

# agweather connection

## Rain, Snow, Sleet or Freezing Rain?

**A**lthough Oklahoma has been flooded with arctic air, the state has yet to experience much significant winter precipitation. Forecasters have predicted freezing rain, snow and sleet for parts of Oklahoma, but these forecasts have fallen short. It is easy to believe how forecasters can be wrong so many times in the winter when you examine the science behind the forecast.

"Winter weather is one of the toughest assignments for a forecaster," said Deke Arndt, Chief of the Climate Monitoring Branch at NOAA's National Climatic Data Center. "When a forecaster misses by two degrees in June, most people don't notice. Eighty-four isn't much different than 86, right? But when she or he misses by two degree in a winter precipitation scenario, when 33 becomes 31, the results can be profoundly different. And the forecaster has the added element of not only getting the surface temperature right, she or he has to worry about the temperature profile all the way up to the precipitation-producing clouds."

In winter, precipitation usually starts as snow several thousand feet above the ground. Depending on whether that snow encounters warm air layers or cold air layers will affect what form it is when it reaches the ground.

"It almost always starts as snow. If there's a warm layer, it melts the snow," said Arndt. "If we're lucky, the warm layer is near the ground and we get rain. If it is slightly off the ground, it can refreeze and turn into sleet or freezing rain."

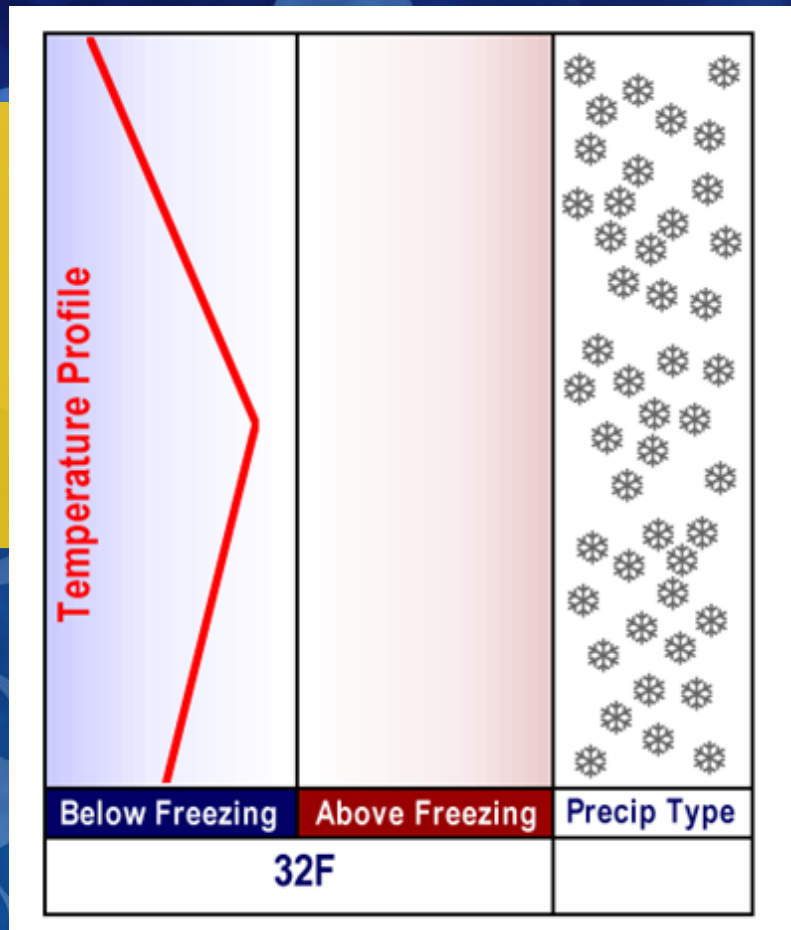
Rain is the most prevalent form of winter weather in Oklahoma, but freezing rain is the one that everyone is scared of, said Arndt. Freezing rain can result in downed power lines, tree damage and devastation to orchard crops. Even though you can't prepare for all scenarios, there are profound consequences for a missed forecast. It is important to remember that a winter forecast will change and it should be checked often, said Arndt.

"This is the toughest forecast in the business. Because it is so tough, don't assume that watching the weather 48 hours in advance will be enough. Check, check and recheck."

For a more detailed explanation and to see pictorial illustrations of the different types of winter precipitation, check out pages 2 and 3.

