Aviation Forecast Guidance from the RUC

Stan Benjamin
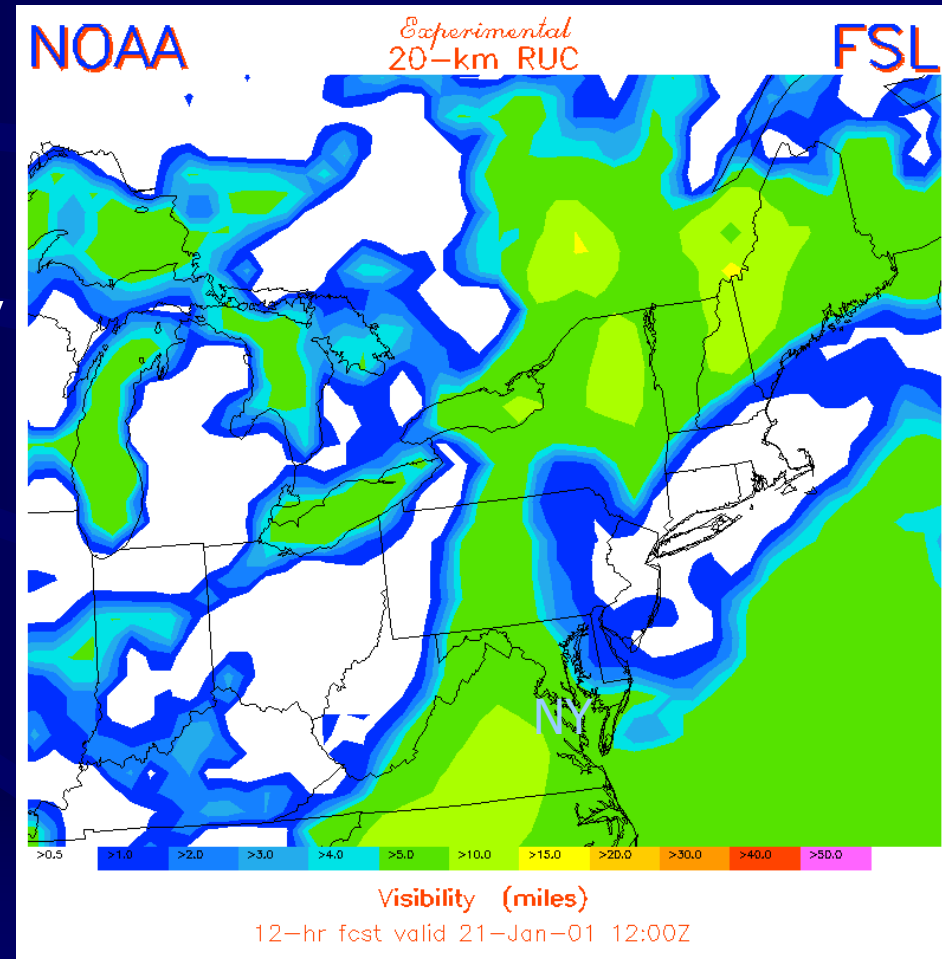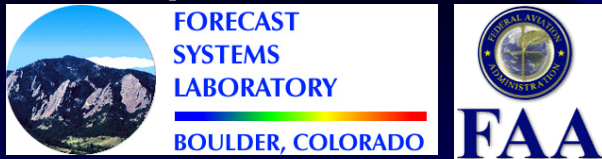NOAA /
Forecast Systems Lab
Stan.Benjamin@noaa.gov
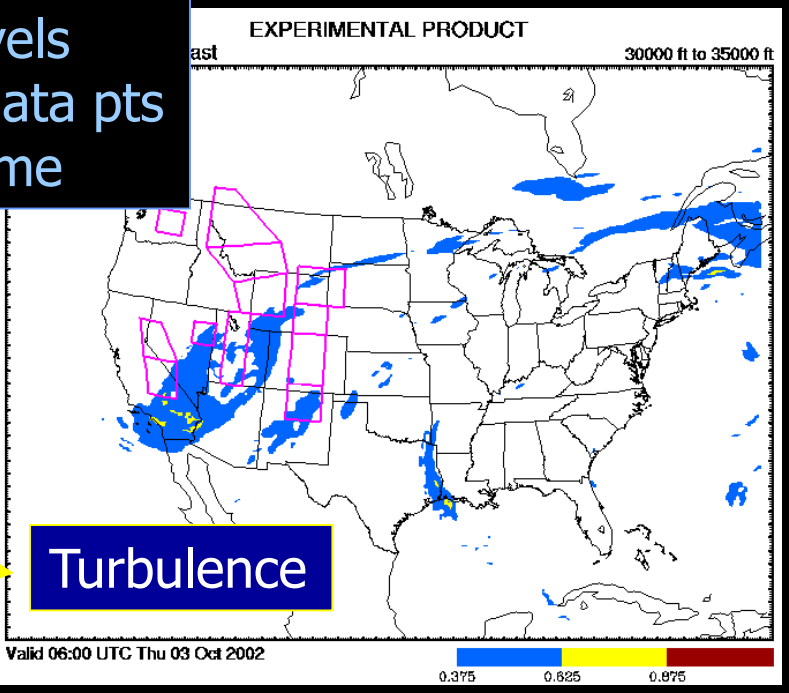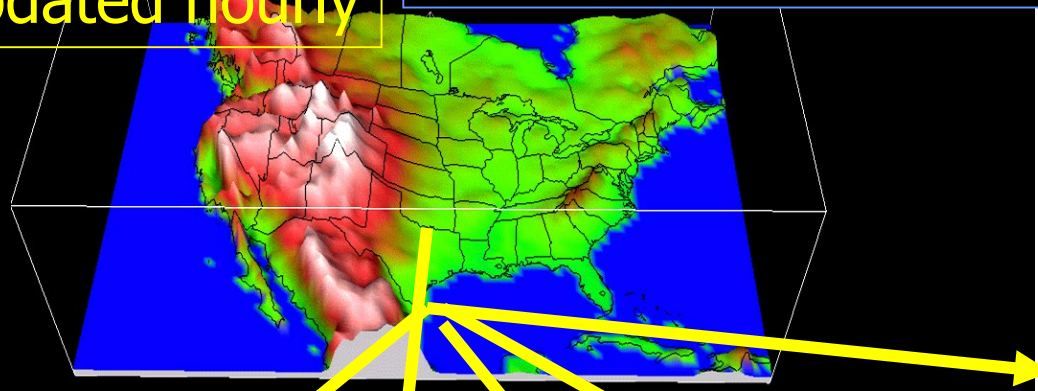303-497-6387

