Evaluation of CAM forecasts for convective events in the ALY County Warning Area

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Introduction – What we think we know

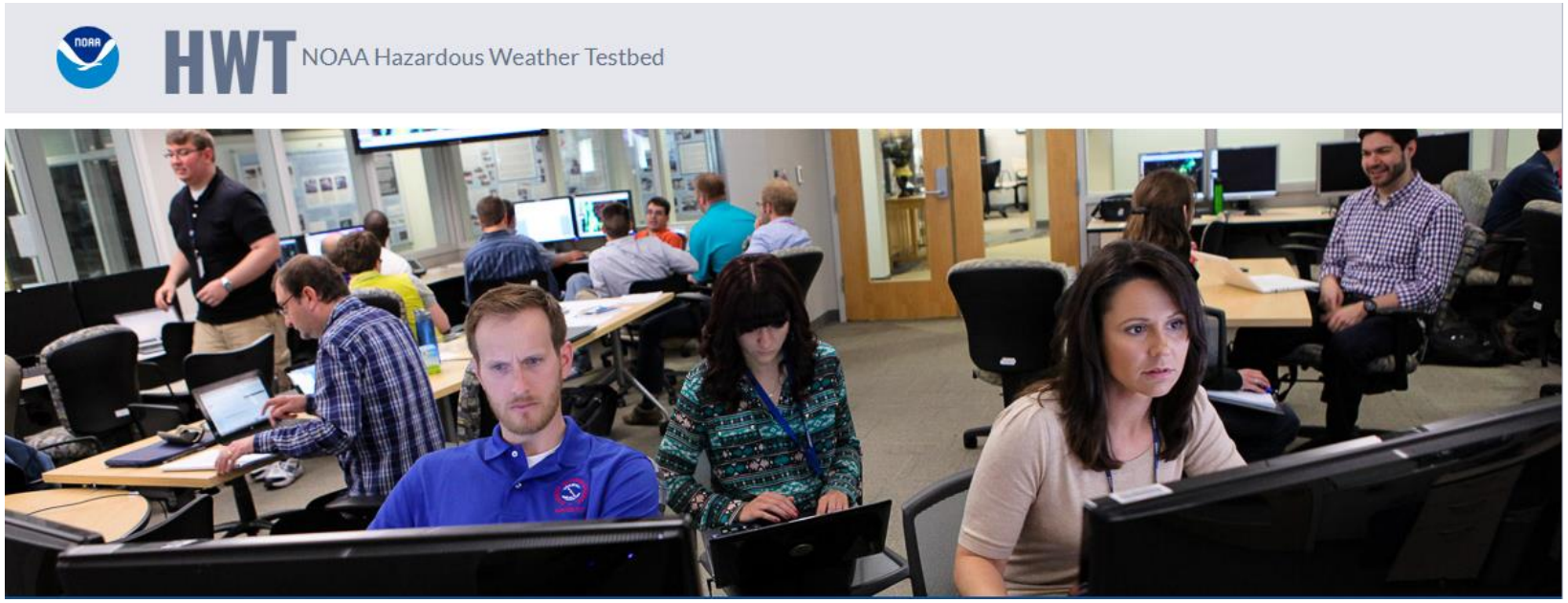
- CAMs are a great tool to evaluate convective potential… however:
- Forecasts that look very realistic are not always correct
- CAMs perform best at predicting convective evolution (squall lines vs. discrete storms).
- Details on timing and coverage of convection are not always reliable.
- CAMs sometimes tend to run “too hot”.
- CAMs perform best when large-scale forcing is strong.

Methodology

- Evaluate CAMs forecasts for the 2021 season
- Examine 32 “significant” events (at least one severe or flash flood report)
- Examine 16 “null” events (SPC outlook indicated at least a marginal, no severe weather was observed).

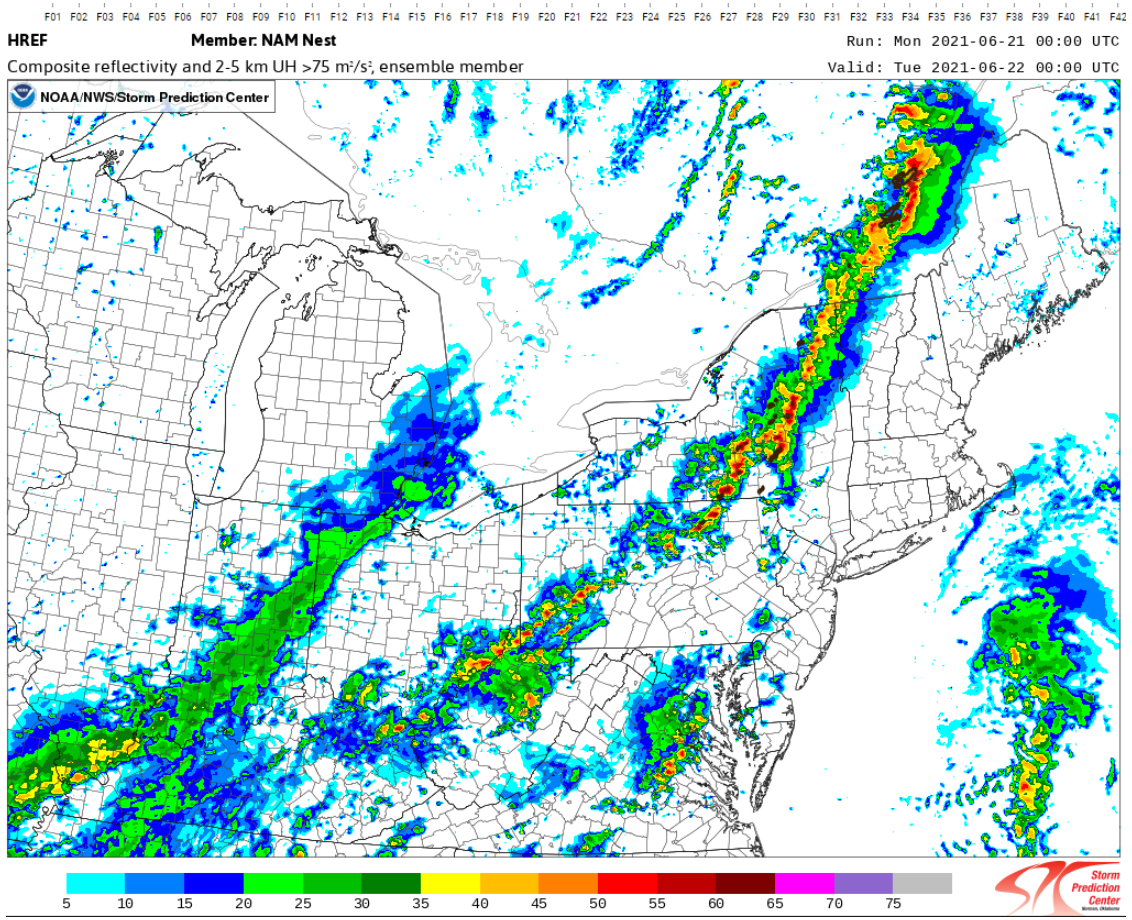
Methodology continued

- Evaluations were subjective, following evaluations done at NOAA hazardous weather test beds (Clark et al., Jirak et al.)
- 9 forecasters evaluated and scored each case
- Forecasters ranged in experience from the SOO and a lead forecaster, to 2 students
- “Coverage” forecasts were scored from -5 to 5
- “Timing forecasts were scored from -5 to 5
- “Evolution” forecasts were scored from 0 to 5