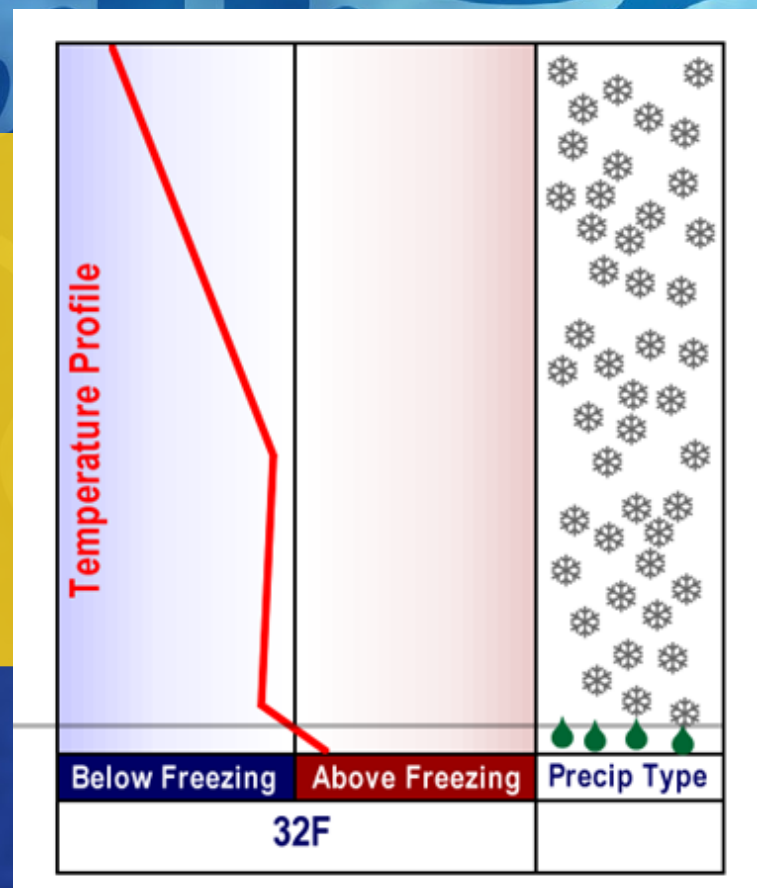
## SNOW

- The red line shows the temperature change as the snow falls from the upper layers of the atmosphere toward the earth.
- In this graphic, the temperature never gets above freezing.
- Because the temperature remains below freezing, the snow falls all the way to the earth.

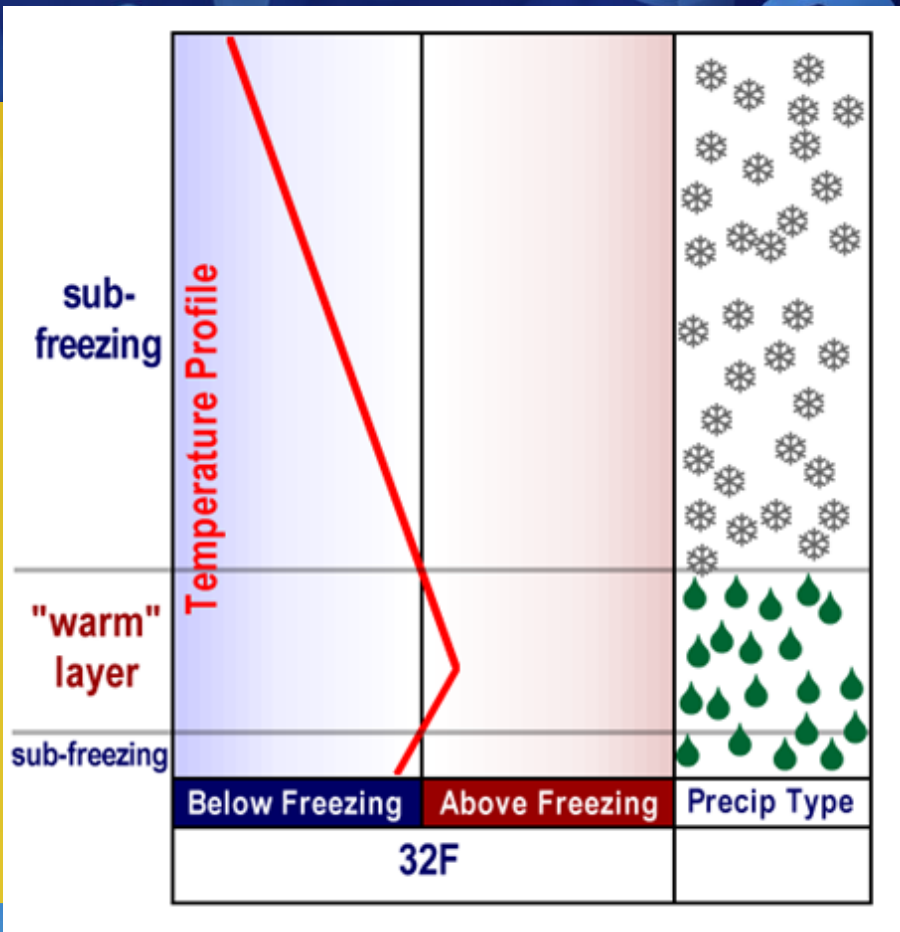


## RAIN

- In this graphic, the temperature is below freezing almost until it reaches the earth.
- However, there is a layer of warm air close to the ground where the temperature is just above freezing.
- With these above-freezing temperatures at the ground, the snow will melt and become rain.