http://ruc.fsl.noaa.gov

3-d RUC weather data updated hourly

301 x 225 x 50 vertical levels x 14 vars ≈ 47,000,000 data pts for each analysis or fcst time

EXPERIMENTAL PRODUCT

30000 ft to 35000 ft

Turbulence

Valid 06:00 UTC Thu 03 Oct 2002

0.375   0.625   0.875
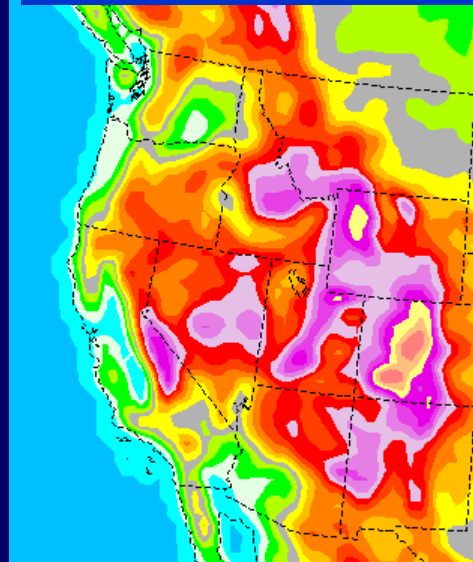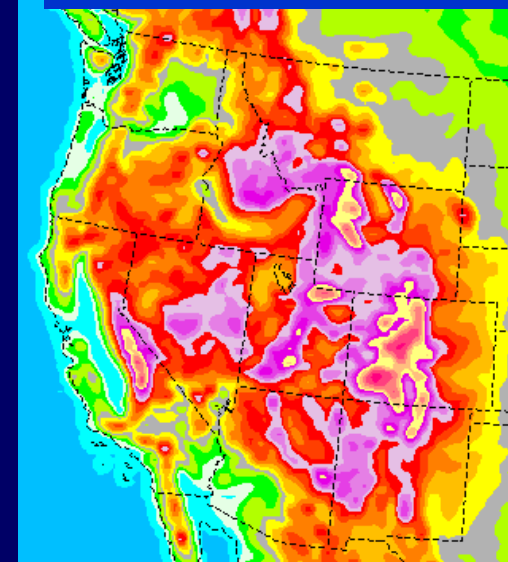
Convection - 2-12h forecast

Ceiling/visibility

Terminal / surface
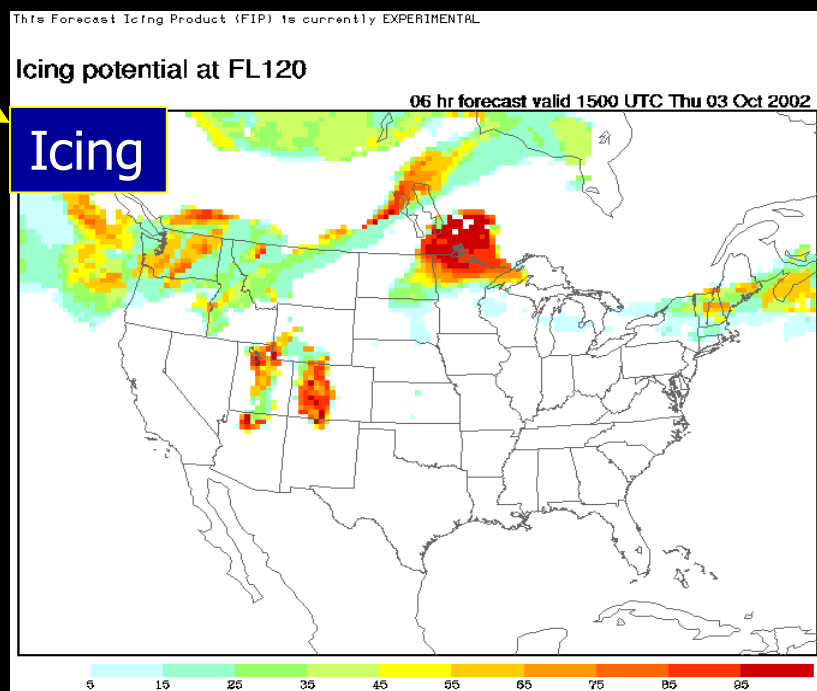
Better weather products will not happen without improved high-frequency high-resolution models with high-refresh data to feed them

