

Utilizing the METRo Road Surface Model for High-Impact Winter Events

Great Lakes Operational Meteorology Workshop
August 25-28, 2015

Amos Dodson (NWS Northern Indiana)
Jonathan Rutz (NWS Western Region HQ)



Annual Winter Weather Driving Impacts



- 500,000 Vehicle Crashes
- 1,800 fatalities
- 140,000 injuries
- \$2.3 Billion spent on mitigation alone



Weather-Ready Nation



- Focus on *impact*-based DSS
- Can be difficult to identify high-impact winter events
- Need an objective tool to integrate all relevant factors and provide guidance



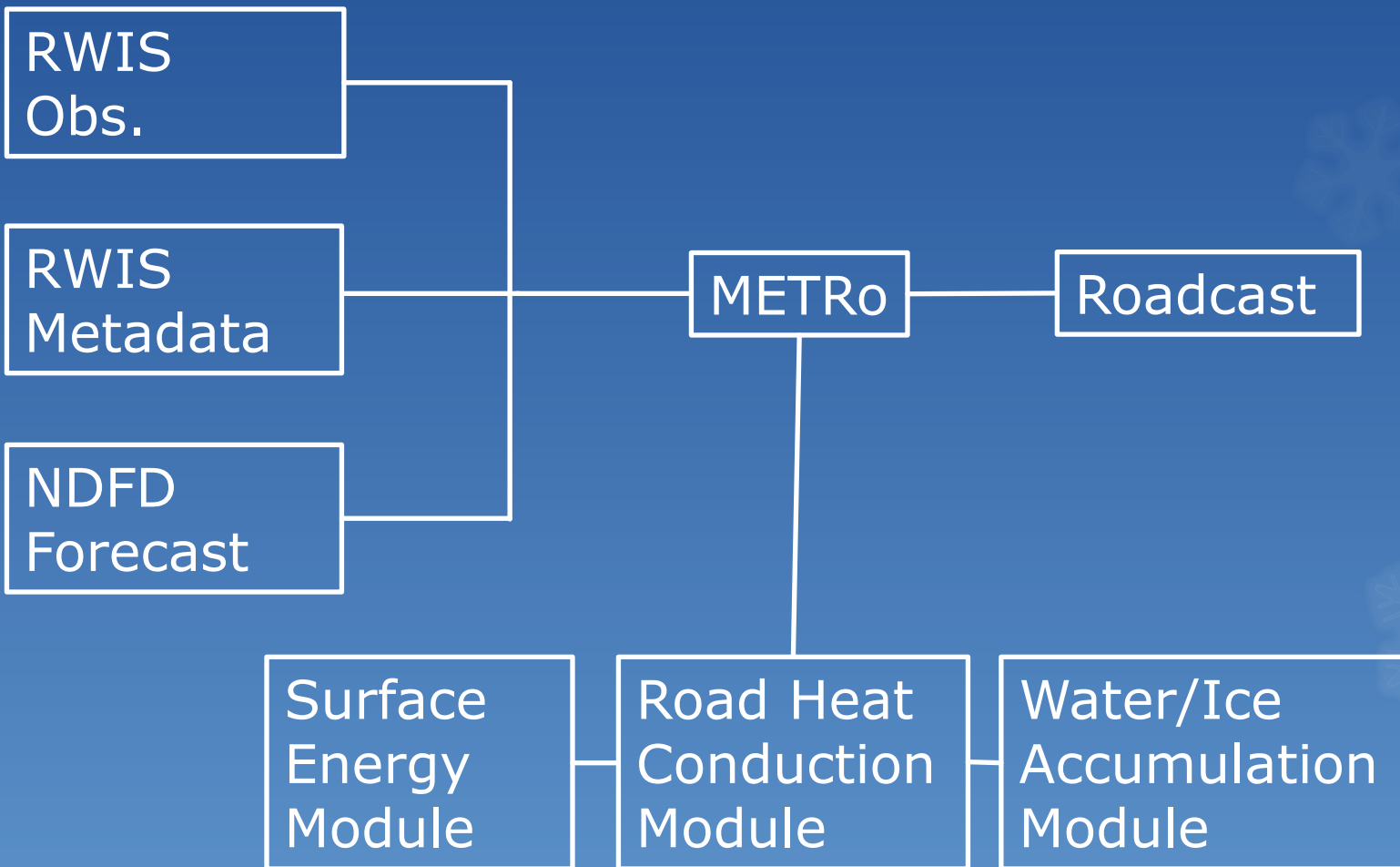
METRo

- Model for the Environment and Temperature of Roads
- Open Source
- Crevier, L.-P., and Y. Delage, 2001: METRo: A New Model for Road-Condition Forecasting in Canada. *J. Appl. Meteor.*, 40, 2026-2037.



