The Joint Hurricane Testbed

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2014 Interdepartmental Hurricane Conference

The Forecasters (Us)

The Researchers (Them)

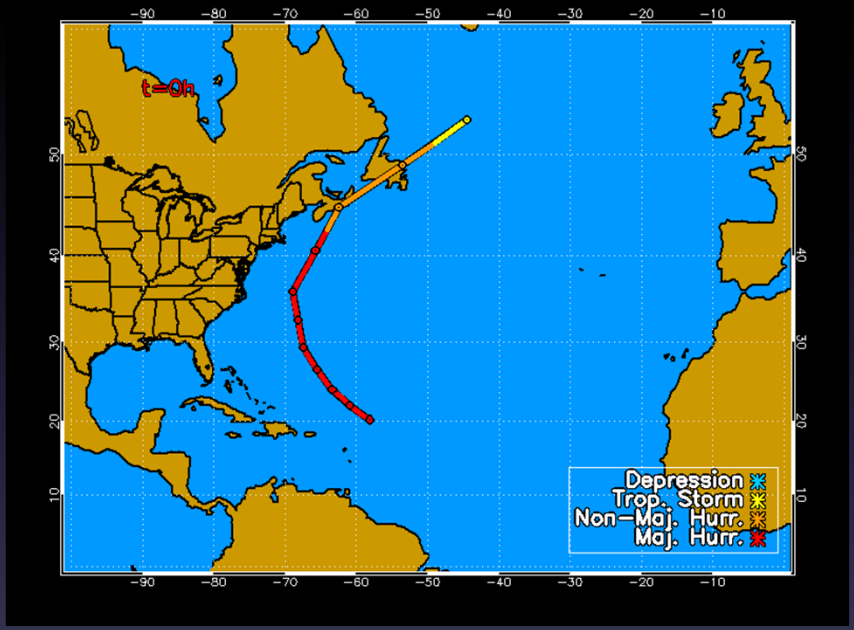
How to bridge the "valley of death"?

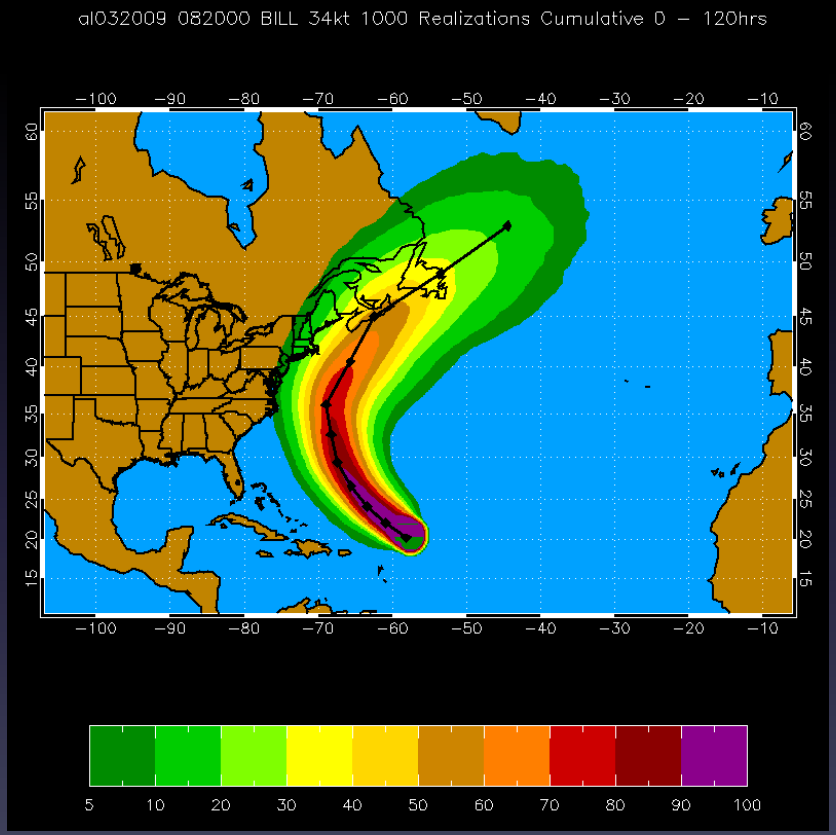
Joint Hurricane Testbed (JHT)

- Bridge hurricane research and operations
- Began in 2001 under the USWRP
- Our Mission: successfully transfer new technology, research results & observational advances from research groups to operational centers
- Testing is done at National Hurricane Center or Environmental Modeling center

Wind Speed Probabilities

Hurricane Bill 20 Aug 2009 00 UTC





1000 Track Realizations

34 kt 0-120 h Cumulative Prob.

