

R2O via The Joint Hurricane Testbed

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NOAA/OAR's Office of Weather and Air Quality

AMS Annual Meeting: Seventh Conference on Transition of Research to Operations, Tuesday 24 Jan. 2017

Joint Hurricane Testbed (JHT)

- Bridge hurricane research & 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 the National Hurricane Center or Environmental Modeling Center

JHT: By the numbers

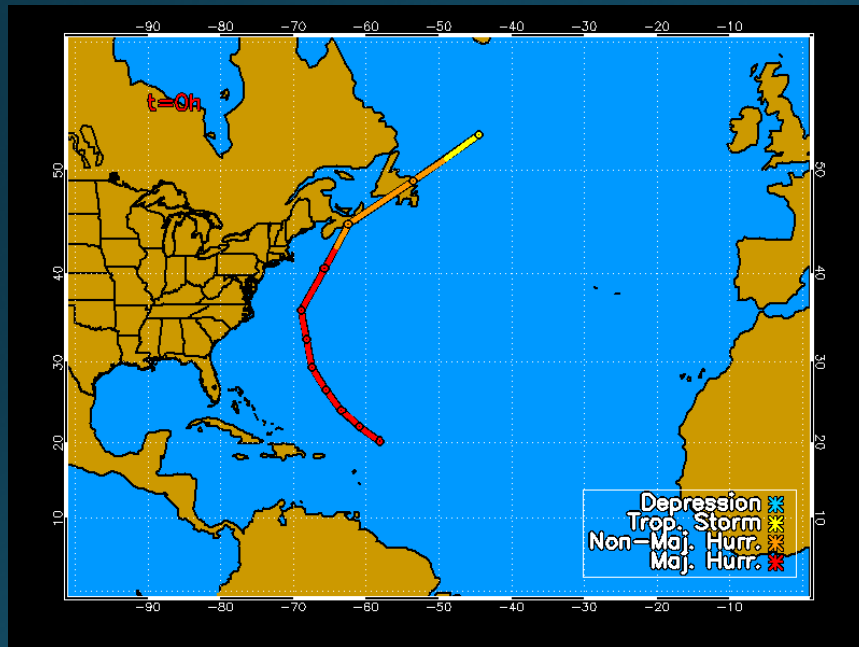
- Number of projects supported: 89
 - 81 completed
 - 55 accepted for operational implementation
 - 20 projects completed but no accepted
 - 2 projects completed, deferred pending further investigation
 - 2 projects with decisions soon forthcoming (FY 13-15: 7th rd)
 - 8 projects started 1 Sept. 2015 (FY15-17: 8th rd)

Our process

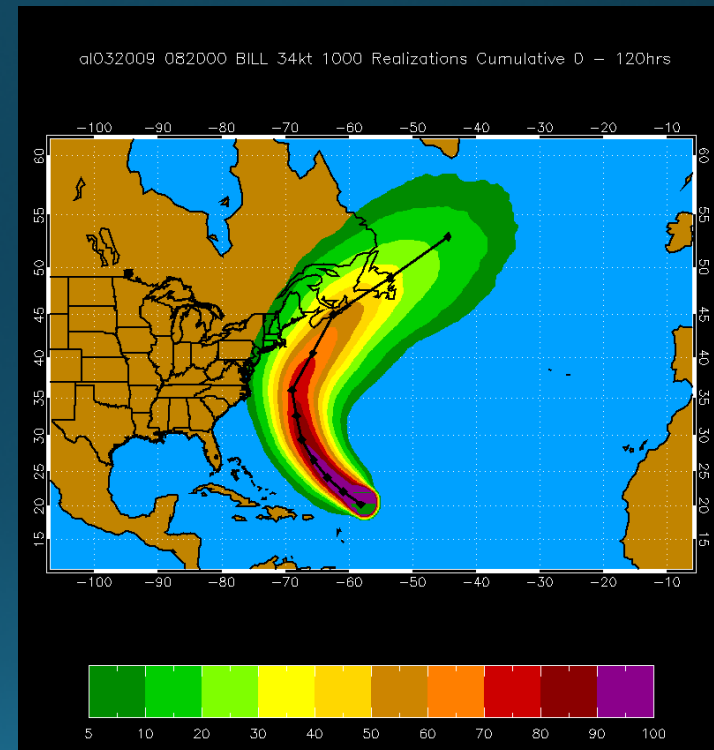
- Call for Proposals – drafted and disseminated (bi-annually)
- Principal Investigators apply for funding through NOAA
- Seven member Steering Committee rates all proposals
- Funded projects are tested during 1 or 2 hurricane seasons in conjunction with NHC/EMC points of contact
- At the project's end,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

Wind Speed Probabilities

Hurricane Bill 20 Aug 2009 00 UTC



1000 Track Realizations



34 kt 0-120 h Cumulative Prob.