**Environment
Canada**

How it works...



Performance

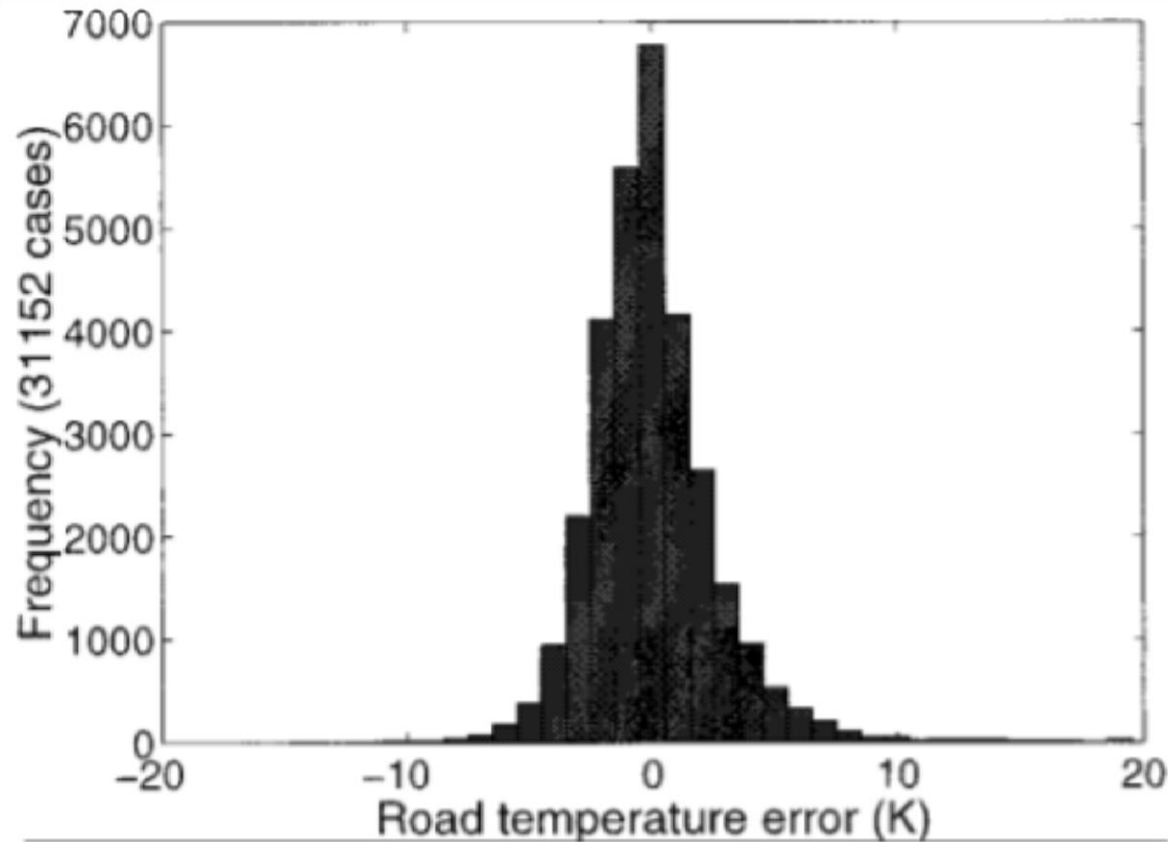
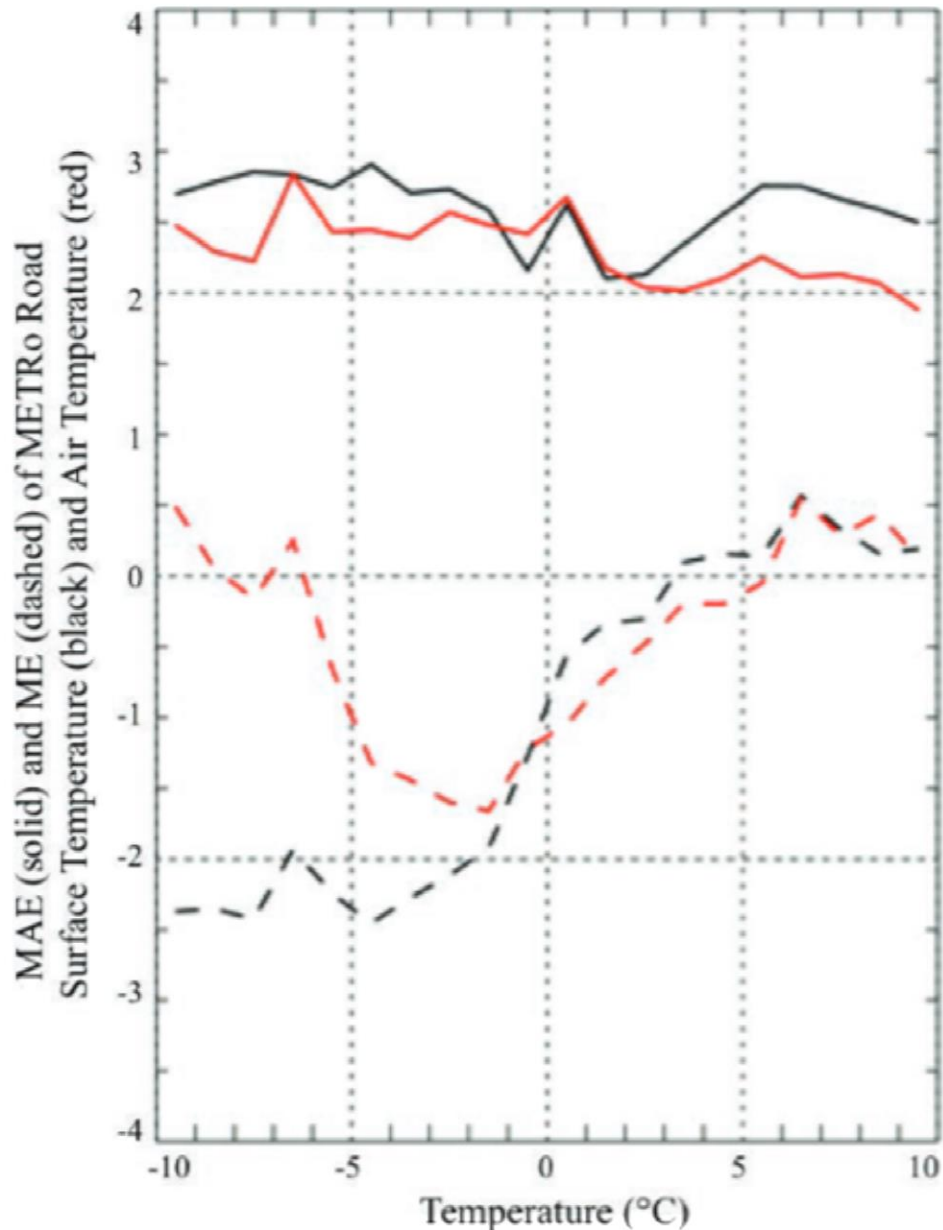


