Regarding Thermodynamics and Heat Transfer

(Why Al Gore's Comments to Bill O'Reilly at Fox News Are Wrong)

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From a meteorologist's perspective, nothing is worse than to see atmospheric science trashed by the likes of Al Gore, who is a self proclaimed expert in this area, but has had no formal training from any accredited university and constantly makes incorrect and un provable assertions about "human caused" climate change.

The latest revelation came on February 2, 2011, when Mr. Gore eagerly answered a questioning of the accuracy of Gore's past claims about climate from Bill O'Reilly from the Fox News Channel since much of the central and east coast of the US have had a cold and snowy winter. Gore told O'Reilly that the snowstorms of this winter were part of the pattern of changing climate expected by scientists and result from the warming earth airmasses with more moisture were running into a patch of cold air. Gore claimed: " These warmer air masses (which Gore claims result from human carbon emissions that create atmospheric CO_2) act like a sponge to moisture and soak it up until they hit a patch of cold air." Gore then claims that this "extra moisture" contained in the warmer air causes more intense precipitation and thus heavier snowfall, and is all consistent with a warming earth.

These statements by Gore are sheer nonsense. While it is true that warmer air can hold more moisture than cold air, the temperature of the air has nothing to do with how much water vapor will ultimately be evaporated (or as Gore puts it "soaked up") into it. That is determined solely by what is called the vapor pressure gradient that exists

between a sample of air that may overly a plane of water. To examine this, we need to introduce the physical concept of vapor pressure. The equation that governs this is called the Clausius-Clapeyron equation for the vapor pressure of water and was named after the two chemists that derived it. It is a first order differential equation, and in differential form, it is:
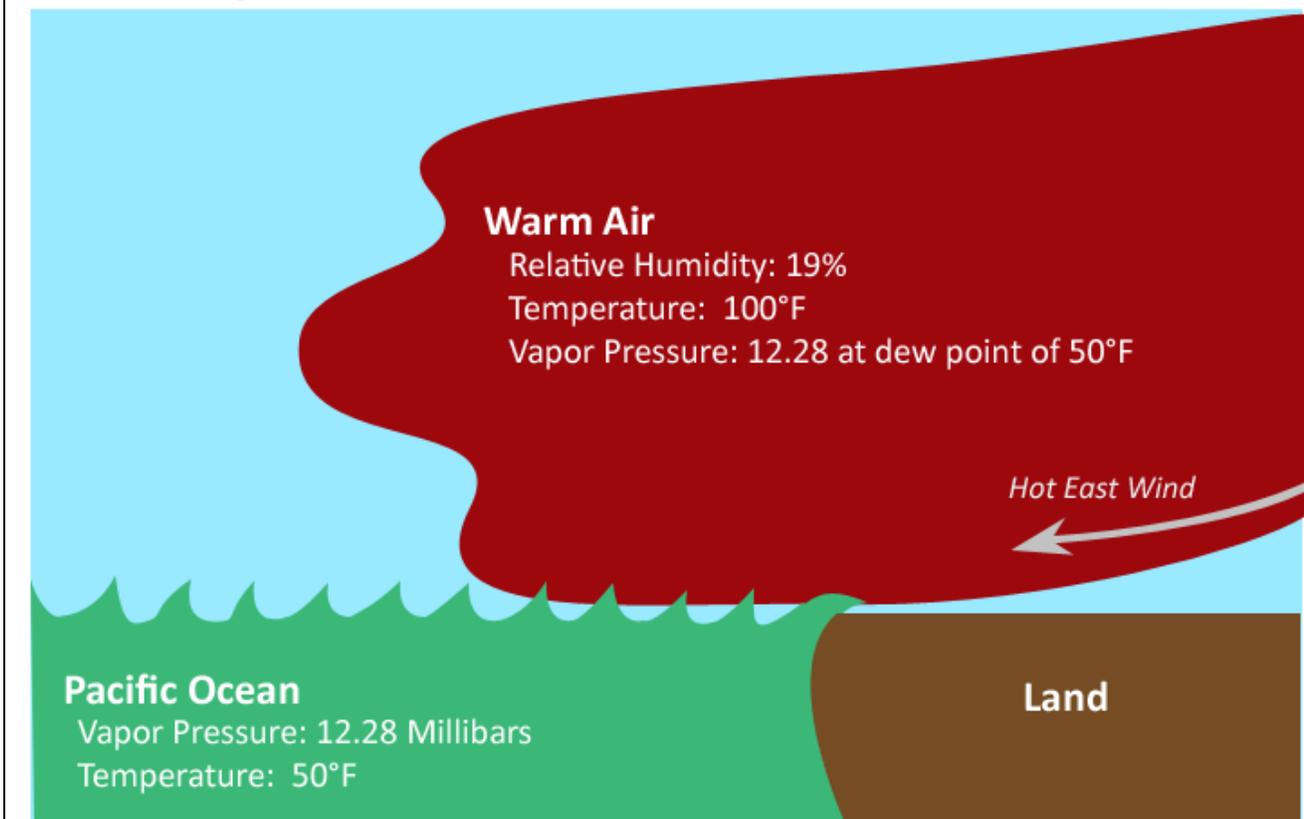
$$Dp/p = L_v/R_u \left(DT/T^2 \right)$$

In this form, p is the vapor pressure of water, L_v is the molar heat of vaporization of water, R_u is the universal gas constant of 8.314 $Jmol^{-1}K^{-1}$, and T is the temperature of the water in Kelvin degrees. Using this equation, the vapor pressure is defined physically as the amount of heat energy required to vaporize one mole of water at 100 degrees centigrade at one earth atmospheric pressure. With this definition we can easily integrate this equation with respect to pressure and temperature and define the summation limits:

$$P_{wa}(T) = P_a \, e^{-K(1/Tdw \, -1/273)}$$

In final form for the examples in this paper, this integrated form of Clausius-Clapeyron states that the vapor pressure of the water or air as a function of temperature is now equal to the atmospheric pressure multiplied by the natural base e raised to the minus power of the quantities indicated. Those are K, the molar vaporization coefficient in Kelvins, multiplied by the reciprocal of the difference in either the dew point temperature of the air (for the vapor pressure of the air) or water temperature (for the vapor pressure of water) and that of the melting temperature of ice at one atmosphere in Kelvin degrees. For accuracy, K is preferred over the quotient L_v/R_u because the latent heats of vaporization are different depending on the temperatures. I looked this up in the Handbook of Physics and Chemistry, 30th edition at the various temperatures we are interested in to make the relevant points. The relevant vaporization coefficient for the melting point of ice is 5398 Kelvins. The various vapor pressures at the indicated temperatures were then computed to be used in the examples below:

