FROM POLLUTION TO AN ICE AGE-THE ROAD TO A CATHASTROPHE

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The natural equilibrium of the atmospheric gases has been maintained for millions of years, but now it is threatened by human activities. These dangers are the greenhouse effect, global warming, air pollution, the ozone hole and the acid rains first we start by presenting the causes which trigger this phenomena.

During the last 200 years global industrialization has disturbed the gas ratio which is necessary in order to maintain the atmospheric equilibrium. This work has to underline and to present the way in which pollution is affecting our lives and the environment for the short and long time. This entire work is in fact just a mathematical demonstration; we have a hypothesis and also a conclusion. The demonstration is based on true facts and it shows how pollution can determine an ice age-the end of the world we know. Each step before reaching the final catastrophe is presented in a logical order from the simple pollution to the global warming effect from here I'm going to speak about the ice caps melting and how this event can determine the destruction of the equilibrium between the salted and sweet water. This equilibrium is fragile and from it´s destruction appears the global super storm, it´s formation and the disastrous effects determine the apparition of the ice age by disturbing the whole weather system. We have to take action now, when is still can be done something and learn from the parable presented in the film "The day after tomorrow,,.

ATLANTIC´S THERMOHALINE CIRCULATION

Pollution causes the global warming and this triggers the ice caps melting, disrupting the equilibrium between the salted and sweet water causing the stop of Atlantic's thermohaline circulation. The Atlantic thermohaline circulation, which includes the Gulf Stream, acts like an oceanic conveyer belt that carries heat from the tropics to the North Atlantic region. Warm surface water from the tropics travels northward by the Gulf Stream. As the warm water cools in the North Atlantic, it sinks to the ocean floor, and then slowly moves southward until it returns once again to the tropics. This ocean circulation pattern is caused by differences in water temperature and salinity in the ocean.

COULD CLIMATE CHANGE SHUT DOWN THE THERMOHALINE CIRCULATION?

Global warming is expected to increase ocean temperatures and to increase the flow of freshwater into the ocean through precipitation, run-off, and melting of glaciers. Many climate models have projected that increased surface ocean temperatures and reduced salinity could slow the thermohaline circulation. A few models have projected a complete shutdown of the thermohaline circulation in the case of severe global warming, but this is being debated by the scientific community.

HOW CAN GLOBAL WARMING CAUSE COLD WEATHER?

Without the thermohaline circulation, not as much heat would be transported from the tropics to the North Atlantic region. We don't know how much of this cooling would be balanced by the simultaneous warming in the atmosphere. While it is possible there would be cooling in the North Atlantic region, it is considered more likely that it would continue to warm, but more slowly than the rest of the world.

The truth is that global warming is happening and that it is already too late to avoid some of the effects. Even under the most optimistic circumstances, atmospheric scientists expect global climate change to result in increased flooding and droughts, more severe storms, and a loss of plant and animal species. These events will occur, even if climate change is gradual. A recent Pew Centre report, “A Synthesis of Potential Climate Change Impacts on the U.S.," summarizes the possible effects of global climate change on the natural resources and economy of the USA. In the last century the average temperature has climbed about 0.6 degrees Celsius (about 1 degree Fahrenheit) around the world. Most scientists say the higher temperatures are a result of an atmospheric increase in carbon dioxide, caused by the burning of fossil fuels such as coal and petroleum. Sea levels have risen 4 to 8 inches (10 to 20 centimetres) because of the expansion of warmer waters. A study in the science journal Nature this year predicted that climate change could drive more than a million species toward extinction by the year 2050. Many scientists also warn of a link between global warming and extreme weather events, like El Niño.

THE ICE AGE

If you look at a globe, you'll see that the latitude of much of Europe and Scandinavia is the same as that of Alaska and permafrost-locked parts of northern Canada and central Siberia. Yet Europe has a climate more similar to that of the United States than northern Canada or Siberia. Why? It turns out that our warmth is the result of ocean currents that bring warm surface water up from the equator into northern regions that would otherwise be so cold that even in summer they'd be covered with ice. The current of greatest concern is often referred to as "The Great Conveyor Belt," which includes what we call the Gulf Stream.

The Great Conveyor Belt, while shaped by the Coriolis effect of the Earth's rotation, is mostly driven by the greater force created by differences in water temperatures and salinity. The North Atlantic Ocean is saltier and colder than the Pacific, the result of it being so much smaller and locked into place by the Northern and Southern American Hemispheres on the west and Europe and Africa on the east.

