NHC Infrastructure Plans

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NOAA/NCEP/NHC

HFIP Annual Review Meeting
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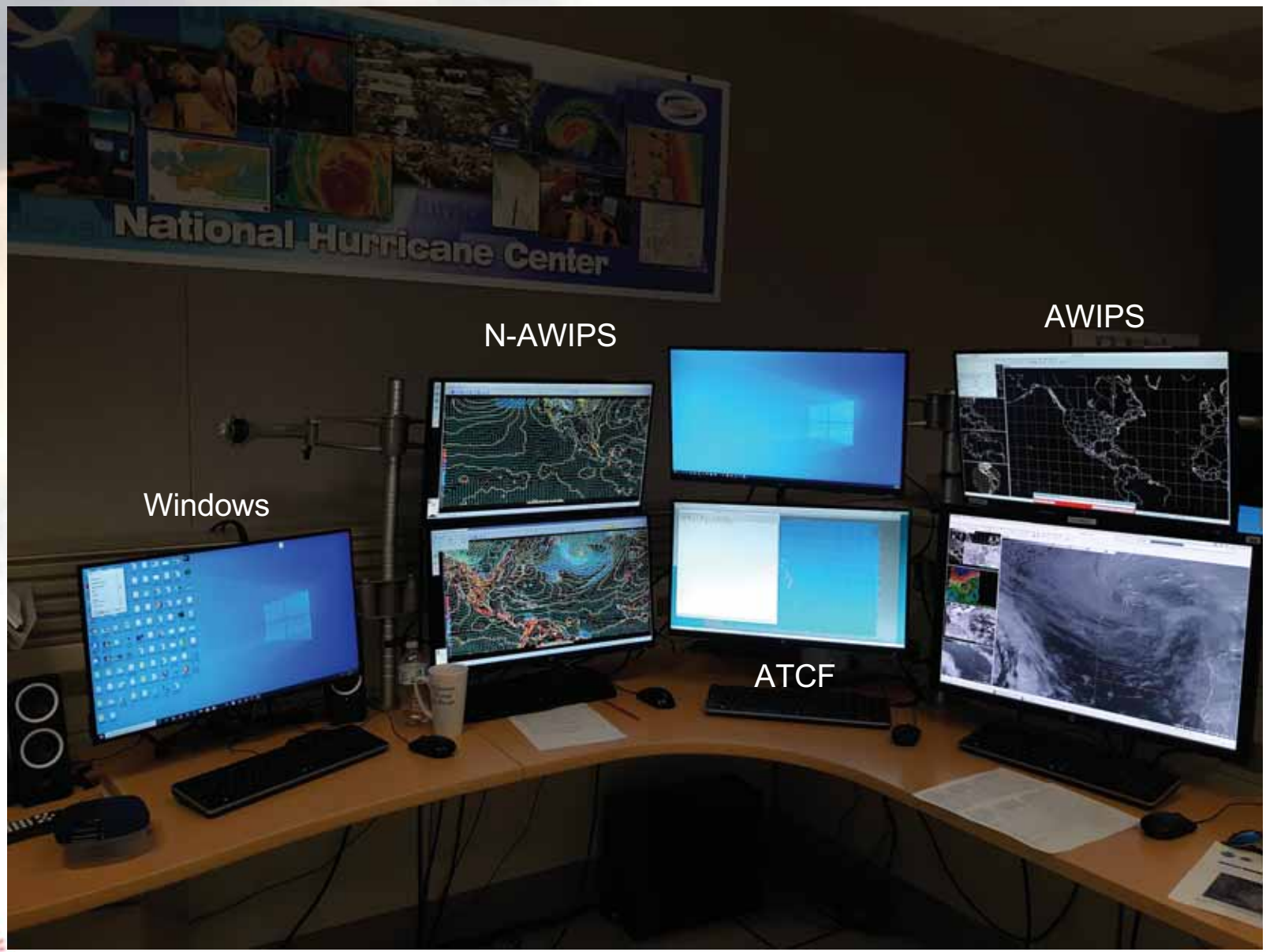
Miami, FL

Outline

- Overview of NHC's current infrastructure and product generation capabilities
- N-AWIPS and ATCF transition projects
- Longer-range plans for NWS Tropical Program and development/infrastructure needs

NHC's Atlantic Forecast Desk



Forecast Desk Input Data

- Satellite data
  - Local GRB antennas and local data processing
  - NESDIS products from PDA and Geo-dist servers
  - AWIPS SBN feed
  - Experimental products from LDM and web pages
- Model forecasts
  - TC initial conditions from ATCF
  - Global/Hurricane model fields, psurge via DBNet and SBN
  - Statistical models from WCOSS and local processing
- Radar and conventional data
  - SBN feed
  - NOAAPort feed, Unisys feed
- Aircraft data, including TDR from P3s
  - LDM feed, CARCAH application

Product Dissemination

- HSU and TAFB text products sent via AWIPS
  - Forecast Advisory, Public, Discussion, text WSP, TWOs
  - High seas, Offshore waters, discussions, etc
- Graphical products
  - NHC web page
  - Marine RadioFax
  - NDFD
- Other distribution mechanisms
  - ftp servers
  - Restricted distribution via rzdm and WCOSS

