Global Climate Change by Vic Michalak
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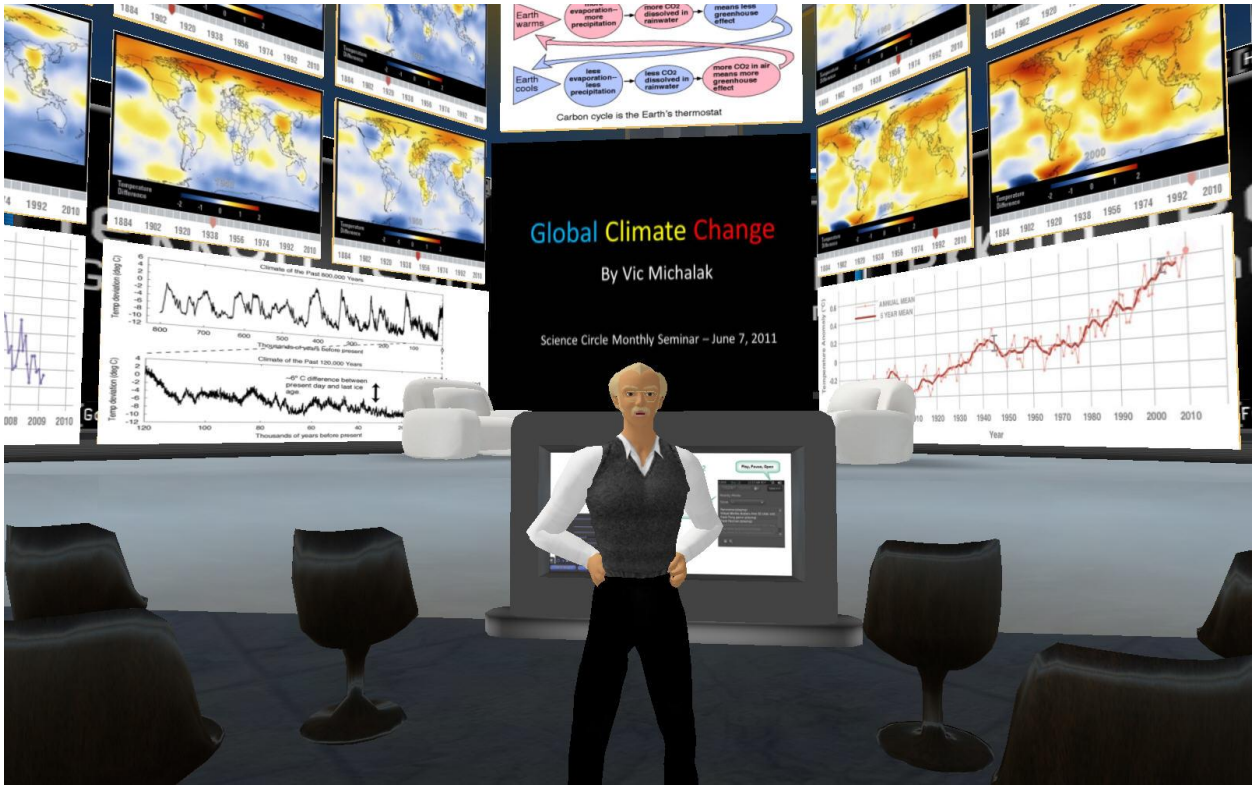

(Note: Vic used voice and text for this session.)

Vic Michalak: Always a nice day here, weatherwise... ☺
Well, as I said... people often show up a bit late in Second Life, but YOU are here and I am glad of that!☺
So let us begin the preliminaries...
I think with this small group that I will stand down here, like I do in the KISS sessions...
Welcome once again to the monthly seminar of the Science Circle!
If you are new to the Science Circle, we invite you to visit http://www.sciencecircle.org/ to learn more.
Every first Tuesday of the month we present a seminar on a science topic - see http://www.sciencecircle.org/index.php/past-subjects for past subjects and http://www.sciencecircle.org/index.php/sc-pdf for downloads of the transcripts.
Today I would like to share with you what I have learned about the complicated issue of global climate change.
I will present in voice and in text and the text will be recorded.
I invite you to comment as I go and to ask pertinent questions that I will try to answer during the presentation or at the end.
--- PART I - HOW THE GLOBAL CLIMATE WORKS ---
Our Earth is a remarkable place. It is the only planet we have found so far that could support the abundance of life as we know it.
The temperature and pressure at the Earth's surface is kept to a narrow range by physical and chemical feedback mechanisms that allow water to predominate in liquid form and to cover the majority of the surface.