Wind Speed Probabilities

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ZCZC MIAPWSAT4 ALL
TTAA00 KNHC DDHHMM
HURRICANE WILMA PROBABILITIES NUMBER  20
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
0900Z THU OCT 20 2005

...THIS IS AN EXPERIMENTAL PRODUCT FOR 2005...

AT 0900Z THE CENTER OF HURRICANE
WILMA WAS LOCATED NEAR LATITUDE 18.3 NORTH...
LONGITUDE  85.0 WEST WITH
MAXIMUM SUSTAINED WINDS NEAR 130 KTS...150 MPH...240 KM/HR.

CHANCES OF EXPERIENCING WIND SPEEDS OF AT LEAST
   ...34 KT (39 MPH... 63 KPH)...
   ...50 KT (58 MPH... 93 KPH)...
   ...64 KT (74 MPH...119 KPH)...
FOR LOCATIONS AND TIME PERIODS DURING THE NEXT 5 DAYS

PROBABILITIES FOR LOCATIONS ARE GIVEN AS IP(CP) WHERE
    IP  IS THE PROBABILITY OF THE EVENT BEGINNING DURING
        AN INDIVIDUAL TIME PERIOD (INDIVIDUAL PROBABILITY)
  (CP)  IS THE PROBABILITY OF THE EVENT OCCURRING BETWEEN
        06Z THU AND THE FORECAST HOUR (CUMULATIVE PROBABILITY)

PROBABILITIES ARE GIVEN IN PERCENT
X INDICATES PROBABILITIES LESS THAN 0.5 PERCENT
LOCATIONS SHOWN WHEN THEIR TOTAL CUMULATED 5-DAY
   PROBABILITY IS AT LEAST 2.5 PERCENT

Z INDICATES UNIVERSAL COORDINATED TIME (GREENWICH)


  - - - - WIND SPEED PROBABILITIES FOR SELECTED LOCATIONS - - - -

                FROM     FROM     FROM     FROM     FROM     FROM     FROM
  TIME        06Z THU  18Z THU  06Z FRI  18Z FRI  06Z SAT  06Z SUN  06Z MON
PERIODS          TO       TO       TO       TO       TO       TO       TO
             18Z THU  06Z FRI  18Z FRI  06Z SAT  06Z SUN  06Z MON  06Z TUE

FORECAST HOUR    (12)     (24)     (36)     (48)     (72)     (96)    (120)
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
LOCATION         KT

MIAMI FL         34  X    X( X)    X( X)    2( 2)   16(18)   23(41)    5(46)
MIAMI FL         50  X    X( X)    X( X)    X( X)    6( 6)   11(17)    3(20)
MIAMI FL         64  X    X( X)    X( X)    X( X)    2( 2)    5( 7)    1( 8)

KEY WEST FL      34  X    X( X)    2( 2)    7( 9)   26(35)   18(53)    3(56)
KEY WEST FL      50  X    X( X)    X( X)    1( 1)   14(15)   11(26)    1(27)
KEY WEST FL      64  X    X( X)    X( X)    X( X)    8( 8)    5(13)    1(14)