N-AWIPS to AWIPS Transition

- N-AWIPS mature system for model display and product generation for National Centers
- Underlying design limits future N-AWIPS transitions
  - Little in common with AWIPS
- Lack of resources to support N-AWIPS and AWIPS
- Several previous migration attempts unsuccessful
  - 1998 when AWIPS1 first deployed
  - NCO effort 2015-2016
- Latest effort involves AWIPS developers working with NHC TSB staff
  - Major emphasis of NHC/TSB staff in FY19/FY20

47 National Center Desks Identified

NHC	WPC	OPC	AWC	SPC	CPC	SAB	SDM	Pacific Region
TAFB Pacific Desk	Day 2-3 QPF Desk	Pacific High Seas Desk	Convective Sigmet Desk	Lead Desk	Extended Range Forecast Desk	Volcano Desk	SDM Desk	CPHC Desk
TAFB Atlantic Desk	Senior Branch Forecaster Desk	Pacific Regional Desk	TCF Desk	Meso Desk	Seasonal Desk	Tropical Desk	COOP Desk	Additional Desk(s)
TAFB Surface Desk	Model Diag Desk	Atlantic High Seas Desk	Tropical Desk	Meso A Desk	Monthly Desk			
HSU Pacific Desk	Winter Weather Desk	Atlantic Regional Desk	G-Airmet Desk	Outlook Desk	Week 3-4 Desk			
HSU Atlantic Desk	Surface Desk	Outlook Desk	International Desk	Fire Weather Outlook Desk	International Desk			
CARCAH Desk	Basic Weather Desk		FAA NAM Desk	COOP Desk(s)				
	Medium Range Temp Desk		FAA PERTI Desk					
	Medium Range Pressure Desk		COOP Desk(s)					
	Alaska Desk							
	Hazards Desk							
	International Desk							

Green = Current desk(s)
Yellow = Next desk(s)
Desk Schedule:
https://docs.google.com/spreadsheets/d/1qINJImhgqKY9l7sS2eHsP24zPJ4RCG6_b1gNkxec-4s/edit#gid=477000951

NHC Desk Flip Status Summary

Desk	Kick off	IRR	ORT	Flip Target	Post ORT Priority 1 Outstanding Items
TAFB Pacific	N/A	x	x	~~11/19~~ 3/20	Configuration: 3, Software: 1, training
TAFB Atlantic	x	x	x	~~11/19~~ 3/20	Configuration: 10, training
TAFB Surface (Sfc Prog Product)	x	x	x	~~11/19~~ 3/20	Configuration: 1, training
NHC HSU (Atl & Pac) and CARCAH desks	x	x	~~11/19~~	TBD	
TAFB Surface Desk	TBD				

Key Challenges

- Forecaster and developer training
- Not enough AWIPS workstations
  - NHC has 15 workstations for 9 forecast/backup desks
- Speed of back-end servers and forecaster workstations
- TSB staff time for migration
- Single point of failure after transition

NCEP AWIPS II Training IDentification Effort (TIDE)

TIDE Objectives

- Identify and review existing training
- Identify key materials the Centers need to create for customized training
- Develop an NCEP AWIPS2 training plan with task-able milestones

