



8th NOAA TBPG Workshop

Kansas City, MO

April 25-26, 2017

Roundup Presentation

Developmental Testbed Center (DTC)

Louisa Nance, Bill Kuo and Kevin Kelleher



AOP 2016

1 April 2016 – 31 March 2017

Developmental Testbed Center



Data Assimilation
• Hui Shao



Regional Ensembles
• Isidora Jankov



Hurricanes
• Kathryn Newman



Global Model Test Bed
• Ligia Bernardet



Verification
• Tara Jensen

Software management/user support + community outreach + T&E



AOP 2016

1 April 2016 – 31 March 2017

Developmental Testbed Center



Software

- NEMS, ARW & UPP support & community engagement
- HRRR ensemble code maintenance & Rocoto end-to-end workflow
- Containers for UPP, MET & MMET datasets
- DA code management & user support
- HWRF user & developer support
- MET development & community support
- NOAA-DTC verification unification
- Common Community Physics Package (CCPP)/Interoperable Physics Driver (IPD) – including Physics Testbed

Community Outreach

- WRF Users Workshop
- 7th Ensemble Users Workshop
- NGGPS Atmospheric Physics Workshop

NGGPS Atmospheric Physics Workshop
~80 participants
NOAA & broader community



8-9 November 2016
NCWCP, College Park, MD



Advancing Capabilities

Developmental Testbed Center



WRF

- Hybrid vertical coordinate (branch available to DTC & GSD for testing)

HWRF

- Idealized capability to simulate landfall
- Physics
 - Scale-aware relative humidity based partial cloudiness scheme (on-going improvements)
- Host hwrf-contrib repository for inter-developer exchange of codes

UPP

- New microphysics-specific reflectivity output fields
- Synthetic satellite fields

GSI/EnKF

- Unified multi-platform build system
- Community utilities

MET

- Enhancements to meet needs of research and EMC
- Python wrappers to make set-up and running easier

Contributions from visitors or supported developers



AOP 2016 T&E

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Activity	Status	Impact	Transition metric
Data Assimilation			
Regional ensemble-based (& hybrid) DA	Complete	Promising—recommended for further testing at 3 km	RL5
High resolution (3 km) EnVar	Jun 2017	TBD	-
Regional Ensembles			
HRRR enhancements	Complete	Positive	RL8
Stochastic physics - NARRE (13 km)	Complete	Promising—recommended for further testing at 3 km	RL5
Stochastic physics - HRRR ensemble (3 km)	May 2017	TBD	-
WRF smoothed terrain-following coordinate	May 2017	TBD	-
Air Force WRF configuration	May 2017	TBD	-
Hurricanes – HWRF physics			
Thompson microphysics	Complete	Mixed—under consideration for further testing	RL5
Radiation – RRTMG cloud overlap method	Jun 2017	TBD	-
Partial cloudiness scheme adjustments	Jun 2017	TBD	-
Grell-Freitas cumulus parameterization	Jun 2017	TBD	-
GMTB			
Grell-Freitas cumulus parameterization	Complete	Bernardet 3 pm	RL5
CICE sea ice model	Complete	TBD	-
Verification			
Clouds	Apr 2017	Brown 1:45 pm	RL7



AOP 2016 Highlight

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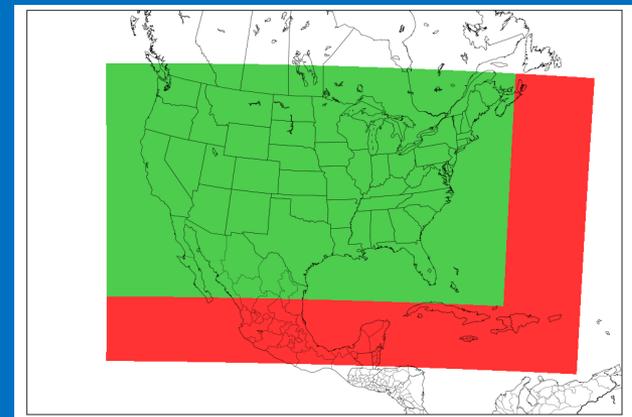
HRRR enhancements

Motivation: Lateral boundaries of HRRR domain are often within the circulation of northeast coastal snow storms and land-falling tropical cyclone when these systems are within 24-36 h striking distance of US mainland.

