The Ice Storm of December 2007 at the SGP

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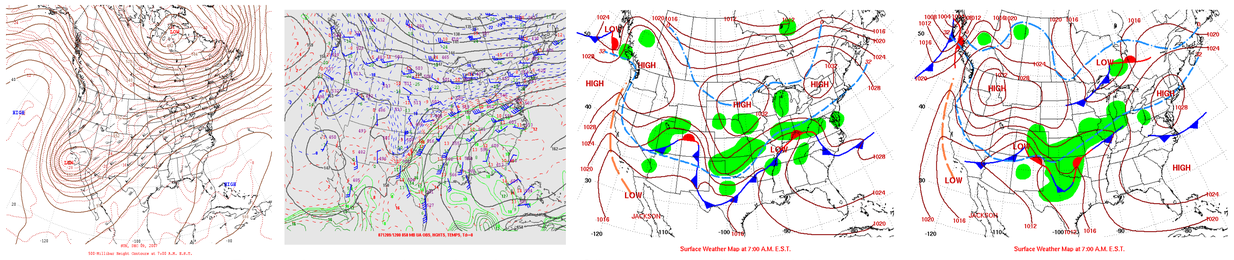
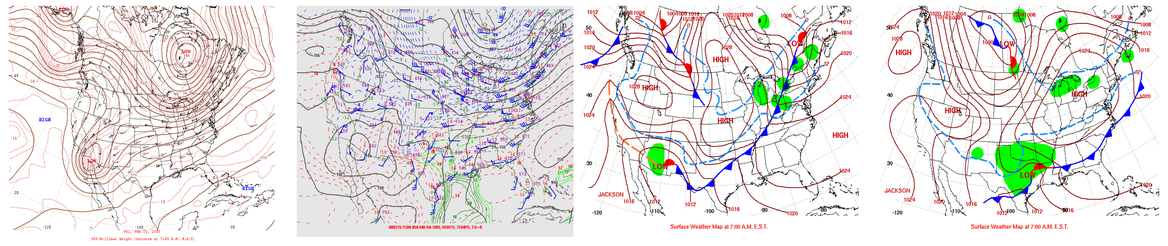
Oklahoma and Kansas experienced a severe ice storm on December 8-11 2007 and a near miss on February 16 2008. *The SGP's instrument suite can provide rare and important looks at storm evolution and can be used for forecasting and case studies.* The storm's effects were widespread in Central and Eastern Oklahoma, with over 600,000 customers without power, some for weeks. Ice began in Oklahoma on the 8th and lasted at many locations through the 10h with ice layers that often exceeded 3/4". By contrast, the storm in February had little or no ice in spite of surface temperatures hovering near freezing for a long period.

9-11 December 2007

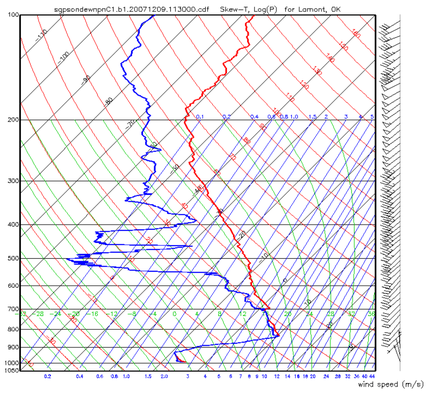


The December storm is a classic case of "overrunning", in which a storm system pulls warm moist air over the top of shallow subfreezing air at the surface.

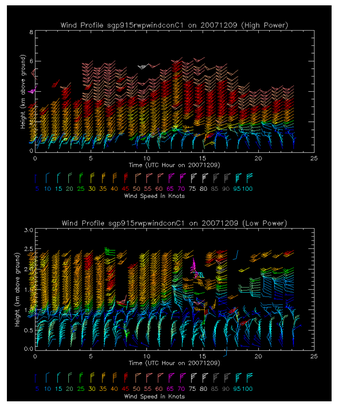
Compare to 15-17 February 2008 Storm (no-ice)

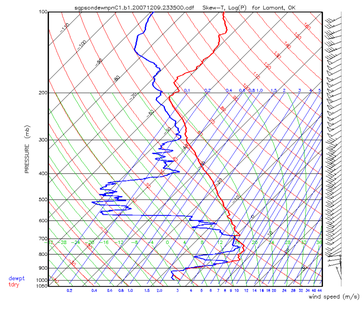


The February 16 storm was a close call. Surface temperatures hovered just above freezing most of the day.