TIDE Deliverables

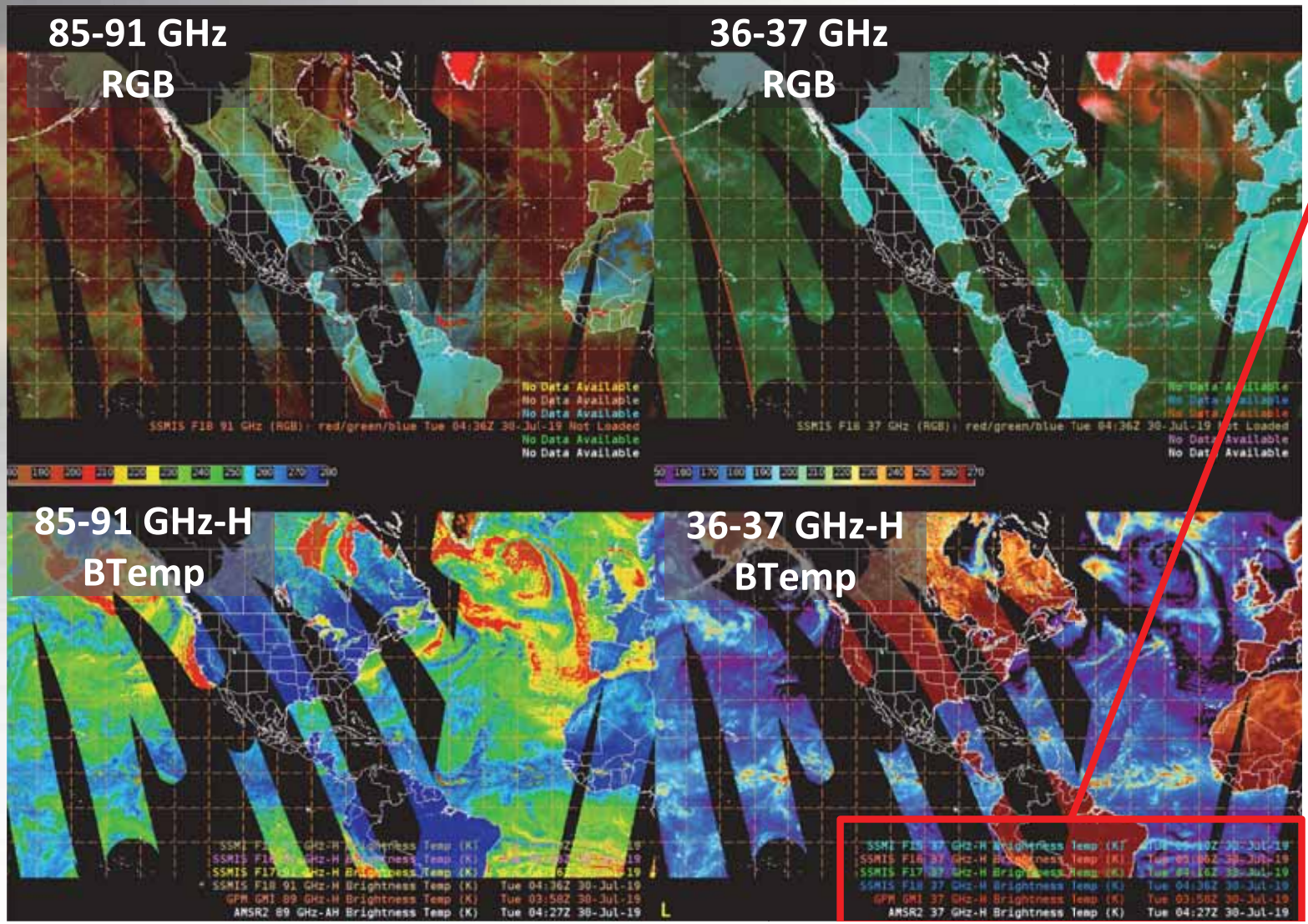
- NCEP AWIPS2 Training Curriculum
  - Build upon basic training, include extra job sheets, quick guides, slide decks, videos, etc. created for general AWIPS knowledge
  - Additional training materials developed by each NCEP Center specific to their mission

Participation

- ★ NHC
  - Monica Bozeman*
  - Brian Zachry
- ★ WPC
  - Diana Stovern
  - Mark Klein
  - Chris Bailey
- ★ AWC
  - Amanda Terborg
  - Scott Minnick
  - Ryan Solomon
- ★ OPC
  - Fran Achorn
  - Joe Sienkiewicz
- ★ SPC
  - Greg Grosshans
  - Matt Elliott
  - Michael Bowlan
  - Israel Jirak
- ★ CPC
  - Jon Hoopingarner
  - Nick Novella
- ★ SWPC
  - Robert Steenburgh
- ★ Training Center
  - Andrea Schumacher
- ★ APO
  - Joe Anderson (Contractor)*
  - Eric Guillot (Contractor)
  - Joe Zajic (Contractor)
  - Steve Schotz
- ★ NWS Union
  - Christa Jacobs
  - Shari Mutchler
  - Eric Blake
  - JoAnn Becker
  - Shannon White
  - Tim Holley

Microwave Imagery 4-Panel

MW Sources:



New Opportunities for Operations-Research Interactions

- Research versions of AWIPS can be implemented with limited resources
  - "AWIPS in a box"
  - Unidata-supported version
- HRD, universities can develop experimental AWIPS displays, products
- OAR-NWS discussing expanded tropical testbed at NHC

ATCF Transition to AWIPS

ATCF to AWIPS2 Development Meeting at NHC September 2019

ATCF in AWIPS2
NWS/OCP/ASDT/NHC

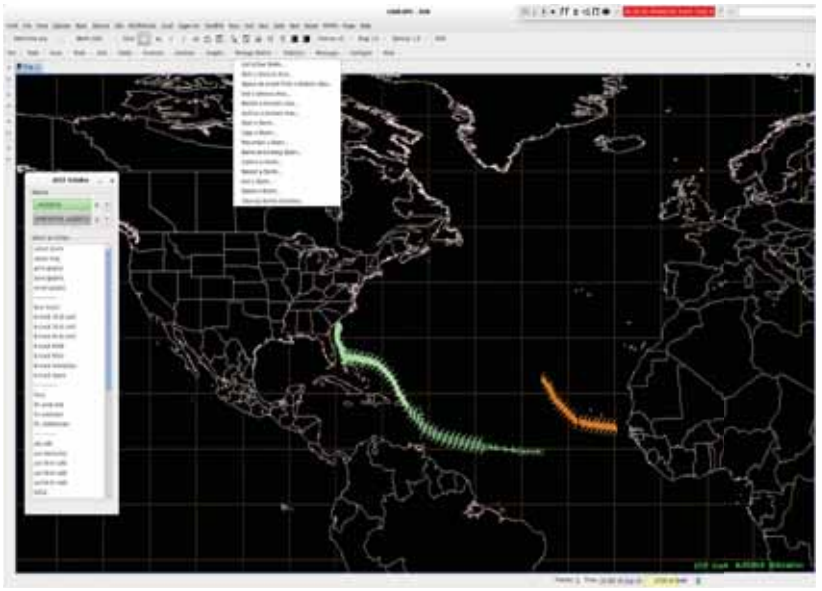
ASDT Developers: Pen/David/William/Daniel/Jun
NHC support: DeMaria/Bozeman/Brennan/Mello

