Improving Forecast Guidance through the Joint Hurricane Testbed

Shirley Murillo – NOAA/OAR/AOML Hurricane Research Division
Chris Landsea – NOAA/NWS/NCEP/National Hurricane Center

The JHT is funded by the US Weather Research Program in NOAA/OAR’s Office of Weather and Air Quality

98th AMS Annual Meeting - Eighth Conference on Transition of Research to Operations - January 10, 2018
Joint Hurricane Testbed (JHT)

• Bridges 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, Central Pacific Hurricane Center or at their institutions
JHT: By the numbers

- Number of projects supported: 95
  - 82 completed
    - 54 implemented into operations at NHC/EMC/other
    - 21 not accepted
    - 5 deferred
    - 2 unable to be implemented
  - 8 projects started 1 Sep. 2015 (FY15-17: 8th round, 1 complete)
  - 6 projects started 1 July. 2017 (FY17-19: 9th round)
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
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 points of contact
• At the project’s end, each are evaluated by NHC and JHT staff
• Implementation of successful projects are then carried out by NHC staff/PIs
Current Project Highlights - FY15-17: 8th round

Tropical Cyclone Genesis Index: Dunion

Rapid Intensity Forecasting: Jiang

Eyewall Replacement Cycle
ARCHER: Wimmers

NRL web page upgrades: Cossuth

RI SHIPS improvement: Rozoff
## New JHT Projects - FY17-19: 9th round

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Principal Investigator(s)</th>
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<tbody>
<tr>
<td>Improvements to Operational Statistical Tropical Cyclone Intensity Forecast Models Using Wind Structure and Eye Predictors</td>
<td>Galina Chirokova (CSU/CIRA), John Kaplan (AOML/HRD)</td>
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<tr>
<td>Ensemble-based Pre-genesis Watches and Warnings for Atlantic and North Pacific Tropical Cyclones</td>
<td>Russ Elsberry (UC-CS)</td>
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<tr>
<td>Improvements and Extensions to an Existing Probabilistic TC Genesis Forecast Tool Using and Ensemble of Global Models</td>
<td>Bob Hart (FSU), Dan Halperin (Embry-Riddle)</td>
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<tr>
<td>Estimation of Tropical Cyclone Intensity Using Satellite Passive Microwave Observations</td>
<td>Haiyan Jiang (Florida Intl Univ.)</td>
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<tr>
<td>Transition of Machine-Learning Based Rapid Intensification Forecasts to Operations</td>
<td>Andrew Mercer and Kimberly Wood (MSU)</td>
</tr>
<tr>
<td>Evolutionary Programming for Probabilistic Tropical Cyclone Intensity Forecast</td>
<td>Paul Roebber and Clark Evans (UW-Milwaukee)</td>
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Our 2018 Plans

• Continued testing during the 2017 hurricane season of 8 projects (8th round)
• Final report provided by Principal Investigators – late 2017
• Operational implementation decision made by NHC – 2018
• New proposals funded starting 1 July 2017 (9th round)
• New PIs present project’s progress at the Tropical Cyclone Operations and Research Forum (March 2018)
• Conduct testing during the 2018 hurricane season
Best Practices/Lessons Learned

• **Dedicated Admin. Staff**
  – JHT Director and Admin. Assistant: work closely with operational centers and PIs
  – IT computer programmer for JHT projects

• **Process is proposal driven**
  – Includes NHC/CPHC/JTWC 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, JIAN-CHAO JING, CHRISTOPHER W. LANDSEA, SHIRLEY T. MURRILL, 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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