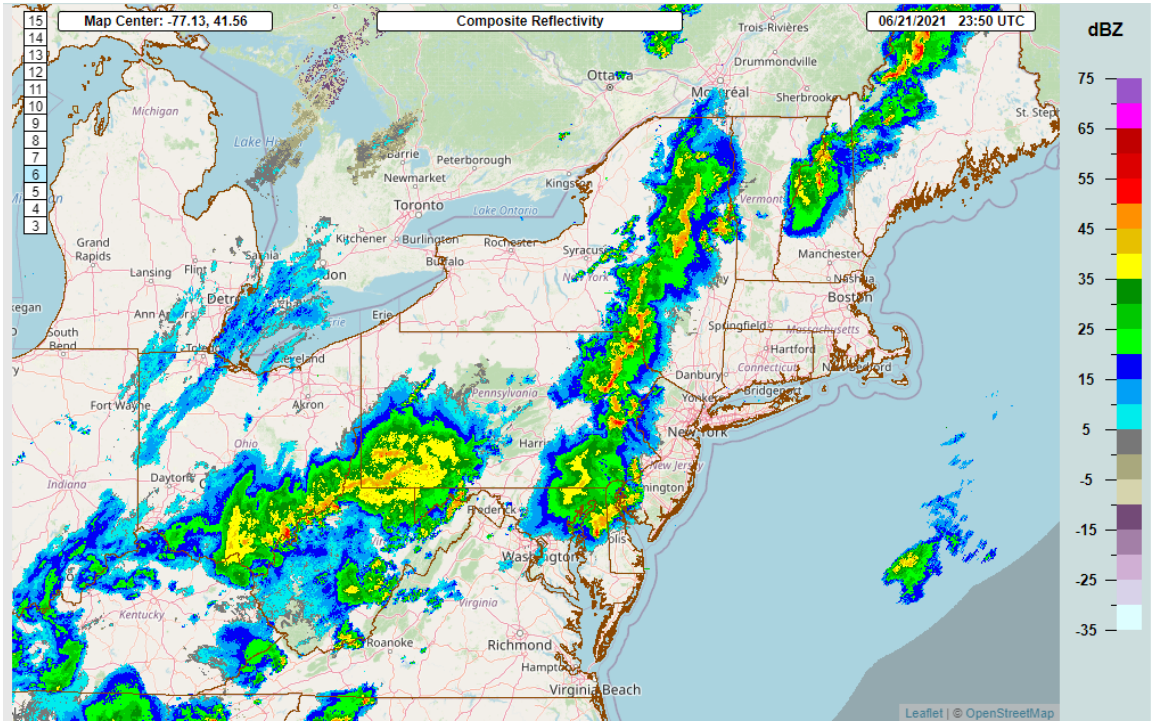


Example – scoring a good forecast

00 UTC June 21, 2021 reflectivity valid 00 UTC June 22



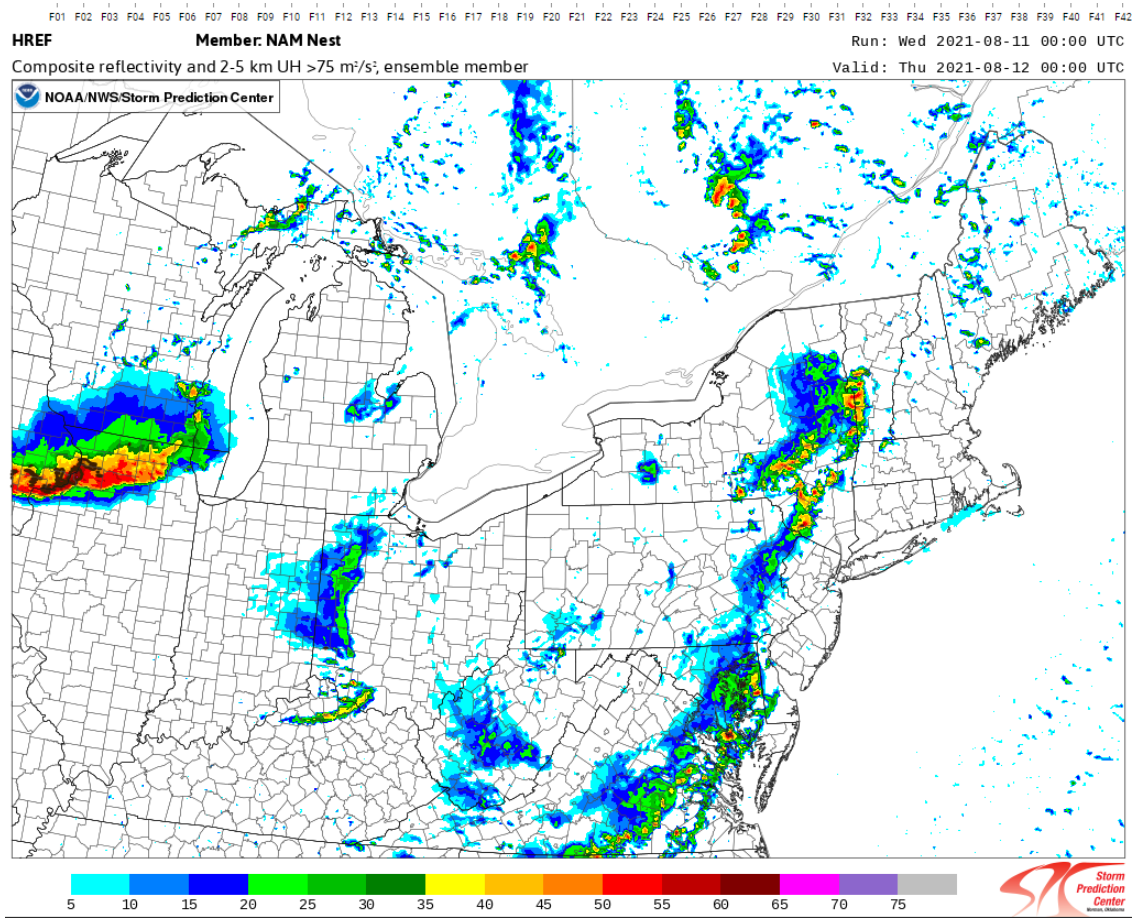
Observed reflectivity at 00 UTC June 22



