

# CLIMATE CHANGE / GLOBAL WARMING & POLLUTION - DEBATE: SOCIETAL IMPACT

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**Abstract**— “Climate Change” & “Global Warming” have not only become hot topics researched by many researchers but also key issues in political contests in many countries, particularly in United States. It entered the geopolitical arena, when the UN set up an Intergovernmental Panel to conduct research and their Committee won the Nobel Prize also in 2007. Since then, more research funding has become available and not only is UN IPCC continuing its research work (Pachauri, R. K., Meyer, L. A., et al, 2014) but also more universities and centers have started probing into various theories relating to Global warming and the more important issue of Pollution has got clubbed into the Climate change issue. “Global warming” & “Climate Change” have become important phrases in the Political vocabulary. This author wonders whether it has become a Political Hoax!

“Global Warming” has also instilled apocalyptic fear amongst many societal groups. Unfortunately, at least during the initial phases of this debate, even though “Pollution” had attracted geopolitical conventions and accords, “Pollution” had taken a back burner role. Now, more and more groups have started giving greater prominence to the issue of “Pollution”. Global Climate Change cannot be caused by discrete emission events (human intervention) whose spatial and time scales are much farther apart (greater than at least 3 decades) than the spatial and time scales of the known natural global phenomenon like Ice age, etc. The main impact of such events is on pollution and human health. ‘Developed’ countries like US is continuing to pollute and the countries like India & China, which are mainly blamed for pollution have not been able to reduce pollution and they blame it on their need for societal upliftment. As a part of that societal progress, even contribution from airplane (manned/unmanned) emission is also increasing. Unfortunately, as can be seen from the E-GAP, ICAO symposium held in September 2015, even ICAO appears to be encouraging some research on Climate Change without giving much attention to the effect on pollution and human health. This paper addresses both issues. It tries to disprove the “Global Warming” scare by presenting arguments based on the behavior of nonlinear dynamical systems and briefly discusses the impact of pollution from various sources on society (Shiva Prasad, B. G., 2015).

**Index Terms**—Climate Change, Global Warming, Climate Change, Pollution, Anthropogenic, Nonlinear Dynamical System

## 1 Climate Change - Introduction

In this author’s view, in addition to the fact that enough, accurate data to evaluate the continuous, global temperature Increase (considering the scales involved) do not exist, this paper presents arguments (based on nonlinear dynamical systems theory) to counter the global warming theory. The data concerning direct temperature measurement is highly insufficient both from a spatial and temporal view point. It is not easy to measure temperature to an accuracy of  $0.5^{\circ}\text{F} - 1^{\circ}\text{F}$  over a large area. Even in advanced countries like US, such accurate data does not exist over the complete area of US. Pointwise mapping cannot be undertaken over large regions even using scanning techniques. Satellite mapping cannot maintain that accuracy uniformly over the complete mapped area. There are several parameters involved in the resulting total uncertainty of these measurement techniques. In addition, the temperature is turbulent and varies with respect to space and time. The height above the earth or water surface, where it needs to be measured and the nature of surface or terrain, where measurement should be made are all issues which are important. All these measurement techniques and devices are relatively new (not more than 50 - 60 years old) compared to the apocalyptic events known to mankind!

One should also ask the question, how much temperature data is available inside the earth to come up with an average temperature of the earth and its rate of change? Is such average temperature of the earth increasing? Are human beings

responsible for such increase if at all it exists?

In many countries like for example in India; in Bangalore (a big city) people talk about Global Warming. Even this author has felt much warmer temperature in Bangalore on some days than what it used to be 30 - 35 years ago. However, a careful thinking (does not require a novel analysis!) would suggest the reasons – they being enormous population growth resulting in use of large energy outputting gadgets and devices like automobiles, air conditioners, industrial machinery, etc. one should note that on a relatively colder day, even human beings can supply heat to the colder environment. On the other hand, if the same person moves from a big city to a remote village, that person would feel much colder.

