

Development of Advanced Data Assimilation Techniques for Satellite-Derived Atmospheric Motion Vectors from GOES-16 and 17 in the Hurricane Weather Forecasting Model

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In collaboration with

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HFIP Annual Meeting, 17-19 November 2020

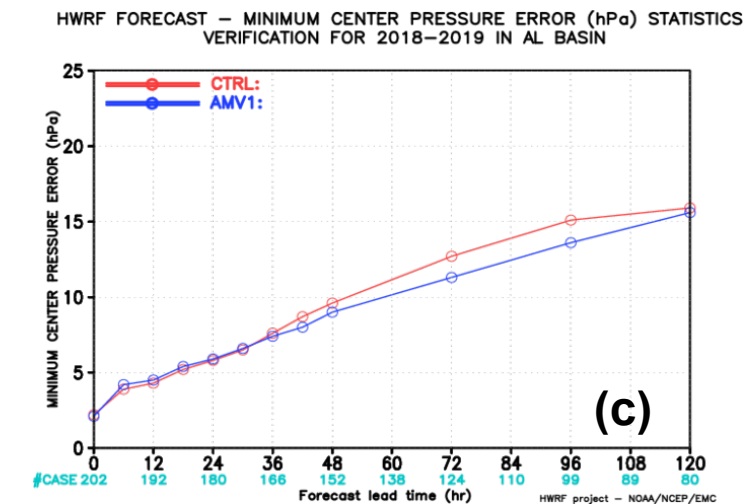
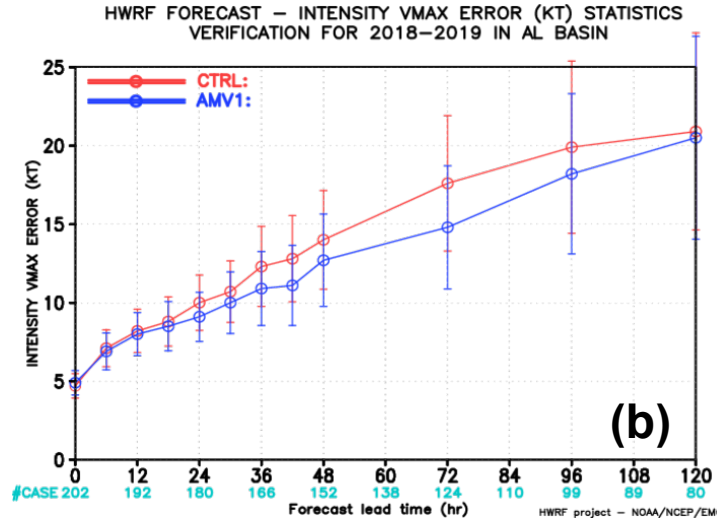
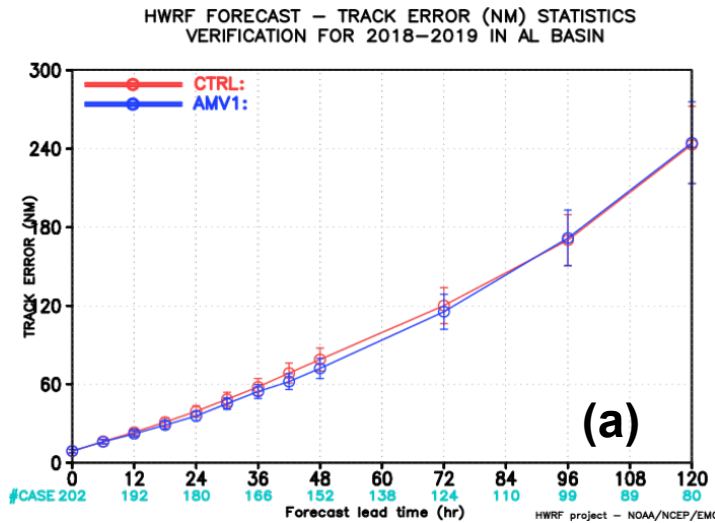
System Configurations

- Operational version of 2020 HWRF.
- Inclusion of Shortwave and Visible AMVs from GOES-16/17.
- New quality control procedures for all GOES-16/17 AMV types.
- Updated observational errors for GOES-16/17 AMVs.

