

Federal Aviation Administration Technical Exchange Meeting

Day 1: Traditional Aviation Weather

Research, Development, Transition to Operations

Steve Weygandt, NOAA Global Systems Laboratory
Assimilation and Verification Innovation Division (AVID) and
Environmental Prediction Advancement Division (EPAD)

FAA Aviation Weather Research Program (AWRP)
Model Development and Enhancement (MD&E)
Product Development Team (PDT)

Research, Development, Transition to operations (R/D/T2O)
for RAP/HRRR and now for the new Rapid Refresh Forecast System (RRFS)

Work with other groups to use model forecast grids for many aviation applications
(convection, icing, ceiling and visibility, turbulence, winter weather, etc.)



Federal Aviation Administration Technical Exchange Meeting

Day 1: Traditional Aviation Weather

GSL and AWRP MD&E PDT:

Long track record of weather model forecast improvement and service to aviation weather community

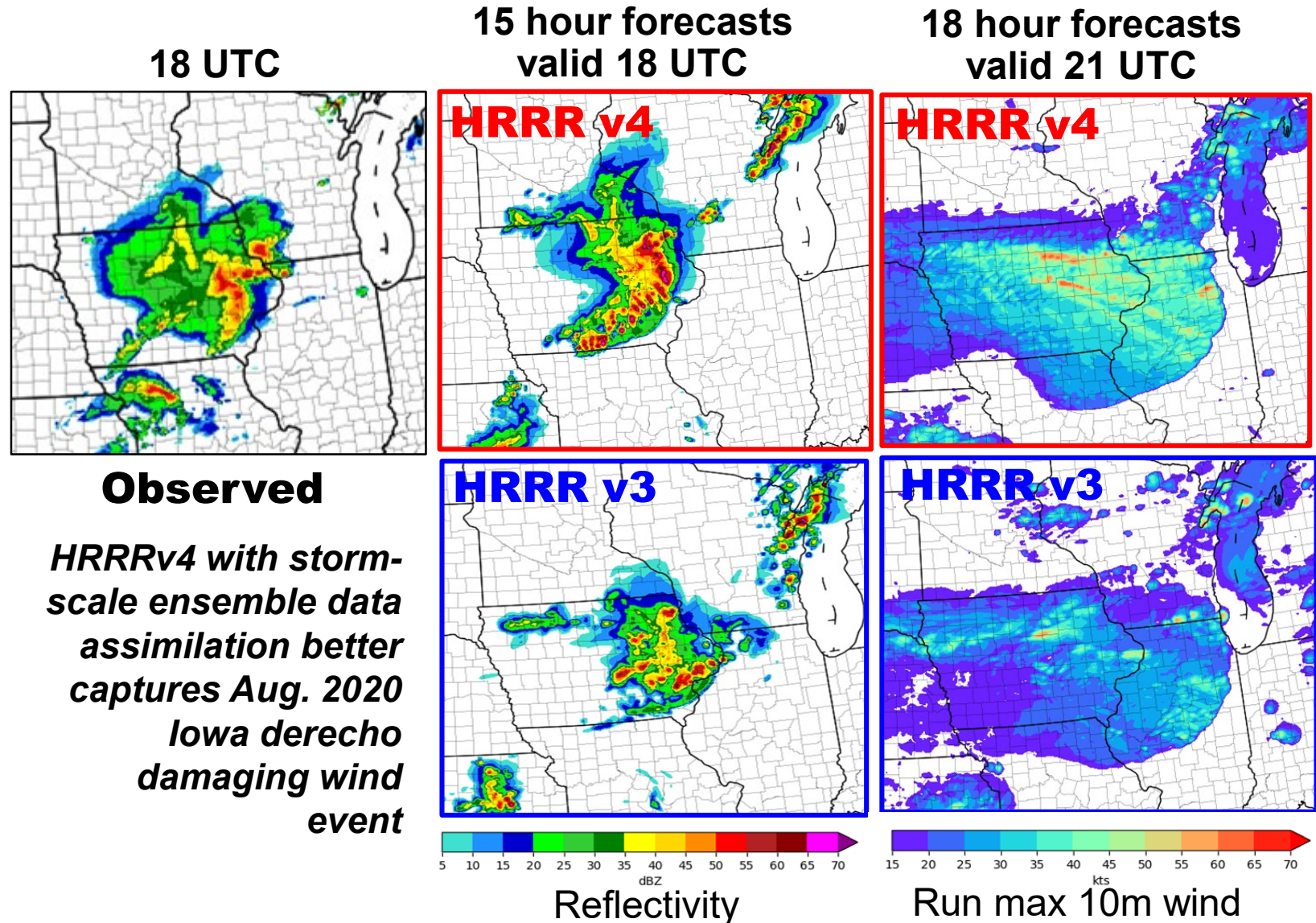
Continued innovation: latest techniques for model physics, data assimilation, post-processing