FIG. 2. Frequency distribution of road temperature errors for all three stations in automatic mode sampled every 20 min for the whole duration of forecasts (24 h) for both 0300 and 1500 LT runs.

~50% of forecasts within $\pm 2^{\circ}\text{C}$

(Crevier and Delage, 2001)

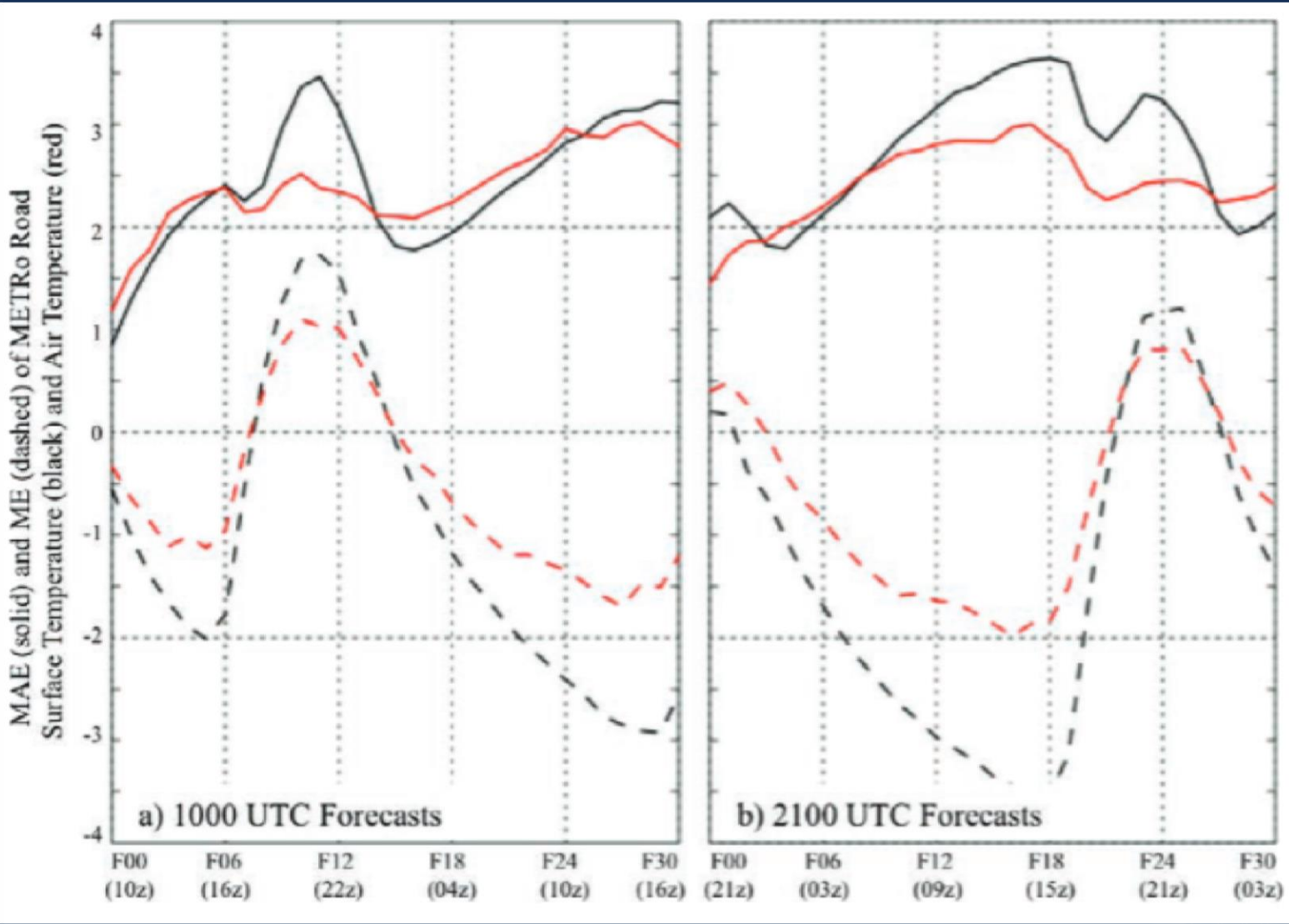
Performance



MAE < 3°C
when roads
temps \pm 10°C

(Rutz and
Gibson, 2013)

Performance



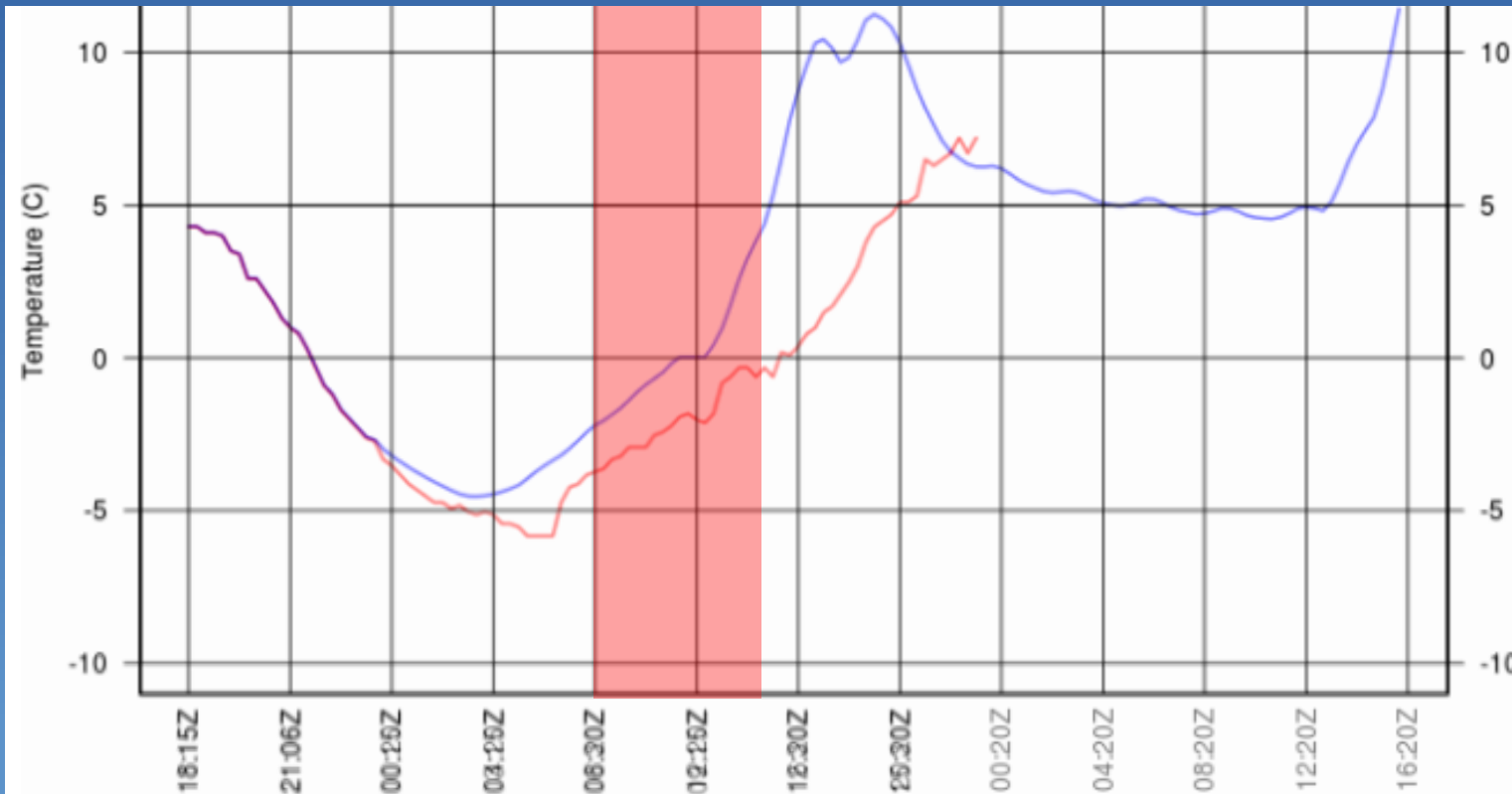
(Rutz and Gibson, 2013)