2020 Major Milestones and deliverables

- Developed HWRF specific quality control procedures for hourly and 15min GOES-16/17 AMVs.
- Impact assessment of hourly GOES-16 AMVs for 2018 and 2019 hurricane seasons.
- Impact assessment of 15min GOES-16 AMVs for 2019 hurricane season.
- Code delivered to EMC for hourly assimilation of GOES-16 AMVs.
- Presentations at AMS and HFIP.

Key Results 1 – Hourly GOES-16 AMVs



Combined verification statistics for 14 tropical cyclones from 2018 and 2019 hurricane seasons. Error bars represent a 95% confidence interval. The secondary x-axis shows the number of samples used in deriving these statistics.

(a) Track error in nautical miles.

(b) Intensity error in knots.

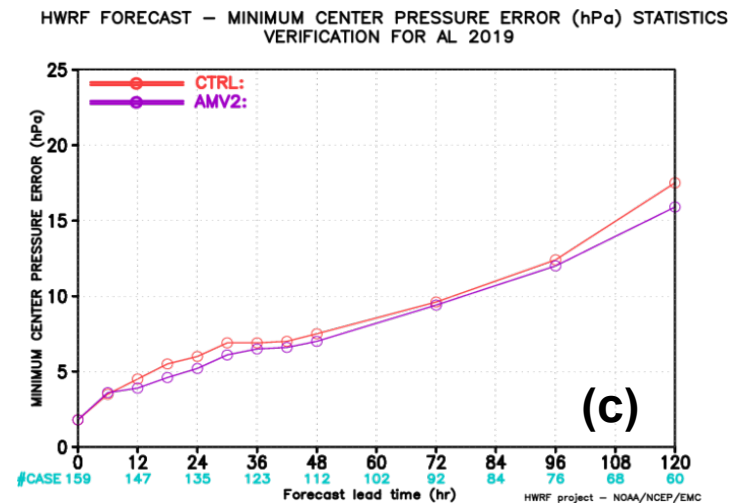
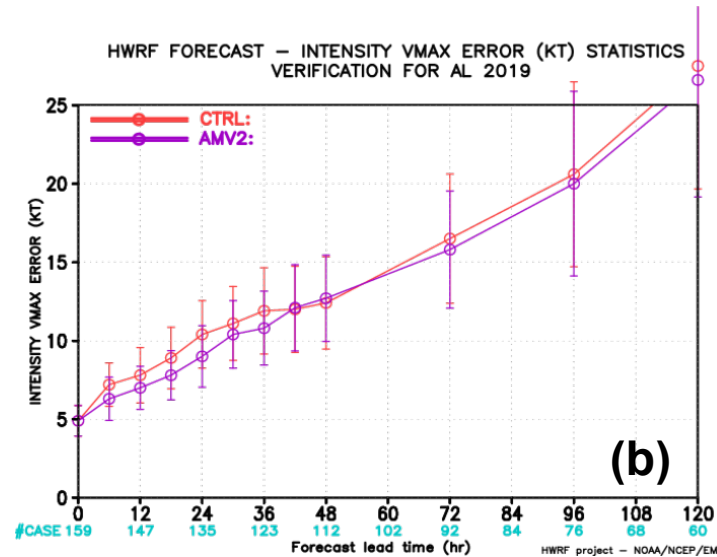
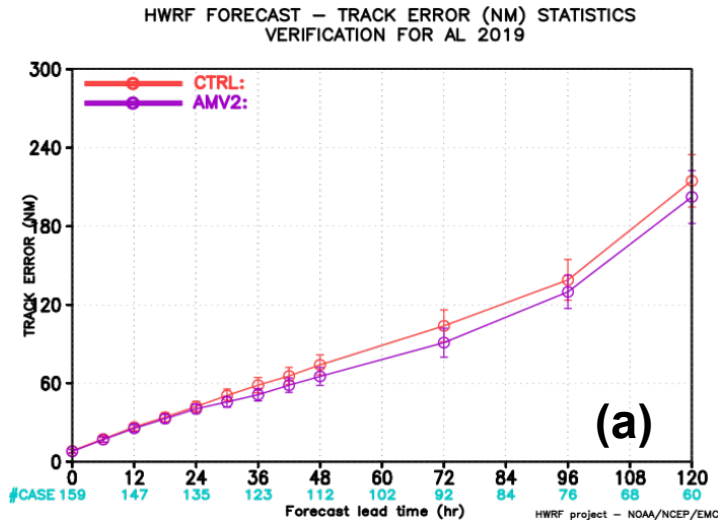
(c) Minimum center pressure error in hPa.