With the same vapor pressure of the air and water:
No net evaporation into warm air

Warm Air
Relative Humidity: 19%
Temperature: 100°F
Vapor Pressure: 12.28 at dew point of 50°F

Hot East Wind

Pacific Ocean
Vapor Pressure: 12.28 Millibars
Temperature: 50°F

Land

In the example above, I took a hot continental air mass that is typically found in the summer months in the US at a temperature of 100 deg F. If the dew point of this hot air mass was 50 deg F (which it typically is in summer) this would be VERY DRY air relative to its temperature of 100 deg F, having a relative humidity of only 19%. This is the kind of airmass that Al Gore claims would "soak up moisture" because it is so warm. So what happens if we moved it out over the Pacific Ocean so it could "soak up" some of Al Gore's moisture? We see from the vapor pressures involved that this hot airmass is not going to do any such thing. Why? Because the vapor pressure of the ocean is the same as the vapor pressure of Mr. Gore's hot air mass! Both the ocean and air have the SAME vapor pressure with the temperature of the water and dew point temperature of the air being equal which equals a vapor pressure 12.28 millibars in both from the Clapeyron equation. The vapor pressure gradient is zero in this case. This means that there would be NO NET EVAPORATIVE GAIN OF WATER VAPOR into this HOT air mass at all. As this HOT air moves into the "patch" of colder ocean, it will simply begin to cool to towards

its dew point temperature, raising the relative humidity of the air but leaving little or no change in the absolute humidity because the ocean will easily take up the extra heat energy without raising its own temperature, which determines its vapor pressure(which determines actual water vapor content) which defines that "sponge" Mr. Gore was talking about.

So in what scenario would we find an airmass acting like a "sponge" and "soaking up moisture" as Mr. Gore claims happens with a warm airmass? If you're laughing about now and guessing the opposite of what Gore claims you would be correct! The best example I could give regarding an airmass "soaking up moisture" would be from one that produces lake effect snowstorms, and that would be a source of COLD continental arctic air. Let's examine the physics of that in the illustration below:
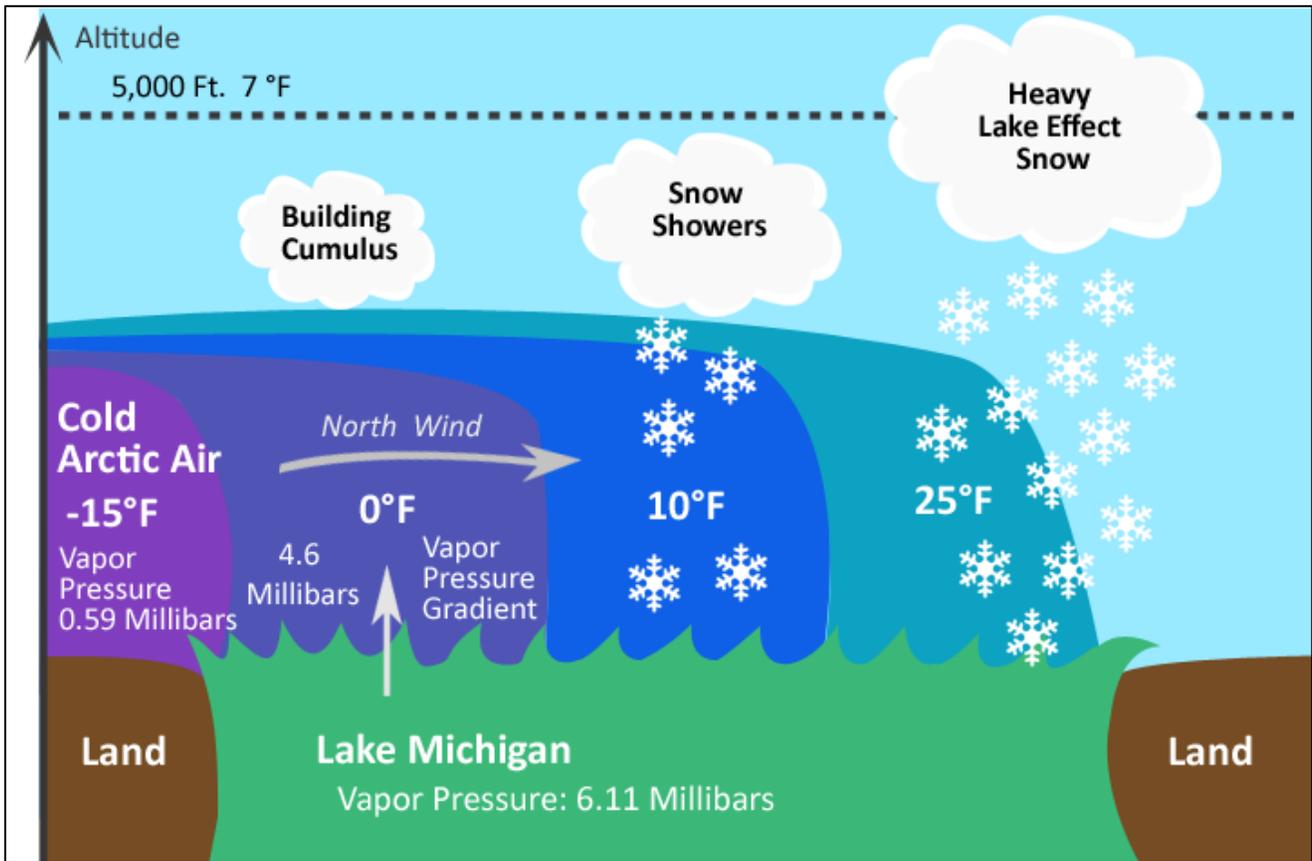
In this scenario, we start with a COLD airmass, whose temperature at the north shore of lake Michigan is -15 degF, with a dew point temperature of -20 degF. Using the Clapeyron equation again, we find the vapor pressure in such a COLD airmass is very

