Clarus Multi-State Regional Demonstrations, Evaluation of Use Case #1: Enhanced Road Weather Forecasting Enabled by Clarus

September 8, 2011
IMPACT OF CLARUS DATA ON PRECIPITATION ESTIMATES
Potential *Clarus* Impacts

- Radar observations can overshoot precipitation originating in the lower atmosphere.
- The problem of overshoot is worse at locations further from a radar station and in the winter.
- *Clarus* observations can be combined with radar and satellite to provide enhanced precipitation estimates.
Impact of *Clarus* on Precipitation Estimates

![Graph showing the impact of Clarus on precipitation estimates. The x-axis represents dates from 21-Nov-09 to 22-Sep-10, and the y-axis represents average PC. The graph includes lines for Precip, w Clarus, Precip, Radar, No Precip, w Clarus, and No Precip, Radar.](image-url)
Impact of *Clarus* on Precipitation Estimates

*Clarus* Impact Precipitation Estimates by Latitude in Winter Months
Impact of *Clarus* on Precipitation Estimates

Clarus Impact Precipitation Estimates by Distance from NexRad in Winter Months
Summary and Conclusion

• The *Clarus* data and the PPAES model improved the ability to identify precipitation
• The improvements are larger at locations distant from the NexRad station
• The improvements are larger in the winter months and at higher latitude
IMPACT OF CLARUS DATA ON REGIONAL FORECASTS
Potential *Clarus* Impacts

- **Model Initialization (LAPS)**
  - Combines data from multiple sources to produce initial estimate for starting conditions
  - This is where *Clarus* data enters the models

- **WRS-ARW Model**
  - Estimates how starting conditions will evolve over time based on weather physics and background models
  - *Clarus* impacts on initialization data flow into model forecasts
Impact of *Clarus* on LAPS

LAPS Temperatures w/o *Clarus* (1/16/2011)

LAPS Temperatures w/ *Clarus* (1/16/2011)
Impact of *Clarus* on LAPS

Difference in LAPS Temperatures, w/ *Clarus* minus w/o *Clarus* (1/16/2011)
Impact of Clarus on LAPS

LAPS and Clarus Temperatures, Station 330-25
Impact of *Clarus* on LAPS

**Station 330-25**

- Laps w - Laps wo
- Clarus - Laps wo

**LAPS and Clarus Temperatures, Station 330-25**
Impact of *Clarus* on LAPS

LAPS Temperatures w/o *Clarus* (3/21/2011)

LAPS Temperatures w/ *Clarus* (3/21/2011)
Impact of *Clarus* on LAPS

Difference in LAPS Temperatures, w/ *Clarus* minus w/o *Clarus* (3/21/2011)
Impact of *Clarus* on LAPS

Clarus Impact on LAPS Temperature Estimates
Impact of *Clarus* on Forecasts

LAPS Temperatures w/ *Clarus* (1/16/2011 12:00 PM)

WRF Temperatures w/ *Clarus* (1/16/2011 12:00 PM)
Impact of *Clarus* on Forecasts

WRF Temperatures w/ *Clarus* (1/16/2011 2:00 PM)

WRF Temperatures w/ *Clarus* (1/16/2011 3:00 PM)
Impact of *Clarus* on Forecasts

WRF Temperatures w/ *Clarus* (1/16/2011 12:00 PM)

WRF Temperatures w/ *Clarus* (1/16/2011 2:00 PM)
Impact of *Clarus* on Forecasts

Difference in WRF Temperatures, w/ *Clarus* minus w/o *Clarus* (1/16/2011 12:00 PM)

Difference in WRF Temperatures, w/ *Clarus* minus w/o *Clarus* (1/16/2011 3:00 PM)
Summary and Conclusion

- The *Clarus* data impacted the LAPS estimates, resulting in estimates that matched closely to the *Clarus* observations.
- This impact gets washed out of the surface layer during the first steps of the model run, when the model is “spinning up”.
- The *Clarus* data does impact the results once spin up is complete.