MARCO ISLAND     34  X    X( X)    X( X)    5( 5)   20(25)   23(48)    4(52)
MARCO ISLAND     50  X    X( X)    X( X)    1( 1)   10(11)   12(23)    2(25)
MARCO ISLAND     64  X    X( X)    X( X)    X( X)    5( 5)    6(11)    X(11)
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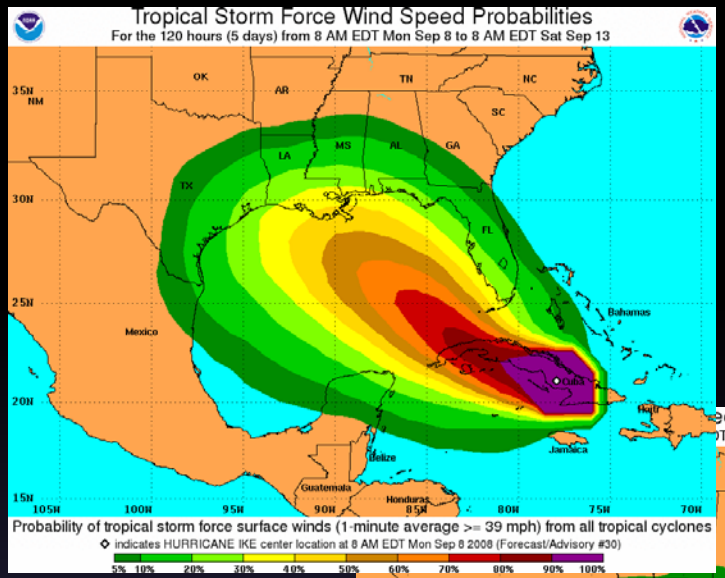
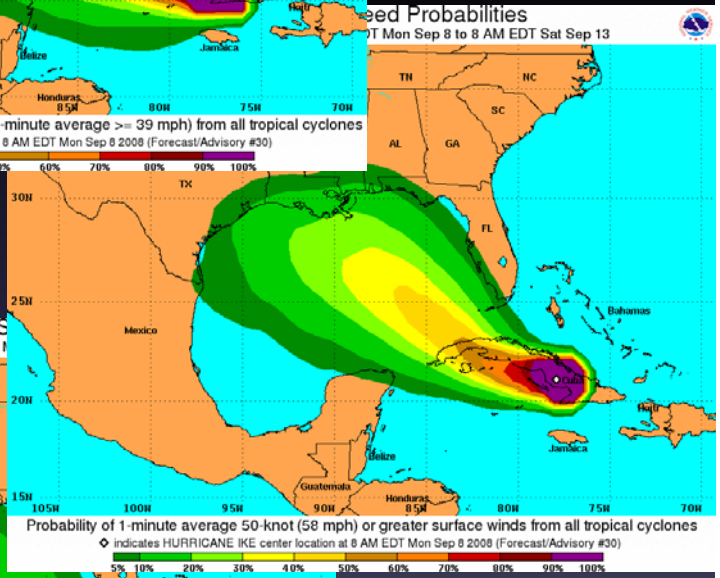
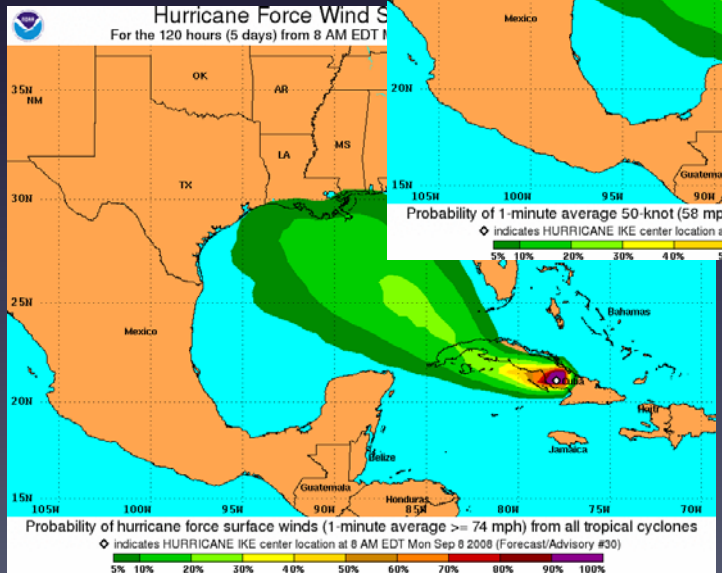






JHT: The Process

- Call for Proposals – drafted and disseminated (bi-annually)
- Principal Investigators apply for funding through NOAA
- 7 member Steering Committee rates all proposals
- Funded projects are tested during 1 or 2 hurricane seasons in conjunction with NHC/EMC points of contact
- At the project's end, each are evaluated by NHC/EMC staff
- Implementation of successful projects are then carried out by NHC/EMC staff/PIs

JHT: The statistics

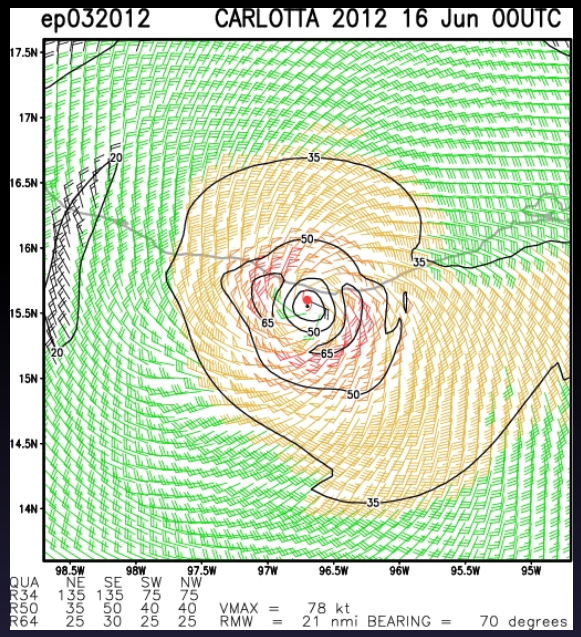
- Number of projects supported: 81
  - 74 completed
    - 46 accepted for operational implementation
    - 7 projects completed but rejected
    - 9 projects completed, deferred pending further investigation at EMC
    - 12 projects with decisions soon forthcoming
  - 7 projects started in fall 2013