low. The value is only .59 millibars. But when we compute the vapor pressure of Lake Michigan, even with a temperature of 32 degF we find it to be much higher at 6.11 millibars. This creates a whopping vapor pressure gradient INTO the COLD airmass of 4.6 millibars! The effect this will have is unmistakable. As this COLD airmass travels over the warmer lake surface, it will be heated rapidly by the lake surface, but as it heats, the vapor pressure gradient will constantly feed a stream of moisture from the lake into the warming airmass and continually re-saturate it. Notice on the diagram that as the air is heated from underneath by the lake that the temperature difference between the air near the lake and higher up gets larger. This eventually causes this warmer and saturated surface air to overturn, causing a deep convective current to ensue, that depending on the 5 and 10 thousand foot temperatures will allow the air to overturn to these altitudes. This process continues to allow the COLDER air to lose and re-saturate moisture as long as we maintain the positive vapor pressure INTO the COLD air, which we do. As the cloud columns form and build from this process, precipitation begins to fall from them and continues on the south side of the lake as long as the wind fetch and supply of COLD arctic air remains on the north side.

Ask people who live Chicago Illinois and Buffalo New York about lake effect storms. They will tell you they observe on a frequent basis, snowfall totals that range anywhere from half a foot to several feet of snow depending on how long the COLD wind fetch across the lake persists. This COLD airmass would have started with a water vapor content of around .035 gKg^{-1} (grams of water vapor per kilogram of dry air) and end up with approximately 2.8 gKg^{-1} by the time it nears the south shore of the lake fully saturated because of the vapor pressure gradient. Yet that water vapor content is only 13% of what is found in one of those juicy tropical airmasses Al Gore claims "soak up moisture". It is COLD, not warm air that "soaks up water vapor" from a water surface, and it is precisely because that air has a VERY LOW vapor pressure compared to any source of warmerwater that it over runs.

So what happens with one of those juicy tropical airmasses that Al Gore claims are the vacuum cleaner to water vapor? Let's look at that problem briefly. To do this I need to introduce another concept in thermodynamics called the wet bulb temperature. To use that concept we need to convert our calculated vapor pressures into mixing ratios, in other words, given the vapor pressure, what is the amount of water vapor in grams

found in a kilogram of dry air? We can easily perform that operation with the use of the ideal gas law:

$$P_w\, m_w / R_u T_{dw} = m/V$$

This gives us the density of water vapor in gm^{-3} (grams per cubic meter) if we multiply the vapor pressure by the molecular weight of water and divide by the product of the universal gas constant and absolute temperature (Kelvin degrees) . If we take a tropical airmass that is loaded with moisture and fully saturated at 80 degF, it would have a wet bulb and dew point temperature equal to that of the air and the relative humidity would be 100% . We know this because the vapor pressure of the air would be equal to its saturation vapor pressure. Relative humidity is defined by e/e_s (100), that is, vapor pressure divided by saturation vapor pressure multiplied by 100 . The vapor pressure and saturation vapor pressure of the air at 80 degF from the Clapeyron equation is 35.51 millibars. So 35.51/35.51 (100) = 100%. Notice that the relative humidity DOES NOT show us how much water vapor is actually in the air. It only shows us the ratio of vapor pressure with respect to saturation vapor pressure. But we know from the Clapeyron equation that vapor pressure is a function of temperature, therefore higher dew point temperatures contain higher vapor pressures at any range of temperature they are associated with. In our example above, if this air is saturated, it is loaded with water vapor at a high dew point temperature of 80 degF. Using the ideal gas law, we find that a vapor pressure of 35.51 millibars has a density of 25.65 gm^{-3} (25.65 grams of water per cubic meter). If we divide this number by a kilogram of dry air that occupies the same volume, we get a mixing ratio of 21.78 gKg^{-1} , that is, 21.78 grams of water vapor for every kilogram of dry air. In the last example, I showed you how easily COLD air soaks up water vapor from a warmer water source and creates lake effect snow. But if we wanted to add more vapor to an air mass already loaded with it such as this tropical one, how much heat must be supplied to do this? In other words, with our saturated air mass at 80 degF, how much heat must we add to raise the dew point temperature another 2 degF to 82 degF and thus re-saturate it like we did with lake effect warming? To determine this we set the wet bulb depression (the difference in the dry air temperature and wet bulb temperature) equal to the difference in the mixing ratio of the wet bulb and dry bulb temperatures, w and w_0, multiply by the latent heat of vaporization of water, L, and dived by the sum of the specific heat of dry air at constant

pressure, C_p with the product of the dry air mixing ratio, w_0 , and the specific heat of water vapor at constant pressure, $C_{pv.}$.