Advanced model physics for improved forecasts of convection, icing, clouds, turbulence, smoke, other fields

Real-time experimental testing of ensemble forecast systems to provide uncertainty information

Extensive work with partners to make best use of the model output grids: FIP, GTG, convection, ceiling/visibility

Strong collaboration with EMC for model implementations and upgrades



Federal Aviation Administration Technical Exchange Meeting

Day 1: Traditional Aviation Weather

→ Transition from RAP/HRRR to Rapid Refresh Forecast System (RRFS)

3-km domain covering large North American domain

Maintain all HRRR capabilities (ensemble DA, smoke prediction, etc.)

Deterministic and 10-member ensemble using stochastic physics

Greater coupling of model output and aviation hazard-specific products

Other model R&D focus areas

Development and testing of ultra-high-resolution models (< 1-km horizontal resolution and significantly enhanced vertical resolution, especially in the boundary layer) with focus on UAS applications, detailed airport hub forecasts

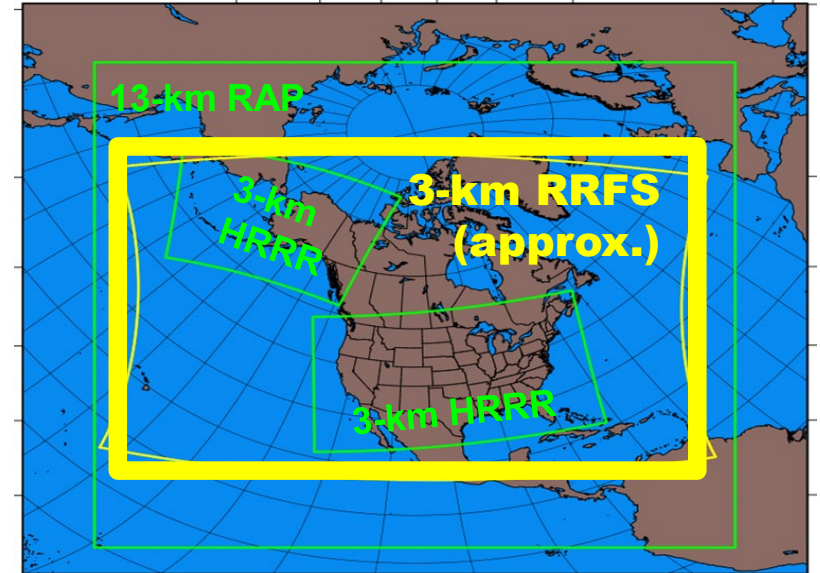
Continued development of high resolution hourly-cycled global rapid refresh models, improved data assimilation

Application of AI-based techniques for enhanced model ensemble post-processing for specific aviation hazards

Increased interaction with other aviation weather groups and stakeholders

Increased testing of cloud computing for modeling (with ensembles)

*Approximate
RRFS large
North American
domain*



Federal Aviation Administration Technical Exchange Meeting

Day 1: Traditional Aviation Weather

Research, Development, Transition to Operations

Steve Weygandt, NOAA Global Systems Laboratory
Assimilation and Verification Innovation Division (AVID) and
Environmental Prediction Advancement Division (EPAD)