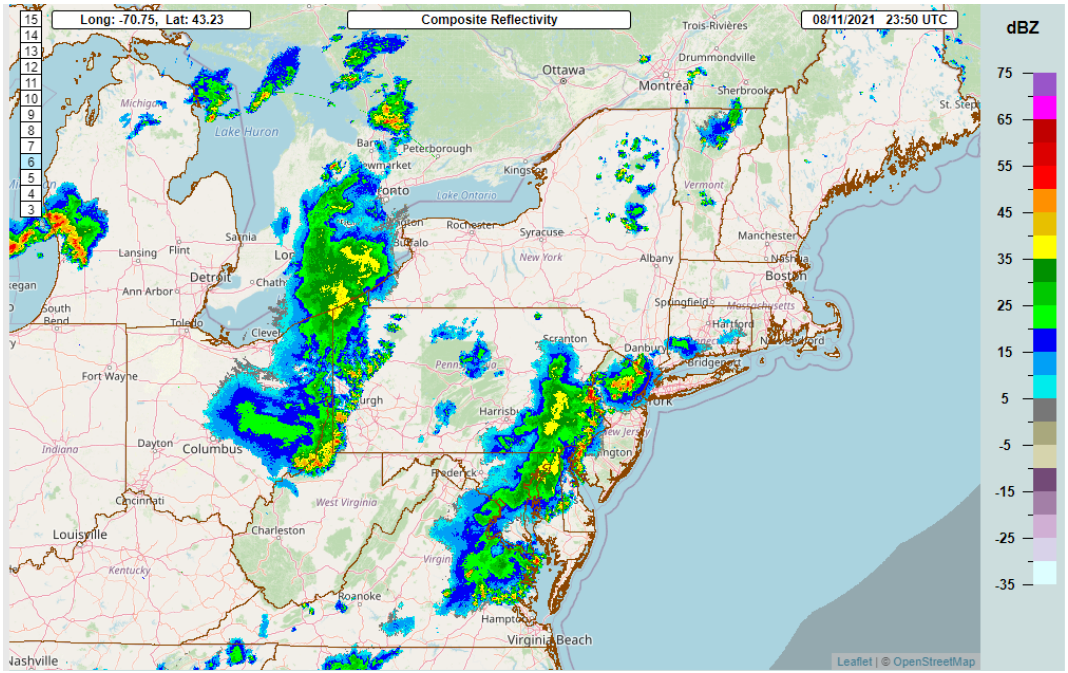
June 21, 2021 – Coverage = 0, Timing = -1, Evolution = 5

Example – scoring a bad forecast

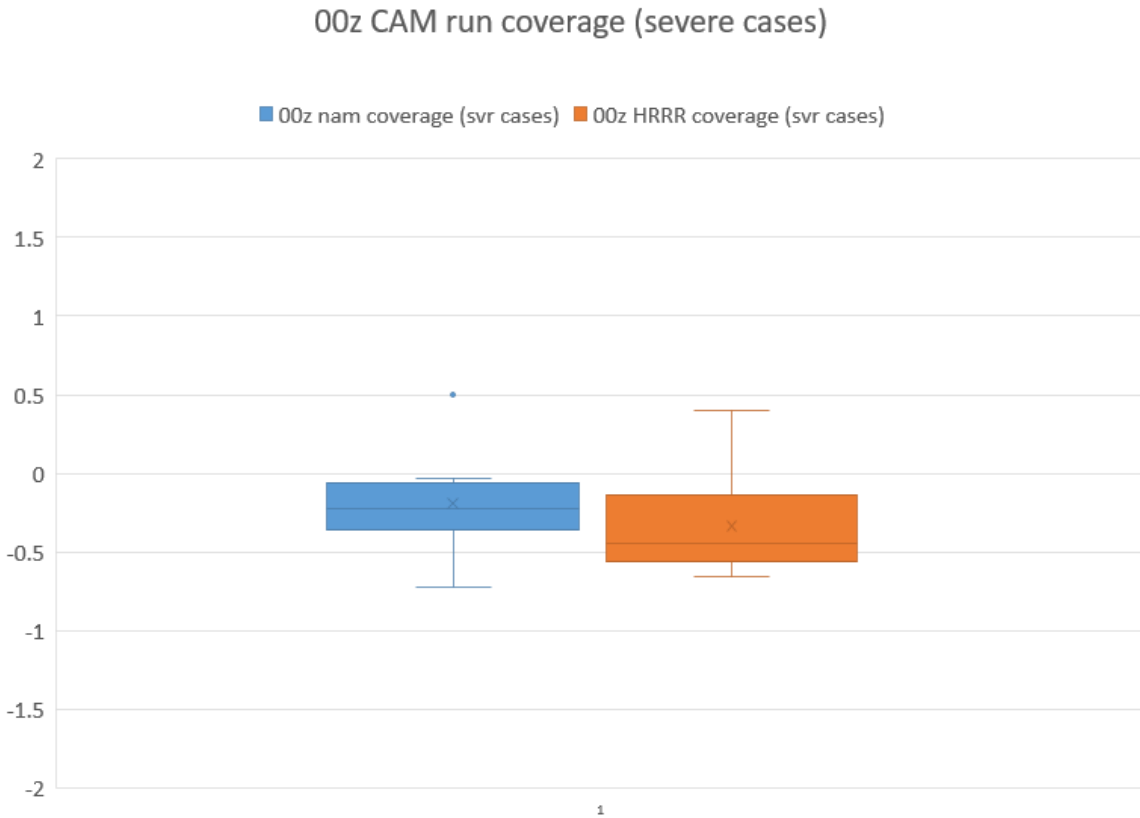
00 UTC August 11, 2021 reflectivity valid at 00 UTC August 12