 The expression is written as:

$$T - T_w =\ (w - w_0)\ L\ /\ C_p + C_{pv}w_0$$

Notice that the latent heat of vaporization of water is constant at 597.3 calg^{-1} (calories per gram) in this expression verses the variable amounts in the Clapeyron equation. The reason for this is because the amounts of water vapor contained in any mixing ratio of one kilogram of dry air are small regardless of the airmass type. Therefore, we find that the value at 0 degC is satisfactory for any values we plug in with the earth range of water vapor concentration. The values of C_p and C_{pv} are .240 cal g^{-1} $^\circ$C^{-1} (calories per gram per degree centigrade) and .441 cal g^{-1} $^\circ$C^{-1} respectively. With the ideal gas law, we can now convert vapor pressures at both 80 and 82 degF to mixing ratios for our expression above. They are 21.78 gkg^{-1} and 23.17 gkg^{-1} respectively. The answer is that $T - T_w$ = 3.32 degC or 6 degF. This shows us that if an external source of energy were to raise the temperature of the tropical ocean by I degC or 1.8 degF , it would take an additional 6 degF of sensible heat energy to raise the dew point temperature of the air 1.8 degF thus re- saturating it like it did in the lake effect snow example above. Since ocean and air temperatures track nearly perfectly because of waters much higher specific heat, the 1.8 deg F increase would be an insufficient amount of heat energy from the air to re-saturate such a warm, moist airmass. But raising the ocean temperature over the dew point temperature of the air does create a vapor pressure gradient into this airmass, so the heat energy must be supplied from the ocean itself to neutralize this pressure gradient. We know from the heat required of the air to vaporize this increased pressure, that it takes 796.8 calories to neutralize the vapor pressure gradient. With the specific heat of sea water being .951 cal g^{-1} $^\circ$C^{-1}, then 796.8 cal / 951 cal $^\circ$C^{-1Kg-1} = .83 degC. In other words, if 951 calories of energy were added to this sea water to raise the mass of one kilogram 1 degC, then 796.8 calories of that external energy source must be used to evaporate water rather than raise the temperature, leaving only 154.2 calories left which equals a real temperature increase of .16 degC rather than a full degree. That is only 16% of the energy put into the water! We can dial in the numbers for cooler oceans such as the North Pacific Ocean, which runs near 50

degF near 45 degrees latitude. The respective vapor pressures converted to mixing ratios are w = 8.2 gkg^{-1} and w_0 = 7.7 gkg^{-1} . We find from these values that $T - T_w$ = 1.22 degC or 2.2 degF. In this case, we almost have more energy that can be supplied from the air to neutralize a vapor pressure gradient from the water, we are short only .31 deg C or .56 degF. With the same analogy, we have 292.8 cal / 951 cal $^{o}C^{-1}$ = .31 degC. So in this case, the sea temperature could rise .69 degC or 1.24 degF and neutralize a vapor pressure gradient through re- saturation, with 951 calories of energy added from an external source.

Much has been said by Mr. Gore and other climate alarmists about rising ocean temperatures and sea levels as a result of rising CO_2. If there is anything you can conclude about the tropical oceans from these calculations is that if external energy is supplied to the warmer oceans and air, most of it is expended evaporating water rather than raising the temperature. It is very difficult to raise the ocean temperatures in the tropics because of the much higher vapor pressures involved with the higher temperatures. And because the Clapeyron equation makes the vapor pressure rise as a function of an exponential increase in the reciprocal of temperature, it becomes a very powerful brake in mitigating a warming temperature by adding energy from any external source. This also demonstrates well that Mr. Gore is wrong again concerning warmer air "soaking up water vapor like a sponge". Instead of soaking it up, we find it actually takes a considerable amount of external energy to either vaporize water or increase its temperature in a tropical airmass. This energy comes from a constant bathing of solar energy received at the ocean surface by the sun. Climate alarmists and modelers use this increased evaporation of water to amplify water vapors infrared radiation absorption and create "water vapor feedback" loops that keep adding more energy to the ocean as water vapor is increased. But there is no proof of this in the actual record of observations, and we actually find that increasing the vapor concentration makes the precipitation rates go up, not allow a greater optical depth of the vapor. Since adding more CO_2 would have an effect to cool the upper troposphere, as well as from the wavelengths of water vapor above 17 microns, the radiation effects from CO_2 are mitigated either entirely or considerably by the hydrological cycle itself. Keep in mind, that my calculations are based upon mass equivalents of one kilogram. In reality, the mean depth of the mixed ocean is around 200 meters, which makes the

masses involved far greater. But this does NOT change the physical meaning of what is really happening at all, it merely reduces the actual changes in temperature and vapor pressures responding to a small amount of energy used in the examples.

If we run warmer, more moist air into a "patch" of colder air like Al Gore uses in his explanations of the world to Bill O'Reilly, do we get increased snowfall from that? To answer that question we first need to understand that warm and cold air masses don't just "run into" each other. They are LIFTED over and under each other to produce the cooling effect needed to condense the moisture contained within them that would produce precipitation. This means that it does not matter how warm a sample of air actually is if it is or was heated by any form of external energy as Al Gore claims. What matters is that there must be a source of COLD air nearby to create the dynamic lift to cool and precipitate water vapor, and the COLDER the adjacent source of air is, the more the dynamic lift and the GREATER THE PRECIPITATION RELATIVE TO THE WARM AIR'S MOISTURE CONTENT, be it rain or snow, as the dynamic lift is potential energy converted to kinetic energy by the atmosphere from the earth's gravitational field. This is the opposite of what Al Gore and AGW advocate scientists claim. To illustrate this, I will use the same temperature and moisture characteristics of the air samples in the previous examples.

In order to determine the potential energy of these air samples, you would first need to determine the thickness of a sample of air subject to a mean temperature of its layers between two pressure surfaces. It is common practice in synoptic weather analysis to use the pressures of 1000 and 500 millibars respectively. Then we use the hydrostatic equation below, solving for pressure and geopotential height:

$dp/dz = -$ (rho) g, where p is pressure, z is geopotential height and (rho) is density.