Supplemental Slides

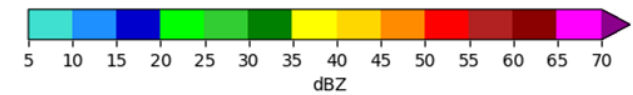
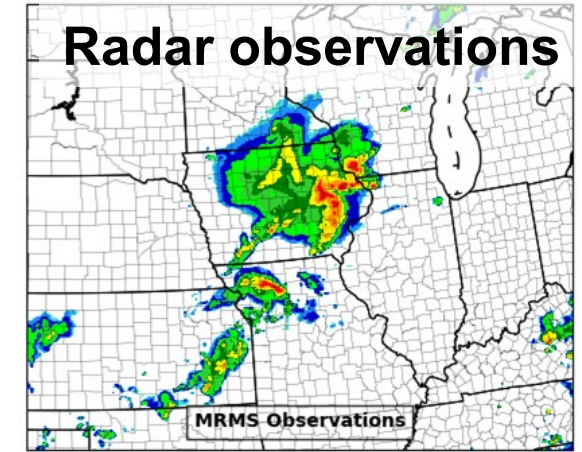


Federal Aviation Administration Technical Exchange Meeting

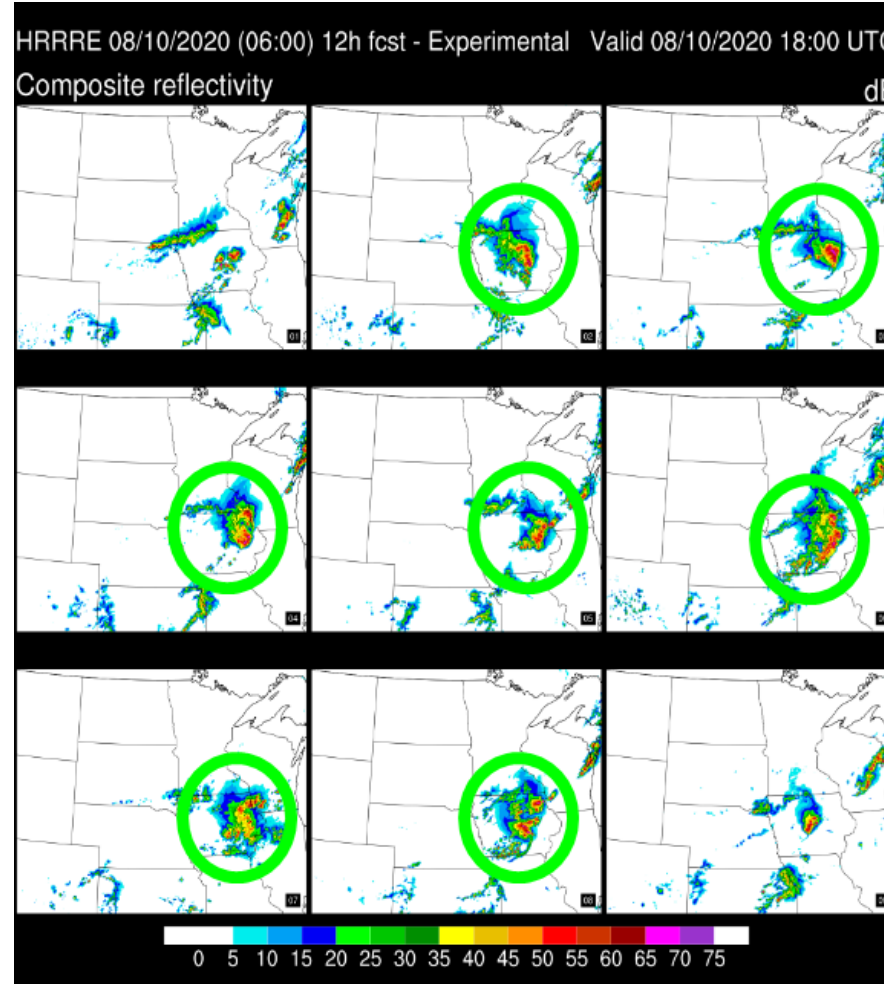
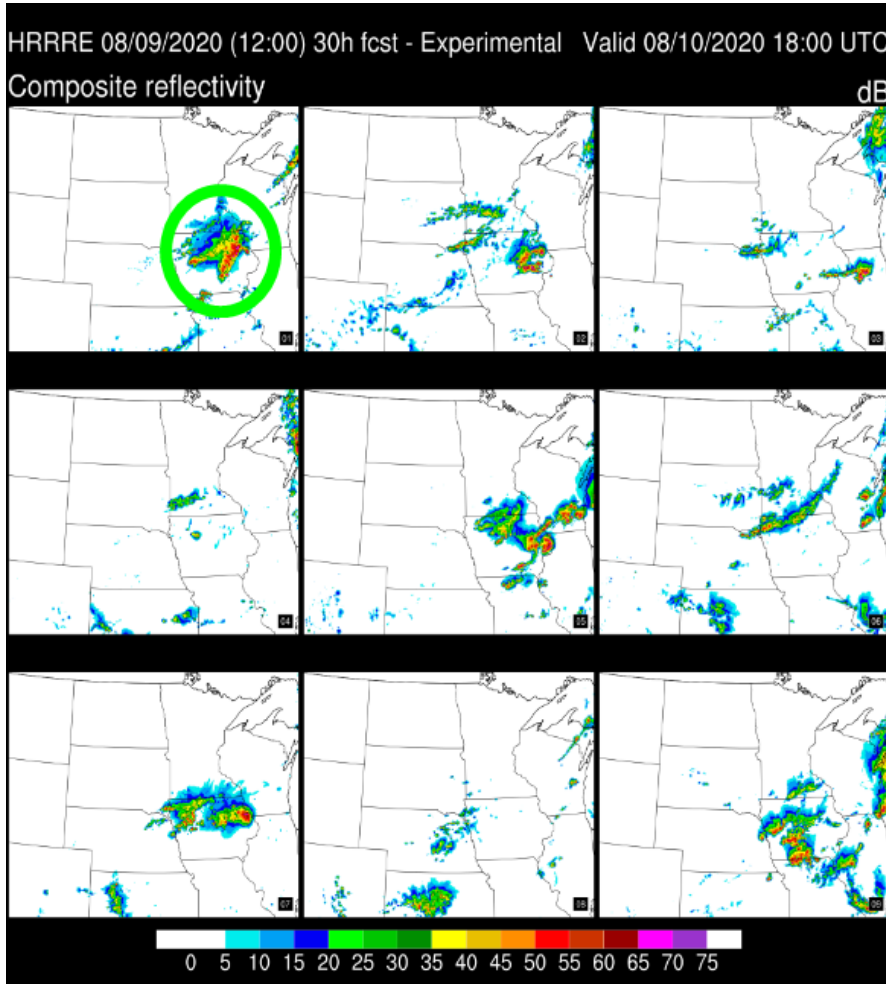
For August 2020 Iowa derecho damaging wind event, HRRR-Ensemble (HRRRE) shows confidence for high impact event increasing