- Implementation
  - 41 projects implemented:
    - 11 numerical modeling projects implemented by EMC/NCO
    - 30 projects implemented by NHC
  - 3 projects accepted but not yet fully implemented by NHC
  - 2 projects unable to be implemented after acceptance

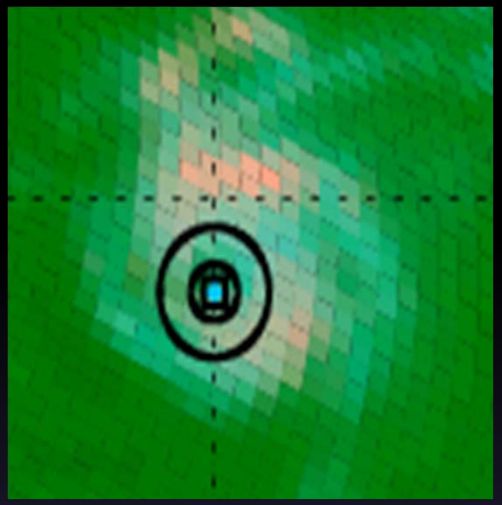
2013-2014 Major JHT Activities - 6th round

- June - November 2013
  - Final season to test of projects
- December 2013 – February 2014
  - Final reports provided by PIs
  - Feedback obtained by points-of-contact
  - Implementation evaluation and decision
- March-June 2014
  - Implementation of accepted projects at NHC and EMC