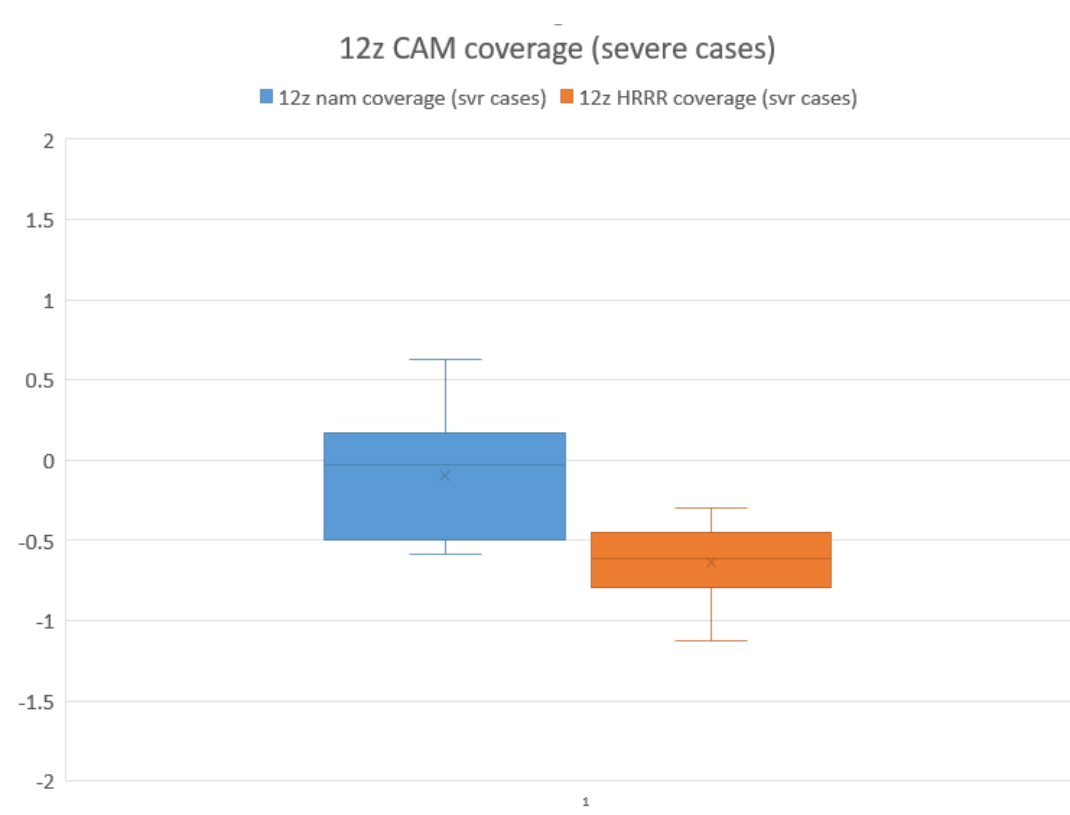


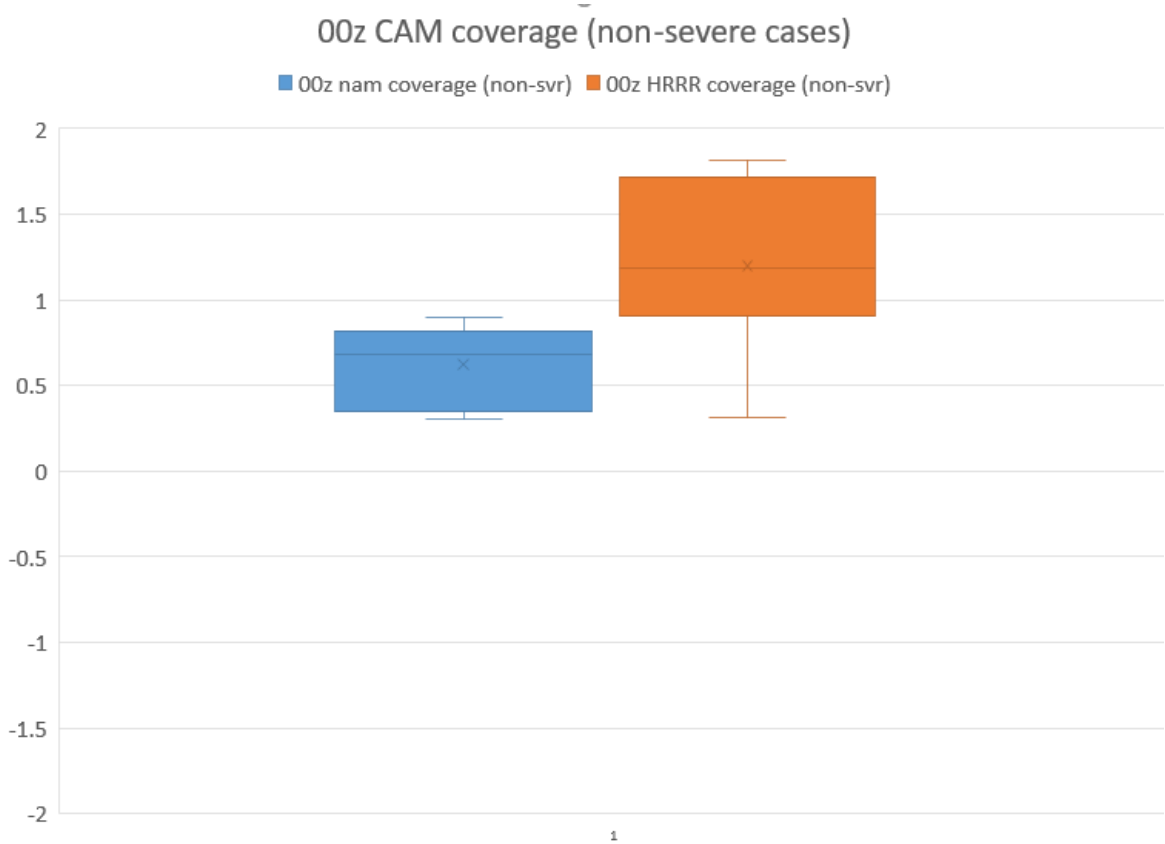
Observed reflectivity at 00 UTC August 12

