Operational Applications Including Ensemble Products

HFIP Annual Meeting
Nov 15, 2021
HFIP Support Staff FY21

NHC Federal Staff:
• Mark DeMaria (Q1, TSB Branch Chief)
• Brian Zachry (TSB Branch Chief, SOO)
• Dave Zelinsky (Lead Meteorologist)
• Matt Onderlinde, Stephanie Stevenson, Matt Sardi, David Ryglicki, Rachel Zelinsky (Meteorologist/Programmer)
• Jamie Rhome (Storm Surge Unit Team Lead)
• Cody Fritz (Storm Surge Specialist)

Non-Federal Staff:
• Ben Trabing: HFIP Model Diagnostician (NHC)
• Alan Brammer: JHT Facilitator
• Kate Musgrave/Mark DeMaria: Model/Product Upgrades and Guidance Suite Support (CIRA/CSU)
• James Franklin: HFIP Verification and Support (NHC)

Additional Staff:
• Buck Sampson: ATCF Support (NRL)
• Pablo Santos (NWS/WFO Miami)
• Tom Lefebvre (OAR/GSL)
FY21 HFIP Supported Projects

• Project 1: Statistical post-processing
  – Compare real-time machine learning-based statistical intensity model forecasts with the operational linear-regression version

• Project 2: AWIPS/ATCF products for forecasters
  – Real-time tests of AWIPS-2 on HSU Atlantic/Pacific forecast desks
  – Test the production of coastal tropical cyclone wind watch/warnings in the new AWIPS-2 wind hazard recommender tool

• Project 3: Graphical products for external users
  – Real time in-house testing of new tropical cyclone maximum wind probability distribution graphical product

• Project 4: Storm surge
  – Test the feasibility of Hazard Services and Polygon-Based Approach to storm surge watch/warning

• Project 5: Testbed and R2O
  – Evaluate real-time performance of new 7-day TC genesis probability guidance tool
# FY21 HFIP Supported Projects

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Completion Quarter</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test the production of coastal tropical cyclone wind watch/warnings in the new AWIPS-2 wind hazard recommender tool (P2)</td>
<td>Q3</td>
<td>Completed (ahead of schedule)</td>
</tr>
<tr>
<td>Real time in-house testing of new tropical cyclone maximum wind probability distribution graphical product (P3)</td>
<td>Q3</td>
<td>Completed</td>
</tr>
<tr>
<td>Real-time tests of AWIPS-2 on Hurricane Specialist Unit Atlantic and Pacific forecast desks (P2)</td>
<td>Q3</td>
<td>Completed</td>
</tr>
<tr>
<td>Test the feasibility of Hazard Services and Polygon-Based Approach to storm surge watch/warning (P4)</td>
<td>Q4</td>
<td>Completed</td>
</tr>
<tr>
<td>Evaluate real-time performance of new 7-day tropical cyclone genesis probability guidance tool (P5)</td>
<td>Q4</td>
<td>Completed</td>
</tr>
<tr>
<td>Compare real-time machine learning-based statistical intensity model forecasts with the operational linear-regression version (P1)</td>
<td>Q4</td>
<td>Completed</td>
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Project 1: Statistical Post-Processing Forecast Improvements

- Neural Net intensity forecast (NNIC/NNIB) model running on WCOSS in real-time
  - Expanded database back to 2013 and included 2020
  - Added to ATCF for 2021 season

- Converting HCCA from NCL to Python-based code (for WCOSS)
  - Updated coefficients and training database for 2021 season
Project 2: AWIPS/ATCF Product Improvements

• HWT-TC wind hazard recommender experiment conducted March 9-11 with WFOs
  ○ Received feedback and guidance on wind hazard recommender from field
  ○ Another experiment planned for March 2022

• AWIPS-2 migration
  ○ TAFB making progress towards issuing product(s) in AWIPS-2 next year
  ○ HSU using AWIPS-2 in operations (model data, satellite, recon, etc.)