30-h lead-time: 1 of 9 hits

12-h lead-time: 7 of 9 hits

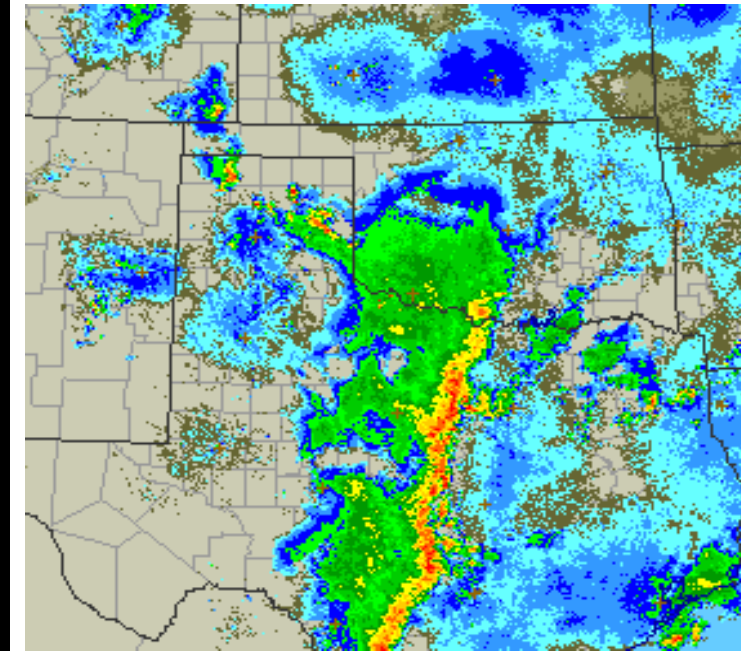
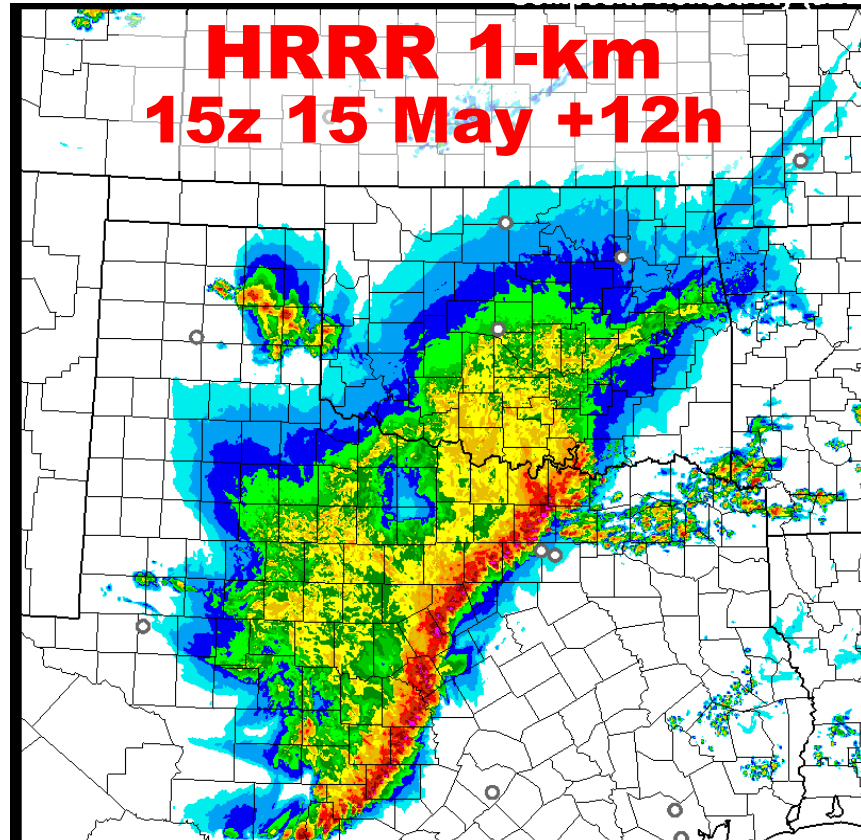
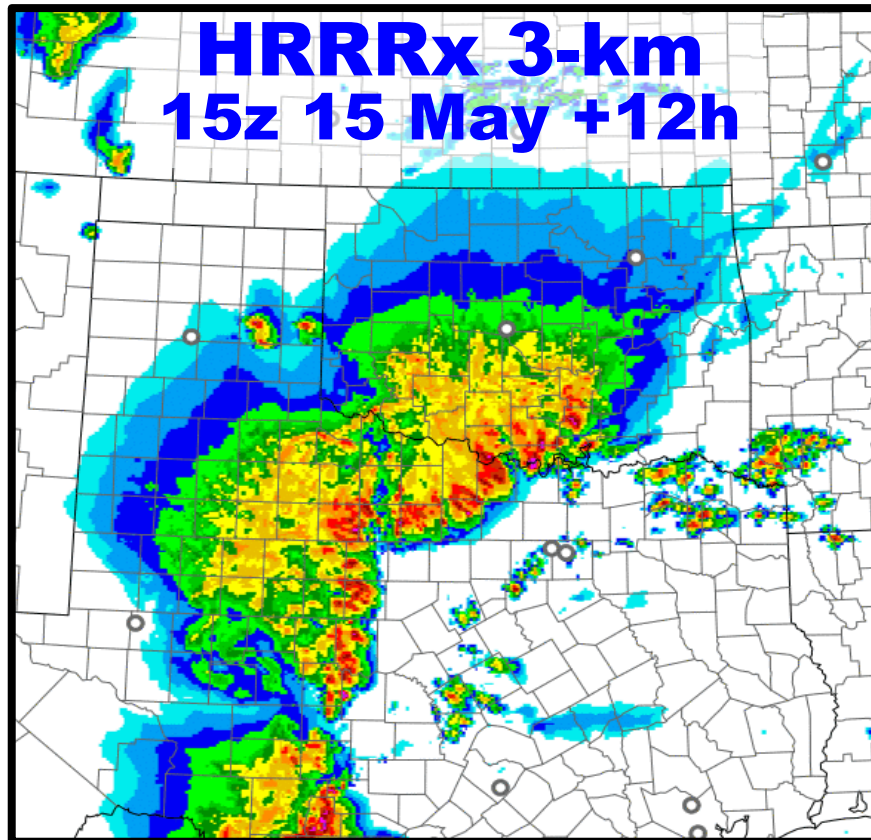


