APPALACHIAN TRAIL CONSERVANCY

Prepared for ATC by Lenny Bernstein

Topic 6 – Does Everyone Agree with the Projections for Climate Change?

Not every scientist agrees with the consensus view of the causes and risks of climate change that can be found in Al Gore's *An Inconvenient Truth* or the reports developed by the UN's Intergovernmental Panel on Climate Change. Some feel that the projected impacts under-estimate the threat, while others question the certainty with which projected impacts of climate change are presented. This is not surprising. Scientific knowledge advances when scientists debate and challenge the findings of other scientists. There is rarely a scientific finding that is so obviously true that it is immediately agreed upon by all experts in the field. What is different is that climate change is an important political issue, and normal scientific debate is headline news. Advocates for and against control of greenhouse gas emissions seize on each new scientific finding to support their political positions.

A few of the more common questions about climate science are discussed below.

- Is climate science "settled?"

  Some environmental advocates, as part of their argument for control of greenhouse gas emissions, have stated that climate science is settled. No science is ever "settled." Every new finding opens up new areas for research. However, the basis for concern about human impacts on the climate system is well-established. Human activities are driving an increase in atmospheric concentrations of greenhouse gases, and this increase will lead to warming. Warming will lead to a wide range of impacts that will, in general, have significant, negative impacts on human society.

  The question we should be asking is whether we know enough to act. With its climate change resolution, the ATC Board of Directors stated that it knows enough to take action to reduce ATC's own greenhouse gas emissions and to support appropriate federal and state policies to reduce these emissions.

- Is the connection between carbon dioxide emissions and climate proven?

  Carbon dioxide affects climate through the Greenhouse Effect. The Greenhouse Effect is real. It can be demonstrated in the laboratory. Shining simulated sunlight on a flask of carbon dioxide will cause its temperature to rise. It can also be demonstrated in nature by comparing the temperature of the four inner planets of the Solar System (Mercury, Venus, Earth and Mars) as shown in Figure 11. Even though Venus is further from the sun, it is much hotter than Mercury. Venus' atmosphere is 96% carbon dioxide, whereas Mercury has no atmosphere and therefore no carbon dioxide. Earth is about 60^{o}F warmer than it would be if

it did not have water vapor, carbon dioxide and other greenhouse gases in its atmosphere. Any phenomenon that traps heat in the atmosphere will affect climate.