• WTCM used experimentally during 2021 hurricane season
  ○ Forecaster feedback and incorporated updates to WTCM
Project 2: AWIPS/ATCF Product Improvements

EXPERIMENT INTRODUCTION

Why Are We Here?

- WFO feedback to NHC has highlighted a lack of guidance on inland wind hazards during TC events
- Increasing IDSS highlights importance of spatial and temporal consistency in inland TR/HU watch/warning issuance across WFO boundaries
- Expansion of tropical program to inland WFOs with limited/no experience in issuance TR/HU watches/warnings
- FACETs - moving toward probabilistic based hazard guidance and building on the success of SS WW paradigm between NHC and WFOs
Project 2: AWIPS/ATCF Product Improvements
Project 2: AWIPS/ATCF Product Improvements
Project 3: Graphical Product Improvements for External Users

- CIRA provided initial reformulation of the wind speed probability model to have the ability to create wind exceedance products

- Developed TC intensity forecast uncertainty product running in real-time
  - Refined prototype product for social science testing
Project 4: Storm Surge Forecast Improvements

- JTTI project on generating Storm Surge Hazards using Hazard Services
  - AWIPS Cloud Environment for hazard services testing (during Ida)
Project 5: JHT and R2O activities

JHT Facilitator Activities

Improved R2O transitions:
- Assisted current projects on code cleanup, developing tests and reducing external dependencies
- Set-up Docker Containers to run code locally using WCOSS libraries prior to deployment
- Current JHT projects are being consumed by HSU in real-time during 2021
- Ran post-season verifications on experimental projects for independent verification
- Revitalized old accepted projects
  - WSRA & KAIA ingested into AWIPS in real-time through JHT VM
  - MTCSWA ingested into f-decks, run in parallel on JHT VM

Improved Visibility and Tracking of Real-time Demonstrations:
- Presented pre-season overview to HSU on experimental demonstrations active for 2021
- Set up an internal website showcasing the various real-time demonstrations
- Created an internal feedback form for HSU to provide quick feedback on products

Maintained NHCs Public JHT Communication:
- Updated NHC JHT website with news, publications, presentations, current project documents
FY22 ATCF Development Requirements

- Enable provision of 96- and 120-h 34-kt wind radii in Forecast Wind Radii Dialog Box and Advisory Composition
- Create “Use AHNI/AVNI” button in the Forecast Wind Radii Dialog Box
- Develop a way to allow the forecaster to enter “off time” track, intensity and wind radii forecast information
- Add a new entry in the “Forecast” menu entitled “Send Forecast for WTCM Processing” to allow forecasters to send forecast information (OCFP or OFCL) for downstream processing
- Have the TCU copy the summary block from either the latest public advisory or the latest TCU, whichever file was updated more recently
## FY22 HFIP Supported Projects

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<th>Milestone</th>
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<tr>
<td>Demonstrate Hazard Services and Polygon-Based Approach to storm surge</td>
<td>Q4</td>
<td>On Track</td>
</tr>
<tr>
<td>watch/warning during the 2022 hurricane season</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display ensemble-based sensitivity analyses in AWIPS-2 for operational</td>
<td>Q3</td>
<td>On Track</td>
</tr>
<tr>
<td>testing</td>
<td></td>
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<tr>
<td>Hazard Services requirements based on the Storm Surge Polygon JTTI Project</td>
<td>Q4</td>
<td>On Track</td>
</tr>
<tr>
<td>Developmental project plan for probabilistic winds/waves for ETCs/TCs</td>
<td>Q4</td>
<td>On Track</td>
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<tr>
<td>combined</td>
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<tr>
<td>Issue operational graphical product(s) from the TAFB Atlantic and Pacific</td>
<td>Q3</td>
<td>On Track</td>
</tr>
<tr>
<td>desks using AWIPS-2</td>
<td></td>
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