When I did this for the respective temperatures of -15 degF , 50degF and 80degF, I used an ICAO international standard earth atmosphere and ISA +0 for the 850,700 and 500 millibar pressures to get a mean temperature, T. The geopotential thickness using that method for the 1000/500 millibar layers for each temperature was computed as:

563 decameters for 80degF, 534 decameters for 50 degF and 525 decameters for -15degF. Below is a bar plot of the respective thicknesses of this layer of atmosphere because of the difference in temperature in each airmass:
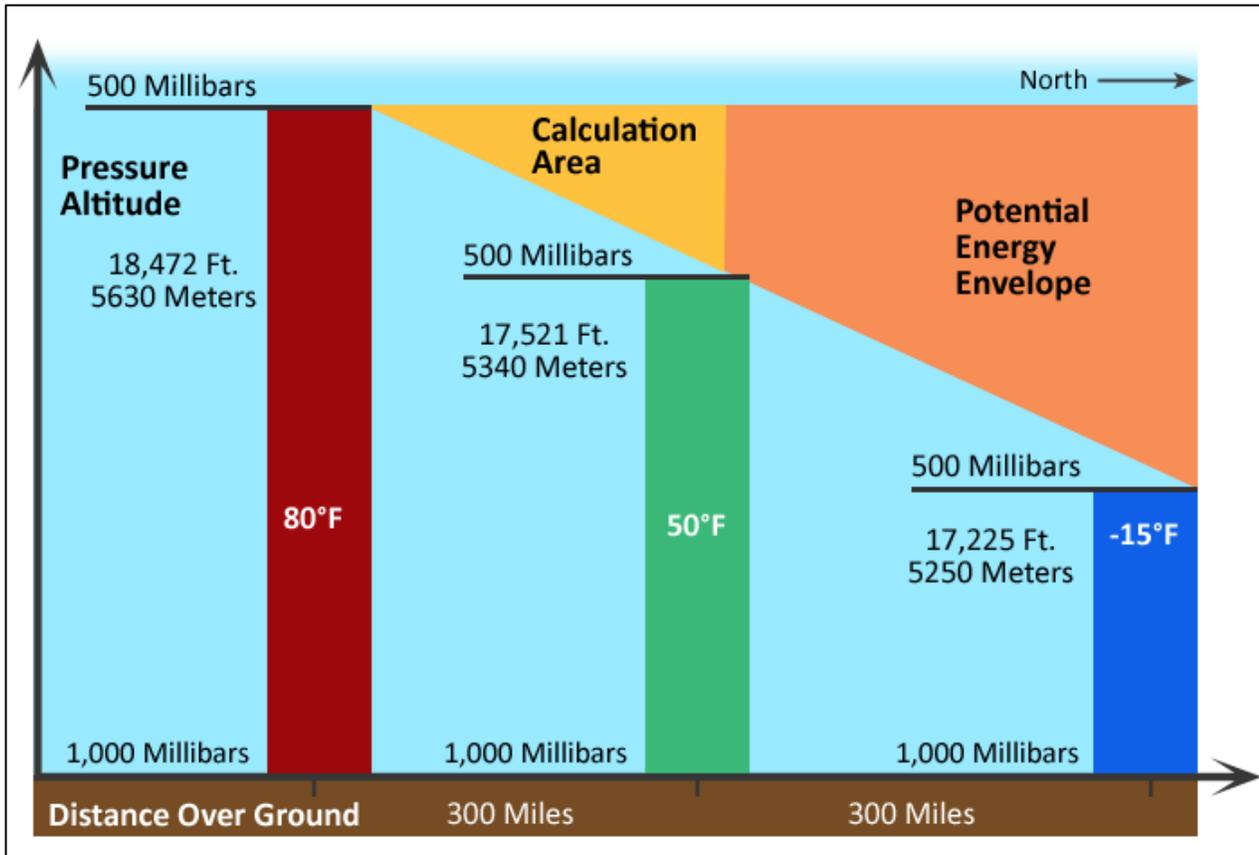
We notice immediately in plotting the bar graphs that the thickness of the pressure layers decreases markedly with decreasing temperature. The reason for this is simple. Cold air contracts and shrinks, while the warmer air expands and widens as more heat is added, thus, at lower levels near ground, the density or mass per unit volume is decreasing, while with colder air, the opposite is true, the mass per unit volume is increasing causing the air density to become larger.

This difference in density is precisely what causes buoyancy forces to create lift as a warm and cold airmass interact with each other, and the lifting or vertical motions begin to generate our global weather systems. Also take note in the graph of the triangular area at the top. This is the potential energy envelope. The area in the triangle changes as the slope of the inverted hypotenuse changes. Notice that the slope depends upon the difference or gradient in how much the temperature changes across the latitude