This Forecast Icing Product (FIP) is currently EXPERIMENTAL

Icing potential at FL120

06 hr forecast valid 1500 UTC Thu 03 Oct 2002

Icing

5   15   25   35   45   55   65   75   85   95

the 20km RUC

- Implemented 17 April 2002
- 20 km/50 level 1 hr version
- Replaced previous 40km / 40 level version

40km RUC topography

20km RUC topography

- Model improvements including cloud icing and convection
- Now uses satellite cloud data
- Improvements in
  – warm- and cold-season precipitation location/timing
  – cloud/icing forecasts
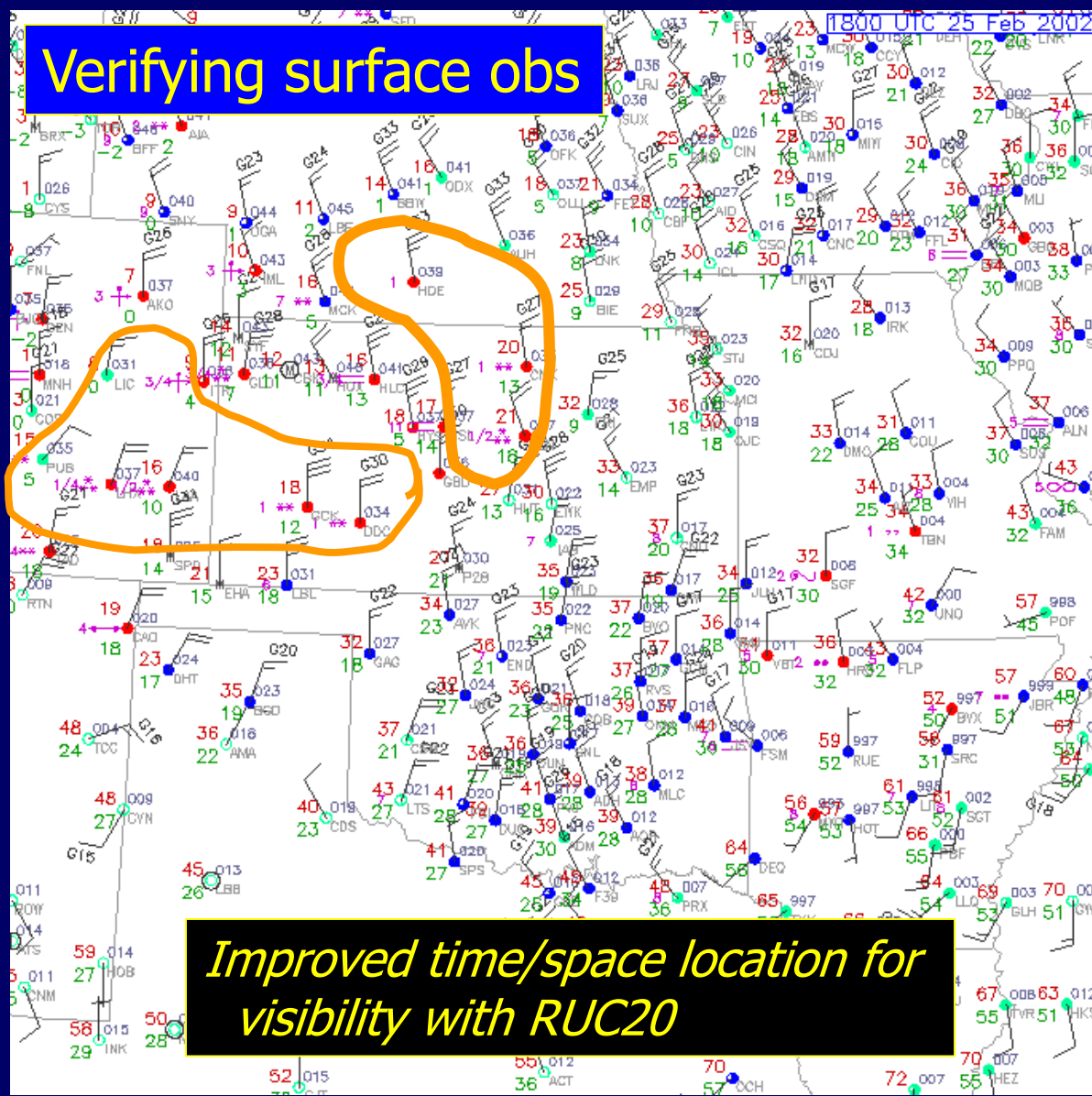 – surface forecasts
  – wind/temperature aloft