Background:

- ATCF is NHC's primary TC product development tool for HSU
- NRL Monterrey leads development on the current Linux ATCF
- ATCF AWIPS2 migration project started in 2016 led by NCO's Bruce Hebbard
  - HFIP funded initial development
- ASDT took over the transition effort in 2017
- Transition being preformed without access to NRL source code

Broad Goals:

1. Minimize user shock by re-using familiar ATCF menus and a similar UI while taking advantage of AWIPS2 display capabilities
2. Develop the ATCF as an independent tool that can be loaded using any AWIPS2 data viewing method
3. Forecaster Goals: Streamline forecaster workflow, reduce button clicks, overlay global meteorological data within a single display
4. System Maintenance Goals: Reduce administrative needs by using one software platform and similar computer languages

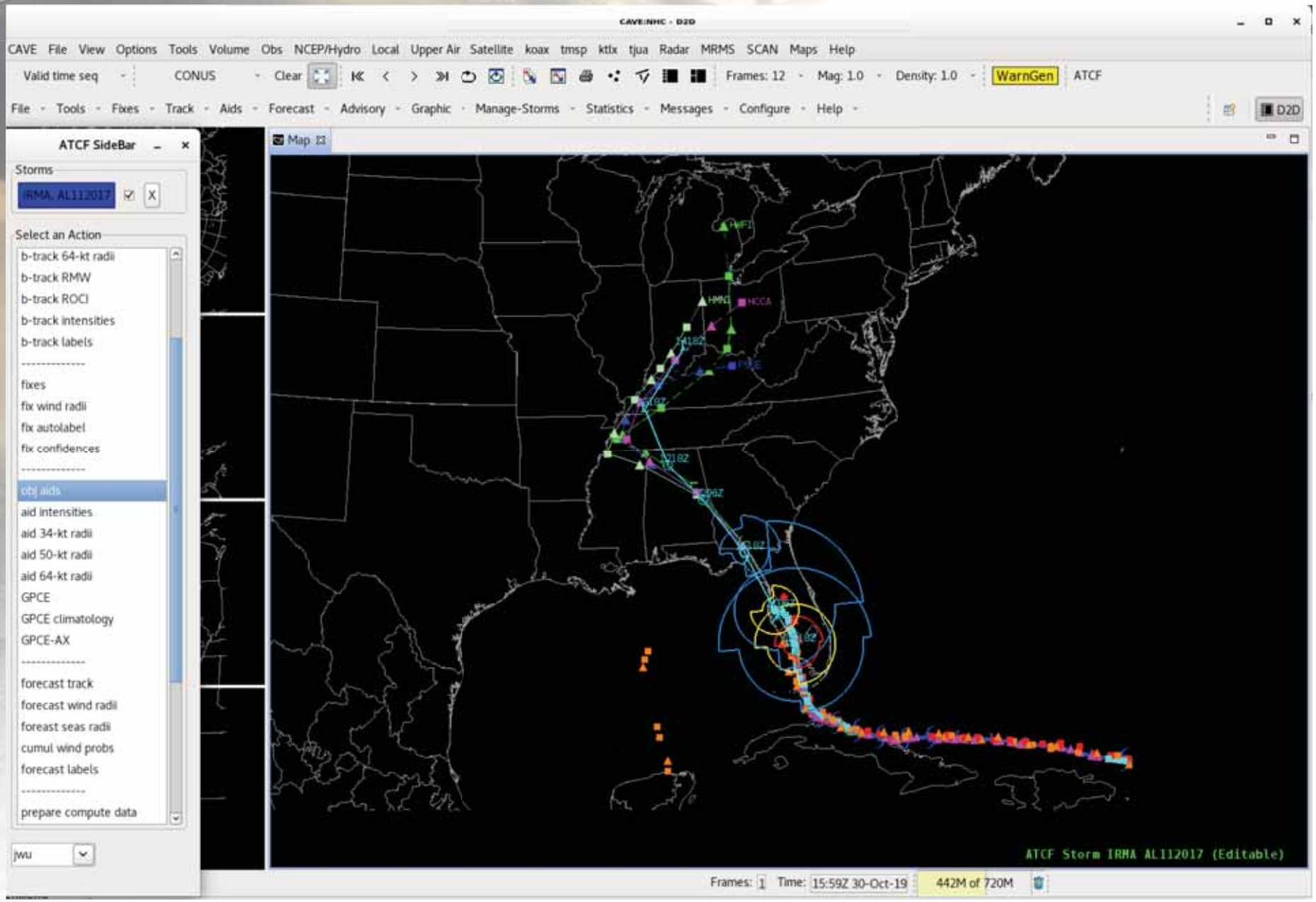


Status Report data ingest from NHC Technical Meeting
NWS/OCP/ASDT/NHC

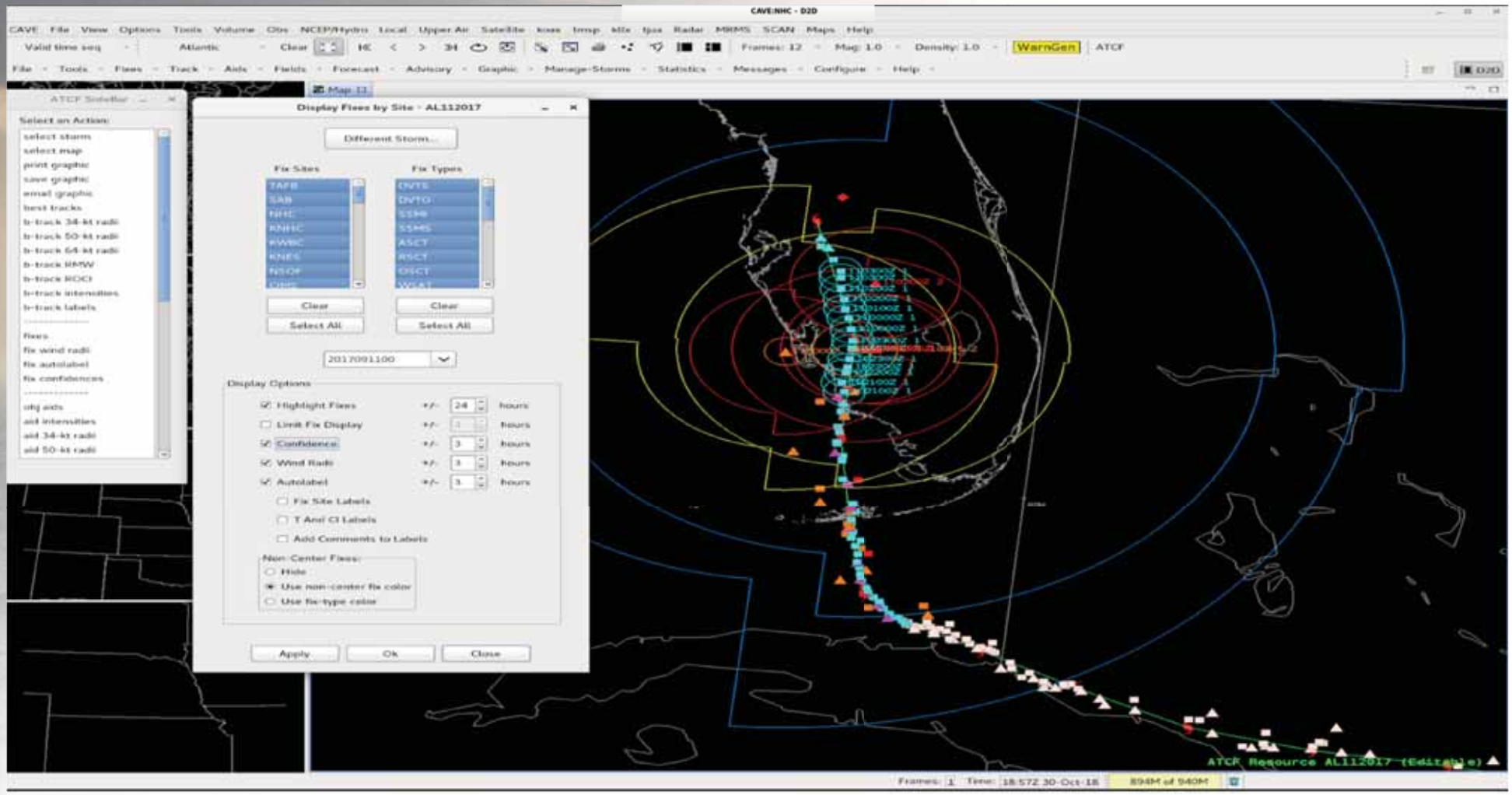
Oct. 16th, 2019

	Display via Menu	Display via Sidebar	Display Options	Edit=> GUI	Enter/Edit => Populate Data	Enter/Edit => Save & Submit	Edit=> Concurrency & Merge
A-Deck	Yes	Yes	Yes	Yes	Yes	Yes	Sprint 18
B-Deck	Yes	Yes	80%	Yes	Yes	Yes	Sprint 18
F-Deck	Yes	Yes	Yes	Yes	Sprint 17	Sprint 17	Sprint 18
E-Deck	No	No	No	No	No	No	No

