

Mother nature can't keep up with man's CO2

I have been honored to teach climate science in the public schools the past two years.

My experience with students is that most generally believe that climate change is a natural process which has been occurring throughout earth history. Surveys of adults indicate that they overwhelmingly believe the same and I happen to agree with them. Thus, when teaching I make this my starting point - the Natural Causes of Climate Change.

The climate of any location on Earth is related to its distance and angle from the sun. The closer to the sun and the more direct the angle the warmer the climate.

Everyone is familiar with the sun being lower on the horizon in winter and higher in summer. That change is caused by the earth's tilt in relation to the sun. As nearly every student knows, the North

Viewpoint

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Pole is pointed at the North Star in both summer and winter. Thus, the Earth cycles annually in its relationship (angle) to the Sun to maintain a constant stellar relationship.

What causes natural climate change; slow, gradual, cyclical changes in this tilt angle plus the ovality of Earth's orbit. These changes are small with extremely long cycles, measured in many thousands of years.

These changes do not change the overall amount of solar energy being received from the Sun. They merely redistribute the energy for the location received, and they change the length and severity of the four seasons.

These orbital cycles additionally impact ocean currents, ocean temperatures and polar freezing and thawing. While the orbital changes are the "trigger" for natural climate change, it is the ocean temperature driven changes in the concentration of CO2 in the atmosphere which is the "bullet" causing surface temperatures to change. Because these changes are cyclical, they and their impacts change naturally back in the other direction.

All of the preceding is described in Dr. James Hansen's, 7-23-2015 paper titled, "Ice melt, sea level rise and superstorms: ..." Dr. Hansen is lead U.S. Representative to the United Nations Intergovernmental Panel on Climate Change.

The oceans play an important role in Earth's natural balance of atmospheric CO2. Overall, there are 100s of times more

CO2 dissolved in ocean water than contained in the atmosphere. Similar to "soda pop," the solubility of CO2 changes with water temperature. Warm water expels/releases CO2, while cold water absorbs increasing amounts of CO2.

With the orbital changes described above, the earth "re-balances" itself naturally. As Earth re-balances to warmer oceans, higher concentrations of CO2 in the atmosphere cause additional warming due to the "Greenhouse Effect."

This process continues until the orbital changes apex and turn in the other direction, diminishing their impacts. Four of the five "great extinctions" in Earth history are believed to have been caused by natural climate change - the exception being what we believe to be "a meteor strike."

Now enters mankind. Humans through our respi-

ratory processes are part of Earth's natural CO2 rebalancing process. On the other hand, man also produces CO2 through our industrial processes. Mankind's extra CO2 from industrial processes has no equivalent natural rebalancing mechanism. Mankind's industrial activities release approximately 5.5 gigatons of CO2 into the atmosphere annually.

This is overwhelming nature's ability to keep up. Eighty percent of this is the use of carbon fuels, and 20% is deforestation. Today, we are experiencing levels of CO2 in the atmosphere which nature has not experienced in more than 800,000 years.

Pure and simple, that is our climate dilemma, and the planet needs your help to address this.

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