THE RH DECEPTION

Clifford E Carnicom
May 21 2001

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Much ambiguity has been circulated regarding the effect of humidity upon the persistence of contrails, or vapor trails. Numerous sources, without exception, state that such vapor trails (composed of water vapor by historical and conventional definition) may persist for "extended periods" under conditions of "higher" relative humidity. Unfortunately, it is apparent that quantitative information attached to these repeated generalizations is lacking. Even the recently issued "fact sheet" under distribution by a combination of federal agencies, including the EPA, NOAA, the FAA and NASA falls victim to this same deficiency.

Observations by this researcher as well as countless citizens of the country for the past 2 1/2 years have revealed the glaring inconsistencies of the official positions and statements made in contrast to the physical reality of a tragically altered atmosphere resulting from the aircraft operations under examination. These records have been most dramatically illustrated in the arid high desert regions of the southwestern United States, where the physical contradictions with the proffered official positions are at the level of absurdity.

The presentation made herein will demonstrate a realistic, and I might add, quantitative assessment of the expected effect of humidity upon what we all now witness on a day to day basis. The foundation of this argument will rest on what can be called a "Relative Humidity Thought Experiment", which seeks to establish a realistic model upon which to base any quantitative examination. This work can be compared at a later point with a rather interesting discussion and dialogue between a curious citizen and three scientists from the United States Department of Energy on this same topic. That discussion follows at the end of this report.

Let us begin by imagining one of two extreme situations at either end of the relative humidity scale. To start, imagine you are in the middle of a fog bank, and an aircraft whizzes by your face leaving the most dense vapor trail (composed of water vapor, of course) possible from the exhaust emissions. Let us assume that we hold the temperature constant for these experiments. The question is, would that trail evaporate? Would it dissipate? The expected answer must be no. Although the visible vapors would eventually mix with the surrounding fog bank, they would not change form. This leads us to conclude that if the atmosphere was at a pre-existing level of saturation (i.e., 100% relative humidity), a vapor trail would not be expected to dissipate or evaporate, although it would continue to mix with the surrounding environment.

Now examine the opposite end of the spectrum. Imagine you are in the desert, the driest desert possible, and the air around you has absolutely no moisture within it (i.e., 0% humidity). The same aircraft zooms by your face, and

leaves you with the same question, will the trail evaporate or dissipate? The answer this time must opposingly be yes, and it must dissipate at the maximum rate that is possible for the given temperature. So with the desert, a maximum rate of evaporation is achieved, and for the fog bank an evaporation rate of zero is earned. To assign a sense of scale to this problem, let us call the maximum attainable rate of evaporation as 1 and the rate of zero evaporation as, well, zero.

It is now time to introduce the model. First, it shall be done narratively, and secondly, within the world of mathematics. The conceptual basis for the model is as follows:

The rate of evaporation is inversely proportional to the humidity itself.

This is the fundamental premise of this work which must be examined with a fair degree of thought. Conceptually, this premise states what has just previously been reviewed. It states that the greater the level of relative humidity that exists within the atmosphere, the slower the rate of evaporation of moisture within it. Conversely, the lower the level of moisture within the atmosphere, the greater the rate of evaporation. Both of these tenets are fundamentally sound, as is demonstrated through the thought experiment described earlier. It will be of interest to scrutinize the mildly variable Department of Energy – Argonne Laboratory responses stated at the end of this report which, incidentally, have provoked this inquiry.

We must now convert the conceptual formulation into a statement of mathematics to achieve any quantifiable results. It is as follows:

$E = (1 / k) * RH + C$

In this equation, E represents the rate of evaporation, and RH represents the relative humidity itself, and it will be expressed as a decimal value (100% = 1.0; 0% = 0.0). C represents an arbitrary constant, and k represents a proportionality constant.

For those with an interest, this equation results from the differential equation:

$dE = (1 / k) * dRH$

where dE represents the instantaneous change in the evaporation rate and dRH represents the instantaneous change in relative humidity.

This equation is an ordinary, first order and separable differential equation. It can therefore be readily solved through integration of both sides of the equation. This leads to the general solution given above.

We now need to solve for k and C. This can be accomplished with the initial conditions that we have already discussed within the thought experiment.

The first case is that when RH = 0, E = 1.
Therefore,
$1 = 0 + C$

or C = 1

The second case is then when RH = 1, E = 0.
Therefore,
0 = (1 / K) * (1) + 1
or
0 = (1 / K) + 1
or
K = -1

Therefore our specific and final solution is:

E = 1 – RH

Non-linear model extensions of the current discussion have also been considered, with no real impact on the final conclusions that result from this work.

It is now of much interest to examine the results of using this equation under the range of circumstances that can be expected in the real world. The results are somewhat enlightening, especially with respect to the abundant generalizations that have been included within the many official responses to citizen inquiries regarding the aerosol operations.

Here is a tabulation of the results, where the relative humidity will now be expressed as a percentage for convenience sake. Recall that a rate of evaporation of 1 means that maximum evaporation will occur at the given temperature, and zero evaporation means that no evaporation will take place (i.e., hydrostatic stability has been achieved).