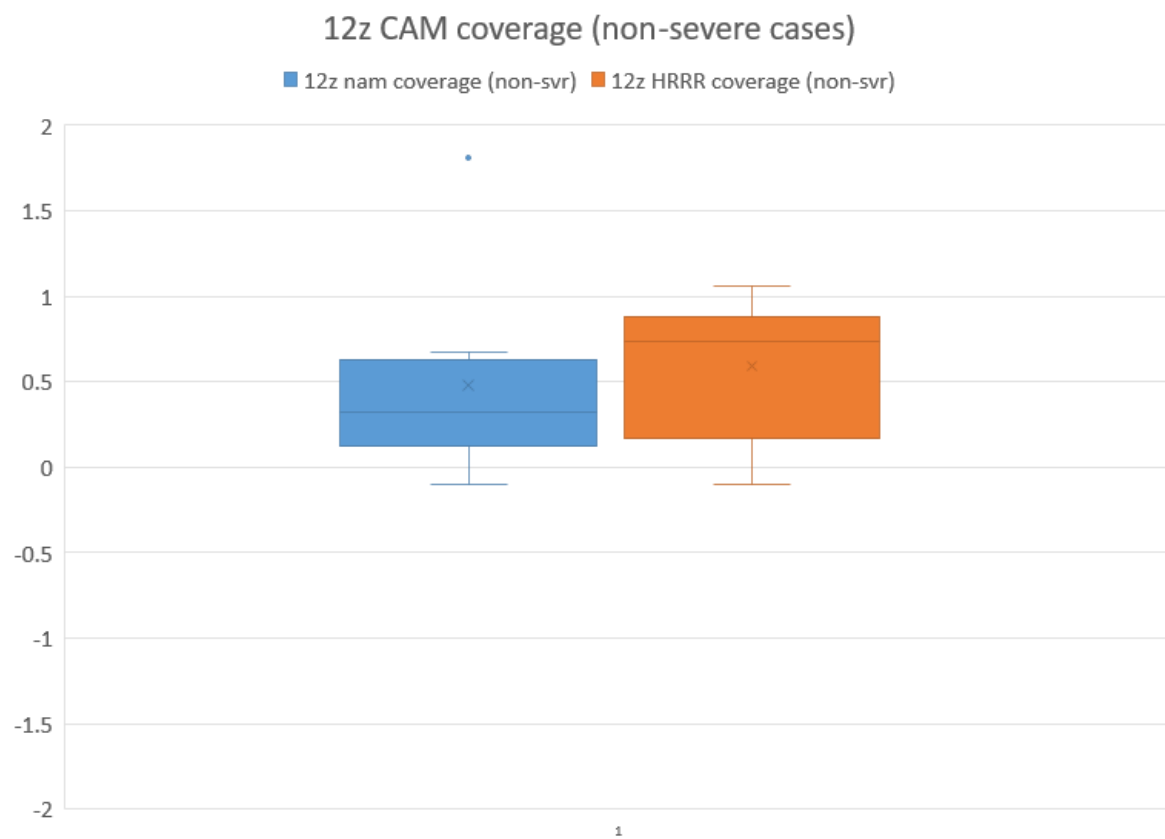


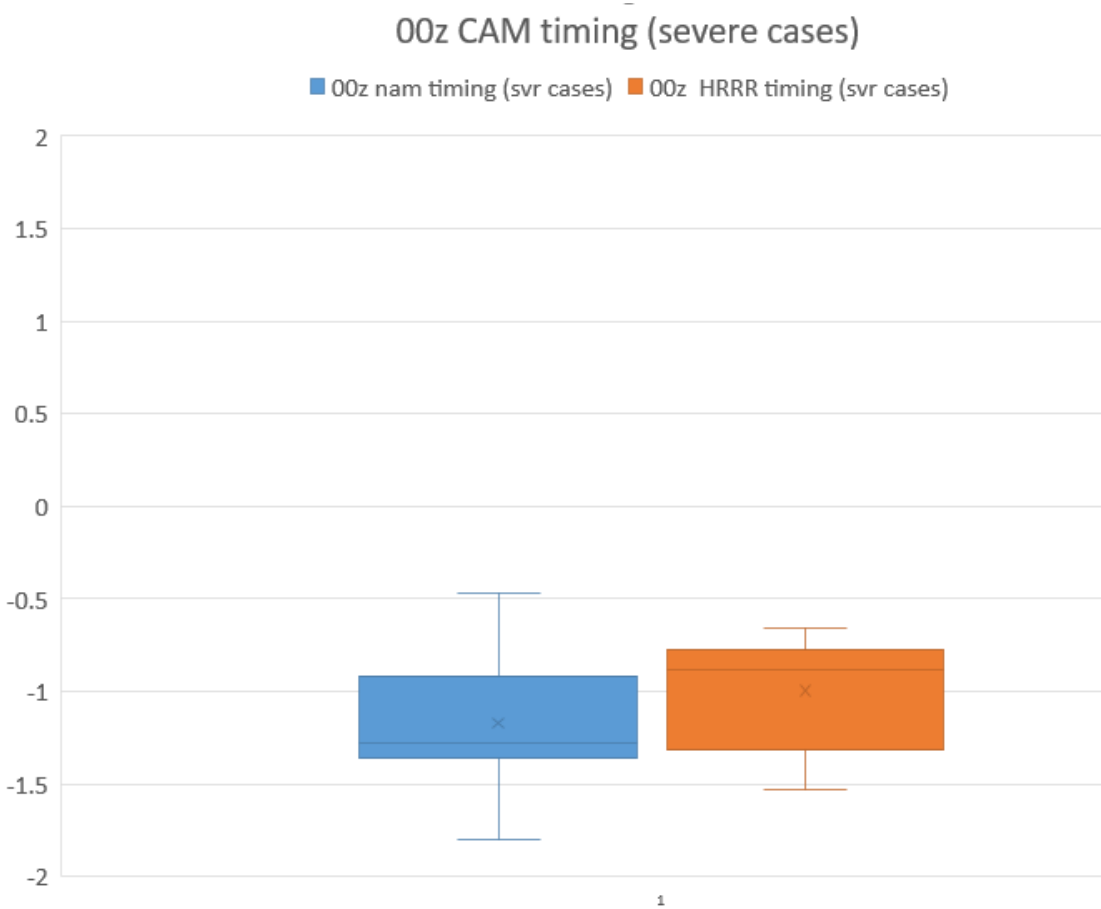
August 11, 2021 – Coverage = 4, Timing = -3, Evolution = 1

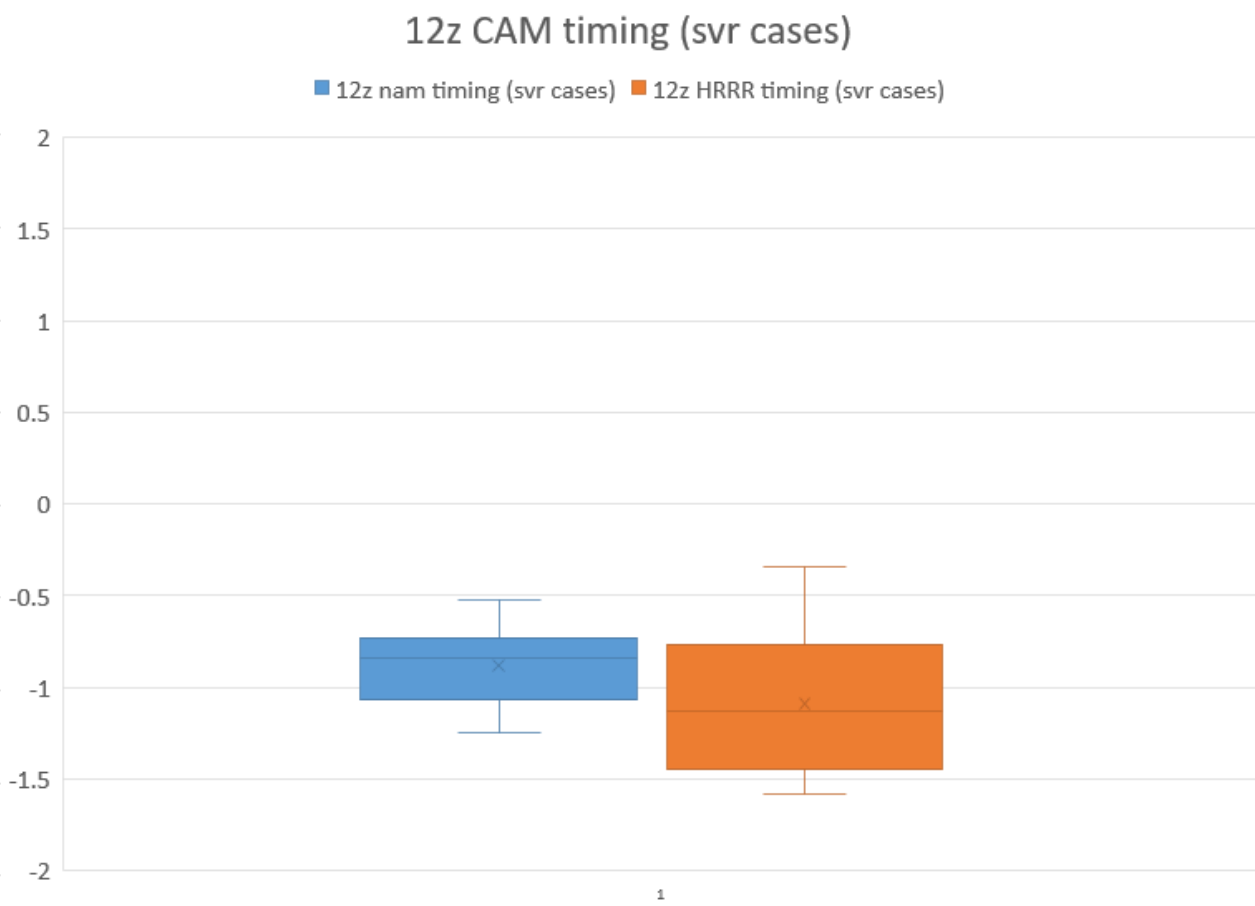

00z CAM run coverage (severe cases)
00z nam coverage (svr cases)
00z HRRR coverage (svr cases)
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
1

