THE

ATMOSPHERIC RESERVOIR

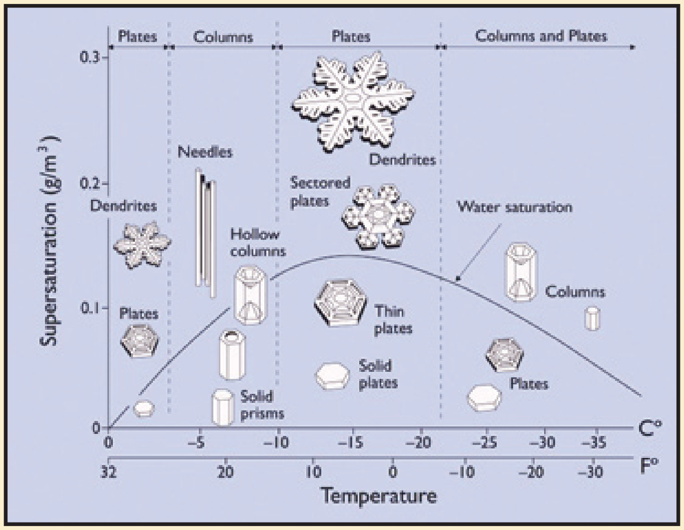
Examining the Atmosphere and Atmospheric Resource Management

"Our Snowy Beginnings"

By Mark D. Schneider

In December unusually cold and snowy conditions were experienced across North Dakota. The monthly average temperatures for Grand Forks and Minot in December were 11.5 degrees below normal!

Climatologically, March represents the last of the snowier months here in our state and it's appropriate to look back at how the snow season really began. The first snowflakes this season originated from small, supercooled (colder than 32 degrees) water droplets about fifteen times smaller than the diameter of a human hair. These droplets are made up of millions of water molecules and remain in a liquid state well below freezing as they wait for an ice crystal or aerosol particle such as pollen or dust to freeze onto. The droplets form crystalline structures, with their ultimate shapes (i.e. needle, plate, or column) determined primarily by the environmental conditions around them (See Morphology Diagram). Individual supercooled droplets are light enough to become suspended in the atmosphere. Once a group of droplets develop into a snowflake though, their combined, heavier weight is generally enough to bring them down to earth.



Kenneth G. Libbrecht/Based upon experiments by U. Nakaya

Temperature, moisture, and air currents around developing snowflakes fluctuate on very minute levels. However, these small differences are enough to create unique shapes that distinguish snowflakes from one another. To observe the structure of snowflakes, try wearing a dark-colored jacket whose surface has been cooled down to the outside air temperature and then extend your arms out in front of you to catch a few of them. Identify the shapes of the snowflakes and see if you can categorize them in the same temperature grouping according to the morphology diagram. There might be a mixture of groupings, considering that there's some overlap between the shape categories. If you have a magnifying glass, try noticing the differences between snowflakes that have the same general shape. Focus in on the elaborate lattice patterns of each flake. The old adage that no two snowflakes are alike is correct. There are literally hundreds of small-scale features that help distinguish each snowflake from another!

On a much smaller and simplistic scale than regular snowflakes, identical snow crystals have been found in nature. This is possible because of the few, basic properties that make up snow crystals in comparison to snowflakes.

When we see large snowflakes (sometimes an inch or more in diameter) falling from the sky, these are actually an aggregate or cluster of regular snowflakes that become stuck together as they're falling. The largest single snowflake formed from one distinct ice crystal was roughly the size of a dime.

As the weather begins to warm up and the seasons change from spring to summer, we'll still have snowflakes around, but they'll be developing higher up in our atmosphere within thunderstorms. When these snowflakes become heavy enough to fall to earth, melting occurs in the warmer air below and they become raindrops.

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