Objective Aids for Hurricane Irma



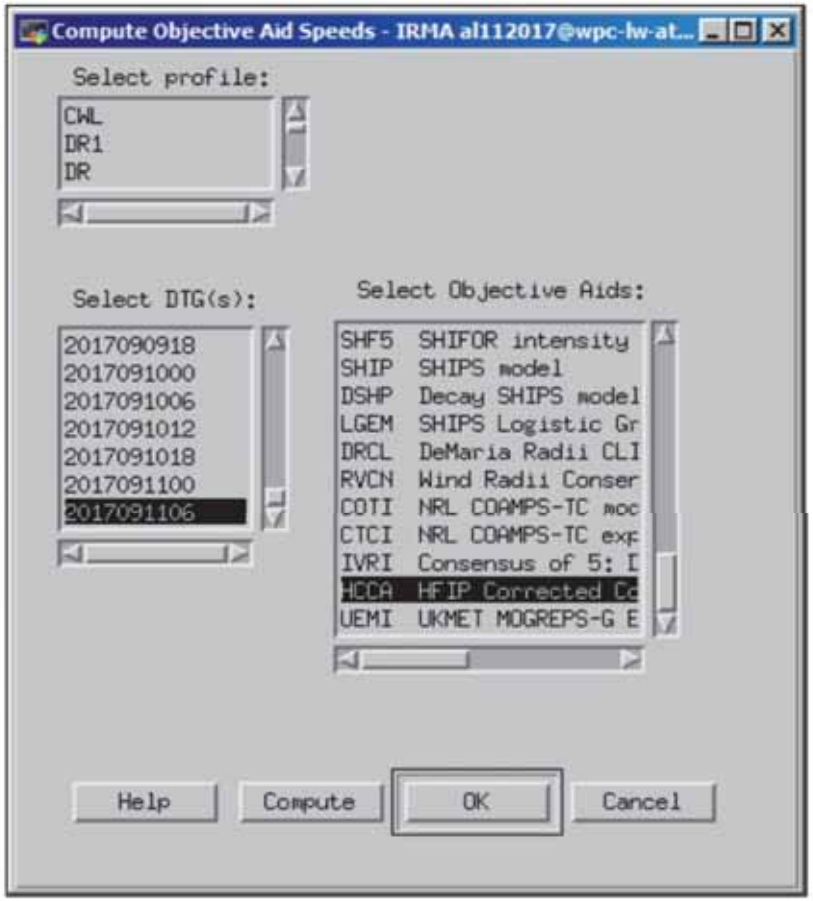
Hurricane Irma Best Track and Fixes in D2D



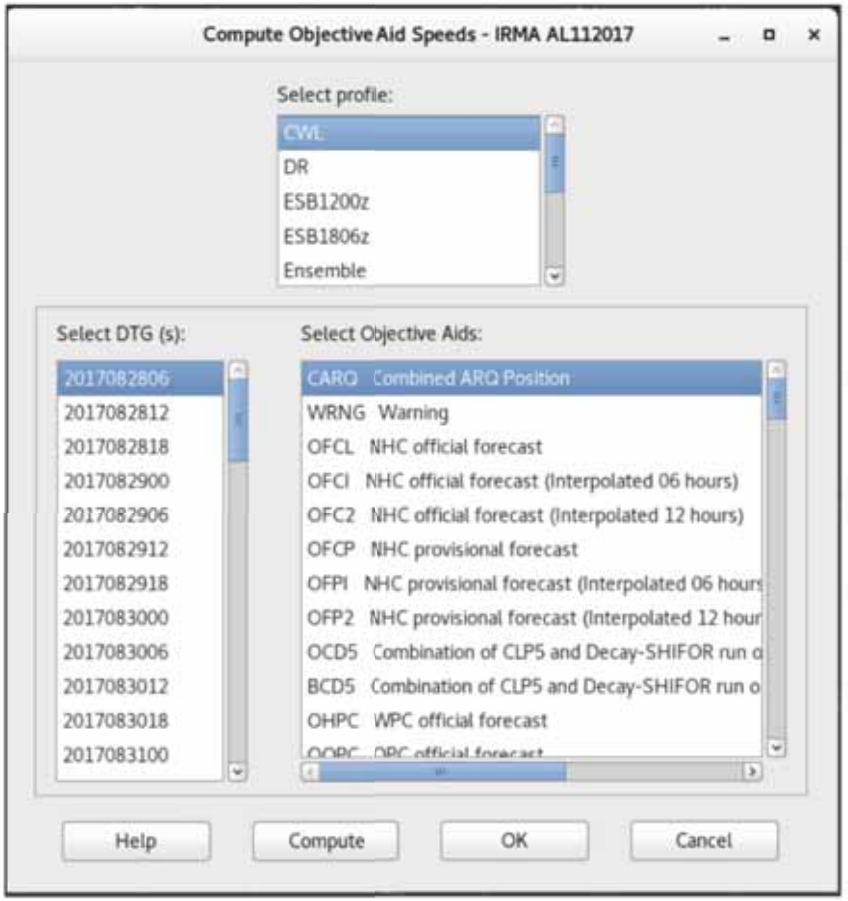
Comparison of NRL vs AWIPS2 ATCF Objective Aids menus