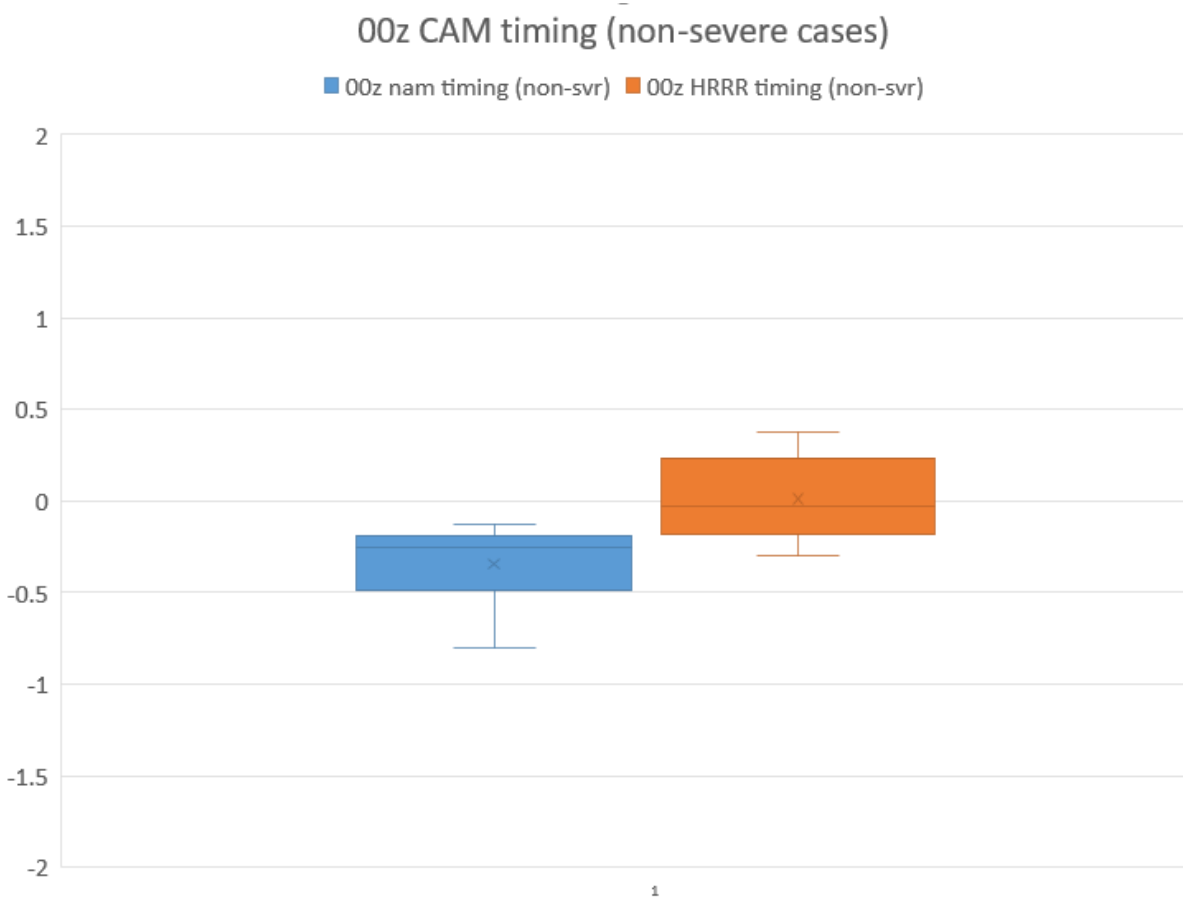

12z CAM coverage (severe cases)
12z nam coverage (svr cases)
12z HRRR coverage (svr cases)
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
1

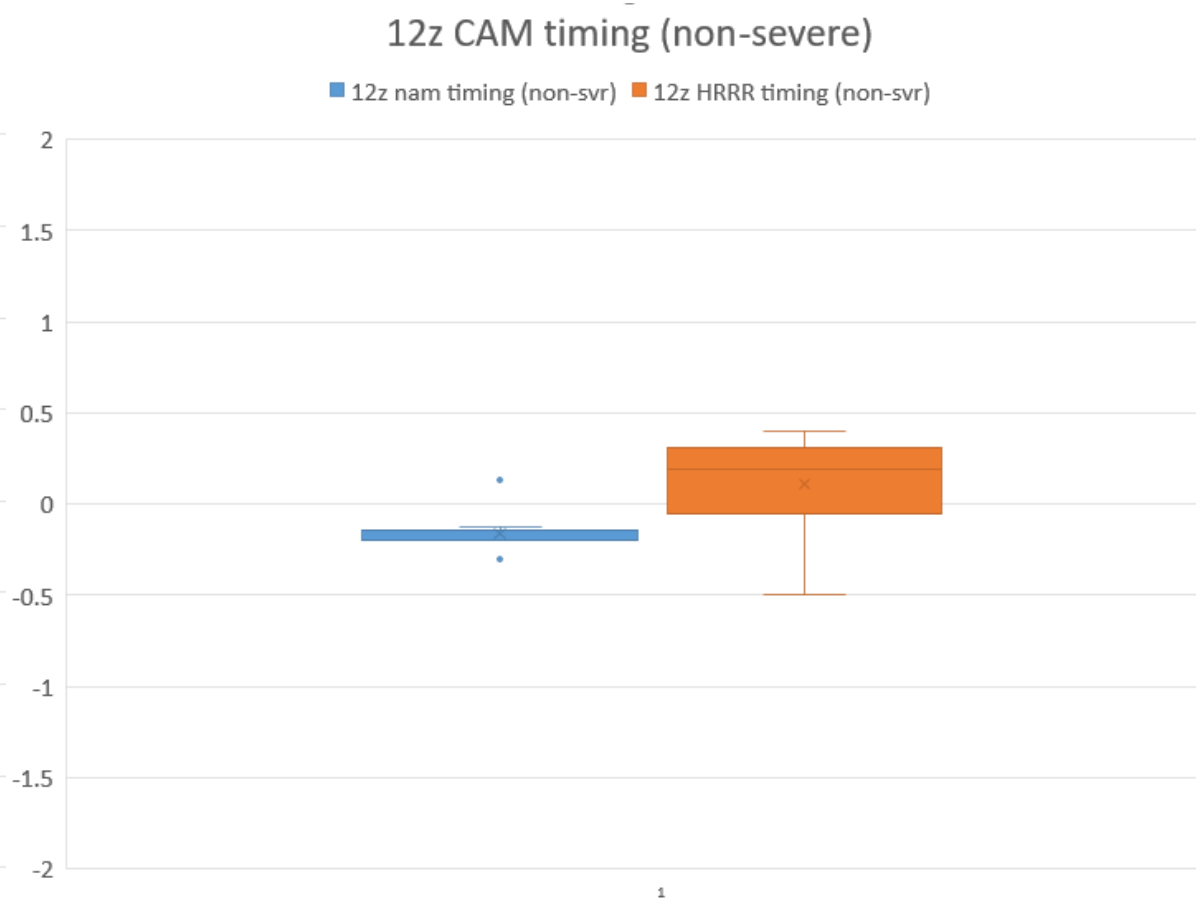

00z CAM coverage (non-severe cases)
00z nam coverage (non-svr)
00z HRRR coverage (non-svr)
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
1

