

Forecasting Visibility and Cloud Ceilings for Light Snow Events at La Crosse WI and Rochester MN

WFO La Crosse Climatology Series #10

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Objectives

- Improve terminal aerodrome forecasts (TAFs) associated with light snow events.
- Enhance aviation safety.
- Strive to meet regional and national goals for accuracy of ceilings and visibility in TAFs.



Methodology

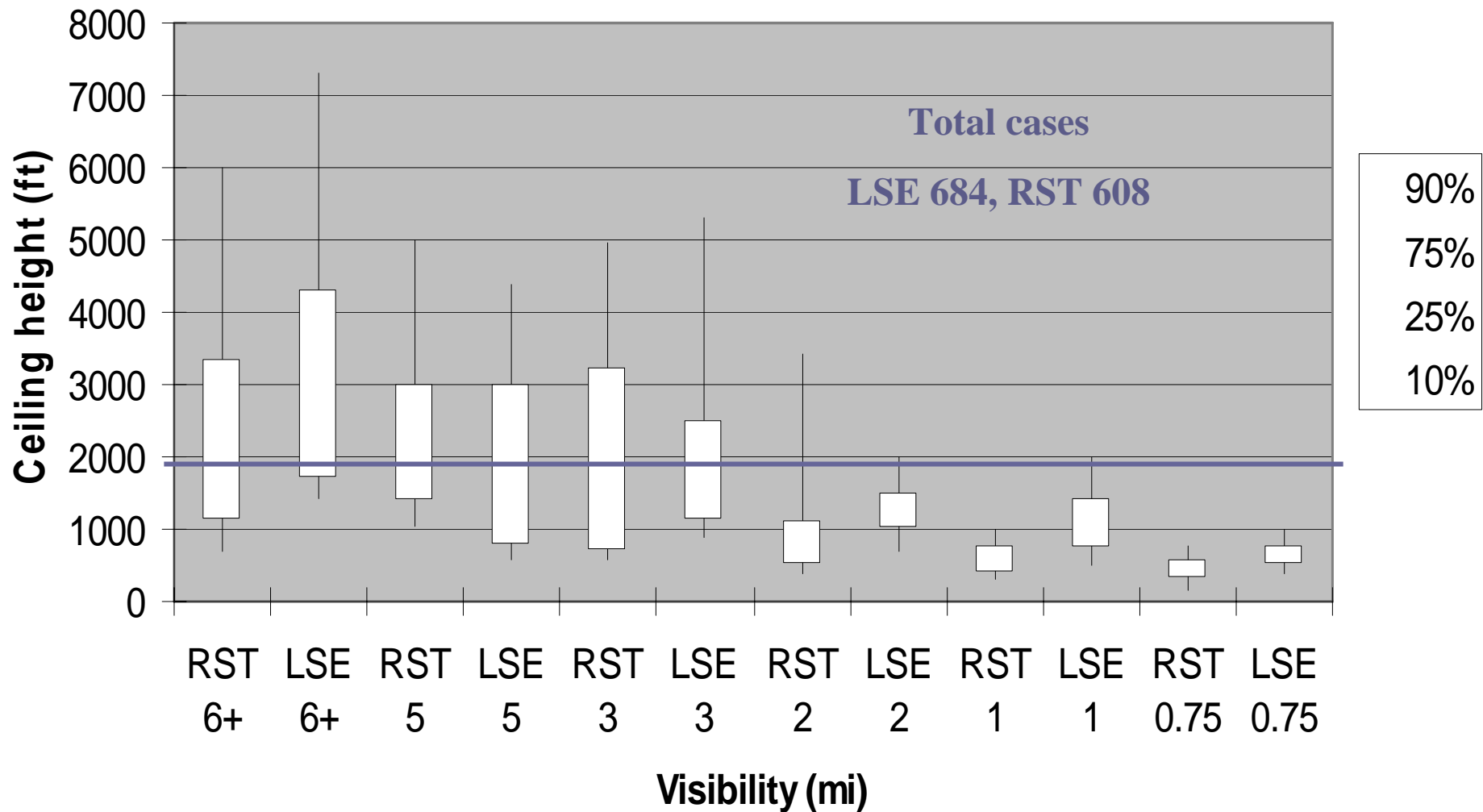
- Utilized surface observations reporting light snow at La Crosse (LSE) and Rochester (RST) for the period 1970-1990.
- Specifically identified observations associated with 0.5 inch to 3.0 inch snowfall events.