Some researchers have offered some data concerning the melting of polar cap as another supporting evidence of global warming. However, one should note that such melting of ice could happen if the polar region gets exposed to energy shocks as for example from underwater acoustic shocks from submarines, even high intensity sonic booms from flying vehicles, cosmic radiation shock from abnormal solar events and in general, shocks generated from some band of the electromagnetic spectrum. One could also surmise a severe cold weather spell over the arctic region say in another 50 years (this is just a guess for explaining the counter argument) which could cause refreezing.

In some sense, the “Global warming” scare is analogous to the “fossil fuel extinction” scare created a few years ago with

very little data concerning the extent of storage inside the earth and a lack of detailed analysis and understanding of the mechanisms of fossil fuel production, transport & storage inside the earth. This type of scare is perhaps fueled by misinformation spread through various sources and hesitation to accept opposing points of view. Cook J. (2019) has provided an extensive discussion and review of the impact of misinformation and public opinion on the issues of Climate change. As this topic has gained political importance, it has attracted media attention and become a very popular topic. It has also attracted plenty of researchers and research funding, most of which subscribes to the popular belief of anthropogenic warming of the earth. This has led to a stiff opposition of any contrary views based on sound scientific basis. Hence researchers who oppose or propose theories contradicting global warming find it hard to gain a foothold. This paper is proposing one such theory based on simple nonlinear system behavior modeling to contradict the global warming concept.

## 2 Nonlinear System Theory Contradicts “Global Warming” Concept:

In a nonlinear dynamical system, events/mechanisms do not interact if their time scales are separated by several decades (about 3 decades or more). The above statement is true for spatial scales also. Lack of such interaction destroys the small scale or discrete events. On the other hand if the scales are closer to one another then nonlinear interactions do occur and generate other events, thus amplifying and sustaining the small scale events. An example would be the coalescence and coherence of turbulent bubbles in a fluid like water. If the bubble sizes are too far apart, the small bubbles gently merge with the larger ones. If the sizes are closer to one another, then the interaction is more active and can produce bigger bubbles and sustain themselves over a longer period.

Global climate change is a very large time scale ( $> 10^6$  years) event. Known apocalyptic earthly events (ice age, etc.) have occurred millions of years ago. Also, the spatial scales are huge (planetary scales), just considering the solar system alone. On the other hand, the claimed, big natural human interventions (for example – emission from automobiles, industries; hurricanes; even nuclear accidents) are in the realm of much smaller time scale (maximum of 1 – 5 years) and are confined to a much smaller spatial scale & hence cannot influence global climate. For example, on the average, a very big power plant might run continuously for a period of 1 to 5 years without shutting down for maintenance, etc. Such power plants (the energy releasing part) might have a maximum spatial scale of 1 mile, while the spatial scale of the earth is about 8000 miles and are separated by at least 3 decades. Hence such human interventions cannot influence the observed frequency of global climate change.

In essence, global climate change deals with global scales, both spatial as well as temporal. The spatial and time scales relating to human interventions are much farther apart compared to the global scales, as discussed above. Hence human interventions will have no influence on global climate change.

In fact, if one were to extend this Global Warming scare argument to the entire universe, perhaps one might claim a destruction of the entire universe by say the solar system, following its apocalyptic destruction! However, one should note that there are trillions of stars in the universe, each in some

sense, similar to the solar system. The spatial and time scales, if any that can be assigned to the entire universe is huge and virtually not known. Some research groups in astronautics have been able to predict the spatial and time scales of big events of some stars in the galaxy based on observations of birth and death of such systems caused by black holes, using space based labs and telescopes. Other experiments like rendezvousing around and landing on comets to understand the material composition, etc. around such objects have been proposed and attempted in this century (Coverstone, V., et al, 2006). This could also, perhaps help in the estimation of such scales of terrestrial systems, where they originated from. This author had in fact pondered and proposed an idea for soft landing of recording and transmitting devices (acoustic and optical) on asteroids and comets and using them for a piggy back ride to send those devices in to outer space also for carrying out research on extraterrestrial signals, intelligent beings and objects. This author recently tried to propose such project to ISRO (Indian Space Research Organization) in collaboration with US researchers [following a Phone Discussion with Coverstone, V (2018)] for attempting the above mentioned piggy back ride type of research experiments.