RUC web site - http://ruc.fsl.noaa.gov - *RUC20/10 products*

06-HR RUC2 VISIBILITY

FCST MADE 12Z 02/25

06-HR RUC20 VISIBILITY

40km RUC

20km RUC

Verifying surface obs
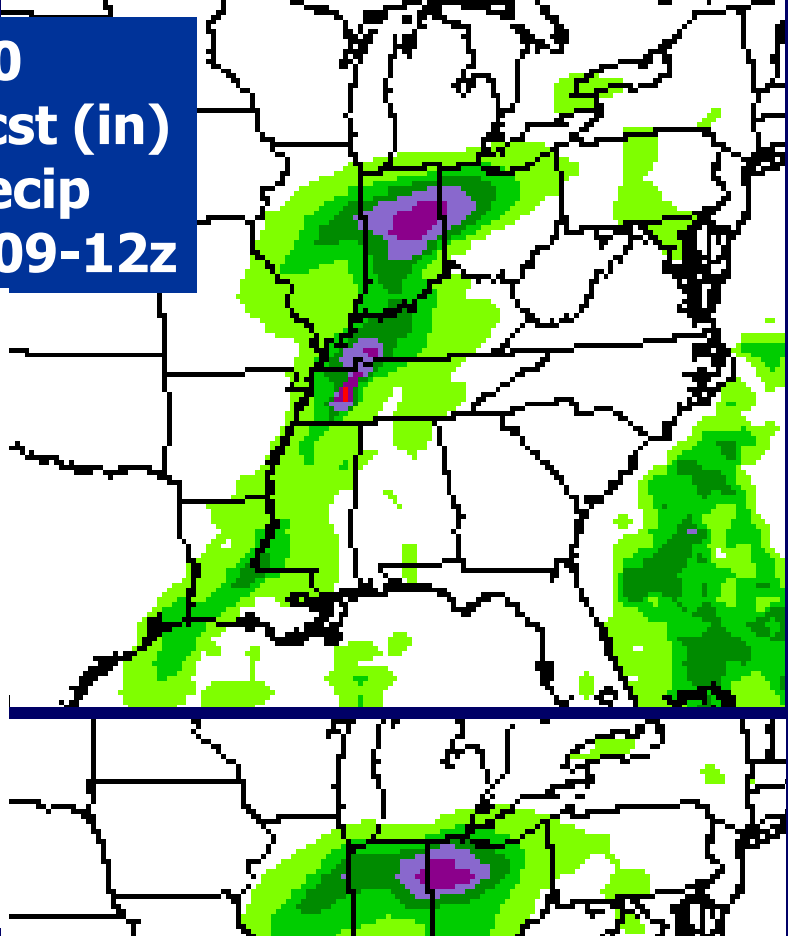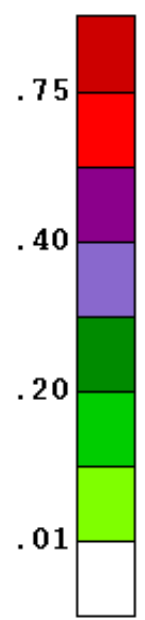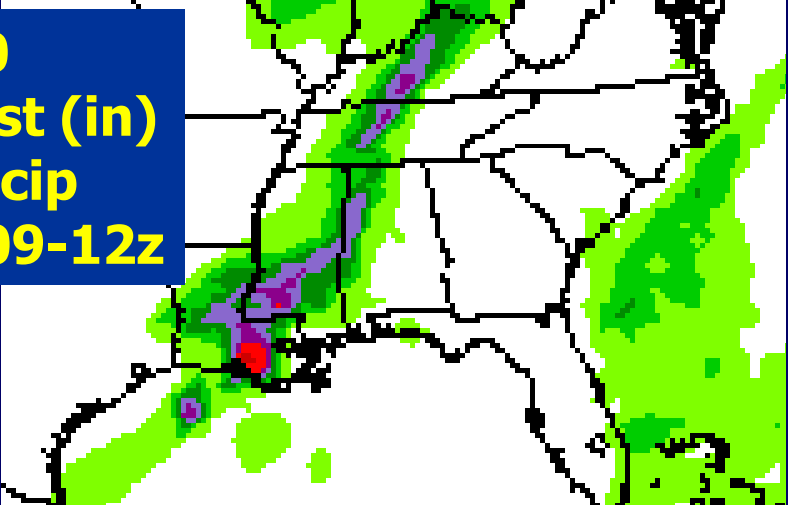
Improved time/space location for visibility with RUC20

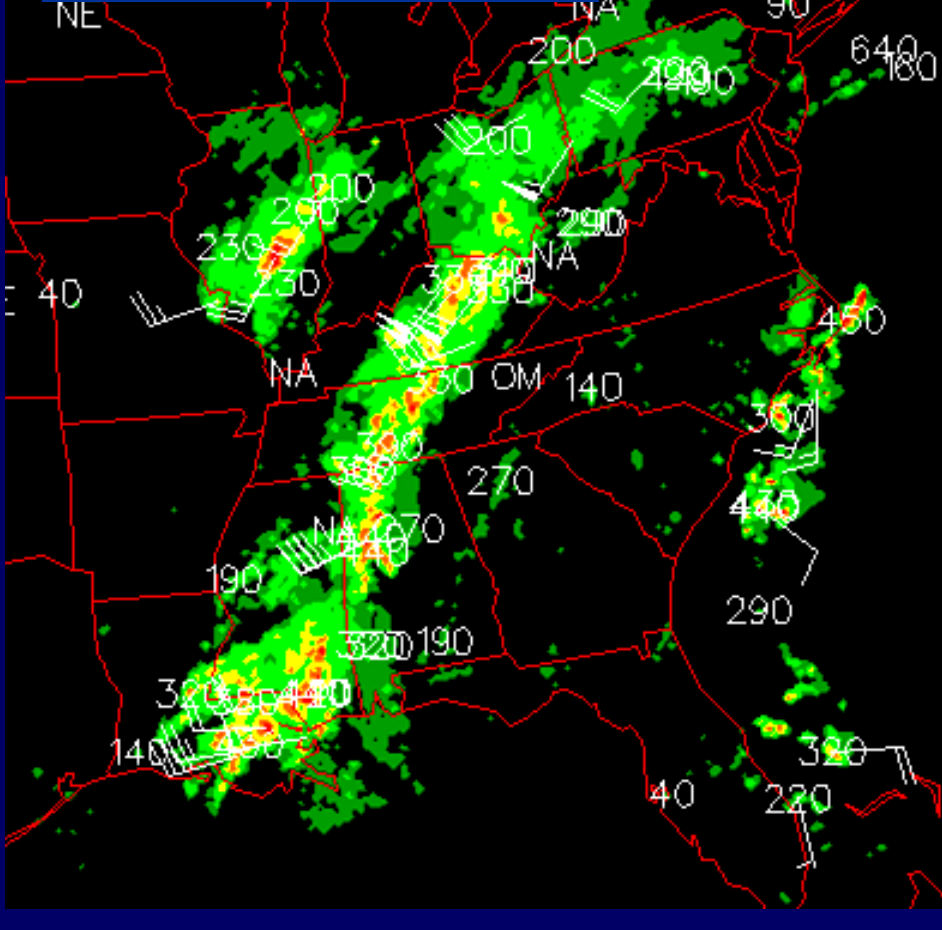# Visibility – 6h forecasts – 18z 25 Feb 02