- Longer forecasts show possibility for major event
- Shorter forecasts shows increased confidence for high impact event
- HRRRE includes stochastic physics to increase spread



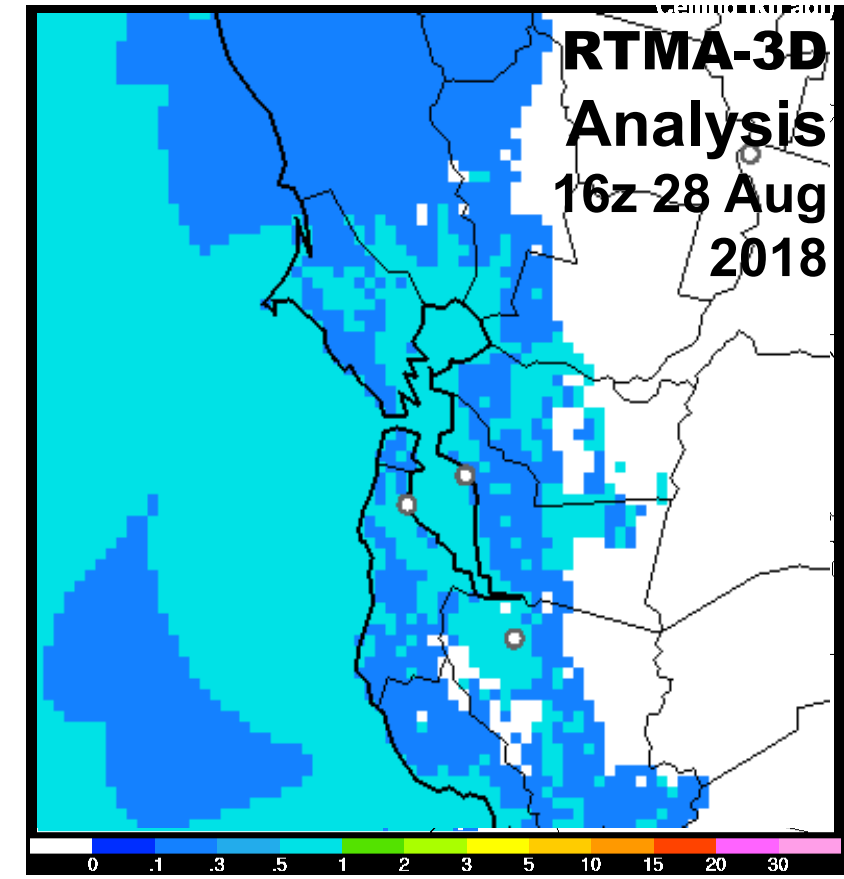
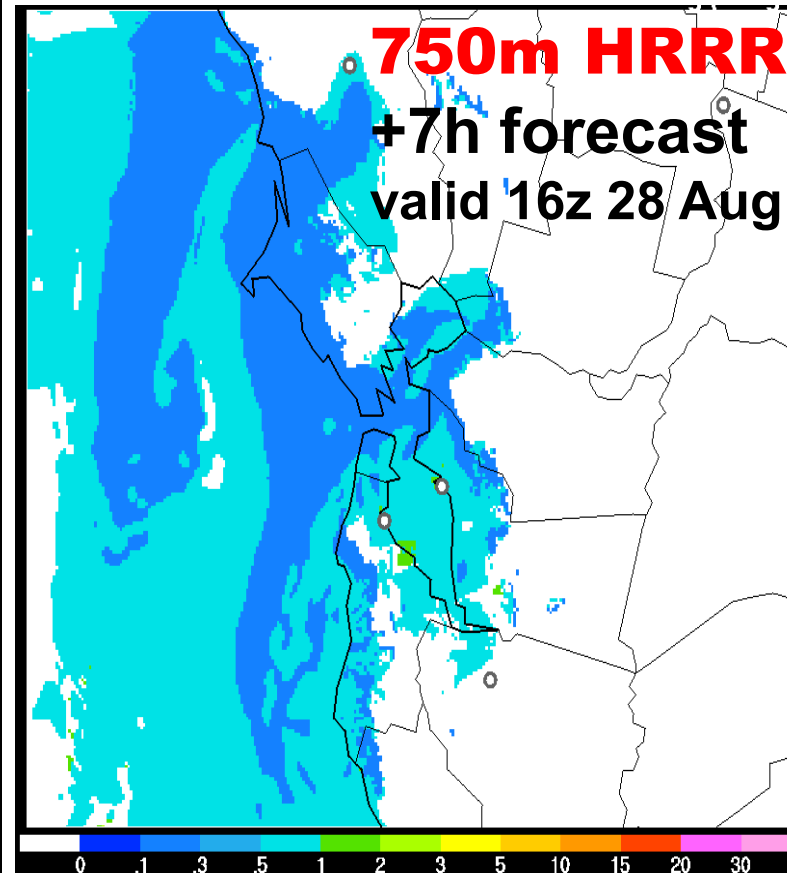