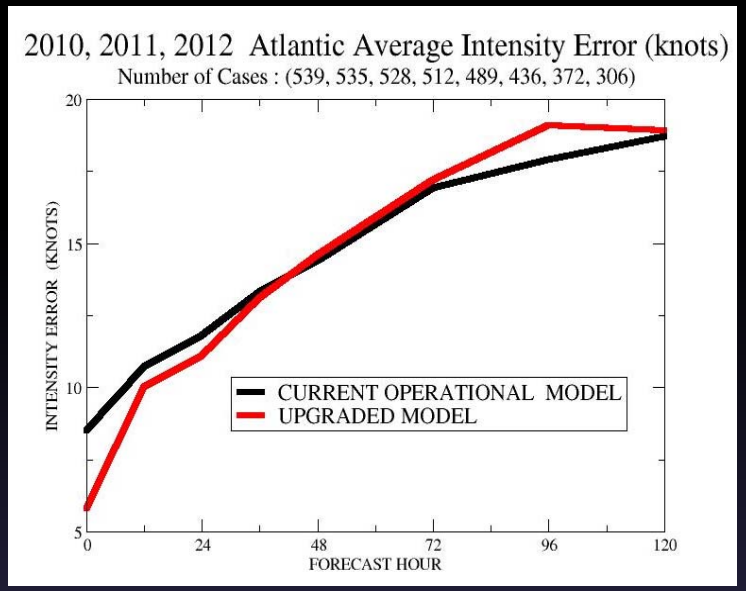
Project Highlights - 6th round



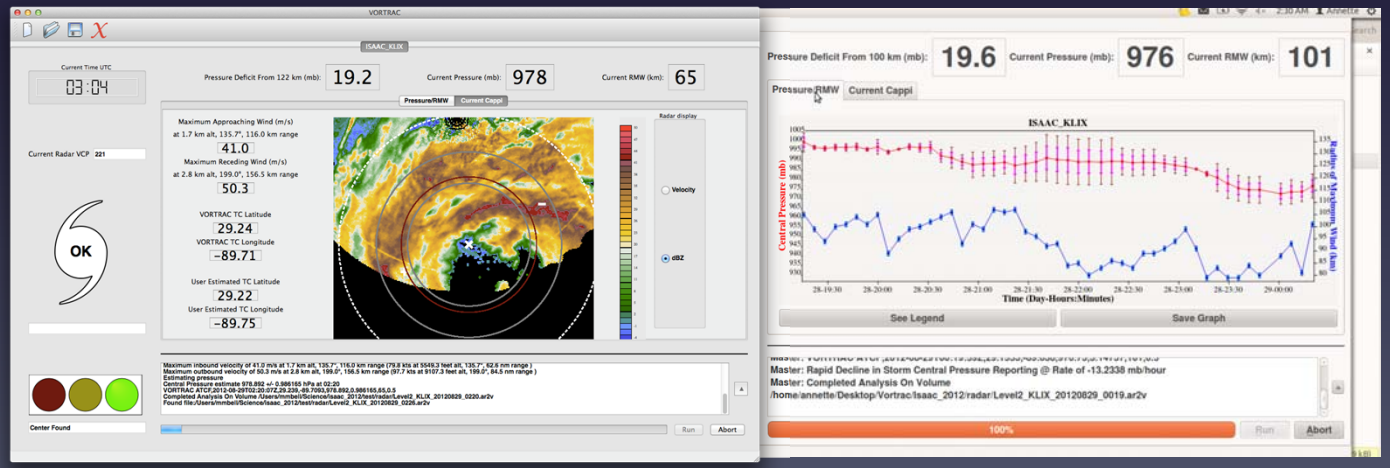
Surface winds: Knaff



Rapid Intensity Forecasting: Jiang



Hurricane model upgrades: Bender



Radar-based central pressure: Lee/Bell

Factors Considered in NHC Decisions on Operational Implementation

- **Forecast or Analysis Benefit:** expected improvement in operational forecast and/or analysis accuracy
- **Efficiency:** adherence to forecaster time constraints and ease of use needs
- **Compatibility:** IT compatibility with operational hardware, software, data, communications, etc.
- **Sustainability:** availability of resources to operate, upgrade, and/or provide support

2012-2014 JHT Activities - 7th round

- August 2012
  - Announcement of Opportunity released
- October 2012
  - 36 Letters of Intent reviewed
- December 2012 - January 2013
  - 22 Full proposals reviewed
- February - April 2013
  - Rank and select proposals for funding
  - Point-of-contacts established among NHC/EMC staff
  - Work with PIs to setup timelines for their projects
- August – November 2013
  - Begin real-time testing during hurricane season
- December 2013 – March 2014
  - PI refine their projects and interact with points-of-contact
  - Present progress at Interdepartmental Hurricane Conf.

7th Round JHT Projects – 2013 to 2015

Project Title	Principal Investigator(s)	NHC Point of Contact
A Visualization Application for Distributed ADCIRC-based Coastal Storm Surge, Inundation, and Wave Modeling	Brian Blanton, Rick Luettich (Univ. of N Carolina)	Feyen (NOS), Rhome, Berg, Schauer, Landsea
Improving the GFDL/GFDN Operational Tropical Cyclone Models at NOAA/NCEP and Navy/FNMOC	Isaac Ginis (Univ. of Rhode Island), Morris Bender (NOAA/GFDL)	Pasch, Mattocks, Tallapragada (EMC), Landsea
A Probabilistic TC Genesis Forecast Tool Utilizing an Ensemble of Global Models	Bob Hart, Henry Fuelberg (Florida State Univ.)	Pasch, Mattocks, Kimberlain, Blake, Landsea
Improvement to the Satellite-based 37 GHz Ring Rapid Intensification Index	Haiyan Jiang (Florida Intl Univ.)	Stewart, Cangialosi, Landsea
Guidance on Intensity Guidance	Dave Nolan (U of Miami/RSMAS), Andrea Schumacher (CSU/CIRA)	Avila, Blake, Landsea
Upgrades to the Operational Monte Carlo Wind Speed Probability Program	Andrea Schumacher (CSU/CIRA)	Brown, Brennan, Mattocks, Landsea
Integration of an Objective, Automated TC Center-fixing Algorithm Based on Multispectral Satellite Imagery into NHC/TAFB Operations	Tony Wimmers, Chris Velden (Univ. of Wisc./CIMSS)	Beven, Mundell, Landsea

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Rappaport et. al., 2012 - *BAMS*

THE JOINT HURRICANE TEST BED

Its First Decade of Tropical Cyclone Research-To-Operations Activities Reviewed

BY EDWARD N. RAPPAPORT, JIANN-GWO JIING, CHRISTOPHER W. LANDSEA, SHIRLEY T. MURILLO, AND JAMES L. FRANKLIN

Collaboration between researchers, forecasters and technology specialists facilitated the development and implementation of numerous projects benefitting forecast operations.