The SGP's 1130 UTC sounding on the 9th clearly shows the cold air at the surface (-5C) and very warm air just above the surface (10C and saturated at 830 mb). The storm system tapped instability in the air above 850 mb to cause convective cells that contributed to much of Oklahoma's heavy icing.

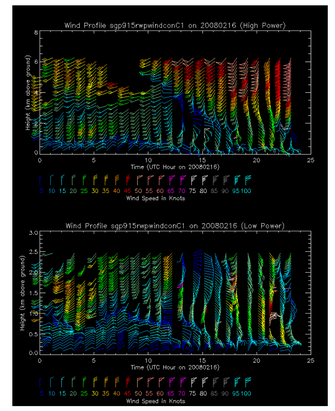


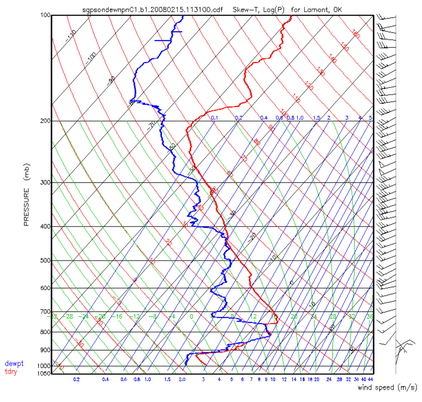


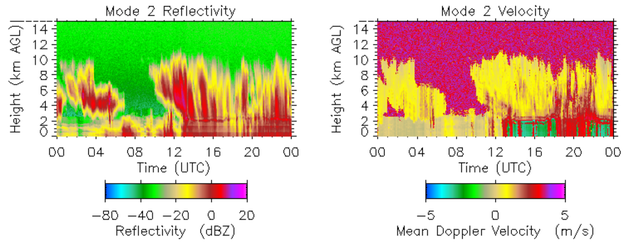
The SGP's 915 MHz profiler winds clearly show the cold layer at the surface dominated by northerly winds. Continued cold advection during the 9th deepened the layer.

By about 2000 UTC, winds had become lighter and more westerly atop the cold layer. This coincided with a drying at that level seen in the 2335 UTC radiosonde observation and was likely due to subsidence behind the first storm system leaving the area. Other rain and ice continued in another episode on the 10th.

The profiler winds clearly show a much shallower cold layer near the surface but one with a complicated evolution. The depth of the layer rapidly decreases after about 0800 UTC. Warm advection takes over between .25 – 1 km, even though winds backing with time close to the surface indicate cold advection. The 1130 UTC sounding shows a good depth of cold air that, as the profiler winds indicated, eroded rapidly.

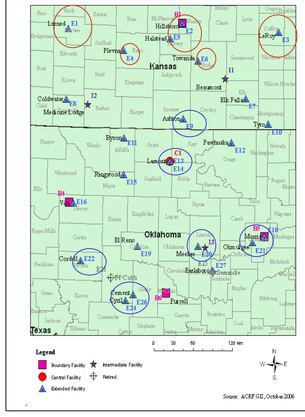




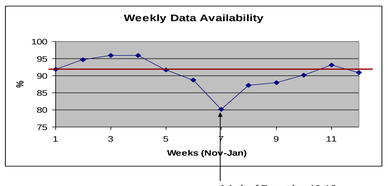


MMCR data from the SGP Central Facility clearly show small scale details that can be used to diagnose microphysical quantities. Such calculations will be even more valuable when coupled with W-band (WACR) data.

Effects on ARM Operations



15 of the SGP's 31 sites were affected by combinations of power, communication and instrument outages: **DEC 9-10** and **DEC 11**



Mean Data Avail %
(w/out ice outages)

Week of December 10-16

Instrumentation For Future Cases

- a Microwave Profiler
- scanning cloud radars
- integrated MMCR and WACR data (microphysical retrievals)
- Real-time displays at the SGP

Summary

The SGP's instrument suite is ideally suited to collect data for case studies; in addition, real-time use of this information for forecasts can provide field campaign customers the best possible service. This is especially true in rapidly-changing, or "borderline" situations like the February case.