Effects of falling snow on visibility

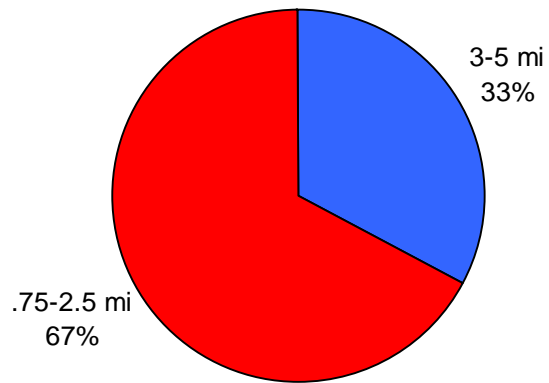
- Since snow is a solid, visibility will be reduced more than with rain.
- Snowfall intensity has a direct relationship on visibility reduction.

Ceiling/Visibility Comparison

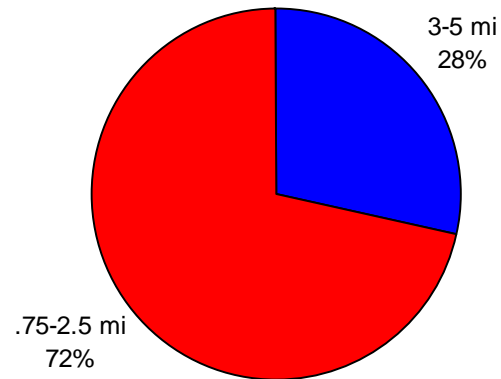
RST vs LSE



IFR vs. MVFR visibility for light snow events at LSE and RST



LSE



RST

■ 3-5 mi
■ .75-2.5 mi

December 2, 2002 light snow event at LSE

Important to note:

- Visibility drops rapidly with onset of snow.
- Prevailing visibility is 1-2 miles.
- This event: Snowfall of 1 inch.

0853Z 03008KT 10SM FEW038 OVC055
0940Z 05006KT 8SM -SN OVC030
0953Z 05008KT 3SM -SN OVC022
1000Z 04007KT 1 3/4SM -SN OVC018
1007Z 05009KT 2SM -SN OVC014
1025Z 05006KT 1 3/4SM -SN OVC012
1053Z 36005KT 2 SM -SN BR OVC016
1057Z 01006KT 1 1/2SM -SN BR OVC014
1153Z 01005KT 2SM -SN BR BKN016 BKN024 OVC045
1207Z 01007KT 1 3/4SM -SN BR BKN016 BKN024 OVC033
1214Z 36006KT 3SM -SN BR BKN018 OVC033
1226Z 01004KT 1 3/4SM -SN BR BKN016 OVC030
1239Z 01005KT 2 1/2SM -SN BR BKN016 BKN024 OVC030
1253Z 02009KT 5SM -SN BR BKN018 BKN025 OVC030
1353Z 02010KT 10SM FEW020 SCT025 OVC100