Wind Speed Probabilities

ZCZC MIAPUSAT4 ALL
 TTA000 KNHC DDDHHH
 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

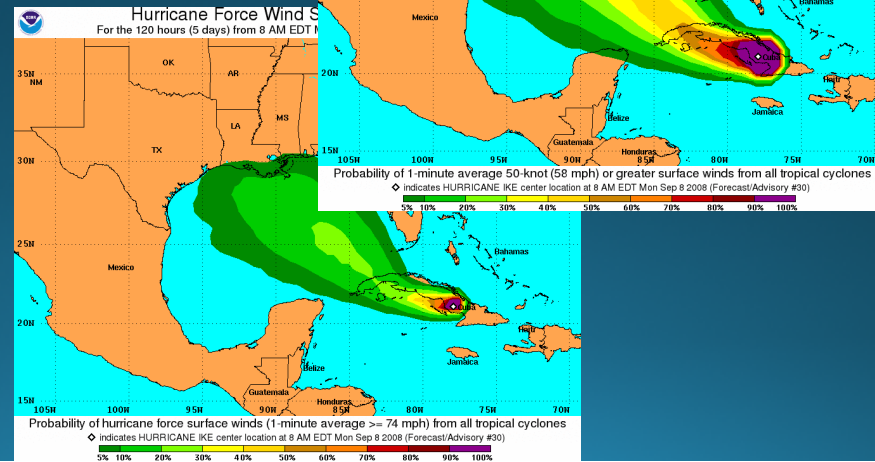
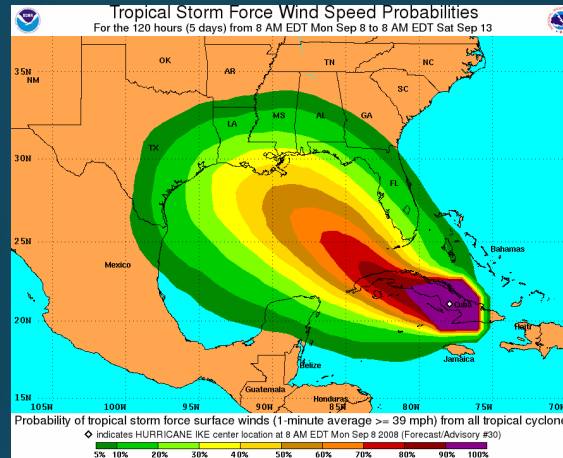
PROBABILITIES FOR LOCATIONS ARE GIVEN AS IP(CP) WHERE
 IP IS THE PROBABILITY OF THE EVENT BEGINNING DURING
 AN INDIVIDUAL TIME PERIOD (INDIVIDUAL PROBABILITY)
 (CP) IS THE PROBABILITY OF THE EVENT OCCURRING BETWEEN
 06Z THU AND THE FORECAST HOUR (CUMULATIVE PROBABILITY)

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 ---

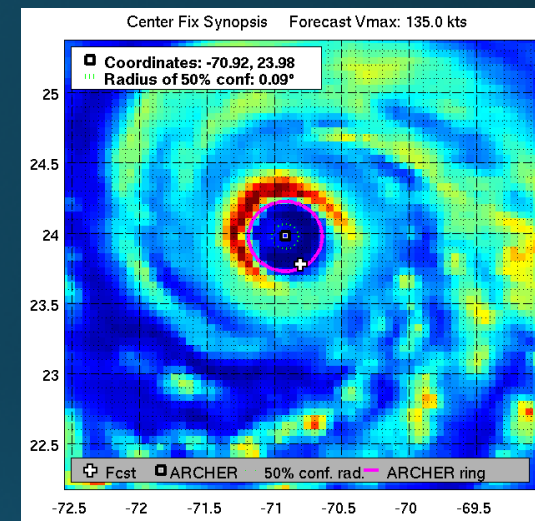
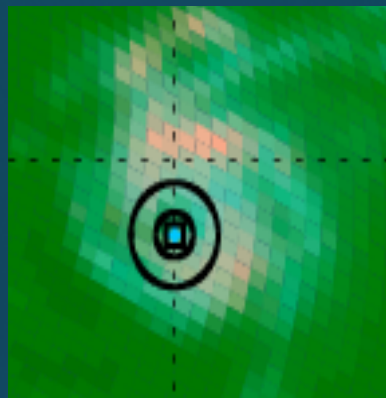
TIME PERIODS	FROM 06Z THU 18Z THU		FROM 06Z FRI 18Z FRI		FROM 06Z SAT 18Z SAT		FROM 06Z SUN 18Z SUN		FROM 06Z MON 18Z MON	
	TO	TO	TO	TO	TO	TO	TO	TO	TO	
FORECAST HOUR	(12)	(24)	(36)	(48)	(72)	(96)	(120)			
LOCATION	KT									
MIAMI FL	34 X	X (X)	X (X)	2 (2)	16 (18)	23 (41)	5 (46)			
MIAMI FL	50 X	X (X)	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)			



