA AOC)
- How? (is the mission coordinated and flown)
- Where? (the Atlantic and Pacific oceans)



Final Thoughts



Why?



Why We Fly



- Some data can only be obtained from inside the storm
- Hurricane Hunter data improves forecasts
- Research inside storms increases scientific knowledge
- Hurricane Hunter data saves lives



Hurricane Ike 2008





Hurricane Michael 2018





Warren Madden

Chief, Aerial Reconnaissance Coordination, All Hurricanes

Twitter: @WarrenMaddenWX

CARCAH data: <https://www.nhc.noaa.gov/recon.php>