**CHARACTERISTICS AND OBSERVATIONS OF “BLACK ICE” IN THE ATLANTA METROPOLITAN AREA**

**Christopher Bosma**¹, **Steve Nelson**², **Steve Listemaa**³, **Keith Stellman**⁴

¹ School of Earth and Atmospheric Sciences, Georgia Institute of Technology (Atlanta, GA)
² National Weather Service (Peachtree City, GA)
³ National Weather Service (Atlanta, GA)

**WHAT IS “BLACK ICE”?**

“Black ice” is a term that has many definitions used in both the media and scientific literature. For forecasting purposes, a consistent definition is needed to distinguish between meteorological conditions caused by winter weather events and those caused by the freezing of residual water on roadway surfaces.

**BLACK ICE CLIMATOLOGY**

- Black ice events happened in Atlanta from November through January. Many black ice events only lasted 1 day, although some events persisted for as many as 6 days.
- The average black ice event from 1991 – 2015 lasted 2.2 days.

**BLACK ICE CRITERIA**

- Liquid water on roadway surfaces (rain or melted snow) + Drop in surface temperatures below freezing = **“BLACK ICE”**
- The system of 27 RWIS and METRo road forecast model be utilized to improve black ice forecasting?

**METHODS**

- Major cases of black ice in Atlanta area identified by finding articles from the region’s largest newspaper, The Atlanta Journal-Constitution through a LexisNexis database search. (Articles are archived back to 1991.)
- Search terms included “black ice”, as well as combinations of other words like “ice”, “accident”, and “roads”.
- Recent events (2004 – present) were verified by cross-checking with archived Area Forecast Discussions (AFDs) from the Peachtree City, GA Weather Forecast Office.
- Corresponding weather data was obtained from:
  - Hourly METAR observations from Hartsfield-Jackson Atlanta International Airport (KATL) to create hourly composites for the progression of black ice events.
  - Georgia RWIS observations and forecasts from METRo (Model of the Environment and Temperature of Roads) near an icing event that occurred on 1/16/2015

**RESEARCH QUESTIONS**

- How frequently does black ice occur in the Atlanta, GA metropolitan area?
- What common meteorological factors are present in these cases to aid in future black ice prediction?
- Can the recently deployed RWIS observation network and METRo road forecast model be improved to utilize black ice forecasting?

**METEORLOGICAL COMPOSITES**

**FIRST DAY OF BLACK ICE EVENT**

- Temperatures decline from avg. 42°F (± 8°F) at 4 PM EST the afternoon before to 28°F (± 6°F) by 7 AM EST the morning of the event.
- Low ceilings (median height between 5000 – 10000 feet) and predominantly overcast skies. Precipitation was also frequently observed prior to events.

**FIRST ICE-FREE DAY**

- Average temperatures peak at 43°F (± 7°F) at 4 PM EST and stay above freezing overnight. Cloud cover more variable, with higher ceilings during day.

**IMPORTANT OF FORECASTING**

- 24 times greater risk of accidents on icy roads (Kilpelainen 2007)
- Anti-icing measures, take before event begins, are more effective than de-icing techniques, after ice has formed (Audrey 2001)
- Road closures have significant economic impacts (Berrocal 2010)
- Thus, accurate advance forecasting and communication with transportation and emergency response partners is critical to mitigate enhanced risk created by black ice conditions.

**CONTRIBUTORS**

- Christopher Bosma, Steve Nelson, Steve Listemaa, Keith Stellman

**REFERENCES**


**CONTINUED BLACK ICE DAYS**

- Average temperatures remain below freezing, even during daytime hours.
- Clear skies and high ceilings overnight (median: unlimited, after 10 PM EST) allow for radiational cooling, extending black ice events.

**ROAD WEATHER INFO. SYSTEMS**

- A system of 27 RWIS stations were installed in throughout metro Atlanta in Dec. 2014.
- A black ice event on 1/16/2015 served as a chance to utilize system to estimate icing risk.
- During this event, RWIS sensors and METRo forecasts were able to identify roadways with greatest icing potential.