THE CARBON CYCLE
Please note the large illustration at the center showing the carbon cycle and how it involves the atmosphere, water, land, and the activities of humans and other living things.
The temperature at the Earth's surface is regulated by the atmosphere above it.
A small amount of water vapor and carbon dioxide in the atmosphere create a greenhouse effect that warms the Earth more than would be expected by its position in the solar system and just enough for liquid water to exist.
The levels of carbon dioxide (CO2) and oxygen in the atmosphere are also regulated by life. Plants and some bacteria convert CO2 and water to carbohydrates using sunlight and they expel oxygen as a byproduct.
Animals use oxygen to help metabolize their food and they expel carbon dioxide as a byproduct. The oxygen in the atmosphere would disappear in about 5000 years without plants.
Toxie Cortes: a bit
Vic Michalak: Is this new?
I always like feedback from participants...㋡
Carbon dioxide captured in plants returns to the atmosphere when they die and decay or are burned or their fossil remains are burned as fuel.
Most carbon dioxide on Earth is locked up in rocks (carbonates) and some is released through volcanic heating, including plate tectonics.
Now note the illustration at the center above the carbon cycle showing a feedback mechanism that helps to regulate the Earth's temperature.
Too much carbon dioxide in the atmosphere will warm the Earth, which increases water evaporation and causes more rain. CO2 is brought back to Earth and the Earth cools and there is consequently less evaporation and less rain.
Cycles such as this one can take a million years or so to complete, which works just fine over the long term, but cannot respond fast enough to regulate rapid changes created by natural and human-created events.
THE ROLE OF THE OCEANS AND ICE
The large amount of water on the surface (covering 70% of the surface area) acts as a buffer by absorbing carbon dioxide when its levels in the air get too high (they coexist in chemical and physical equilibrium).
When air temperature rises, so does the temperature of the ocean, though this takes some time to occur. Warmer water melts sea ice and also expands, causing sea levels to rise.
Warmer water also absorbs more CO2, which raises the acidity of the oceans, which in turn dissolves carbonates that form the shells of coral and other animals, making it difficult for them to survive. [Increased ocean acidity is the subject of a whole talk in itself.]
Sea ice reflects sunlight, helps keep the oceans cold, and locks up fresh water. Warmer air and water melts ice on the oceans (notably in the Arctic) and on land (notably in Greenland and Antarctica). [The effects of melting ice is another subject of a whole talk.]
Arisia Vita: high
Vic Michalak: --- PART II - THE ANTHROPOCENE EPOCH ---
In March of 2008 I gave the first presentation for the Science Circle. The topic of that presentation was "The Anthropocene Epoch."
The strategy I used in that talk was first to describe what a geological epoch was in the vast time scale of the history of the Earth...
...then the concept and evidence that humans have changed the Earth so much in the last 200 years that this change had competed with natural forces...
...and finally how major scientific bodies have agreed with this assessment.
--- PART III - WHY JUST SHOWING GRAPHS DOES NOT WORK ---

What strategy should I use for this presentation?
I could present charts and tables and diagrams, and you can look around the room at those I will share with you shortly because they are evidence for global climate change.
But this issue is far more complex than just interpreting scientific evidence and that is the primary point I wish to make today.
If it were a matter of convincing a group of impartial scientists (if there are such people) of the conclusions based on data, then the overwhelming evidence would speak for itself.
If these same scientists could halt global climate change or even turn it back on their own, then this would still be an enormous international issue, but possibly one with a solution.
But global climate change affects the globe and everyone on it and will continue to do so from here on out.
Let me reemphasize the impact of my last statement with an analogy that many of you may understand.
Global climate change is a bit like gaining weight in that it can happen very slowly over many years before you really notice it.
You can lose weight though if you decide to change the patterns of your life and to expend the effort to do so, which is no easy task.
However, weight gain may also change your body in negative ways that are irreversible, even if you succeed in losing the weight, particularly the longer you are overweight.
The same may be said for global climate change. It is conceivable that humans could change the way they live so that we could halt or reduce the effects of how we are changing the Earth right now.
However, there are changes we have made that no amount of effort by everyone on the planet could reverse. It is simply too late.
--- PART IV - OBSTACLES TO OVERCOME ---
On the other hand, there are things we can do if we all work together.
But first we would have to overcome some seemingly insurmountable obstacles, which I categorize here;
THE DEGREE OF CHANGE
-- The Earth is very large and so the rate of climate change is very slow. Like the proverbial frog in water that is heated very slowly, the increase in temperature can go unnoticed as we adapt to the new climate.
-- Seasonal changes in temperature are much greater than the average trends in global temperature changes so an average increase of a couple of degrees gets lost as "background noise" and is not noticed.
-- Humans are marvelously adaptable to climate change and can live almost anywhere, particularly with the aid of technology. Not so plants and animals, but more on that in a moment...
THE COMPLEXITY OF THE PROBLEM
-- Trends only show up over time and the change is often not constant.
-- Global warming is a statistical trend over the entire globe. Regional changes may vary because regions are related in complex ways and many factors are involved.
-- The effects of global climate change vary by region. Some areas may simply get drier, not hotter. Others may get wetter instead.
-- Climate change affects many other systems, particularly the oceans. And the oceans are not affected in just one way.
For example, melting of water in the Arctic may change the Gulf Stream that brings warm water to Europe, thereby making Europe much colder than now.
-- Not all of the gases we are increasing in the atmosphere through our activities affect the atmosphere in the same way. Methane, for example, has a much stronger greenhouse effect than carbon dioxide, and sulfur dioxide actually helps cool the atmosphere.
THE SOCIAL ELEMENT
-- Charts and table and diagrams mean little to people who are ignorant about science and math.