4

RUC40
12h fcst (in)
3h precip
Valid 09-12z

.75
.40
.20
.01

RUC20
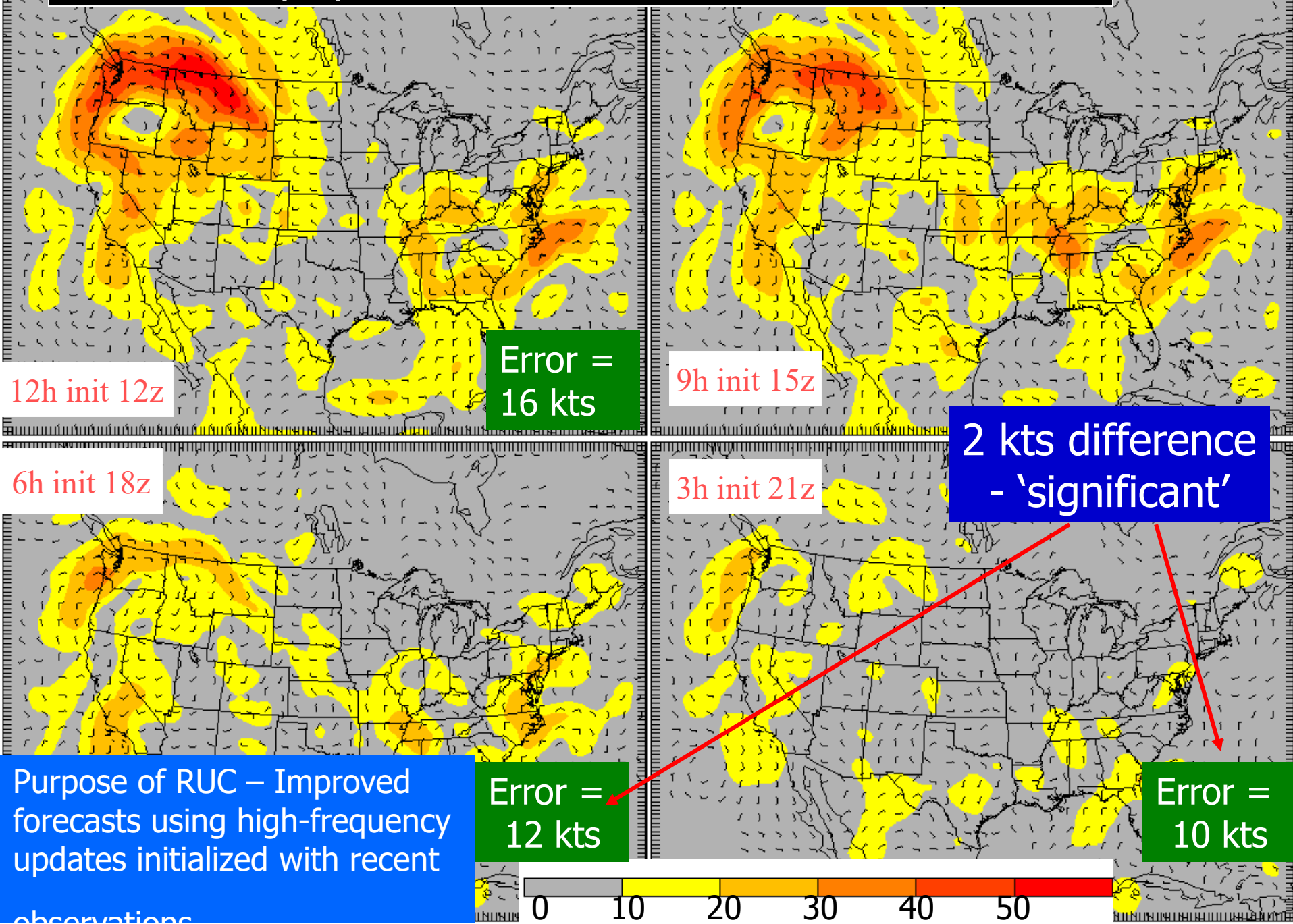12h fcst (in)
3h precip
Valid 09-12z

