



# THE ATMOSPHERIC RESERVOIR

*Examining the Atmosphere and Atmospheric Resource Management*

## Winter clouds

By Mark D. Schneider

There are distinct differences between the cloud types and sky coverage in North Dakota's winter and summer seasons. Besides receiving less sunlight due to shorter days, winter is typically cloudier than summer. Colder temperatures during the winter translate into more days where the dew point depression, or difference between the air temperature and the dew point temperature, is smaller and the air is closer to saturation. Another reason for cloudier skies in winter is the positioning of the jet stream. North Dakota can experience frequent low-pressure systems called "Alberta Clippers" when the jet stream is oriented northwest to southeast over our state. Even though Alberta Clippers move relatively fast, they contain extensive cloud "shields." From late winter into spring our North Dakota skies can remain cloudy just due to snowmelt. As our snowpack begins to melt from warmer daytime temperatures it moistens the air right above the ground and this added moisture oftentimes condenses into a cloud layer.

Many of these cloudy winter days contain low, layered clouds called *stratus*. They are characterized by their flat, uniform bases and extensive horizontal development. Due to their shallow depth, stratus clouds generally don't produce precipitation, but when they do it is very light. If you observe heavier precipitation falling from a stratus filled sky it means that there are either *nimbostratus* clouds present which can extend from near the surface up to around 10,000 feet or *cumulus* clouds above that layer.



Stratus



Credit: Peggy LeMone



Credit: Carlye Calvin/UCAR



**ALTOSTRATUS**

Credit: Keith G. Diem



**ALTOCUMULUS**

Credit: UCAR



**CIRRUS**

Credit: Lisa Gardiner



**CIRROSTRATUS**

Credit: Darin Langerud



**CIRROCUMULUS**

Credit: UCAR



**SUN DOG**

Credit: Daniel Brothers

Cumulus clouds are characterized by their puffiness, are thicker than stratus clouds, and can tower to vertical heights in the thousands of feet. In summertime, there's more instability to create cumulus clouds and their structure is easier to observe because the dew point depressions are usually greater, meaning less chance for a stratus deck to be present.

At the mid-levels of our atmosphere, *altostratus*, *altocumulus* and *nimbostratus* commonly make their appearances during the winter season. Nimbostratus can be found at both low and mid-levels, so there is some transition or "crossover" of cloud layers in our atmosphere. Notice the difference between altostratus and altocumulus in the photos. Altostratus clouds have a

uniform, layered appearance and altocumulus clouds are puffy and generally form in groups or clusters.

During our winter, we also observe *cirrus*, *cirrostratus*, and *cirrocumulus* which are high clouds. These clouds are made up of ice crystals and commonly create the phenomenon of *sun dogs* (see photo) when the sun is low in the sky and its light is being refracted and viewed through a 22-degree halo. When clouds aren't present, a sun dog can still occur because of suspended ice crystals in the clear air called *diamond dust*.

Now that you have an idea of what cloud types are commonly seen during the winter, get outside and observe them in the cold, crisp North Dakota air!

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