Aids => Objective Aids Speed Analysis

Current ATCF



ATCF AWIPS2 D2D

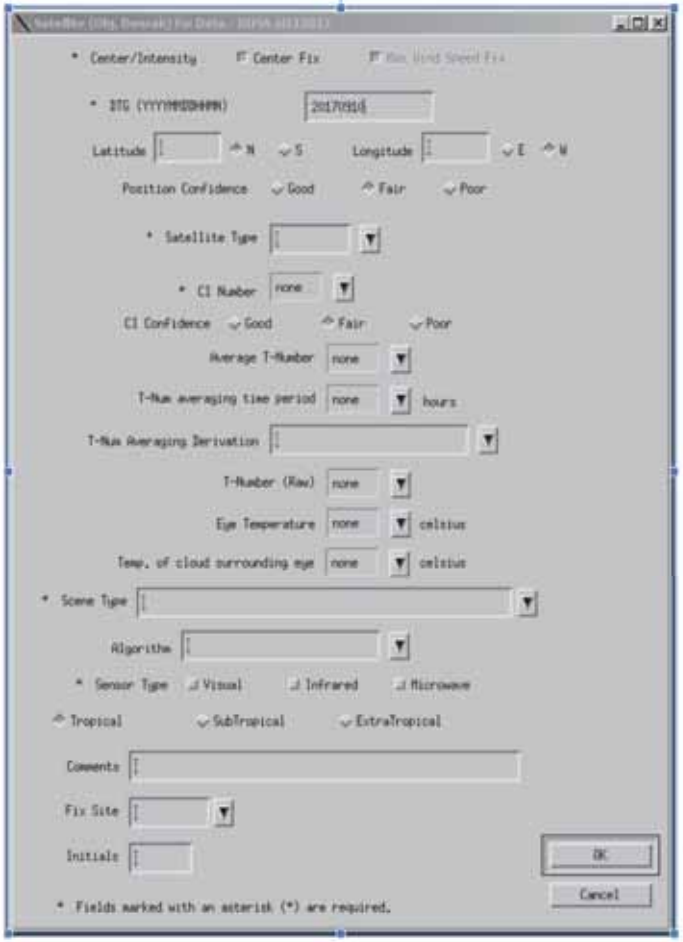


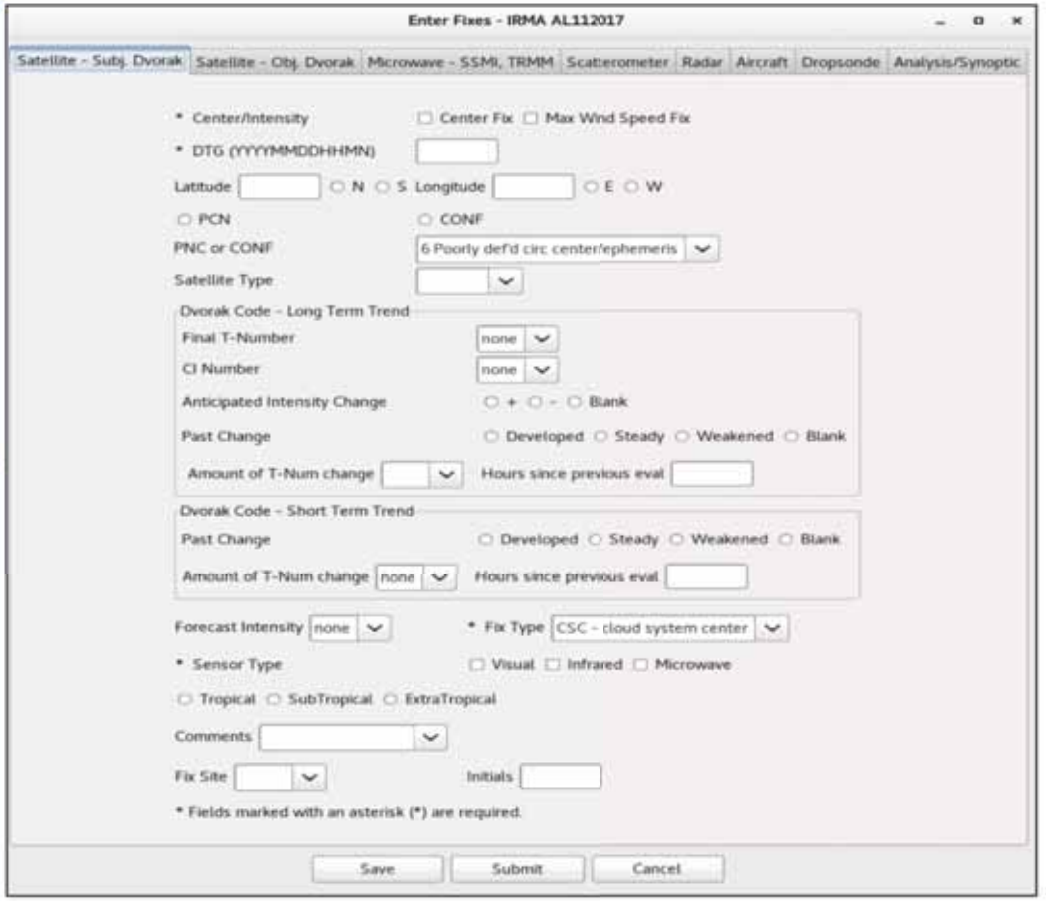
Comparison of NRL vs AWIPS2 ATCF Enter Fixes menus