Although this paper dismisses the theory of Global Warming, human intervention can be demonstrated to produce climate change in laboratory scale experiments and also over smaller areas/regions. Some examples would be Forest Fire, Cloud Seeding, etc. One could use the technique of cloud seeding along with UAV's or Drones to produce or divert rain into river catchment areas along a river flow path. This would involve cloud management and transport using Drones to change the local atmospheric pressure, wind velocity, temperature and move the clouds into the required regions (perhaps at multiple, feasible locations) and produce precipitation in the flow path of rivers. However, even this would depend on the atmospheric conditions in the vicinity, like pressure, velocity, temperature, their spatial and temporal gradients and the energy contained in such cloud and wind systems, and might not succeed always, as the momentum and energy involved in atmospheric systems cannot always be overwhelmed by artificial techniques. However, this author thinks that it is worth while trying such experiments first on a laboratory scale and depending on the extent of success, expanding it to small scale field experiments and then applying it to full scale field trials.

## 3 Pollution

Impact on human health & society occurs due to pollution rather than climate change. Hence pollution is more important than climate change and the main impact of human interventions is on pollution and human health. ‘Developed’ countries like US is continuing to pollute and countries like India and China are offering very little help to control pollution. The important sources of pollution are from transportation vehicles including manned and unmanned aerial vehicles (Airplanes & Drones), and industrial effluents. Research on auto emissions started since the advent of automobiles and is now progressing under the label of “green fuel”, “greenhouse gases”, etc. New, adaptable and optimizable engine and fuel research has continued and automobiles are switching from diesel to gasoline/petrol to ethanol – mixed fuels – LNG, LPG – bio fuels, etc. Green Technology fad has rightly given a boost to initiation

and advancement of research for developing alternate and renewable energy technologies. This has given rise to hybrid vehicles. Some of them claim energy efficiency improvement by capturing even the frictional energy generated during braking! Research has progressed for developing noiseless, electric automobiles. There is considerable debate regarding the merits and demerits of all electric vehicles including the issue concerning lack of noise. In many countries and cities like Bangalore, where road noise is required to warn pedestrians and other vehicles, noiselessness becomes a disadvantage. Also, if one were to consider the overall pollution economics involved in manufacturing the battery or fuel cell and the gadgets required in battery charging stations, some such systems might not compete well. Similarly researchers working in the area of alternate/renewable energy have tried to probe into the overall energy/pollution economics aspect for assessing the contribution, if any to energy efficiency, conservation, pollution reduction and cost.

In a similar fashion, research is continuing to mitigate greenhouse gas emission during industrial manufacturing and production processes. As with automobiles, technology is also being developed not only for recovering energy from industrial effluents but also for reducing greenhouse gas emission. Carbon fixing and trading have become new topics in R&D. Similarly attention is gradually being paid to pollution arising from particulate emission, which is more dangerous to human health, as even surgeons might not be able to remove such particulates from the lungs!

The issue of Climate Change and the associated research funding has perhaps contributed to a better understanding of atmospheric turbulence, climate systems and improving weather prediction techniques. Turbulence models based on laboratory scale experiments are being extended to atmospheric systems. Data gathering from hurricanes and other atmospheric systems using airplanes are being used to support such research and validation of CFD&HT predictions. Real time CFD&HT predictions supported by airplanes and Drones have and could lead to saving of lives from catastrophic events like tropical storms, lightening, hurricanes, tsunamis, etc.