December 2, 2002 light snow event at RST

0854Z 03011KT 7SM -SN BKN036 OVC070
0905Z 03013KT 3SM -SN BKN024 BKN033 OVC070
0914Z 02011KT 2SM -SN BR OVC018
0918Z 02013KT 1 3/4SM -SN BR FEW001 OVC014
0954Z 02011KT 1 1/4SM -SN BR SCT001 OVC012
0958Z 02011KT 3/4SM -SN BR BKN001 OVC012
1017Z 02013KT 1 1/4 SM -SN BR OVC001
1022Z 02012KT 2SM -SN BR BKN001 OVC055
1027Z 02013KT 3SM -SN BR SCT001 OVC050
1054Z 02013KT 2 1/2SM -SN BR BKN015 BKN034 OVC055
1117Z 03014KT 3/4SM -SN BR BKN001 OVC011
1154Z 01013KT 2SM -SN BR SCT001 BKN015 OVC075
1219Z 01013KT 1 1/2SM -SN BR FEW001 SCT007 OVC015
1239Z 01013KT 2SM -SN BR BKN001 BKN009 OVC070
1254Z 02014KT 2SM -SN BR FEW001 SCT009 OVC070
1313Z 01012KT 10SM UP OVC080

Important to note:

- Visibility drops rapidly with onset of snow.
- Prevailing visibility is $\frac{3}{4}$ to 2 miles.
- This event: Snowfall $\frac{1}{2}$ inch.

December 2, 2002 TAF for LSE

TAF

020530Z 020606 01006KT P6SM OVC060
TEMPO 0812 5SM -SN OVC030
BECMG 1517 01012KT P6SM SCT200

TAF AMD

021013Z 021006 04006KT 3SM -SN BKN025
TEMPO 1013 1 1/2SM -SN OVC015
FM1300 04006KT P6SM -SN SCT015 BKN025
BECMG 1517 01012KT P6SM SCT200

Recommended TAF AMD

021013Z 021006 04006KT 1 1/2SM -SN OVC015
TEMPO 1013 3SM -SN BKN025
FM1300 04006KT P6SM -SN SCT015 BKN025
BECMG 1517 01012KT P6SM SCT200

Important to note:

- Recommended TAF amendment has prevailing visibility of 1 ½ miles and cloud ceiling of 1500 feet.

December 2, 2002 TAF for RST

TAF

020530Z 020606 03013KT P6SM OVC050
TEMPO 0812 5SM -SN OVC025
BECMG 1517 03013KT P6SM SCT200

TAF AMD

020933Z 021006 02013KT 3SM -SN BKN025
TEMPO 1012 1 1/2SM -SN OVC015
FM1400 02013KT P6SM -SN SCT025 BKN060
BECMG 1517 02013KT P6SM SCT200

Recommended TAF AMD

021013Z 021006 02013KT 1SM -SN OVC010
TEMPO 1013 3SM -SN BKN025
FM1300 02013KT P6SM -SN SCT025 BKN060
BECMG 1517 02013KT P6SM SCT200

Important to note:

- Recommended TAF amendment has prevailing visibility of 1 mile and cloud ceiling of 1000 feet.

Quick reference for forecasting visibility vs. ceilings with light snow in LSE and RST TAF

		3-5mi	2mi	1mi	0.75mi
LSE Ceiling Guidance	Recommended Lower Threshold	800ft	700ft	500ft	400ft
	Average Ceiling	1000ft- 3000ft	1000ft- 1500ft	700ft- 1400ft	500ft- 800ft
	Recommended Upper Threshold	5000ft	2000ft	2000ft	1000ft
RST Ceiling Guidance	Recommended Lower Threshold	600ft	400ft	300ft	100ft
	Average Ceiling	1000ft- 3000ft	500ft- 1100ft	400ft- 800ft	300ft- 600ft
	Recommended Upper Threshold	5000ft	2000ft*	1000ft	800ft

Conclusions

- For measurable light snow events, i.e. 0.5 inch to 3.0 inch amounts, forecast prevailing visibility of 0.75 miles to 2 miles in the LSE and RST TAF.
- Cloud ceilings drop considerably with visibility 2 miles or less in light snow.
- Visibility tends to drop rapidly with the onset of light snow.