November 22nd, 2014

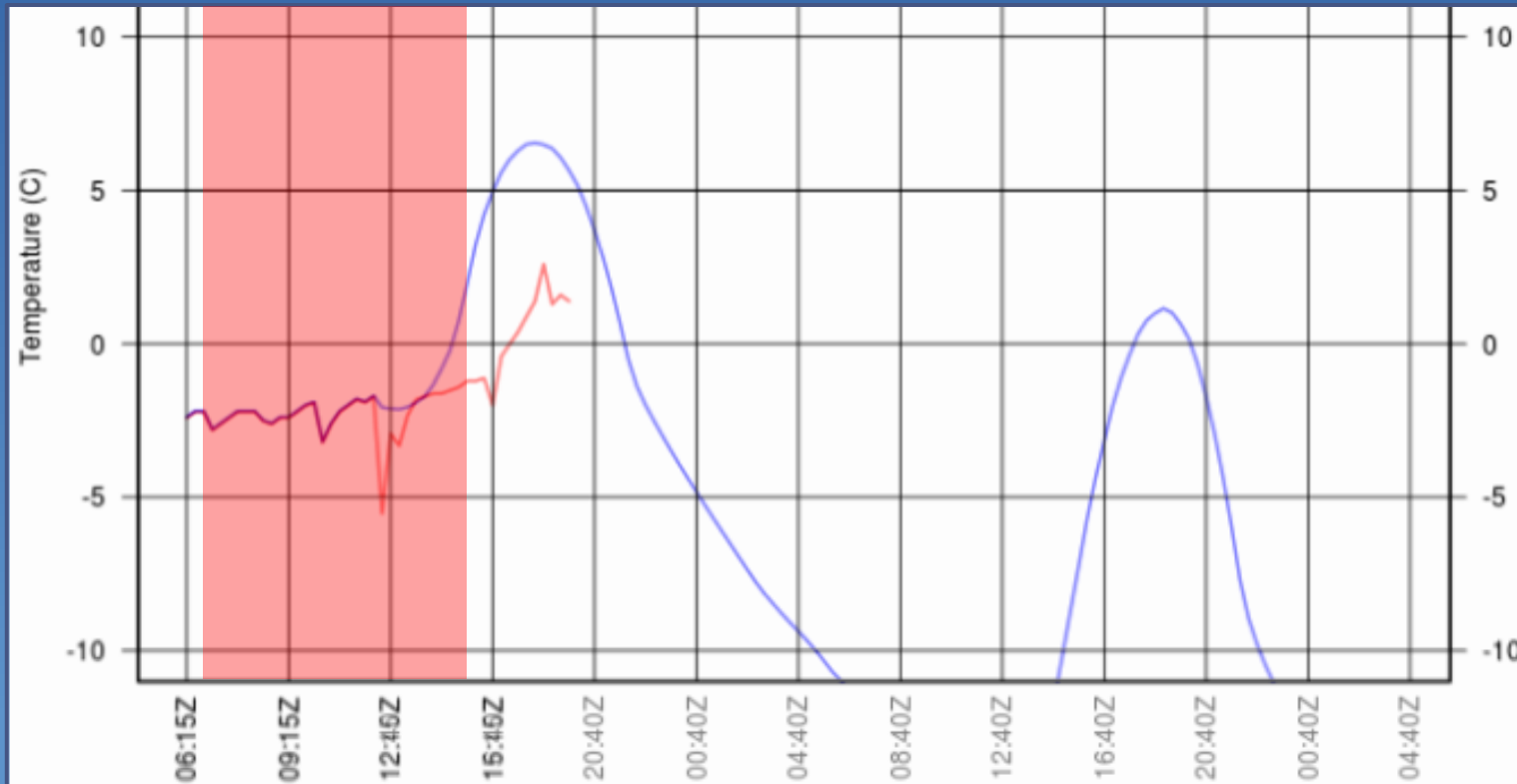


- Freezing drizzle, 06-15Z
- Freezing rain advisory issued
- Numerous accidents in morning commute