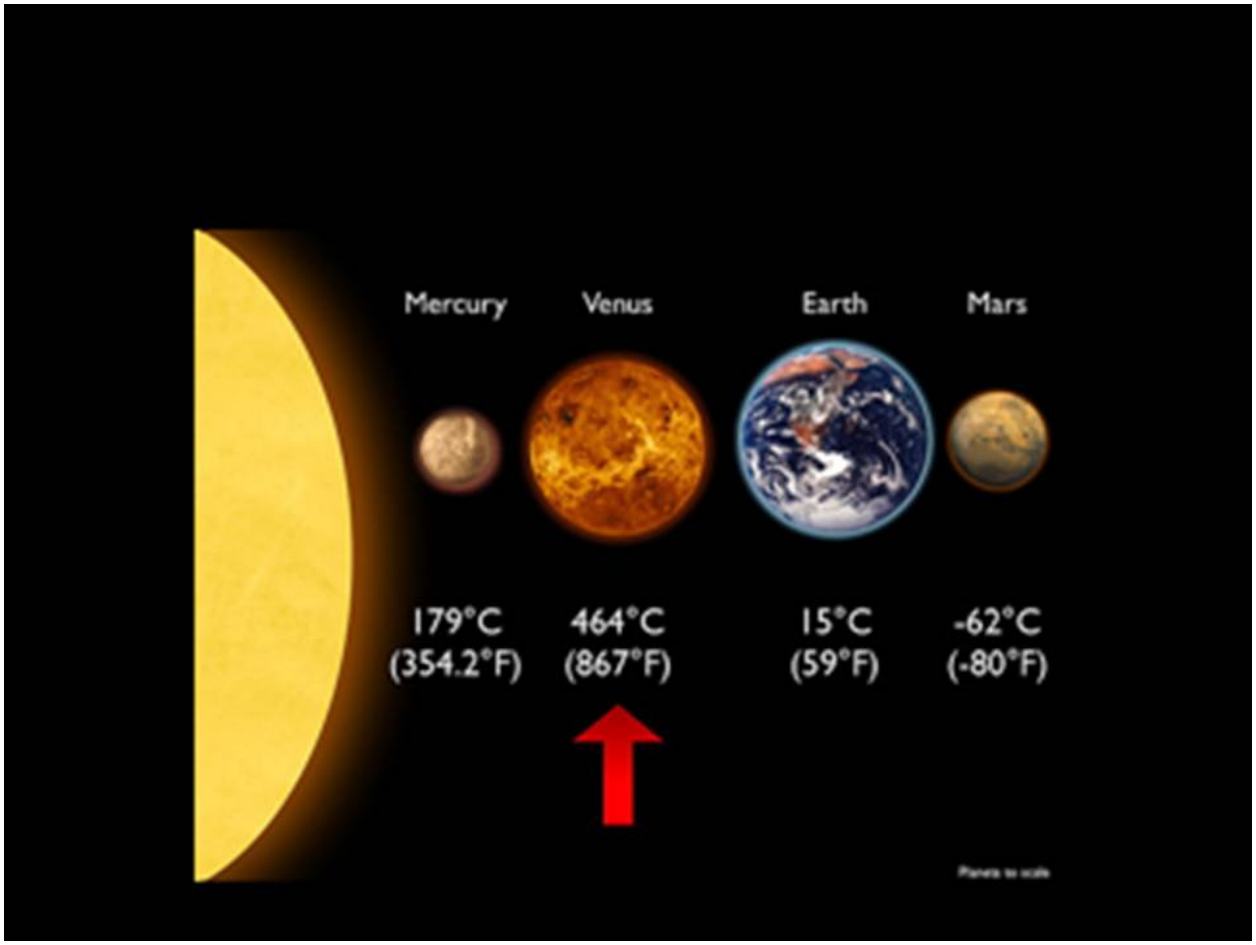

Figure 11 – Surface Temperature of the Four Inner Planets
Source: Hawk Metheny to supply

- Is a new Ice Age imminent and do we need carbon dioxide to avoid it?

  The best scientific evidence indicates that Ice Ages are the result of changes in the Earth's orbit which change its orientation to and distance from the sun. These occur on three cycles, the longest of which is 100,000 years. Astronomical measurements indicate that the Earth is at least 30,000 years away from entering another Ice Age. Ice core data indicate that during the last Ice Age, global average temperature was 7 to 13^{o}F lower than it is today. Higher concentrations of carbon dioxide and other greenhouse gases would counteract the temperature changes due to changes in the Earth's orbit, but purposely raising global average temperature by 7 to 13^{o}F during the 21st century in anticipation of an Ice Age that is not expected to occur for at least 30,000 years seems fool-hardy.

- Do we need higher levels of carbon dioxide to increase crop growth and feed the world's growing population?

  In photosynthesis, carbon dioxide and water are combined to make plant matter. Put another way, carbon dioxide is plant food. Experiments have shown that if additional water and other plant nutrients are provided, increasing carbon dioxide increases plant growth. However, plants cannot use unlimited amounts of carbon dioxide. Many important food crops see only small benefits from increased carbon dioxide. The question is whether the benefits for plant growth from increased carbon dioxide in the atmosphere are worth the negative climate impacts that would occur.

- Can the climate change experienced to date be explained by climate cycles?

  Climate cycles are an important part of the climate system, and can lead to either temporary warming or cooling. Atmospheric concentrations of carbon dioxide, methane and nitrous oxide, the three most important man-made greenhouse gases, are now significantly higher than they have been for more than 650,000 years, and all are projected to increase over the next few decades. The warming due to these higher levels of greenhouse gases has to be added to the warming or cooling due to climate cycles. (See Figure 5.) As shown in Figure 10, natural climate changes would have led to a slight cooling over the past 50 years. But even if the warming of the last century was due to climate cycles, increasing greenhouse gas concentrations will soon lead to warming that is outside the range of known climate cycles.