Worst Case Scenarios Apocalyptic and Post-Apocalyptic Hypothetical Scenarios

Climate Change

What is a scientifically plausible worst case scenario for Global Warming?

Looking for details on melting polar ice, raising sea levels, effects on the climate and effects on society.
Also, please include your sources.

8 Answers

Matthew Kuzma
Updated Aug 9, 2015

In short: apocalypse.

The worst case scenario is that the deep ocean warms enough to start releasing methane clathrates, or the permafrost thaws enough to begin fermenting and releases large quantities of greenhouse gasses, resulting in an abrupt, large, and unstoppable increase in GHGs and correspondingly, temperature.

Subsequently, the worst case outcome of that development is that world weather patterns make 90% or more of current agricultural land unproductive. If that happens gradually and we actually notice the trend, we might have a chance to switch to new crops (though that requires a lot of retraining by farmers) and continue to meet our basic caloric needs. If instead it manifests as sudden drought that never ends, the disruption to the food supply would be catastrophic. If that happens, the worst case scenario is spiraling global conflict and famine that wipes out 90% or more of the population and all of civilization with it. Those that survive will have to sustain themselves in a much harsher and less predictable wilderness long enough to build back from lawless scavengers to a true society over the course of presumably many generations.

The bad news is that the percentage of people who get raped, tortured, enslaved, and murdered will skyrocket. But the good news is that for a brief shining moment the earth will be free of politicians, lobbyists, lawyers, and disinformation media. I still think it's a net loss, but it's important to note that it won't be all bad.

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Assuming a worst case scenario for global warming (4.5+ C), what technologies would we need to develop to keep Earth habitable?

Assuming a worst case global warming scenario, which areas of the USA become the best places to live? Which are the worst?

In a global warming worst case scenario we could

Eric Last, music fanatic, skeptic, gimp, political junkie
Written Feb 28, 2015

Ever since the IPCC started forecasting/modeling possible warming scenarios, they have done so based on multiple possible scenarios, with the differences being rooted mainly in variations concerning what steps humanity takes to bring activities that contribute to elevated atmospheric greenhouse gases under control.

So far, we're not doing well. Our behavior concerning limiting the burning of fossil fuels to mitigate the climate change effects from adding all that carbon to the atmosphere has thus far tracked right in line with the worst case scenarios of the IPCC forecasts. So what that means is that we are currently on a path predicted to result in 4.5°C (8°F) of warming compared to pre-industrial conditions. And this could be a conservative prediction - the IPCC indicates an outside chance that the warming could be as high as 6°C (10.8°F). If we continue our present course of doing very little to minimize burning fossil fuels, this is the expected outcome.

What will a world following that much warming look like? Here are some quotes directly from the article linked below, but note that even the WORST of the descriptions are for temperature increases LOWER than the worst-case scenarios listed above:
A Glimpse at Our Possible Future Climate, Best to Worst Case Scenarios

"At 3–4°C warming (5.4-7.2°F), widespread coral mortality will occur (at this point corals are basically toast), and 40–70% of global species are at risk as we continue on the path toward the Earth's sixth mass extinction . Glacier retreats will threaten water supplies in Central Asia and South America. The possibility of significant releases of CO2 and methane from ocean hydrates and permafrost could amplify global warming even further beyond our control. Sea level rise of 1 meter or more would be expected by 2100, with the possibility of destabilization of the Greenland and West Antarctic ice sheets, which would cause much more sea level rise and flooding of coastal communities."

Suppose we get our butts in gear and act to prevent the worst case scenario, by limiting greenhouse gases enough to hold the warming down to a somewhat lower level?

"Once we surpass 2°C (3.6°F) (which is internationally considered the 'danger limit ' beyond which we should not pass)...Coastal flooding will impact millions of people. Coral bleaching will be widespread (exacerbated by ocean acidification), most coral reefs may not survive...global food crop production will decline, and sea levels will rise by close to 1 meter by 2100. Up to 30% of global species will be at risk for extinction."

And if we act immediately and effectively to wean the world off of fossil fuels? Though this is looking incredibly unlikely, it is at least possible that we could limit the warming to comfortably below 2°C.

