THE
ATMOSPHERICRESERVOIR
Examining the Atmosphere and Atmospheric Resource Management

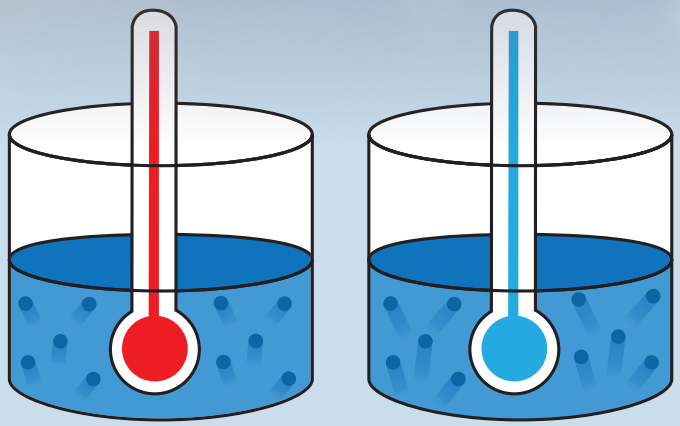
April's Energetic Air

By Mark D. Schneider

North Dakota's average air temperature increases more in March and April than in any other months. In fact, there's a 12 to 16 degree Fahrenheit increase at Bismarck, Dickinson, Fargo, Grand Forks, Jamestown, Minot, and Williston reporting stations from the beginning to the end of those months for the 1981-2010 climate period. It's not surprising that this increase in temperatures is due to disappearing snow cover brought along by longer days and more incoming solar radiation (or insolation) from the sun.

We think of temperature as simply a measure of how warm or cold the air is, but it's also important to see temperature as a measure of molecular kinetic energy or the average speed of molecules in the air. Kinetic energy is defined as the energy a body possesses by virtue of being in motion. To visualize this motion, imagine a glass bulb thermometer partially full of liquid (mercury or alcohol). In order to make the liquid move higher in the tube, the molecules have to be excited and expand. When these molecules are less excited, they contract and the liquid moves lower in the tube. With regard to the average speed of molecules, speed escalates as the temperature increases and diminishes when the temperature decreases.

To excite the molecules in an outdoor thermometer and make the liquid expand, we need the sun's help. When the sun is high in the sky and its rays are almost perpendicular to the earth, we receive much more insolation. In the wintertime, the sun is lower in North



Dakota's skies and its rays are at a greater angle, giving us less insolation. Take a flashlight and point it directly, or perpendicular to the wall. Notice how concentrated the beam is? Now point the flashlight either upward or downward along the wall to create an angle. Observe how the light beam gets stretched and is no longer as concentrated.

The many layers of the earth's atmosphere and clouds also act to reduce insolation. Annually, approximately 30 percent of the solar energy approaching the earth's atmosphere gets reflected and scattered back out to space, close to 19 percent gets absorbed by the atmosphere and clouds, and about 51 percent is absorbed at the earth's surface.

As you can see, temperature is a dynamic measurement of our atmosphere's energy. Air molecules moving faster during April's warmth are a reminder to us that it's time to move out of our winter slumber and spring into motion!

Atmospheric Resource Board | North Dakota State Water Commission | 900 East Boulevard, Bismarck, ND 58505
(701) 328-2788 | http://swc.nd.gov

ND Weather Modification Association | PO Box 2599 | Bismarck, ND 58502 | (701) 223-4232