Radar summary
1115z 26 Mar 2002

*Improved time/space location for precipitation with RUC20*

5

RUC vector (kts) forecast error – 0000 UTC 27 Jan 98 – FL350

12h init 12z

Error = 16 kts

9h init 15z

6h init 18z

3h init 21z

2 kts difference - 'significant'

Error = 12 kts

Error = 10 kts

Purpose of RUC – Improved forecasts using high-frequency updates initialized with recent observations

3-h/12-h wind forecast errors - 4-16 Feb 2001
(verification against rawinsondes)
Verification over full RUC domain (92 raobs)
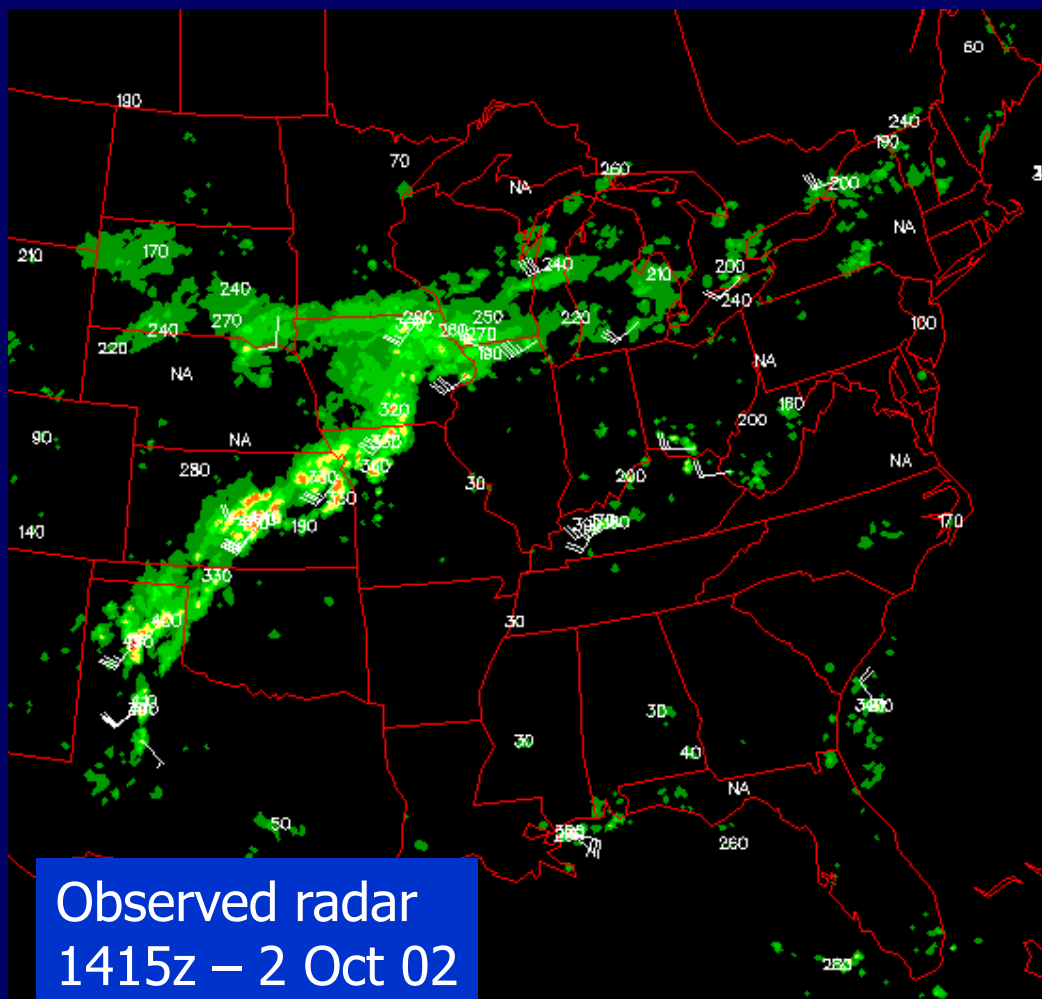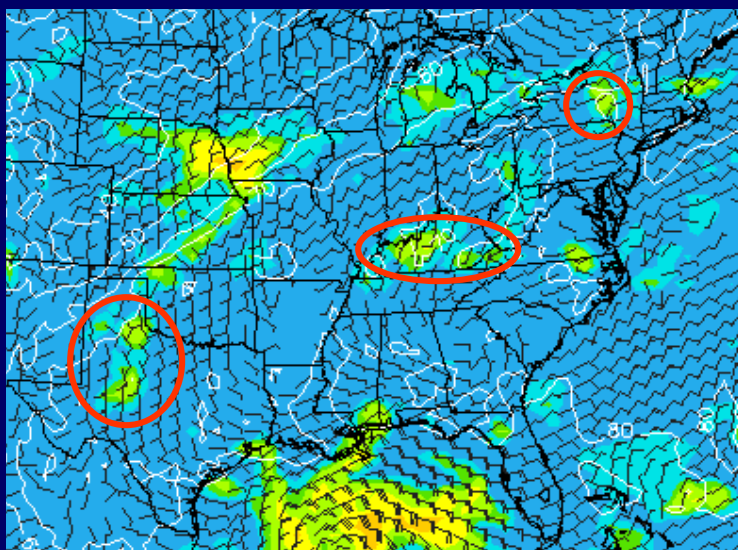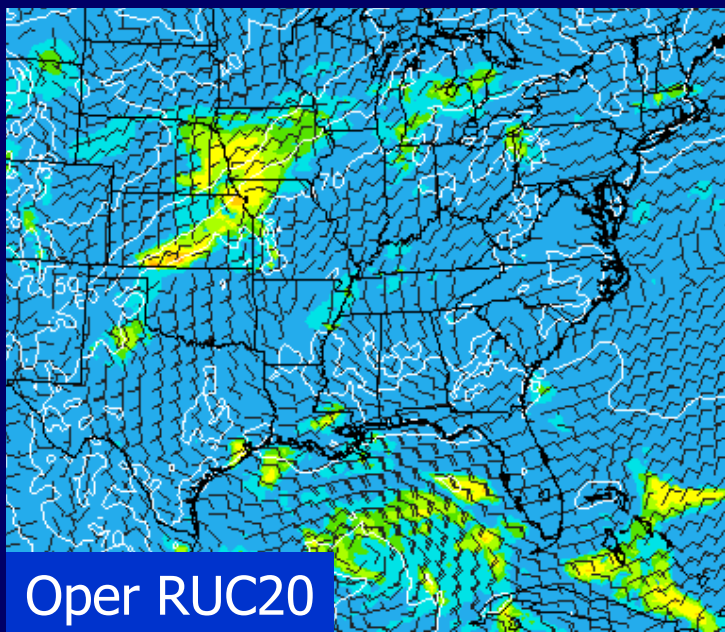RUC20 MDCRS denial experiments
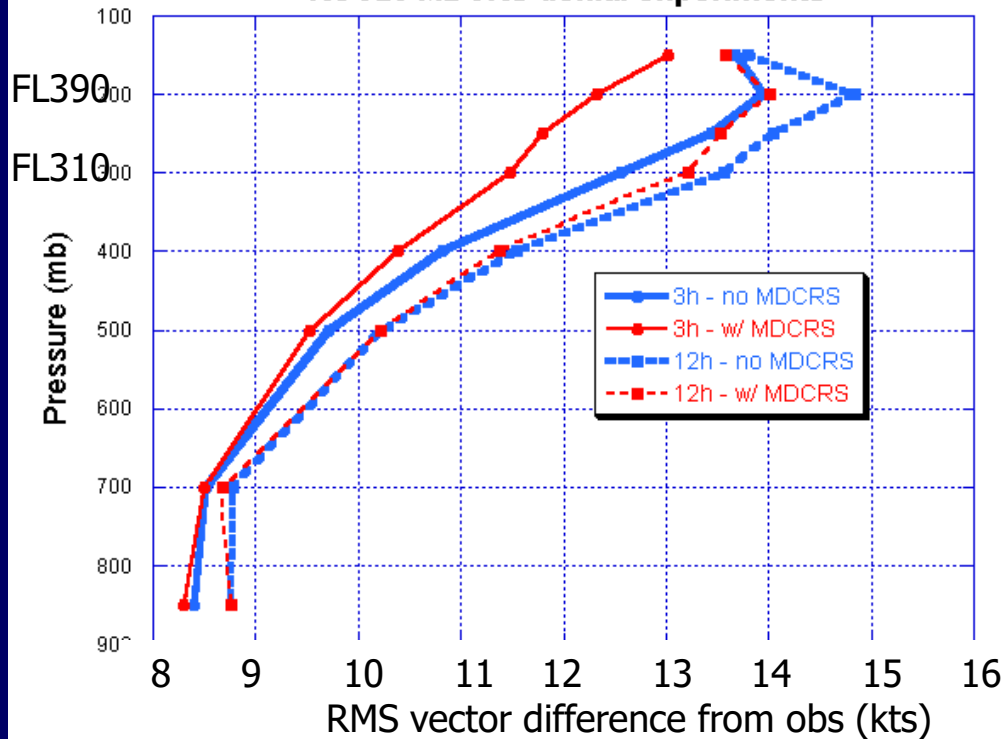
Parallel RUC20
runs w/ and w/o
MDCRS data
-13-day period
- Feb 2001