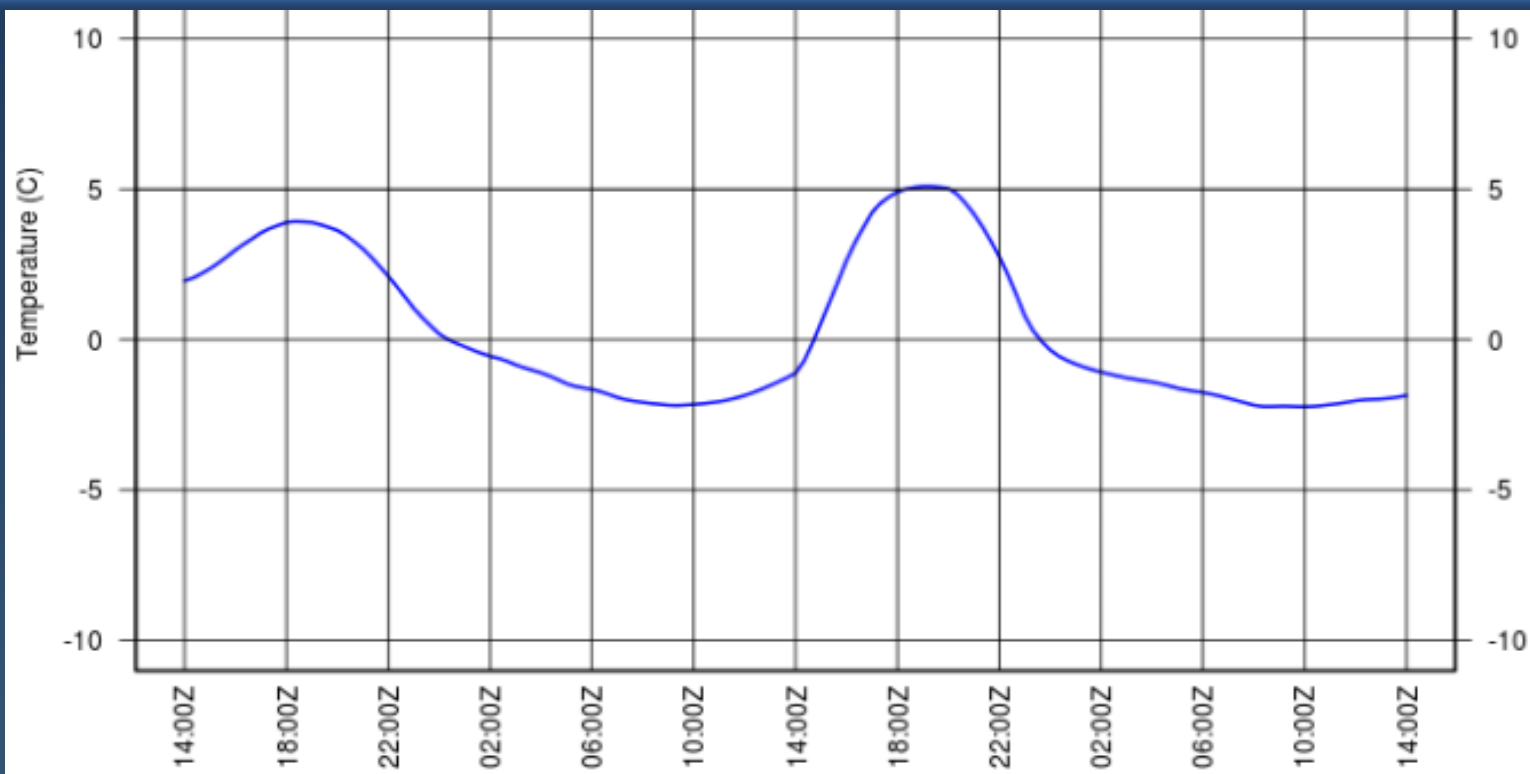
January 12th, 2015

- Snow, sleet, and freezing rain
- Air temperatures $\sim 0^{\circ}\text{C}$
- Road temps $< 0^{\circ}\text{C}$



November 11th, 2013

- Clipper, 1-2" of snow during afternoon
- Air temperatures slightly below freezing
- No headlines issued & little to no impacts



Benefits of METRo

- Useful in transition seasons & when temps $\sim 0^{\circ}\text{C}$
- Very helpful with timing impacts to roads (crucial for DOT's)
- Great situational awareness tool
- Objective guidance for forecasters
- Easy to install and run



Drawbacks of METRo

- **Highly dependent on accurate atmospheric forecast**
- **Need more robust verification stats**
- **Limited accounting for road treatment**
- **Point forecast only**



Warning

- METRo forecasts must be kept internal
- Site-specific pavement forecasts cannot be distributed in any public product
- Providing ourselves guidance to enhance existing NWS products (e.g., headline decisions during a low-accumulation, high-impact event)



WR METRo Output

(dev.wrh.noaa.gov/wrh/metro/)