As a result, the warm water of the Great Conveyor Belt evaporates out of the North Atlantic leaving behind saltier waters, and the cold continental winds off the northern parts of North America cool the waters. Salty, cool waters settle to the bottom of the sea, most at a point a few hundred kilometres south of the southern tip of Greenland, producing a whirlpool of falling water that's 5 to 10 miles across.

While the whirlpool rarely breaks the surface, during certain times of year it does produce an indentation and current in the ocean that can tilt ships and be seen from space (and may be what we see on the maps of ancient mariners).

This falling column of cold, salt-laden water pours itself to the bottom of the Atlantic, where it forms an undersea river forty times larger than all the rivers on land combined, flowing south down to and around the southern tip of Africa, where it finally reaches the Pacific. Amazingly, the water is so deep and so dense (because of its cold and salinity) that it often doesn’t t surface in the Pacific for as much as a thousand years after it first sank in the North Atlantic off the coast of Greenland.

The out-flowing undersea river of cold, salty water makes the level of the Atlantic slightly lower than that of the Pacific, drawing in a strong surface current of warm, fresher water from the Pacific to replace the outflow of the undersea river. This warmer, fresher water slides up through the South Atlantic, loops around North America where it's known as the Gulf Stream, and ends up off the coast of Europe. By the time it arrives near Greenland, it's cooled off and evaporated enough water to become cold and salty and sink to the ocean floor, providing a continuous feed for that deep-sea river flowing to the Pacific. These two flows - warm, fresher water in from the Pacific, which then grows salty and cools and sinks to form an exiting deep sea river - are known as the Great Conveyor Belt. Amazingly, the Great

Conveyor Belt is only thing between comfortable summers and a permanent ice age for Europe and the eastern coast of North America. Much of this science was unknown as recently as twenty years ago. Then an international group of scientists went to Greenland and used newly developed drilling and sensing equipment to drill into some of the world's most ancient accessible glaciers. Their instruments were so sensitive that when they analyzed the ice core samples they brought up, they were able to look at individual years of snow. The results were shocking. Prior to the last decades, it was thought that the periods between glaciations and warmer times in North America, Europe, and North Asia were gradual. We knew from the fossil record that the Great Ice Age period began a few million years ago, and during those years there were times where for hundreds or thousands of years North America, Europe, and Siberia were covered with thick sheets of ice year-round. In between these icy times, there were periods when the glaciers thawed, bare land was exposed, forests grew, and land animals (including early humans) moved into these northern regions. Most scientists figured the transition time from icy to warm was gradual, lasting dozens to hundreds of years, and nobody was sure exactly what had caused it. (Variations in solar radiation were suspected, as were volcanic activity, along with early theories about the Great Conveyor Belt, which, until recently, was a poorly understood phenomenon.)

Looking at the ice cores, however, scientists were shocked to discover that the transitions from ice age-like weather to contemporary-type weather usually took only two or three years.

Something was flipping the weather of the planet back and forth with a rapidity that was startling. It turns out that the ice age versus temperate weather patterns weren't part of a smooth and linear process. They are part of a delicately balanced pick and falls, which can exist in one state or the other, but transits through the middle stage almost overnight. They more resemble a light switch, which is off as you gradually and slowly lift it, until it hits a mid-point threshold or "break over point" where suddenly the state is flipped from off to on and the light comes on. It appears that small (less that .1 percent) variations in solar energy happen in roughly 1500-year cycles. This cycle, for example, is what brought us the "Little Ice Age" that started around the year 1400 and dramatically cooled North America and Europe (we're now in the warming phase, recovering from that). When the ice in the Arctic Ocean is frozen solid and locked up, and the glaciers on Greenland are relatively stable, this variation warms and cools the Earth in a very small way, but doesn't affect the operation of the Great Conveyor Belt that brings moderating warm water into the North Atlantic.

For early humans living in Europe 30,000 years ago - when the cave paintings in France were produced - the weather would be pretty much like it is today for well over a thousand years, giving people a chance to build culture to the point where they could produce art and reach across large territories. And then a particularly hard winter would hit. The spring would come late, and summer would never seem to really arrive, with the winter snows appearing as early as September. The next winter would be brutally cold, and the next spring didn't happen at all, with above-freezing temperatures only being reached for a few days during August and the snow never completely melting. After that, the summer never returned: for 1500 years the snow simply accumulated and accumulated, deeper and deeper, as the continent came to be covered with glaciers and humans either fled or died out. (Neanderthals, who dominated Europe until the end of these cycles, appear to have been better adapted to cold weather than Homo sapiens.)