"Some adverse impacts are expected by the time we reach 1.5°C (2.7°F) surface warming above pre-industrial temperatures. For example, widespread coral mortality, hundreds of millions of people at risk of increased water stress, more damage from droughts and heatwaves and floods, and increased species extinction rates. However, by and large these are impacts which we should be able to adapt to, at a cost, but without disastrous consequences."

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Liz Qiao, to thine own self be true
Written Dec 14, 2012

We're already at a global increase of 0.8 °C above pre-industrial levels.

Assuming we're on a trajectory for 4-6°C of global warming by 2100, some projected outcomes (gathered from various climate models/recent literature) would be: [drumroll]

In a warming of ~4°C by 2100:

only have 10-15 years of livable conditions left on our only planet. What should I do about i...

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-Global sea level would potentially increase 0.5-2m and inundate vulnerable coastal/tropic/sub-tropic cities in Mexico, Venezuela, India, Bangladesh, Indonesia, Philippines, etc.

- Extreme, unprecedented heat waves (over land would range from 4° C to 10°C). Increases of 6°C+ in avg monthly summer temperatures would be expected in the parts of USA, middle east, etc. Dry regions would become dryer, wet regions wetter.

-Greater rates malnutrition rates because of increased risks for food production; exacerbated water scarcity in many regions; more intense tropical cyclones; permanent loss of biodiversity, permanent loss of sea ice in the Arctic..permafrost would melt at rates that would further perpetuate global warming via increased emissions of CH4 and CO2

Basically, it is said that rapid global warming of 4-6ºC would barely give humans any time to adapt because the effects are projected to be unlike anything we've ever experienced before so we'll basically all scramble like chickens. :D Woot!

PwC, 5 November 2012, "Business as usual is not an option" as current rates of emissions reduction point to 6C of warming - PwC Low Carbon Economy Index

New M.,Liverman D.,Schoder H.,Anderson K:2011 Four degrees and beyond: the potential for a global temperature increase of four degrees and its implications. Phil. Trans. R. Soc. A 369, 6–19.

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Bruce Jones, MBA, Statistician, Six Sigma Black Belt, Modeling Climate Change Data Since 2006
Written Sep 2, 2015

Worst case, in short,

- Average global temperatures go up about 4 degrees (~2100)
- Oceans acidify and reefs melt, natural fish hatcheries gone
- Jellyfish become huge
- Dry areas get much drier, wet areas get much wetter
- 300,000,000 people become climate refugees (~2050)
- Sea levels rise consuming coastal ports, transportation shuts
- The conflux of refugees, food scarcity, transportation disruption leads to masses of dislocated people rioting

Best case, in short,

- It is my hope that positive behavior changes and technology to solve this global challenge out paces the growth of it.
- We need to envision a positive future where we work together to solve the changes our industrial revolution has made to the atmosphere.
- We work together. Have we ever seen the world's religious, political and scientific leaders agree so strongly before? Consider this: All of the top religions of the world have statements warning about man made climate change. There is agreement in science, the non religious world, and the religious world: interfaithpowerandlight.org - I mean all the leaders of the major religions of the world in agreement? Christians, Muslims, Hindi...

  I did the math and realized that nearly all religious, scientific and non-religious

leaders of the world's population have come out against man made climate change. This covers nearly 100% of the world's population.

How is it then that a handful of Republican Presidential hopefuls think that climate change is not real nor man made? How many of them are sponsored by fossil fuel? Maybe that's another question for quora.

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Narinder Wadhawan, former Scientist, Instt. Maint. Engr, Retd. IAS
Written Thu

The earth is going to witness catastrophe, not immediately but at a later stage if its temperature continues increasing due to global warming if any ot otherwise.. Physics and chemistry of atmosphere say that it consists mainly of Nitrogen, Oxygen, Carbon dioxide, Water vapours and dust particles. Major constituents are Nitrogen and oxygen, remaining in small quantity. Atmosphere surrounds the earth in its huge blanket whose density decreases with height. As one moves up, the atmosphere rarifies and finally dies down to vacuum. The gases present in the atmosphere also adjust according to their densities and other factors like temperature, velocities of gaseous molecules, sun rays, gravity likewise.