METRo Roadcasts

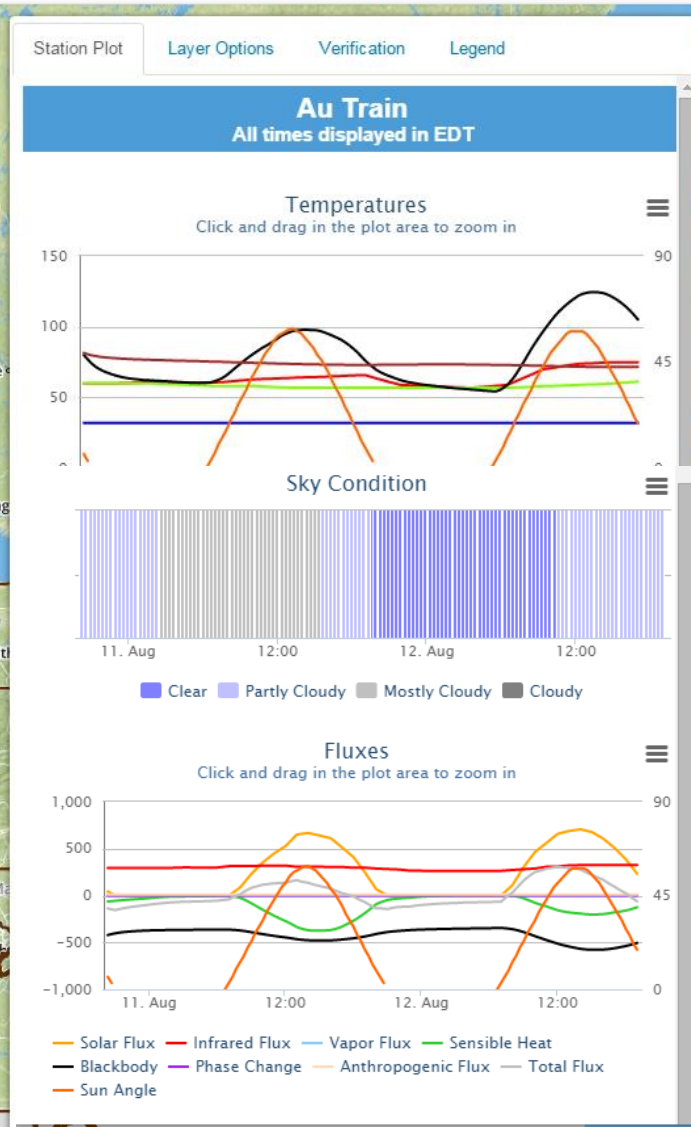
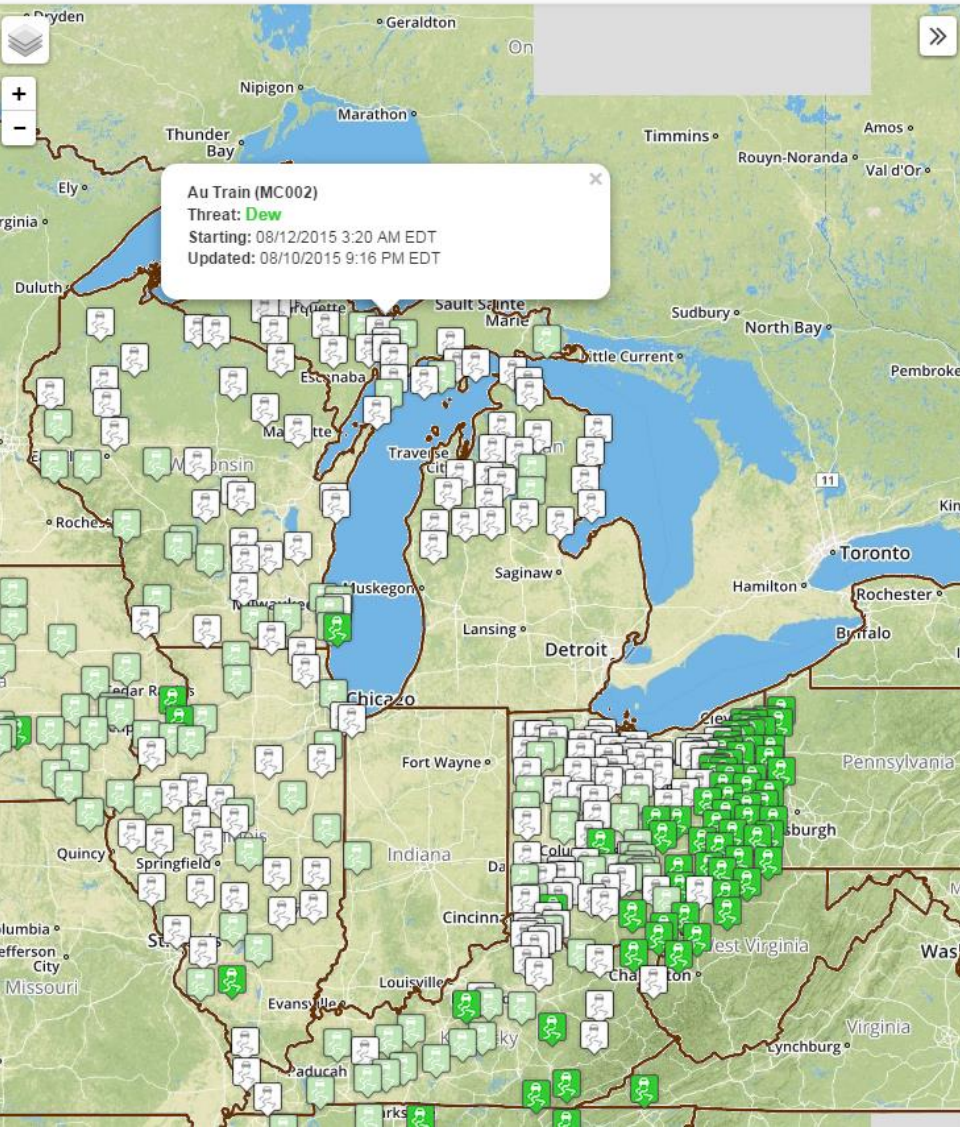
Press buttons to toggle layers:

METRo

MesoWest

Radar

Hazards



How it works at WR...

- At :55, RWIS data provided by MesoWest
- At :10, NDFD, NAM, and RWIS are downloaded and a "setup" program creates necessary files for each site
- METRo then runs at each site
- Roadcasts usually online by ~:30 (these graphics are dynamically generated – not saved)



Thank you!

- <http://youtu.be/3Z6NRcoQw5I>
- Questions?
- Amos.Dodson@noaa.gov or Jonathan.Rutz@noaa.gov



References

- Crevier, L.-P., and Y. Delage, 2001: METRo: A New Model for Road-Condition Forecasting in Canada. *J. Appl. Meteor.*, 40, 2026-2037
- Federal Highway Administration, cited 2012: How do weather events impact roads? [Available online at www.ops.fhwa.dot.gov/weather/q1_roadimpact.htm]
- Jonathan J. Rutz, Chris V. Gibson. (2013) Integration of a Road Surface Model into NWS Operations. *Bulletin of the American Meteorological Society* **94**:10, 1495-1500.
- National Center for Atmospheric Research, cited 2007: A comparison of road temperature models: FASST, METRo, and SNTHERM. Version 2.0 [Available online at www.rap.ucar.edu/projects/rdwx_mdss/documents/RoadModel_Comparison_Report_v2.0_8_3_07.pdf.]