-- Even if you can read a chart, so what if temparatures have risen a couple of degrees? So what if carbon dioxide has increased by a few hundred parts per million?
-- Even if there appears to be overwhelming data about the reality of global climate changes, this means nothing to those who mistrust science and think that you can hire a scientist to say anything you want that will support your view.
-- Politics are such driving factor for many that no amount of scientific evidence is going to sway them from whatever position is favorable to those in politics or for people they support.
-- Those who believe that business and the economy is paramount will have a difficult time changing their habits to counter what we are doing to the Earth because this costs money and eats into profits, at least in the short run.
-- Consumers also do not want to change habits or spend money on activities that will decrease their comfort.
-- Those who believe that religion is paramount have many reasons for not changing their ways.
They can believe that God will not let anything catastrophic happen to us or will bail us out.
They can believe that humans cannot change God's world unless God approves of this.
They can believe that we have a right to change the world because we were given dominion over it.
They might also believe that this is God's punishment for us.
RATIONALIZATION
-- How can we be responsible? Must be nature.
-- Climate changes have occurred in the past and yet the Earth and life is still here so how bad could it get?
-- Humans had nothing to do with the climate changes of the past so why would be believe that we are contributing to current change?
-- Climate is cyclical anyway, right? This must just be a cycle and conditions are going to reverse themselves normally.
--- PART V - EVIDENCE FOR GLOBAL CLIMATE CHANGE ---
Now for the charts diagrams I know you have all been anticipating!
How many came to see charts and graphs?? ツ
Be Ewing: Not me
Toxie Cortes: I did
and the rest ;-)
Vic Michalak: Since there are so many biases on this subject, a good, reliable, website to visit for statistical figures (the "vital signs of the planet") is NASA's "Global Climate Change" site at http://climate.nasa.gov/.
At this website you can view the indicators I have around the auditorium.
Let us start with time series on your far right showing the rise in atmospheric carbon dioxide levels in just this last decade.
Toxie Cortes: a cycle, and then a spike
Be Ewing: same here
druth Vlodovic: we ought to be looking at a natural cooling cycle if we only go by this graph
Templeton Tigerpaw: I'm not sure why things must be cyclic - in addition, the time is far too short to assess moderation effects or beneficial effects.
Be Ewing: yes -- and picture at bottome is looking yellow/orange to me
the one immediately to the left of the graph chart
Vic Michalak: Things are often cyclic because there are effects that try to bring it back to "normal" and other factors that affect it like volcanic episodes and ice ages and such..
Arisia Vita: concentrated in northern hemisphere?
druth Vlodovic: it goes east and west
Be Ewing: Arisia -- yes