The phenomenon which triggered the sudden "disappearance of summer" period was that the warm-water currents of the Great Conveyor Belt had shut down. Once the Gulf Stream was no longer flowing, it only took a year or three for the last of the residual heat held in the North Atlantic Ocean to dissipate into the air over Europe, and then there was no more warmth to moderate the northern latitudes. When the summer stopped in the north, the rains stopped around the equator: At the same time Europe was plunged into an Ice Age, the

Middle East and Africa were ravaged by drought and wind-driven firestorms. . If the Great Conveyor Belt, which includes the Gulf Stream, were to stop flowing today, the result would be sudden and dramatic. Winter would set in for the eastern half of North America and all of Europe and Siberia, and never go away. Within three years, those regions would become uninhabitable and nearly two billion humans would starve, freeze to death, or have to relocate. Civilization as we know it probably couldn't withstand the impact of such a crushing blow.
And, incredibly, the Great Conveyor Belt has hesitated a few times in the past decade. As William H. Calvin points out in one of the best books available on this topic ("A Brain For All Seasons: human evolution & abrupt climate change"): ".the abrupt cooling in the last warm period shows that a flip can occur in situations much like the present one. What could possibly halt the salt-conveyor belt that brings tropical heat so much farther north and limits the formation of ice sheets? Oceanographers are busy studying present-day failures of annual flushing, which give some perspective on the catastrophic failures of the past. "In the Labrador Sea, flushing failed during the 1970s, was strong again by 1990, and is now declining. In the Greenland Sea over the 1980s salt sinking declined by 80 percent. Obviously, local failures can occur without catastrophe - it's a question of how often and how widespread the failures are - but the present state of decline is not very reassuring." Now days we have all over the world many examples of climate change: the disorder of seasons and the extreme weather we register.

What's almost certain is that if nothing is done about global warming, it will happen sooner rather than later and the ice age will be triggered by the Super storm.

THE GLOBAL SUPER STORM

A global super storm is a severe consequence of global warming. The theory behind it is a complex theory of events triggered each by the one before it as we have already shown. It starts off with global warming melting the polar ice caps. This was first argued to cause a complete climate flip and deserts would turn to rainforests and rainforests to nothing but a memory. The actual facts state that the Earth goes through a cycle unknown to man until recently. As you might know, the Earth has been hit with ice ages many, many times before.

Now science knows why. Earth foregoes a dangerous cycle which includes hundreds of thousands of years of ice and glaciers known as an ice age until the Sun is finally able to force the glaciers back and a climate similar to the one we know now comes to the places where glaciers once ruled. This period of warmth is brief in the actual scheme of the planet. It ends when there are enough greenhouse gases in the planet’s atmosphere to trigger another ice age, introduced by a super storm. These greenhouse gases are put into the atmosphere naturally and accustom themselves with the cycle of the planet. No problem there. Another ice age starts, ends, and the warmth comes back. This is where humans come in. Millions of factories have sped up this precious cycle by such a great amount of time that predictions for the next ice age were left in the dark with those who predicted them. Now we are living in the precious few moments before another ice age begins. Although an ice age doesn’t have to happen, (fossil records show that around 7,000-10,000 years ago, a super storm hit in the summer and the ice could melt before winter struck and placed more snow on the already existing snow) they are more like an after-taste, the main feature being the reckless storm crushing down hard-packed snow on top of half the world. Once the ice melts up north, the fresh water will disturb the fragile combination of salt and fresh water that make up the North Atlantic Current (NAC). The NAC, as soon as it failed, would allow freezing air to come swooping down from the arctic. This air would collide with the warm air moving up from the south, where it was heated. The collision would produce a storm we cannot imagine.

The movie “The Day After Tomorrow” illustrates the storm in the formation of a hurricane with an eye (Although a storm would be produced, I cannot say for myself that it

would have an eye, or even be hurricane like, yet I have not concluded studies on it). This eye would be like a gateway to the above atmosphere in which air would fall to the Earth, dropping the temperatures by 100°F and further. The theory of global warming tells us that the greenhouse gases would trap heat from leaving our planet. This means that the above atmosphere isn't receiving the heat it used to and so the temperature is dropping about 50°F a year, therefore providing those extreme temperatures that would fall down the eye and smother the people of the northern hemisphere, freezing them instantly. A global super storm overall, is not something you want to experience, and even if it is, you must have a soft spot for the lives of others. The most important thing is that you still can take action on gaining time against this force of nature, although never preventable.

CONCLUSION

There is no single cause of global climate change and there is no single answer. Most experts believe that technology will provide the solutions. Technologies that reduce emissions (energy efficiency, hydrogen fuels, carbon storage, nuclear energy and renewable energy) and technologies that remove carbon from the atmosphere may all play a role. Government policies that encourage businesses to develop and use these and other technologies are also very important, we just have to treasure the only world we are living in.

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