Experimental design: Retrospective test comparing HRRRv2 (green) to extended domain (red) for 3 tropical storms

- Bonnie – May 2016
- Colin - June 2016
- Hermine – August 2016

*also looked at impact of lightning DA





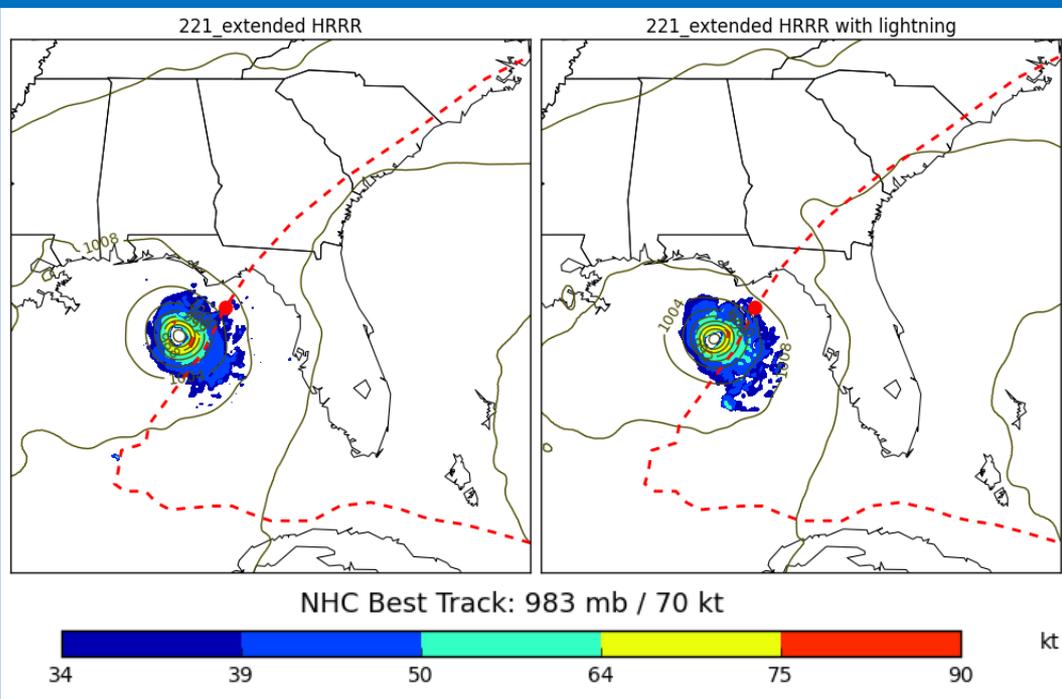
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Without lightning data

With lightning data



- Overall impact of lightning DA small but positive.
- The track error relative to the control reduced (138 km vs. 158 km)
- 10-m wind speed slightly overestimated in the control run while that was not the case for the lightning DA run.

Outcome of lightning DA test prompted GSD to include the lightning reflectivity proxy algorithm in real-time HRRRv3.



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- Enhancing community collaborations through DTC-supported software containers
- Common Community Physics Package (CCPP)/Interoperable Physics Driver (IPD) – including Physics Testbed

Community Outreach

- WRF Users Workshop

Testing and Evaluation

- Model Evaluation for Research Innovation Transition (MERIT)
- Addressing model uncertainty using stochastic parameter perturbations w/in the HRRR ensemble
- Testbed collaborations with HWT
- Testing and evaluation of new ARW development for use in RAP/HRRR
- Testing DA advancement in observation aspects and evaluation for operational readiness
- HWRF physics advancement
- Cycled Grell-Freitas in GFS



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HWT Collaboration

Stochastic physics T&E

- Explore use of stochastic parameter perturbations for microphysics and radiation and test in combination w/ other stochastic approaches
- Provide improved stochastic membership for CLUE

Testbed collaboration

- Conduct a systematic, post-experiment evaluation to assess a subset of CLUE combinations using single physics/core vs. multi-physics/core collected during the 2017 HWT Spring Experiment
- Evaluate probabilistic forecast performance of each targeted ensemble subset
- Assess deterministic forecasts from select members to understand their contribution to overall ensemble spread
- Use traditional metrics along with spatial methods to highlight performance of general meteorological fields and specific severe weather storm-attribute fields



Questions

Developmental Testbed Center



- **Additional Information**

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- **Webpage:**

- <http://www.dtcenter.org/>**