Legacy ATCF

Fixes=>Enter Fixes Data

ATCF AWIPS D2D





ATCF Major Development Goals for 2020

Priorities:

- **Make current ATCF features functional:**
  - **Re-Best GUI**
  - **Enter Fixes GUI**
  - **Model Priority GUI (combine NHC & JTWC functionality)**
  - **Forecast intensity table & GUI**
  - **Forecast wind radii table & GUI**
  - **Edit TC Update**
  - **Interactive Intensity vs Time popup with intensity fixes**
  - **Run your own consensus button**
- **Menu improvements**
  - **Add frequently used Aids menu items to the sidebar:**
    - **Prepare Compute Data, List Compute Data, Send Compute Data, NWP Model Priority, Retrieve Primary Guidance**
  - **Remove erroneous or obsolete menu items from existing menus**
- **Additional D2D enhancements**
  - **Add sampling to fixes and Aids**
  - **Add D2D menu tear-off functionality to ATCF menus**
  - **Ability to display Geostationary or Microwave imagery from T-24hrs**
- **Determine the best AWIPS2 text editor (and text formatter) options based on current ATCF text editor requirements**
- **Create new database table for genesis area tracking**
- **Fine tune Advisory Composition to meet list of needs**
- **Edit Forecast and Public Advisory functionality to meet list of needs/recommendations:**
  - **Easily format AWIPS corrections, re-transmissions, etc in the headers**
- **Manage Storms: determine changes (if any) to how storms are named and managed.**

Longer-Term Plans for ATCF in AWIPS 2

- Remaining Issues
  - Submitting/retrieving guidance from WCOSS
  - Linkage with NHC code for advisory composition
  - Data exchange with CPHC, WPC, access to archive data
  - Forecaster training
  - Acceptance criteria
  - Single point of failure, AWIPS build/patch schedule
- Tentative schedule
  - 2020 Season – HSU forecaster tests of initial capabilities
  - 2021 Season – Continued development and testing
  - 2022 Season – Parallel forecast operations
  - 2023 Season – Operational transition

5-Year Outlook - Infrastructure

- N-AWIPS to AWIPS2 transition: 1-2 years
- Upgrade of NHC graphics software: 1-3 years
  - NCL to Python-based
  - 3-D visualization for forecasters (HSUP project)
  - Advanced graphics package for media, IDSS
- RHEL 8 migration: 2-3 years
- Python 2.x to 3.x: 2-3 years
- More WCOSS transitions: 2-3 years
- ATCF to AWIPS2 transition: 3-5 years
- Transition of product generation to AWIPS Hazard Services: 3-5 years
- Upgrade NHC web processing: 4-5 years
  - Possible CMS
- Infrastructure for expanded NHC Tropical Testbed - TBD
- Unknown changes due to IT security requirements

5-Year Outlook – Development

- New graphical products* (2-3 years)
  - Landfall intensity probabilities*
  - Time of Departure of 34 kt winds* (not public product)
  - IDSS/media graphics*
  - Wild Card: Recommendations from HFIP Social Science evaluation of NHC public-facing products*
- Capabilities for 6, 7 TC forecasts* (2-4 years)
- Reformatted TCM (2-4 years)
- Improved wind speed probabilities* (1-5 years)
  - Vortex model, land reduction from WTCM*
  - Replacement of statistical ensembles with dynamical model ensembles*
  - Alignment with NBM
- Probabilistic marine products (4-5 years)

**Contributions from HFIP contractors*

5-Year Outlook – Development

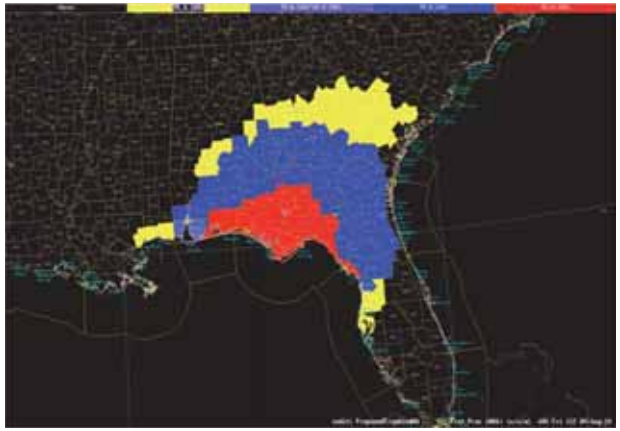
- R2O of successful HFIP, JHT, JTTI projects (1-5 years)
- Upgrade of NHC guidance suite* (2-5 years)
  - Advanced statistical/AI techniques
- Exploitation of new hurricane models* (2-5 years)
  - FV3-GFS, HAFS + ensemble systems*
- Possible new framework for tying together dynamically-based wind speed probabilities, surface wind fields, wind watch/warnings* (2-5 years)
- Transition to Hazard Services (3-5 years)

**Contributions from HFIP contractors*

5-Year Outlook – Development

NHC TCM

Wind Speed Probabilities



Wind Watch/Warnings
from AWIPS Recommender

- Model improvements lead to better TCM
- Ensembles, statistical post-processing refine WSPs
- Improved WSPs, wind hazard recommender lead to better W/Ws