This author also likes to propose the concept of continuous monitoring of weather using airplanes, drones, radar and networked communication systems. Such improved data gathering techniques could further help better tuning of turbulence models and improving overall weather prediction.

This paper concentrates on the contribution to pollution from airplane (manned/unmanned) emission only. Unfortunately, as can be seen from the report of the E-GAP ICAO symposium held in September 2015 (Hupe, J., 2015) ICAO appears to be encouraging some research (see Fig. 1) using Drones with very little attention to its societal impact.

### 3.2 Impact of Jet Exhaust

Just airplane (manned) flight contributes to about 3 – 4 % emission. Figure (2) gives a qualitative picture of the amount of harmful smoke contained in the Jet exhaust of airplanes.

With the development of UAV's, and associated technology for its application for carrying out various tasks, frequent and even continuous drone flights have become a common sight.

However, a pollution researcher is also concerned about the impact of daily continuous drone flight concentrated over small



CAEP Projection of CO<sub>2</sub> Emissions to 2040

Ref: ICAO website: [Http://www.icao/environmental-protection/Pages/AlternativeFuels-questionsAnswers.aspx](http://www.icao/environmental-protection/Pages/AlternativeFuels-questionsAnswers.aspx)

Fig. (1): Measures for Reducing Net CO<sub>2</sub> Emissions



Ref: EPA430-F-00-005, September 2000, [www.epa.gov](http://www.epa.gov)

Fig. (2): Contrails forming behind the engines of a Lufthansa Airbus A310-330 cruising at an altitude of 35,100 ft (10.7 km) as seen from Research aircraft. (Photo: German Aerospace Center (Deutsch Zentrum für Luft- und Raumfahrt (DLR)), Oberpfaffenhofen, Germany)

regions.

Daily scene of Jet trails from Drones not only increases humidity but also spreads cloud cover (see Fig. 3). A fluid dynamicist / turbulence researcher cannot miss the daily scenery of turbulent art in the sky, sometimes colorful also! In fact, one might have noticed a Rainbow art creation! The following questions arose in this author's (a student of turbulence) mind after he started seeing incessant, daily Jet trail in the sky in

Ohio (USA) and the associated turbulent art from the emission. Now he has started seeing (though sparingly) similar drone flights over Bangalore!



Fig. (3): A snap shot taken at Ohio, USA, of the Jet trail left by a Drone with the associated cloud cover

Is it for understanding Turbulence or Atmospheric Turbulence? Former and to a considerable extent even the latter postulate can be ruled out as very little conclusions can be made by such experiments in a highly uncontrolled environment.

Is it for advancing Drone/Airplane fuel technology? – Is it not possible to carry out most of such research in static test stands?

Is it for airplane/RPV Pilot training?

Is it for understanding weather pattern?

Is it being used to prove “Global warming”? Is it really possible to tune/control the Global Climate? Or is it for local weather tuning? How effective is it?

Is it for helping military in war fighting? – Creating cloud cover or smoke screen for covering up airplane flight? In fact, in this author's view, it is impossible to hide an airplane (designing stealth airplane) over the complete electromagnetic spectrum! It depends on the jamming ability of the opponent!

In this author's view, irrespective of the objective, there is no doubt that it results in enormous pollution.

## 4 Conclusions

Simple nonlinear dynamical system principles do not support Global Warming theories. Global Warming issue has assumed political importance and can be called a Political Hoax! Pollution and its control should assume much greater importance to save human lives.

Ideas are proposed for application and further use of the present day advancement in aerospace science and technology like drones, space vehicles, communication systems, radar, etc. for:

- 1) developing airplane/drone based, linked digital systems for better weather (including cloud pattern) monitoring and prediction

- 2) developing drone based systems for cloud transport and tuning for precipitation control/management for enhancement in river catchment areas and flood mitigation in areas where rain is not needed
- 3) making use of asteroids/comets for piggy back riding type transport of recording and transmitting devices to capture and transmit signals from outer space to understand extraterrestrial objects and systems.

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