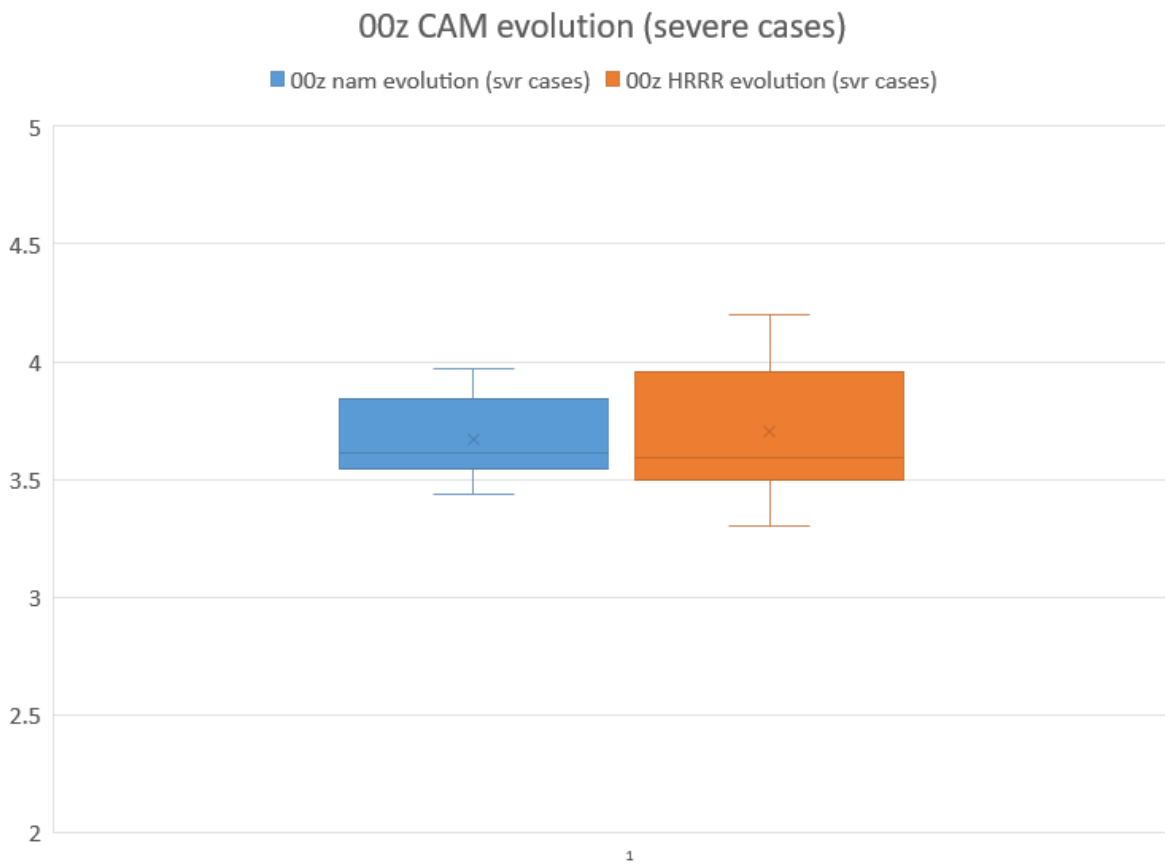

12z CAM coverage (non-severe cases)
12z nam coverage (non-svr)
12z HRRR coverage (non-svr)
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
1

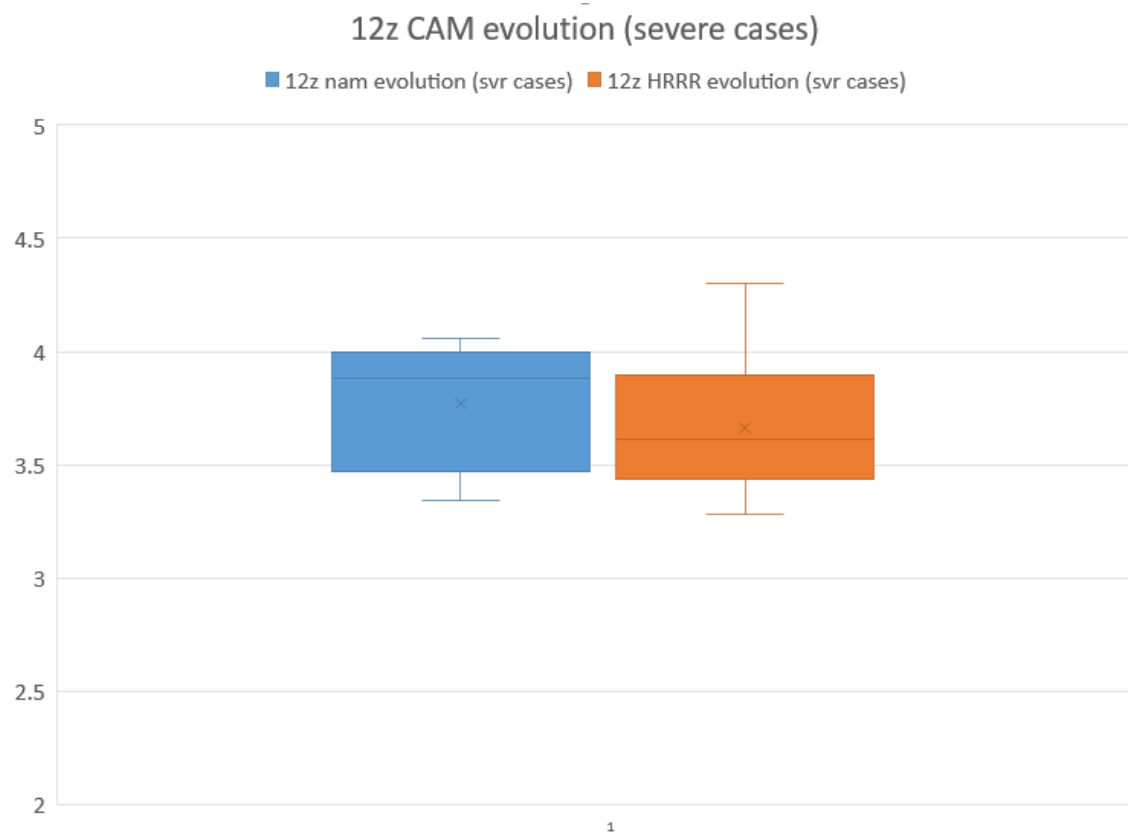

00z CAM timing (severe cases)
00z nam timing (svr cases)
00z HRRR timing (svr cases)
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
1