Current Project Highlights - FY15-17: 8th round

Tropical Cyclone Genesis Index: Dunjon

TIME (hr)	ATLANTIC TC GENESIS INDEX												
	0	6	12	18	24	36	48	60	72	84	96	108	120
TCGI (%)							45.1						65.0
HDIV (x10-7s-1)	-3.0	-4.0	-1.0	-3.0	-5.0	0.0	-6.0	1.0	-5.0	0.0	-4.0	0.0	0.0
VORT (x10-6s-1)	1.3	1.6	1.6	1.7	1.6	1.5	1.1	0.8	1.0	0.5	1.1	1.1	1.1
DV24 (x10-6s-1)	0.3	0.0	-0.1	-0.7	-0.5	-0.7	-0.1	-0.3	0.1	0.6	0.0	-0.1	-0.3
VSHD (kt)	5	9	11	9	9	17	19	19	19	26	24	28	27
MLRH (%)	67	67	64	63	67	64	68	62	64	52	54	52	54
PCCD (%)	42	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TNUM	1.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LAT (deg N)	16.8	17.2	17.8	18.5	20.3	22.9	25.0	26.3	27.6	28.3	29.2	30.1	31.4
LON (deg W)	83.0	83.5	84.4	85.1	85.8	87.0	87.4	87.5	86.8	86.5	85.5	84.4	82.9
DTL (km)	169	172	217	259	132	154	382	358	270	188	56	-5	-140
TRACK SOURCE	AVNO	AVNO	AVNO	AVNO	AVNO	AVNO	AVNO	AVNO	AVNO	AVNO	AVNO	AVNO	AVNO



Prob. Prob. **U.S. NAVAL RESEARCH LABORATORY**

NRL Tropical Cyclone Page

Storm Home | Microwave | Scatterometry | Vis/IR | ATCF | Environment

Pass Mosaic | Mosaic | List | Instant Loop | Animated Gif

Storm List

Sensor	% Cov	89H	89 Diff	89 Color	37H	37 Diff	37 Color	19H	19 Diff	Vis	IR Color	IR Dvorak	RGB Test 1	RGB Test 2	RGB Test 3
F08 SSM/I	55.7														
F16 SSM/I	62.7														
AMSR2	95.2														
TRM	33.9														
WINDSAT	49.9														
HWI	100.0														

Currently: Saturday, August 13, 2016 18:44:14 UTC (Z)

Switch | Reverse | Rock | Next | Previous | Speedup | Slowdown | Refresh | Zoom In | Zoom Out

Speed bar for animations

GCOM-W1 AMSR2 89H 2016/07/25 22:11:00Z NRL-Monterey

Rapid Intensity Forecasting: Jiang

Eyewall Replacement Cycle
ARCHER: Wimmers

Matrix of RI probabilities

RI (kt / h)	20/12	25/24	30/24	35/24	40/24	45/36	55/48
SHIPS-RII:	17.4%	64.3%	54.0%	37.1%	30.9%	62.9%	70.6%
Logistic:	7.1%	42.6%	43.0%	19.6%	12.3%	55.7%	56.8%
Bayesian:	0.9%	47.6%	34.5%	8.3%	3.5%	10.1%	36.4%
Consensus:	8.5%	51.5%	43.9%	21.6%	15.6%	42.9%	54.6%

NRL web page upgrades: Cossuth

RI SHIPS improvement: Rozoff

Metrics for Operational Implementation

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

Best Practices/Lessons Learned

- **Dedicated Admin. Staff**
 - JHT Director and Admin. Assistant: work closely with ops center and PIs
 - IT computer programmer for JHT projects
- **Process is proposal driven**
 - Includes NHC/CPHC/JTWC and EMC's areas of priority
 - Provide info on operational center's IT environment
- **Seven member Steering Committee**
 - Representatives from the Tropical Cyclone community
 - Review and rank proposals
- **When projects begin, PIs are partnered with forecasters**
 - Continuous interaction throughout transition process
 - PI provide semi-annual progress reports

The Joint Hurricane Testbed



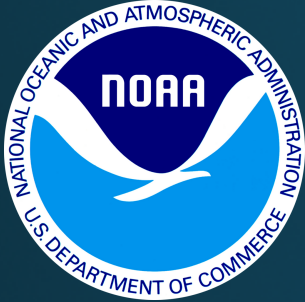
Rappaport et. al., 2012 - *BAMS*

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 benefiting forecast operations.



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