MDCRS data denial experiment results – w/ RUC20
Substantial loss of upper-level wind short-range
    forecast accuracy without MDCRS
3h forecast skill w/o MDCRS ~ 12h forecast skill w/ MDCRS
   → 9h loss of skill

3h prec – 12-15z – 2 Oct 02

Oper RUC20

Experimental RUC20 at FSL
- incorporates radar/lightning data

Observed radar
1415z – 2 Oct 02

The Future:
Incorporate new observations
into RUC model
(and keep MDCRS)

Observed radar
2002z – 20 Nov 00

Experimental **10km** RUC
24h snow forecast
3h snow total – 0.5" cont int
21z 20 Nov 2000 – 00z

Ontario

Lake Erie

NY

OH

PA

5" / 3h

Vis5D
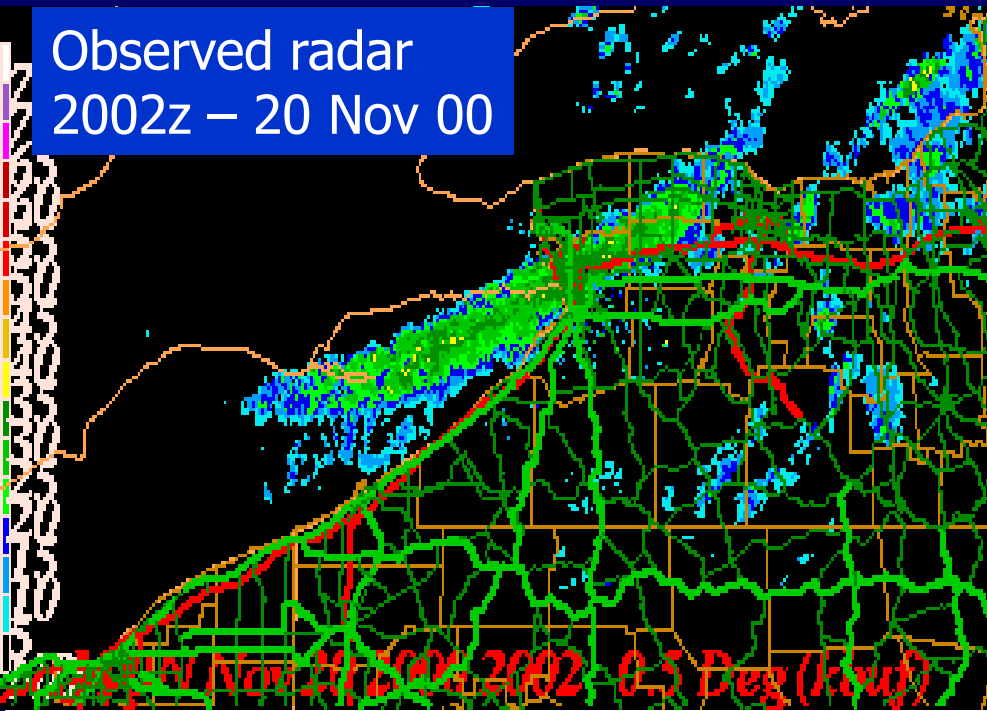
- 17" snow in 6h between 18-00z
- BUF airport closed
- NY Thruway closed
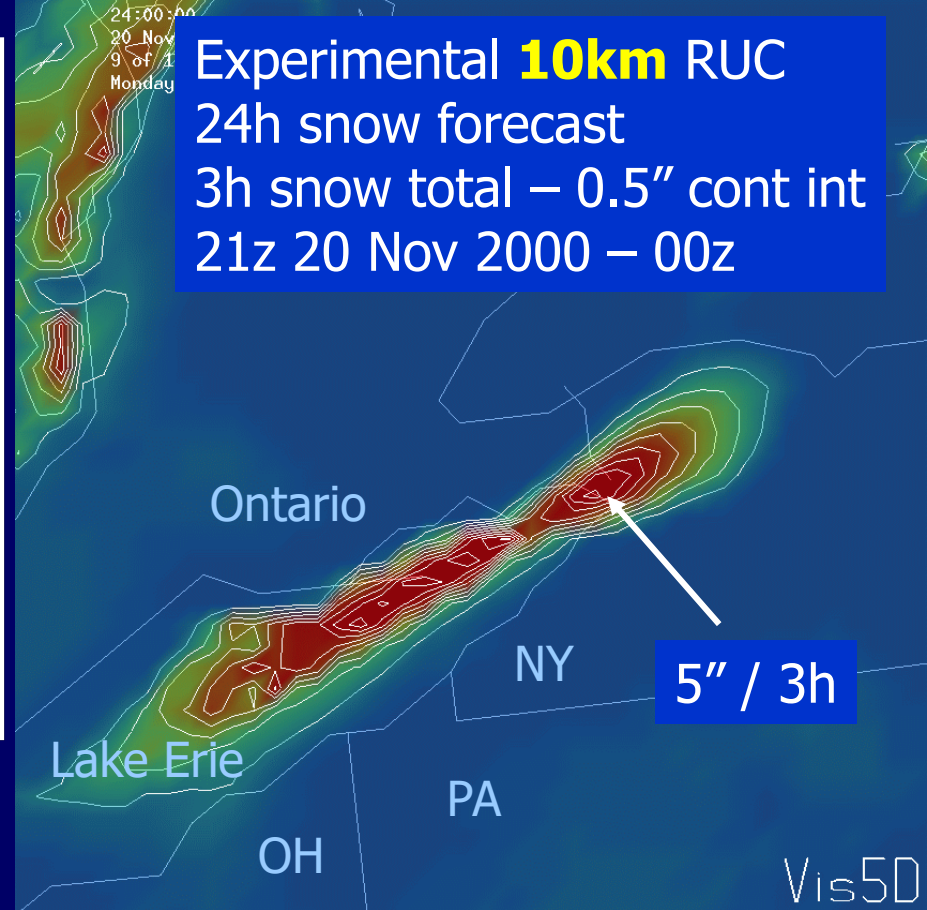
The Future:
Better depiction of aviation hazards
through higher resolution in RUC model

Backbone of improved aviation forecast products for icing, turbulence, convection, TAFs
= weather model forecasts updated at
high frequency with latest observations

Keys to improvement of model forecasts
in RUC20 and future versions:
• Higher spatial resolution – better capture fine-scale weather hazards
• Use new observations to initialize model – force more realism in model initial conditions
• Keep MDCRS to improve rapid refresh
• Improved realism of physical processes in model – clouds, turbulence, land-surface