Improvements in track, intensity and minimum center pressure.

CTRL - operational version of 2020 HWRP with hourly GOES-16 IR, CTWV and CAWV AMVs .

AMV1 – CTRL + hourly GOES-16 SWIR and VIS AMVs, new QCs and error profiles.

Key Results 2 – Hourly and high temporal GOES-16 AMVs



Combined verification statistics for 6 tropical cyclones from 2019 hurricane season. Error bars represent a 95% confidence interval. The secondary x-axis shows the number of samples used in deriving these statistics.

(a) Track error in nautical miles.

(b) Intensity error in knots.

(c) Minimum center pressure error in hPa.

Improvements in track, intensity and minimum center pressure.

CTRL - operational version of 2020 HWRP with hourly GOES-16 IR, CTWV and CAWV AMVs .

AMV2 – CTRL + all GOES-16 hourly and 15 min wind types , new QCs and error profiles.



NWS/OSTI 2018 FFO PI Presentation



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Project Status as of 31 October 2020

Project Information and Highlights

Leads: Agnes Lim, CIMSS

Scope:

Evaluation of GOES-16/17 AMVs for use in the HWRF to support a quick transition of GOES-16/17 AMVs to operations.

Expected Benefits:

- Technology readiness level 7.
- Improvements to hurricane forecasts.
- Presentations at AMS and International Winds Working Group.
- 1 publication expected.

Implementation Date:

- Code for quality control procedures for hourly AMVs and updated error profile handed off to EMC for incorporation to next year operational HWRF upgrade.
- Code for high temporal AMVs will be ready next year when 2020 TCs storms are completed.

Challenges/Problems:

Delay in milestones for a year due to RDHPCS access.
 Only 6 TCs tested for high temporal GOES-16 AMVs for 2019 hurricane season due to data reprocessing limitations.
 Delay in operational production of GOES-17 AMVs limits its testing to only 2020 hurricane season.

Deliverables

Milestones	Completion Quarter	Status
Complete the development of HWRF specific quality control procedures for hourly GOES-16 AMVs	2019 Q3	Completed
Complete forecast impact statistics for storms in 2018 and 2019 hurricane season for GOES-16 AMVs	2019 Q4	Completed
Complete forecast impact statistics for storms in 2020 hurricane season GOES-17 AMVs.		On Track
Presentation at 2020 AMS Annual Meeting	2019 Q3	Completed
Presentation to NCEP/EMC at NCWCP or HFIP	2019 Q4	Completed
Complete the development of HWRF specific quality control procedures for GOES-16/17 high temporal AMVs.		On Tack
Complete forecast impact statistics for storms in 2019 and 2020 hurricane seasons for GOES-16 high temporal AMVs.		On Track
Complete forecast impact statistics for storms in 2020 hurricane season for GOES-17 high temporal AMVs		On Track
Presentation at 2021 AMS Annual Meeting		On Track
Presentation in NCEP/EMC at NCWCP		On Track
Presentation to International Winds Working Group		On Track

R	Program Attention Required	Y	Potential Program Attention Needed	G	On Target
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