lines that make the thickness values change. This graph to the observer is a vertical slice of atmosphere with altitude increasing towards the top and looking into the picture is looking west, while looking north is to the right, where, as we would expect, it gets colder. The airmasses are arranged so that the warmest is farthest south and the coldest
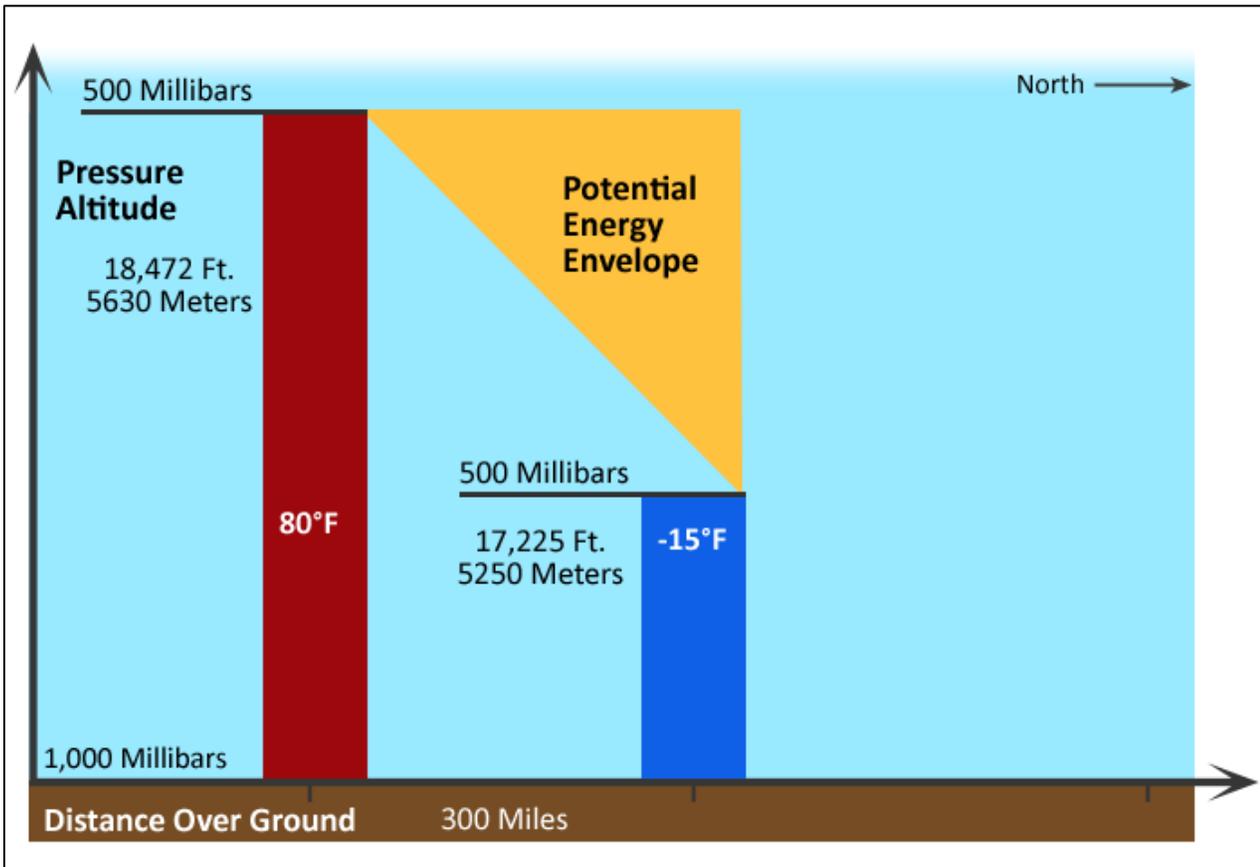
farthest north with the slope gradually decreasing across 600 miles of ground. But now see how the slope of the potential energy envelope would change if we switch the coldest air with the intermediate air at 50 deg F and generate a storm from this from the redistributed temperature changes in the second graphic above.

As you can see, by placing COLDER air next to Al Gore's warm, moist air, the area of the energy envelope is increased substantially, meaning there is much more available energy to be used for lift, wind and precipitation as a new storm develops. This is precisely what was happening during the many episodes of this winter's blistering snowstorms and cold weather on the east coast. The intrusion of COLD, continental arctic air was advancing and far reaching to southerly latitudes, increasing available potential energy for storm generation and snow. It had absolutely nothing to do with

"warmer, more moist air hitting a patch of cold" from "global warming" as Al Gore and other climate alarmists state.

How would we calculate what the potential energy is to compare these graphings? To do this we are looking for the area of the potential energy envelope that is drawn with the above graphings. The slope is a straight line that has the equation of a simple linear expression:

$Z(x) = mx$, where $Z(x)$ is the geopotential height as a function of x, or cross sectional distance and m is the slope. Differentiating Z with respect to x and integrating with respect to Z and x gives us:

$$Z-Z_0 = m/\Delta x \int x dx = (m/\Delta x) 1/2x^2$$

This is a solution that is equivalent to the formula for the area of a triangle. From atmospheric science we know that gravitational potential energy per unit mass is just:

$$P_E = g \int dZ = g(Z-Z_0)$$

Substituting for dZ, we now get $P_E = g([m/\Delta x] 1/2x^2)$.

In the first example, comparing the potential energy of the 80 degF airmass with the 50 degF air mass the potential energy from this equation is:

$(9.8 \text{ ms}^{-2})(3.030 \times 10^{-4}) (2.33098 \times 10^{11} \text{ m}^2) / 4.82803 \times 10^5 \text{m} = 1,433 \text{ JKg}^{-1}$ or 1,433 Joules per kilogram.

In the second example, we then take the much colder airmass and place it next to Al Gore's warm air that "soaks up" the moisture:

$(9.8 \text{ms}^{-2})(3.921 \times 10^{-4})(2.33098 \times 10^{11} \text{m}^2) / 4.82803 \times 10^5 \text{m} = 1,855 \text{ Jkg}^{-1}$ which is a 23% increase in available potential energy per unit mass just by making it COLDER next to Al Gore's warmer airmass.

These numbers don't sound large, but they are misleading in that regard. If we sum the total available energy by adding a third dimension and integrating backward or forward through this cross section of atmosphere, i.e., westward or eastward along the frontal boundary to sum the mass involvement, one need only look at the areas involved in the computations above to see that the amount of mass would increase rapidly for reach meter we create of volume summing westward or eastward. In a very short order, the difference between either number would escalate rapidly into trillions of Joules of energy along the frontal boundary. The comparisons would be nowhere close to each other. For example, if we took just 100 miles of additional space computed from the total area of the triangle) either side of our computation, the new "area" is now a volume of 1.11364 x 10^{12} m^3 or 39.32263 x 10^{12} ft^3 , or approximately 39.3 trillion cubic feet. At 500 millibars of atmospheric pressure in an ISA atmosphere, the air density is .69Kgm^{-3}, which is the multiplier to the volumes I just calculated to get the atmospheric mass involved along a short 100 miles of the frontal boundaries for the TOTAL available potential energy.

Now the difference is elevated in terms of total energy to 1.454 x 10^{15}J – 1.124 x 10^{15}J = 330 TRILLION Joules of additional potential energy available for storm development and precipitation if we take the COLDER air mass (-15 degF) in our example and place it next to Al Gore's warm, moist, "soaks up moisture like a sponge" airmass and sum along a path of 100 miles of the frontal boundary.

CONCLUSIONS

 The claims made by Al Gore and other "climate scientists" that state this year's heavy snowstorms in the USA and across the world were caused by warmer (and thus the claim of more moist) air "colliding" with cold air (and according to the claims are "proof" of human caused ,CO_2 induced) are proven here to be false.