Relative Humidity(%)	Rate of Evaporation
0	1.0
10	.90
20	.80
30	.70
40	.60
50	.50
60	.40
70	.30
80	.20
90	.10
100	0.0

We can also translate these results into a tabulation of a “persistence factor”, i.e., if the rate of evaporation is zero, the vapor trail is expected to persist indefinitely (disregarding any mixing of mediums within the environment). Therefore the reciprocal of the rate of evaporation leads to this factor of “persistence” under the circumstances considered.

Relative Humidity(%)	‘Persistence’ Factor
0	1.00
10	1.11
20	1.25
30	1.43
40	1.67
50	2.00
60	2.50
70	3.33
80	5.00
90	10.00
100	Infinity

This means for example, if a vapor trail under conditions of 0% humidity was, hypothetically, to last for 10 seconds and the relative humidity was instantaneously increased to 50%, the trail would be expected to persist for approximately 20 seconds (2.00 *10sec) instead. More realistically, if the relative humidity was 30% and a vapor trail was to last, hypothetically, for 15 seconds, and the relative humidity was suddenly increased to 60% (a reasonably high value under commercial flight conditions), the trail would be expected to last approximately 26 seconds ((2.50 /1.43) * 15secs.).

This formulation and the results now reveal some rather enlightening conclusions. Before embarking further, it is worthwhile to mention that the upper atmosphere at flight levels may generally considered as a relatively arid environment. It is not uncommon, as countless examinations throughout the previous two years plus have disclosed, for the relative humidity at flight altitude to range between 10 and 60 percent. This should not be surprising in any particular way, since it is easily established that most cloud layers form at lower altitudes where the moisture levels commonly exceed relative humidity levels of 70%. This is not the case for upper regions of the atmosphere, which is the favored domain of jet aircraft traffic. As a case in point, during congressional hearings regarding the environmental effects of projected supersonic flight traffic at 65,000 ft., the expert testimony explained that “persistent contrails” would not be a factor as the relative humidity at that level commonly is approximately 5%. My own computations and analysis of radiosonde observations as well as those of those of the witness in this case are in complete concordance. It is fair to state that the upper atmospheric regions are generally more arid than the lower counterparts, with relative humidity levels commonly within the range that has been stated. Extreme upper levels of relative humidity within the flight corridor region are uncommon, and again are in complete agreement with our common sense observations. It is interesting to note that one study involving persistent contrails by NASA focussed on a SINGLE persistent contrail under conditions of uncharacterisically high relative humidity. The examination of relative humidity data (reported with respect to water vapor per conventional standard) in a quantitative sense is now required for anyone

that wishes to justify the existence of so-called “persistent” vapor trails on a regular basis. This is the epitome of requirements if the area under consideration is the arid southwestern desert of this country, where this work has been developed.

It may be recalled that an earlier study assessed the expected times for contrail, or vapor trail dissipation. The results of that model are in complete agreement with the observation, common sense and experience base that has accumulated during the last 50 years, i.e., vapor trails routinely dissipate within a matter of seconds, and the extreme range extends at most to a couple of minutes under usual conditions. That particular model was developed independently of any effects from relative humidity, and it is a function of the particle size, the surrounding temperature and the amount of energy placed into the system via solar radiation.

If we now wish to develop the model further, and include the expected effects from relative humidity, we learn that the model is not affected significantly by any commonly encountered levels of humidity at those upper altitudes.

Even at a relative humidity level of 70%, which must be considered quite high for the commercial flight domain, a factor of 3.3 against the maximum evaporation rate of a completely arid environment must be considered as relatively minor. Most of us would have a difficult case of making the argument of a persistent vapor trail within a moisture-free environment, and more realistically we would expect dissipation within a matter of seconds (disregarding deliberate aerosol injections). To multiply a few seconds by a factor of 3.3 leads to no real world change in the situation at hand.

One of the accomplishments from this most current analysis is that generalized statements regarding the effect of humidity upon the duration of vapor trails can no longer be accepted without further definition. It can be seen that the effects of humidity upon vapor trail evaporation rates are generally insignificant and minor within the historical reference frame of human experience, physics, chemistry, meteorology and common sense observation. To offer any extraordinary and exceptional circumstances to the American public as an explanation for the events now witnessed on a regular basis is deceptive, disingenuous and a prevarication. It is important that the citizenry educate themselves on the facts and physics of the world around themselves to serve the purpose of establishing the truthfullness of that which the public is subjected to without their consent.

That truth now includes overwhelming evidence that the populace has been systematically subjected to a covert, extensive and sustained project of aircraft aerosol dissemination without their consent. Biological components repeatedly identified within atmospheric samples during that same time period remain equally distressing and disturbing. Let it be reiterated that the United States Environmental Protection Agency remains in possession of one of those samples referred to, and to date refuses to acknowledge the existence of that sample or to disclose the results of any testing.

The need for accountability, disclosure and Congressional hearings to serve the rights of the people of this nation and the world remains paramount.

Clifford E Carnicom
Authored at Rio Chama
May 19 2001

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