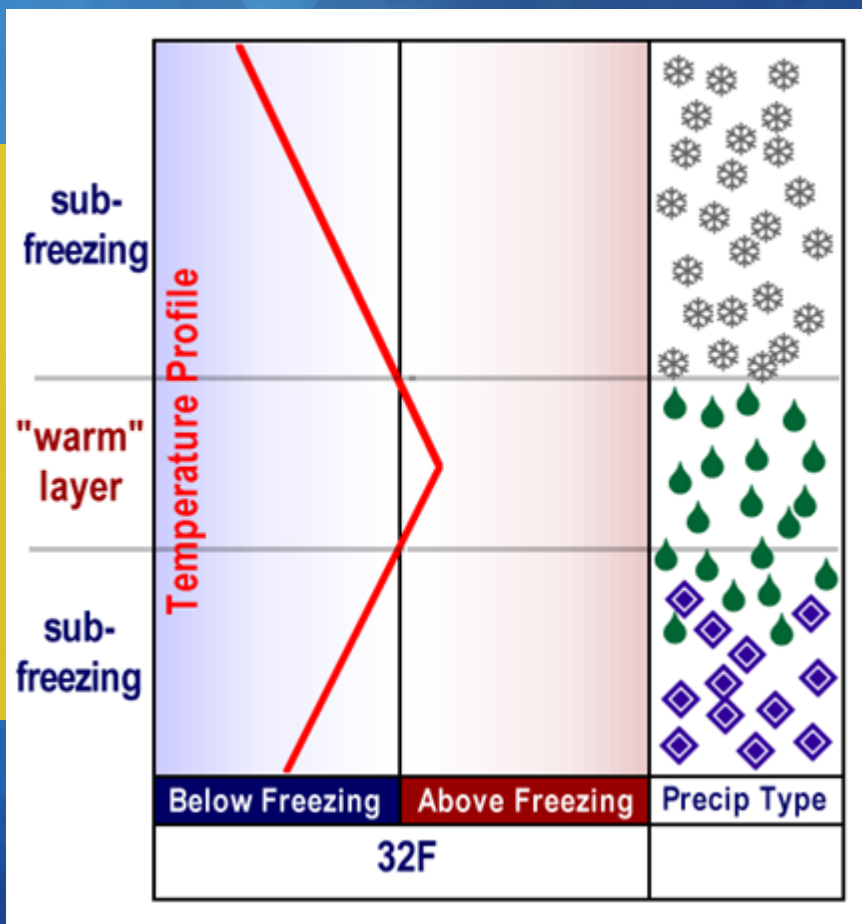






## FREEZING RAIN

- In this graphic, snow falls in the upper layers of the atmosphere
- As this snow moves toward the earth, it encounters a warm layer of air that is above freezing.
- This warm air melts the snow into rain.
- As the rain travels toward earth, it encounters a shallow layer of air that is below freezing. This layer isn't deep enough to refreeze the rain into snow.
- However, because the earth is below freezing, the rain refreezes once it comes into contact with objects such as power lines, a road or bridge, and trees.



## SLEET

- At the top of this graphic, snow falls through a layer of air that is below freezing.
- As the snow encounters a warm layer of air that is above freezing, it melts into rain.
- Then the rain hits a layer of air that is below freezing.
- Because the lowest layer is very thick and very cold, the rain refreezes in the form of ice pellets or sleet.

# CLIMATE AVERAGES

By Gary McManus, Associate State Climatologist

**N**ovember was distinctly dry and warm. The statewide average precipitation finished more than 2 inches below normal, the 22nd driest since 1895. The statewide average temperature was nearly 5 degrees above normal for the eighth-warmest November on record. The western two-thirds of the state were exceedingly dry with most locations receiving less than a half of an inch of rainfall. Despite the warm and dry month, however, fall finished as the 15th coolest and 18th wettest on record.

NOVEMBER  
NORMAL

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TEMP: 48.3°

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PRECIPITATION:  
2.82"

NOVEMBER  
2008

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TEMP: 49.5°

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PRECIPITATION:  
1.00"

**NOVEMBER  
2009**

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**53.1°**

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**0.63"**

DECEMBER  
NORMAL

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TEMP: 39.0°

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PRECIPITATION:  
2.02"

DECEMBER  
2008

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TEMP: 38.5°

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PRECIPITATION:  
0.89"

**DECEMBER  
2009**

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**COLDER**

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**DRIER**

JANUARY  
NORMAL

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TEMP: 36.1°

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PRECIPITATION:  
1.45"

JANUARY  
2009

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TEMP: 38.0°

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PRECIPITATION:  
0.52"

**JANUARY  
2010**

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**COLDER?**

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**DRIER?**