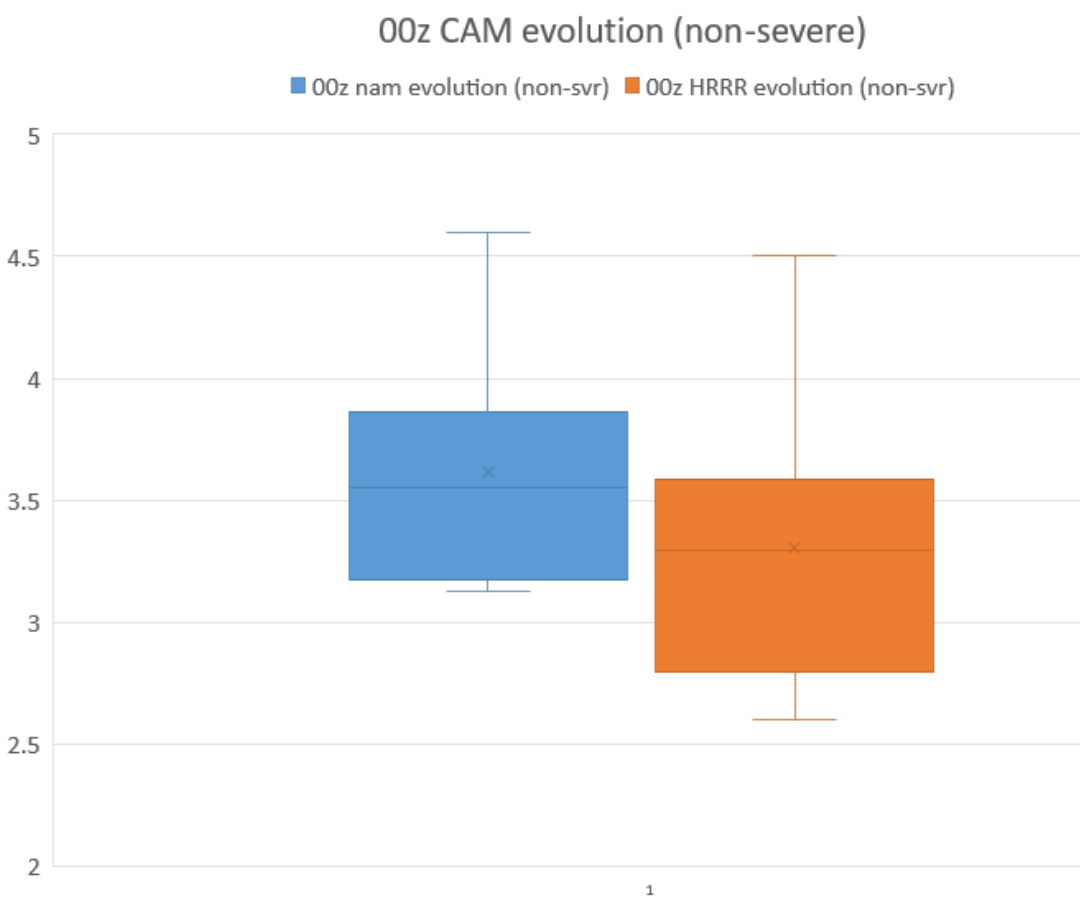

12z CAM timing (svr cases)
12z nam timing (svr cases)
12z HRRR timing (svr cases)
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
1

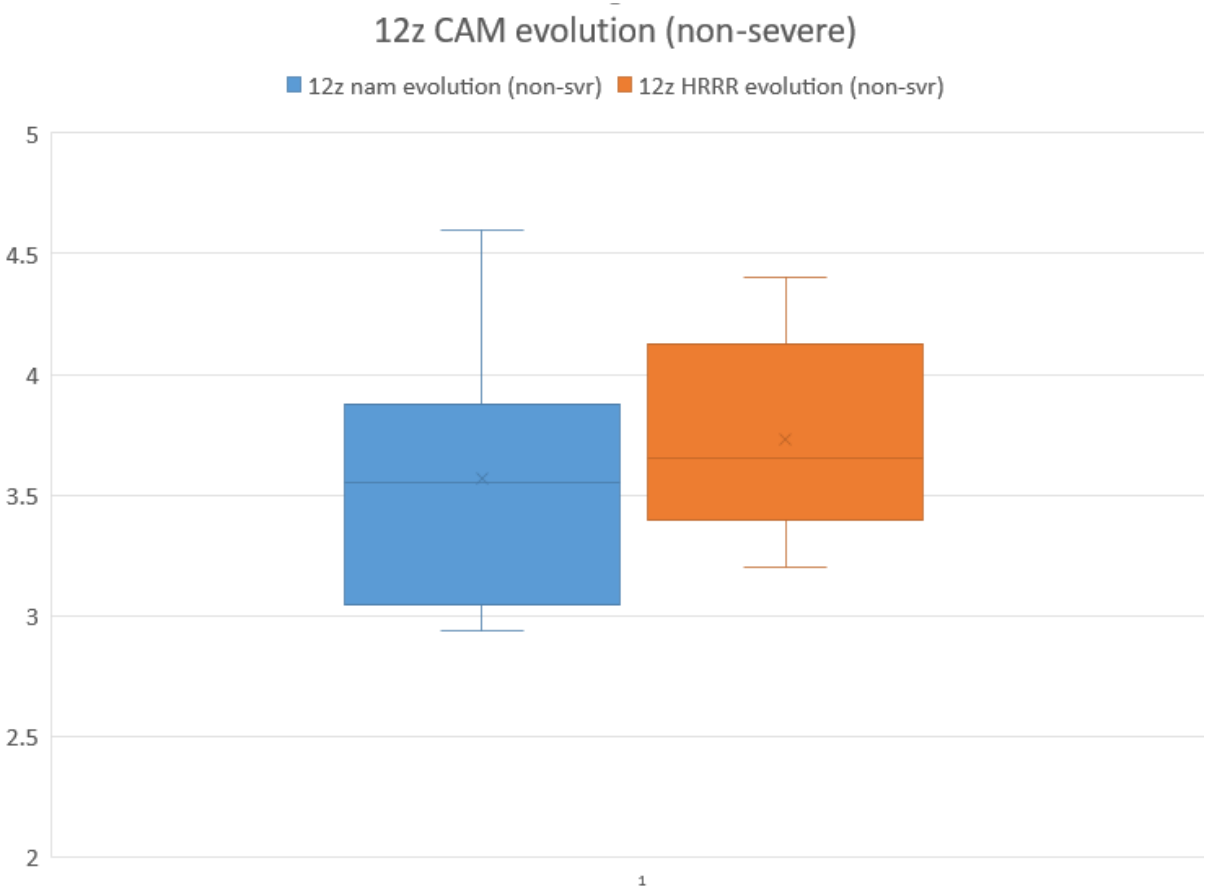

00z CAM timing (non-severe cases)
00z nam timing (non-svr)
00z HRRR timing (non-svr)
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
1


12z CAM timing (non-severe)
12z nam timing (non-svr)
12z HRRR timing (non-svr)
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
1


00z CAM evolution (severe cases)
00z nam evolution (svr cases)
00z HRRR evolution (svr cases)
5
4.5
4
3.5
3
2.5
2
1


12z CAM evolution (severe cases)
12z nam evolution (svr cases)
12z HRRR evolution (svr cases)
5
4.5
4
3.5
3
2.5
2
1


00z CAM evolution (non-severe)
00z nam evolution (non-svr)
00z HRRR evolution (non-svr)
5
4.5
4
3.5
3
2.5
2
1


12z CAM evolution (non-severe)
12z nam evolution (non-svr)
12z HRRR evolution (non-svr)
5
4.5
4
3.5
3
2.5
2
1

Summary - primary findings

- Coverage was overdone for non-severe cases, slightly underdone for severe cases.
- Timing was too slow for severe cases, better for non-severe.
- There were no indications that either model was superior.
- The HRRR seemed to improve from 00z to 12z for non-severe cases, otherwise no improvements from 00z to 12z.

References

- Jirak et al, 2020: Evaluation of multiple analysis systems in the 2019 HWO spring forecasting experiment, 30th conference on weather Analysis and Forecasting / 26th conference on numerical weather prediction (NWP) analysis and forecasting for recent field campaings and testbeds, Amer. Meteor. Soc., 12C.3. https://ams.confex.com/ams/2020Annual/meetingapp.cgi/Paper/366623

- Clark et al, 2020: The 2019 NOAA hazardous weather testbed spring forecasting experiment, 10th conference on transition of research to operations testbeds to enable and accelerate transitions of R2O to decision-makes, end users, and the public in weather, water, or climate applications, Amer. Meteor. Soc. https://ams.confex.com/ams/2020Annual/meetingapp.cgi/Paper/366950