diruth -- true also
Templeton Tigerpaw: Yes, we know things used to be cyclic, but we don't know how long it takes for oceans, forests, etc. to take up the non-cyclic CO2.
Also, as humanity gets richer it will have less emissions.
Be Ewing: but that could be cyclical too?
Templeton Tigerpaw: It's mostly populations below a $10,000 per capita income that are polluting.
Toxie Cortes: what are the techniques used to estimate the historical Co2 levels?
Vic Michalak: This data is reconstructed from CO2 trapped in ice cores dated back over the last three ice ages by NOAA, by direct measurement of the atmosphere more recently, and by NASA's Atmospheric Infrared Sounder (AIRS).
Templeton Tigerpaw: Also, you are omitting that the graph for innovation would be far outsteeping the graph for CO2 increase - and innovation is also non-cyclic
Vic Michalak: CO2 is now 390 parts per million in our air and rising. This may not seem like much, but is ominously high compared with levels in Earth's history.
The reason why this is ominous is because CO2 levels have so closely matched Earth's temperature over its history due to the way CO2 regulates the temperature of the atmosphere.
This set of graphs in the center show Earth's temperature over the last 800 thousand years and the corresponding CO2 levels.
There have been periods when the Earth was several degrees warmer and that was when CO2 levels were much lower than now -- note that the present level of 390 ppm is off the chart at the bottom.
Be Ewing: UV Index has been getting extreme in Dallas -- How does that relate to CO2?
Templeton Tigerpaw: You said it's already too late. That means that any conservation efforts would have to be drastic indeed and may not work even then. However, conservation efforts will impoverish us all and rob us of our best chance to change things positively, namely innovation. Innovation can only happen on broad-based consumption. A safe and sound environment is a consumer good.
Well, can you explain why the CO2 increase actually tracks the temperature increase?
Be Ewing: also between April and October EMF readings are really getting high -- at times unbearable for me
Vic -- is anyone watching the correlation between CO2, climate change and EMF readings?
Mona Heliosense: Yes
Vic Michalak: The small graph at the bottom right of the stage shows the rise in sea level ovder the last 140 years.
The current average rise since 1994 of 3.27 mm per year (an inch and a half per decade) or 3.27 meters per century is double the average over the entire 140 years.
Now look at the time series on your far left showing the decrease of sea ice during its September minimum in five year snapshots.
The current rate of decrease is 11.5% per decade.
There are already plans for using the fabled "Northest Passage" to cut considerable time for ships traveling to and from Asia to Europe.
There is also a bit of a "land rush" to claim the resources of areas of the Arctic that will soon become accessible.
The small graph at the bottom left of the stage shows the decrease in ice coverage over Greenland, which is now losing 100 billion tons of ice a year.
Antarctica has been losing 100 cubic kilometers per year since 2002.
Templeton Tigerpaw: Are people here aware that the melting of floating ice does not increase sea levels one iota? You can melt all of the North Pole without the slightest rise in sea levels. The only sea level changes come from land-based ice. Again, here you have to ask if people are aware that places as Greenland were FREE of ALL ice as recently as around AD 1000.

Vic Michalak: Now look forward and up on both sides of the stage at the time series of the Earth's surface temperature at 10 year intervals over the last 100 years.
Be Ewing: Pictures getting orange/redder
top of picture is intense
druth Vlodovic: the oceans are getting coldr in spots
Be Ewing: the slope is increasing
Vic Michalak: Also note that the total change is about 0.8 degrees Centigrade (1.5 degrees Farenheit) since 1880. This may not seem high, but the rate of change is increasing and you can see what even a small change can bring already.
Templeton Tigerpaw: I hate to be such a spoilsport, but coloring maps is unfair. You ca show the most dramatic differences when there are practically no differences at all. those people who show brain scans do that fraudulently all the time.
Vic Michalak: The scary part is when you note over the Earth's history the the current CO2 level of 390 ppm corresponds to an average of many degrees higher than today.
Be Ewing: just think of temperature change of 1 degree in our homes
perhaps most people might be able to relate to that?
Templeton Tigerpaw: Think that today practically all warmer zones are over the ocean while all the land is frozen and unusable (think Siberia). Now imagine how nice it would be if we could use all that land in Russia and Canada.
We could support a population 5 times a large
More people are more fun
Be Ewing: But what about the ecosystem? ... the animals etc that pollinate crops etc
Toxie Cortes: or get boats...
Templeton Tigerpaw: Animals migrate and adapt - think "killer bees"
Vic Michalak: --- PART VI - EFFECTS OF GLOBAL CLIMATE CHANGE ---
Global climate change will affect our food supply as crop seasons change, lands become drier, and water is more scarse. The front page of the Sunday New York Times has an article entitled "A Warming Planet Struggles to Feed Itself" and I have heard articles on the radio about an increasing number of food riots worldwide.
Templeton Tigerpaw: However, our main problem will not be overpopulation, but in a very few decades it will be the coming population collapse
Vic Michalak: Global climate change will affect our water supply as ice reserves on which rivers are dependent, particularly in places like India, melt.
Templeton Tigerpaw: Food riots are caused by corn-based fuel
Vic Michalak: Global climate change will affect our weather. While some areas will become more dry and more susceptible to fires, others will be in jeopardy of flooding and storm-related damage from hurricanes and tornadoes.
Templeton Tigerpaw: The earth can easily feed the current population. There hasn't been a non-artificial famine in decades
Vic Michalak: Whlie humans can adapt to climate change, particularly with the aid of technology, stationary plants cannot.
And even animals will be severely affected as their ecosystems change. Human activities have isolated animal groups and many will not be able to migrate as they have historically.
Extinction is final. Plants and animals that cannot adapt will perish and no amount of effort on our parts can bring back biodiversity. The world will be a different place than we have known it.
The effects of global climate change are global and universal and persistent and increasing.
- This means that everyone in every nation is now and will be affected by these changes and will be more so in increasingly more noticeable ways.
Templeton Tigerpaw: Why is different bad?