In every example used, it is the amount of COLD air placed adjacent to a source of warm air that is the true catalyst in generating precipitation anywhere on the earth, and the amount of precipitation generated is relative to the absolute humidity of the warmer airmass LIFTED by the adjacent source of cold air. So in this regard, it does not

matter if an external source of energy added more water vapor to a warm airmass or not. The only exception to this is at tropical latitudes where the precipitation process is induced by COOLING the air ABOVE the ground rather than adjacent to it. Precipitation rates and storm snow or rainfall totals at most latitudes of earth are dependent upon the DIFFERENCE in temperature of two bordering air masses, which is what determines the amount of potential energy available for lifting an airmass vertically against gravity, thus cooling it and causing a certain amount of precipitation that is based upon that amount of lifting and cooling, not cooling the warmer air by "running it into colder air." The fallacy of Gore's comments can further be demonstrated by noting that there is a significant difference in the density of the sample of warm air at 80 degF, which would be 1.17 kgm^{-3} versus 1.42 kgm^{-3} for the -15 degF sample. Volume to volume, it is clear that the COLD air has more mass. If we imagined a cube of this warm and cold air being a solid rather than a gas, and ran the samples into each other at a combined speed of 10ms^{-1} as Gore claims happens, the COLD air would push harder against Gore's warm air upon collision, and from Newton's Third Law, F = -F, the recoil force, a part of -F, would send the warmer air BACKWARDS at a speed of 2.14 ms^{-1}. In reality, this means that warmer air does not push colder air out of the way in lateral space on a one to one basis, it is not dense enough to do this. It is always COLD air that impinges on warm and causes displacement, and in the case of warm air, displacement of cold must include significant vertical motion by the warm air because of the relevant viscosities of the air. Not only does the cold air have this density advantage over warm, it also has the advantage of advancing southward from the polar regions with a decreasing Coriolis force causing the air to accelerate with a static pressure gradient. This creates frontogenesis or the accumulation of temperature difference across a smaller and smaller distance. This is what generates the accumulation of potential energy as I have already shown.

 If it were true that global warming was causing increased snowfalls as Gore and other "climate scientists" are claiming, then in order for there to be increased precipitation along the frontal boundaries we have shown here, the COLDER air source would have to remain static or become COLDER with respect to time in order precipitate more water vapor. So the increased precipitation would tell us that the earth is either not warming at all, or it is cooling since it is demonstrated here that in the tropical latitudes, most of

the external energy input is used to vaporize water rather than raise the temperature of the air, so if you are increasing precipitation, you are EXPENDING and using up tropical heat energy stored as latent heat, and further, that latent heat is being released back to the atmosphere at high altitudes where it is effectively radiated as a perfect Planck emitter off of the cloud tops to space and at a much decreased optical depth!

 If Gores scenarios were true, the earth would not respond by increasing snowfalls or precipitation rates. If CO_2 infrared radiation was capable of causing climate change, (and this author does not believe it does) the first response we would see is a reduction in the potency of high latitude continental arctic air masses, because theoretically speaking, if you lessen water vapor concentration with a CONSTANT SURFACE TEMPERATURE (adding more CO_2 would have a greater effect, but the problem here is that temperatures and water vapor are ANYTHING but constant!) That response would weaken the southward penetrating capability of these COLD air masses and cause the butting frontal boundaries to migrate farther and farther north. Precipitation would then decrease world wide as a result of the northward jet stream migration and cause problematic drought, not increased precipitation! Again, the EXACT OPPOSITE of what Gore and the alarmists state. These recent heavy snows reaching far south from average are an indication that the earth is cooling based upon the laws of physics, and if you examine the US NCDC temperature record for the continental US, that is precisely what we find, a decrease in temperature during the last decade that trended downward by .67 degF or .37 degC. GLOBAL temperatures remain static, with no statistically significant change and that is attributable to the thermal inertia of the oceans that have been receiving a higher amount of solar radiation from the sun during the last period of high solar activity that terminated after the peak of solar cycle 23 back in the year 2000. Below, are the surface LAND based records of the continental USA for the last 10 years, COOLING at the rate indicated:

