Have you ever wondered how air pressure effects the weather around you?

Before hurricanes could be spotted by satellites from space, people would keep a wary eye on their barometers during hurricane season. If the air pressure dropped, that was usually a good time to board up windows and head further inland!

As hurricanes pass over coastal areas, air pressure can drop significantly. At sea level air pressure is normally around 1013.25mb (29.92 inches of mercury). Extremely strong hurricanes are accompanied by air pressure drops of between 30 and 70mb. The greater the pressure difference between a low pressure area and a high pressure area, the stronger the winds! Wind is the natural result of having a low pressure area next to a higher pressure area since the air molecules in the higher pressure zone will migrate to the "more spacious" surroundings of the low pressure area.

Tornadoes, also known as Twisters, can be as destructive as hurricanes on a smaller scale. A falling barometer can indicate bad weather approaching and many people in the midwest and central plains states will head into the cellar when the air pressure drops dramatically.

Tornadoes account for millions of dollars of damage and significant human suffering in the U.S. each year. Because of this, many scientists are studying the way in which tornadoes form and how they behave.

The most fundamental thing you have to understand is that heavier gases weigh more than lighter gases. Now that's pretty straightforward - but what does it mean? Well, different chemical elements, as you know, have different atomic weights. Those which form gases (like nitrogen, oxygen, etc.) often combine two atoms at a time to form a gaseous molecule - like N2 (two nitrogens) or O2 (two oxygens).

Now the ATOMIC weight of nitrogen (N) is 14 and of oxygen (O) it's 16. The molecules N2 and O2 have MOLECULAR weights of 28 and 32, respectively. Doesn't take a rocket scientist to see that a gallon of oxygen weighs more than a gallon of nitrogen. Matter of fact, it turns out that - at room temperature and normal (sea level) atmospheric pressure, 28 grams of nitrogen occupies a volume of 22.4 liters and 32 grams of oxygen occupies the same volume!

In other words, under STP (standard temperature and pressure) the weight of 22.4 liters of a gas in grams equals the molecular weight of the gas.

Now for some fun with numbers. Air is ABOUT 80% nitrogen and 20% oxygen. How much does a liter of air weigh? Well.....

If 22.4 liters of nitrogen weighs 28 grams; 0.8 liters weighs (0.8/22.4) X 28 grams = 1 gram (almost exactly) and 0.2 liters of oxygen weighs (0.2/22.4) X 32 = 0.286 grams, so...

A liter of air weighs about 1.286 grams.

Now, let me change the subject just a bit. How much does gaseous water weigh? Not LIQUID water - I mean steam or vapor. Let's figure it out. The chemical formula for water is H2O. One oxygen atom (atomic weight 16) and two hydrogen atoms (atomic weight 1). The total weight of the molecule is 18. Now how much does 22.4 liters (of the gas) weigh? 18 grams. One liter weighs 18/22.4 grams or 0.8 grams.

Now we're getting close. You can see that air normally weighs 1.286 grams per liter but, if we substitute water for some of the air, the mixture becomes lighter. So, if there's water (otherwise known as humidity) in the air, the air mixure becomes LIGHTER - and it doesn't push down so hard on the mercury and the barometer's lower.