Vic Michalak: - This means that the problem is not one we can solve in the near future and it will go away. we have already created effects that are permanent and that we will have to deal with the consequences of our actions in the near future.
Be Ewing: So where should we move to?
I am just doing quick global map in my head
and I am currently clueless as to what might be better than living in Dallas
Vic Michalak: I do not have solutions. But understanding the nature of the problem is the first step.
Templeton Tigerpaw: Stay put and you will be fine. If you want a nice cheap place to live, move right below some high-tension power lines. They are harmless but cause low housing prices in that place.
Vic Michalak: That concludes my seminar.
Thank you very much for your participation.
☺
Be Ewing: Templeton -- I already do
Arisia Vita whispers: ty Vic!
Arisia Vita: This was excellent
Vic Michalak: Thank you!
Be Ewing: Vic -- Thank you so very much ;)
Toxie Cortes: Thanks, Vic. Good food for thought!
Vic Michalak: And thank you for your participation...
Templeton Tigerpaw: Thank you Vic. I'm sorry to be such a nuisance - but somebody has to
Be Ewing: This is excellent presentation/discussion
Lolli Bluebird: Thank you - very interesting Vic.
Vic Michalak: You are NOT a nuisance! You are thinking participant...
Be Ewing: and your charts/pictures are wonderful
druth Vlodovic: thank you for the presentation vic
Vic Michalak: Thanks, Be... and droth...
Templeton Tigerpaw: I wish somebody ever would, though, address my two central questions. the one about warming tracking CO2, and the one about Greenland being ice free in the Middle Ages.
Be Ewing: Templeton -- I do have one question for you if I may
Vic Michalak: Templeton... we can check about Greenland easy enough. That is interesting...
Be Ewing: Along the way you mentioned depopulation within a few decades
What do see contributing to that primarily?
that last question is for Templeton
Toxie Cortes: I really appreciate the time that you devote to give these very interesting presentations, Vic. See you next time.
Vic Michalak: But my only explanation about CO2 and temperature is empirical -- that is what we have observed in ice cores and other evidence -- and theoretical - CO2 creates a greenhouse effect that regulates Earth's temp..
Thanks, Toxie! ☺
It is fun.. but it takes time to work up...
But this is important!
Toxie Cortes: it is, indeed.
Templeton Tigerpaw: Yes, I understand that. I used to be a warming believer until I saw Al Gore's hockey stick. It stuck in my craw ever since.
Vic Michalak: Be... population will increase, unless there are enormous pressures like lack of food or water...
druth Vlodovic: wealthy countries tend not to replace their population through procreation

it's a shame that so many countries are ruled by people who maintain control through warfare which contributes to poverty
Vic Michalak: Yes, druth.. luckily... because they use most of the resources... that balances out the increased rate of population in developing countries that use less resources...
druth.. I agree with you completely...
Templeton Tigerpaw: The collapse of population has already started in most developed countries and China. It is only increasing. Unless we keep the rest of the world poor, the problem at the end of the century will be underpopulation.
druth Vlodovic: well, how many people do we need?
Be Ewing: All -- take care and miles of smiles ;) ... I need to move on elsewhere right now ... Vic, once again very special thanks to you ;)
Vic Michalak: Thanks, Be!
druth Vlodovic: tc Be
Vic Michalak: I must be going as well....
Templeton Tigerpaw: If we had asked somebody in 1900 what the most pressing problem would be in 2000, they would have probably answered that the world will be drowing in manure from all the horse-drawn carriages. We really are in the same position today.
druth Vlodovic: bye Vic
Vic Michalak: Thanks again to this wonderful audience!
Templeton Tigerpaw: Yes, thanks. I really appreciate it despite my comments.
Vic Michalak: Templeton... surely things change... hopefully we will find a solution we have not thought about...
And I really appreciated your comments... ツ