The molecules of the gases in the atmosphere are in random motion and collide with each other depending upon their temperature. More the temperature, more will be the kinetic energy or motion of the molecules. Average length per collision of the molecules is the average distance at which the molecules collide and is also called mean free path. As the height of atmosphere increases, collisions become less frequent. Then a stage reaches where there will be collisions limiting to even one between molecules in that thickness of the atmosphere. That height is called base of the exosphere, according to Chamberlain and that thickness above exobase where single or less collisions take place is called height of the exosphere, denoted by H. For earth, exobase is at approximately 500 Km height. How this height varies from planet to planet, will also be discussed in this article at appropriate time.

Why does the atmosphere escape? As stated above, atmosphere is held in its place by the gravitational pull. Its molecules are also in random motion, colliding with each other and their velocities depend upon the temperature. To knock out the molecules of the gases from the the atmosphere, their velocity must either be equal or greater than escape velocity. Escape velocity is defined as that velocity at which an object escapes the gravitational pull. That is, its kinetic energy becomes equal to its potential energy due to the gravitation.

Equating both these energies, we can find the value of escape velocity as square root of the quantity 2.M.G/r where M is mass of earth, r radius of earth and G universal gravitational constant. Some molecules may have velocities equal to escape velocity whereas other molecules of gases can achieve this velocity if energy is imparted to them. Energy is imparted to the molecules by Thermal or heat or Chemical or Photo solar energy. Even comets and asteroids provide splash energy to the atmosphere on their impact with the planets..

I will discuss first the cases where thermal energy helps leaks. Physicist Jean in the early twentieth century explained how the molecules escape in to space. He considered the effects of gravitation, temperature and collisions of molecules at exobase by a parameter Lambda called Jean Parameter which is the ratio of gravitational potential energy to random kinetic energy. This parameter can also be expressed as ratio of square of escape velocity to square of random velocity. Random velocity is square root of quantity 2.K.T/m where K is Boltzmann constant, T temperature in Kelvin at exobase and m mass of molecule of the gas.

Substituting value of escape velocity and random velocity, Jean parameter is reduced to r (exobase)/H where H is equal to K.T/(m.g) and g is gravity, r (exobase) is the starting layer of exosphere. It is already stated that gases in atmosphere are in random motion and suffer endless collisions with one another but as we move up, the gases become less dense and have less collisions. And a stage comes, where the molecules are able to have as less collisions as one and that layer of atmosphere is called exobase. At exobase, the mean free path must be equal to H. If the mean free path of collisions is less than H, then there may be

a number of collisions, the gas will be collision dominated and will need sufficient velocity to surpass escape velocity. But when the mean free path is more than H, then the gas will have single or less collisions and is considered quasi collision-less. Therefore, as the ratio of mean free path l to H (l/H) changes from high positive quantity to one then to small fraction, transition of gas from free escape to quasi collision less to collusion dominated atmosphere. It is not abrupt but slowly changes.

As stated earlier, Jean Parameter Lambda = Gravitational potential energy/ Random kinetic energy.

Therefore, when lambda = 0, then there will be no gravitational potential energy and the atmosphere will not be bound. In fact, comets, asteroids, small light planets have negligible gravitational potential energy, therefore, the atmosphere is not bound and leaks to space.

If lambda is infinite, then gravitational potential energy is infinitely high meaning thereby that strong gravity will hold the atmosphere firmly and there would be no leakage of the atmosphere.

When lambda will be equal to one then gravitational potential energy will be equal to random kinetic energy, this condition will give rise to exobase. There will be escape of gases from exosphere. It is clear from above that as lambda or gravitational potential energy decreases below random kinetic energy, atmosphere leaks to space.

But the gas can only leak if it reaches at the exobase. Hydrogen being lightest has better chances of reaching exosphere as compared to other heavier gases. To find the availability of hydrogen at exobase, we will have to find the sources of hydrogen on earth. Compounds containing hydrogen are water, methane, hydrocarbons likewise. Water which is abundant when heated, turns to vapours and goes up. But on being cooled, it condenses and comes back to earth in the form of rain drops. Methane combines with oxygen and form carbon dioxide and water. However, a little quantity of hydrogen released from water and methane manages to reach exobase which is located at a height of 500 Km from surface of earth. It has temperature of 1000 degree Kelvin. At this temperature, average velocity of hydrogen molecules is 5 Km/Sec whereas escape velocity is 10.8 Km/Sec. This velocity is still less than escape velocity. Since 5 Km/S is the average velocity, there is every likelihood that a part of it, will have velocity equal or more than escape velocity and a part even lower than 5 Km/s. The molecules below escape velocity will fall back and those above or equal to escape velocity will make their way to space. This leak contributes approximately 25% of total leak from earth.