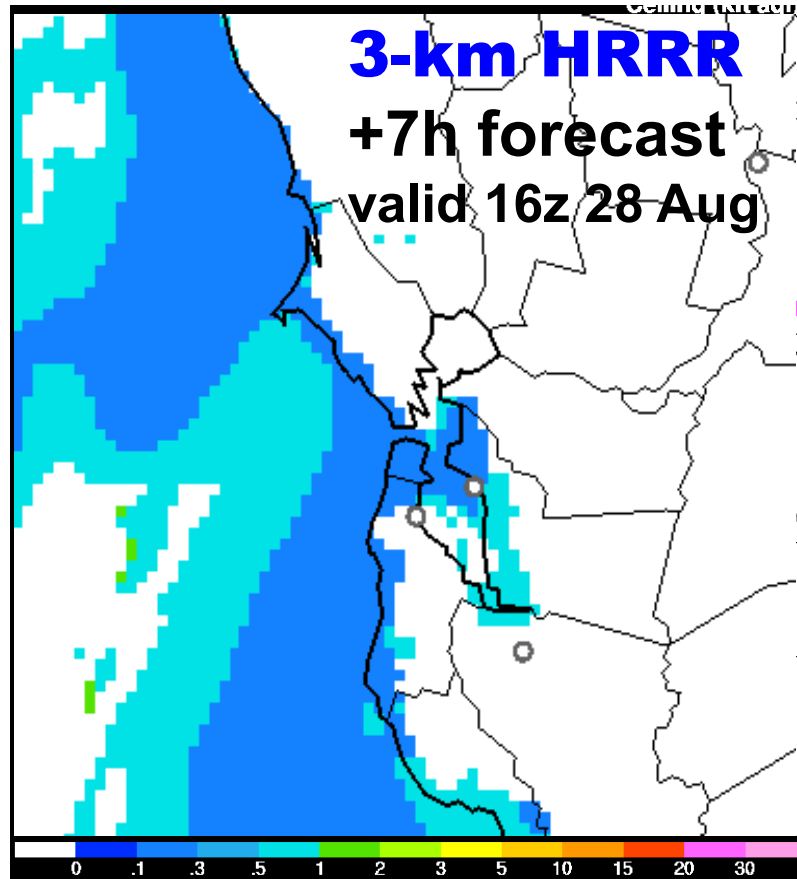
Federal Aviation Administration Technical Exchange Meeting

1-km HRRR shows better convective storm structure compared to 3-km HRRR



Radar observations
03z 16 May 2020

750m HRRR better retains SFO low clouds compared to 3-km HRRR



Ceiling (kft agl)