Annual 2000-2010 Data Values: Annual 2010: 53.75 DegF Rank: 3

Annual 1895 - 2000 Average = 52.76 degF

Annual 2000 - 2010 Trend = -0.67 degF / Decade
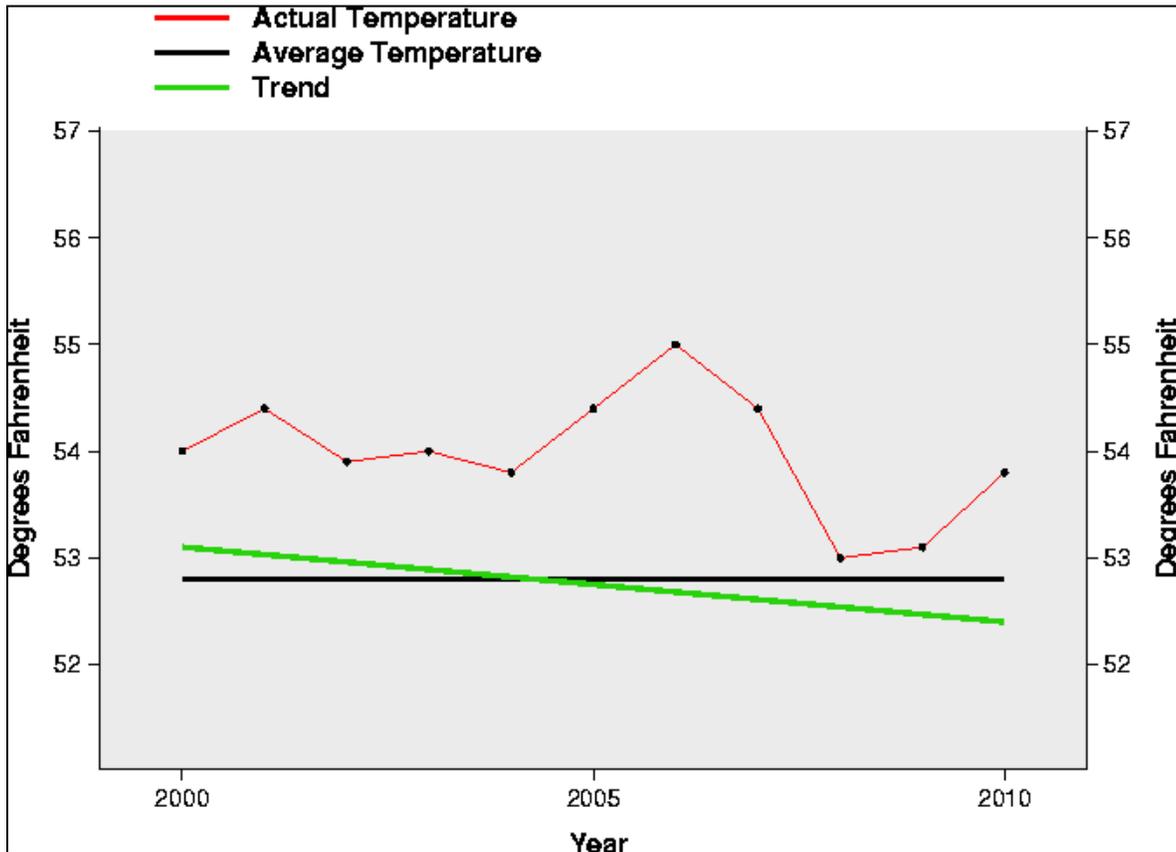
 Mr. Gore and any other scientists are wrong when they claim warm air masses "soak up moisture like a sponge" as we determined that the differential vapor pressure between the air and a body of water are what determines evaporation, and larger differential vapor pressure is NOT generated in the tropical environment as Gore seems to think. It is actually generated with COLD and very dry continental arctic air overrunning a body of warmer water, such as when arctic air spills out over the ocean or when it runs over the Great Lakes and produces lake effect snow. We also found from thermodynamics of heat transfer between air and water that it is much more difficult to evaporate water from the ocean with a body of nearly saturated air in a tropical region without adding a great deal of external energy, and most of any increased external energy is then used up

evaporating sea water rather than raising its temperature which is at direct odds with Gore and the alarmists who claim another consequence of their perceived scenarios is sea level rise and inundation of coastal areas. "Climate scientists" and alarmists are also wrong when they claim that any perceived external energy added from a source such as CO_2 blocking extra lines of Infrared radiation from the ground can warm the troposphere and increase the optical depth of water vapor. This cannot be true in light of the fact that adding more of a greenhouse gas such as CO_2 COOLS the troposphere in exchange for the higher emission altitude that creates a warming effect at the ground. That cooling of the troposphere would act to limit water vapors presence higher up and easily mitigate or terminate CO_2's effects. The only way such theory works with CO_2 is in atmospheres that do not have a hydrological cycle with a greenhouse gas like water vapor, which ultimately controls the earth's nocturnal radiation not only because it is much more powerful than CO_2 in absorbing infrared radiation, but because it can change phase, which allows it to change the optical depths, which become self correcting to maintain a mean optical depth that cannot be changed without adding a source of external energy from the sun. Walter Elsasser's work in atmospheric radiation from Harvard University established the controlling effect of water vapor on the earth's surface infrared radiation back in 1942 after Einstein had quantasized it through relativity. To study more of this, I encourage the reader to see Dr. Ferenc Miskolczi's paper entitled "The Greenhouse Effect in Semi Transparent Atmospheres".

I have been involved with operational meteorology, weather forecasting and weather instrumentation for 30 years. Never in my career have I ever run up against such utter incompetence and lack of understanding of basic principles as I have in reading or discussing climate with advocates who are promoting human induced global climate change. In most every scenario or explanation, total error or seriously flawed logic is presented but needed to tout the human caused warming claims. Gore and his sycophants (including James Hansen from NASA who professes the earth is at a catastrophic tipping point with CO_2 levels) are playing fast and loose with physics to create frightening and false scenarios that could never happen in reality, but are being used to attempt to flog and beat the public into a mental submission of "taxing and regulating" a solution that comes from the proclaimed "climate emergency". More tragic is the general acceptance of this trashing of science in public education of today's

youth. From my perspective, this problem was created by involving politics in science which has led to deliberate distortion and alarmist propaganda for the purpose of proposing a solution of taxing and regulating carbon emissions which will accomplish nothing except to enrich the special interests promoting the claims. Those special interests include government agencies themselves, academia and "green" energy companies, consultants and "carbon traders" like Mr. Gore, who aspires to be the first carbon billionaire selling "carbon offsets". And since the public will receive no perceivable benefit by these insane proposals of taxing carbon, the entire idea amounts to nothing more than a wealth redistribution scheme mandated by government and collectivists to redistribute wealth for self enrichment. That is nothing short of stealing from the public at large.

Since the United States is now in a financial crisis of its own and the newly elected Congress needs to find cost saving measures, I would suggest it is time to look at higher education. Most of the alarmist propaganda is emanating from there, and it is apparent that the propaganda chases federally funded grant money. These institutions have pillaged the taxpayers for nearly 100 billion dollars for "climate research" that has proven nothing in relation to CO_2 causing climate change but has falsely claimed a causation relationship of CO_2 to rising global temperatures that stopped warming over a decade ago, but yet the CO_2 levels have continued upward. Higher educational institutions are being used by academics as propaganda centers to promote the dogma of human caused global warming and being given a false sense of credibility under the Ph.D. "union card" to promote more taxation that feeds the research trough. The propaganda is being used to brainwash youth at the K1-12 levels to condition youth to accept it without questioning as the youth grow older and are able to reason and analyze better. A multitude of expansion of federal agencies as well as new ones have also been created that are supposed to deal with a "problem" that has not even been proven to exist! Every one of these agencies should be abolished and academia as well as James Hansen from NASA held accountable and forced to justify the claims and scare tactics that have been used to build them up.