Hydrogen leaking from the planet forms a halo which is clearly visible in ultraviolet light. It is submitted that hydrogen escapes via this route from molecule to molecule basis and is not a bulk sweep. This leak is called Jean Evaporation. Earth and Moon are losing atmosphere through this process.

Atmosphere can also escape in bulk quantity. When upper layer of the atmosphere gets heated up due to ultraviolet radiations, it expands the air which moves up being accelerated. This accelerated air attains the velocity above that of escape and the bulk air sweeps out of earth. Such escape is also called hydrodynamic escape and is also known as planetary wind. This accelerated air also drags even heavier elements like helium, oxygen and other inert noble gases along with it which adds to the loss. Recent report of oxygen leak is likely to be attributed to drag of oxygen by lighter gases to exobase. Ratios of lighter isotopes to heavier isotopes of noble gases on Venus, Mars and Earth evidences that much of the lighter isotopes of noble gases have been driven away from the atmosphere by hydrodynamic escape. It is estimated that hydrodynamic escapes have caused appreciable loss of atmosphere to Venus, Mars and even Earth.

At present, earth is not appreciably affected by its atmospheric leak since it is slight. Slightness of the leak is attributed to the fact that minuscule hydrogen finds its way to exobase thankfully to recirculation of water vapours which are abundant source of hydrogen, back to earth in the form of rain. Nuclear fusion reactions in the sun will not remain same as these are today. Fusion reactions will form higher atomic weight elements when store of hydrogen in the sun is exhausted. Sun is expected to increase its brightness or radiation energy by 10% every billion years. This duration may appear very large on human

scale but is small on geologic scale. This increment of 10% will further facilitate evaporation of water to vapours which will come back as rain. Earth if it gets heated up due to global warming as is apprehended or due to any other reason will increase temperature of its atmosphere. Higher temperature will impart more energy to hydrogen molecules facilitating more molecules to escape exosphere. The temperature then would be high enough to dry up the ocean, thermal equilibrium between incoming energy and outgoing energy from the earth will be disturbed. Earth temperature would further rise as the time passes, water at the polar caps would dry up and water will be extinct. Escaping hydrogen would cause oxidation of elements which would give the earth perched reddish look. Earth would follow Venus into a barren lifelessness.

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What is the worst thing that can happen in life?

What are some worst case scenarios of the popular hospitals you have faced?

What are the worst/best case scenarios for the world in the next 100 years?

Is it the case that humans cannot stop global warming? If so, why?

Is it still possible to prevent the worst of global warming as of 2016?

What is the worst case scenario for climate change to Canada?

What could be the worst case scenario for a nation?

What is the worst case scenario of jaundice?

Assuming a worst case global warming scenario, when will Florida go under water?

In what scenario the lookup in hash table is O(1) in worst case?

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What is the most disgusting thing you've ever seen on the internet?

Aloysia Apollo, Utrecht University
Written Dec 19

One year ago I read an article about a couple in an Asian country who was convicted because they produced crush movies. I had no idea what crush movies were. I knew snuff movies of course but what could this be? So I made the stupid mistake to Google it. Please don't do that because it can really traumatize you.

What is the strangest experience you've had as a pizza delivery driver?

Justin Tischer
Written Jan 15

Delivered a pizza to a home that had gasoline odors drifting out the front door.
They invited me in while they went to get cash. I was greeted by this. Not this exact

What is your weirdest spontaneous thought?

Dylan MacIntyre, Early 2000s emo wannabe
Updated Jan 22

I'm just going to list all the ones I can remember.

- "I want to throw a handful of pens across the room."
- "I could push that lady in front of the subway. I'm not gonna, but I could."

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