

Sarah Janjua  
History of the Universe Final Paper  
Mr. Ling

### **A Global Tragedy**

The last two decades of the twentieth century have been the warmest within the past four hundred years. The ultimate cause of this, global warming. Global warming is the increase of the Earth's temperature. The increase in Earth's temperature is directly related to climatic change. The Earth's climate has changed greatly throughout history. From being covered with thick sheets of ice (also known as the Glacial Periods), to all of the glaciers retreating to the poles, the climate has varied throughout history (Past Climate Change, 2005). Even though this is so, scientists are starting to realize that what is happening to the Earth is not typical. This is because, although the Earth has been heating up at a steady rate for centuries, the rate at which the Earth is going to start heating up is greater than any rate ever recorded. Many studies are being done to prove that global warming is indeed true, and scientists are working vigorously trying to come up with solutions to help slow down the rate at which the Earth is heating up.

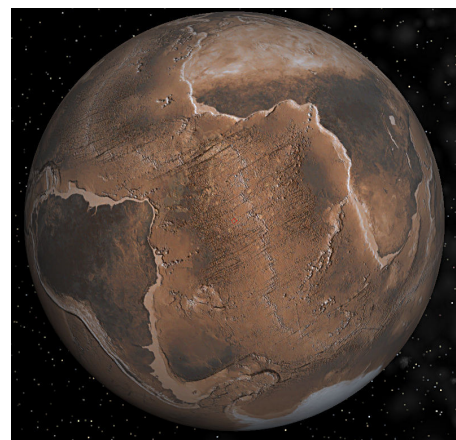
#### **Humans Are To Blame:**

The big controversial issue that is entwined with global warming is the question as to whether or not humans are to blame for the Earth's rapid climatic change. Climatologists, or scientists who study climate, have come to the conclusion that humans are responsible for most of the Earth's warming. Climatologists have stated that humans are to be held accountable for the warming because their activities have a large impact on the Greenhouse Effect. The Greenhouse Effect is the rise in temperature that the Earth experiences due to certain

gases trapping energy from the sun (Greenhouse Effect, 2004). These gases include water vapor, carbon dioxide, nitrous oxide, and methane. Without these gases in our atmosphere, heat would escape back into space. If this were to happen, it is estimated that the Earth's average temperature would be approximately 60 degrees Fahrenheit colder. Greenhouse gases work for the entire Earth as a greenhouse works for the plants inside of it. Energy from the sun is absorbed through the Earth's surface, land, water, and biosphere. After the energy is absorbed, it is then sent back into the atmosphere. While some of the energy is passed back into space, most of it remains trapped in the atmosphere by the greenhouse gases. The energy that is trapped in the atmosphere enables the Earth to warm up.

**The Earth is Gradually Warming up:**

Since the late 1800's, the Earth's average temperature has increased about .7 to 1.4 degrees Fahrenheit (0.4 to 0.8 degrees Celsius). Many scientists predict that the average temperature will eventually rise an additional 2.5 to 10.4 degrees Fahrenheit (1.4 to 5.8 degrees Celsius) by 2100 (Global Warming, 2005). Even though it is seen as a natural process for the Earth to be warming up gradually, this rate of increase would be beyond any past rates of increase that the Earth has encountered. With these great changes in Earth's temperature would come great changes in things such as weather conditions and natural ecosystems. Scientists fear that humans and Earth's natural ecosystems will not be able to adapt to the rapid changes in the environment. For example, the



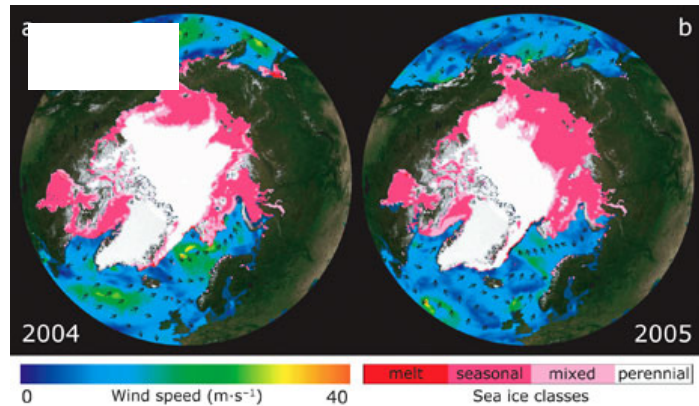
*A digital image of Earth if it were to dry out, taken from shatters.net.*

Earth is expected to be warmer and dryer. These widespread shifts within natural ecosystems will make it difficult for plants and animals to survive. Many

species are expected to encounter difficulty surviving in the new climate conditions. For instance, many plants will have a hard time growing in dryer conditions. Not only are we going to be experiencing problems like this in the future, but we are also already seeing results like these today. The melting of the sea ice located in the Arctic is a big problem that is already occurring.

**Impacts on the Arctic:**

According to NASA studies, the recent changes observed in Arctic temperatures and sea ice covers are gargan-



*This image, taken from National Geographic, displays rate at which ice is melting in the Arctic.*

tuan. A study, known as the Arctic Warming study, shows that compared to the 1980's, the majority of the Arctic has warmed drastically over the past decades. These findings are directly associated with the NASA- funded studies that revealed that sea ice in the Arctic has been declining at a rate of nine percent per decade (Recent Warming of Arctic May Affect Worldwide Climate, 2003). Scientists working on this study have come up with a theory that says the melting of the sea ice may be caused by changing atmospheric patterns above the Arctic region, which are directly related to the buildup of greenhouse gases in the atmosphere. The building up of various greenhouse gases are causing the waters to warm up, therefore leading the sea ice to melt.

**Warmer Climate Leads to Severe Weather:**

There are going to be major consequences that Earth must endure if the overall climate continues traveling down the same path that it currently is. One major consequence includes the theory that with warmer climate Earth will also experience more severe weather storms. It is

NASA that has been working on several experiments, trying to determine if this theory is valid. There have been very few model studies that have been able to simulate the strength of updrafts in severe storms that could potentially occur in future years if the Earth continues warming up. At NASA's Goddard Institute for Space Studies, Tony Del Genio, Mao-Sung Yao, and Jeff Jonas developed a model that is the first to successfully simulate the observed difference in strength between land and ocean storms. It is also the first model to be able to estimate how the strength of the storms will vary in a warming climate. In order to gain all of this information, the scientists derived information from the temperatures and humidities predicted by the climate



*This image, taken from National Geographic, shows a severe lightning storm. If Global Warming continues down the path it is now, storms humans will face will much more intense than this.*

computer model. The studies show that in a warmer climate, stronger and more severe storms can be expected to occur. In the study, the scientists used climate computer programs to detect when conditions were conducive to the outbreak of storms of varying strengths. This model was first tested against current climate conditions. Scientists used it to determine thunder, lightning, and other storm-related conditions in areas such as Africa and the Pacific Ocean. After testing the model on current conditions, scientists then configured the model to represent what the climate would be like in future years. In the hypothetical model of future climatic features, the scientists doubled the amount of carbon dioxide found in the atmosphere, and raised the average temperature five degrees Fahrenheit. The study found that the continents warmed more than the oceans, and that lightning levels rose to an altitude where storms are commonly more vigorous (NASA Study Predicts More Severe Storms with Global Warming,

2007). The theory of stronger, more vicious storms in the future is just one of many expected consequences that Earth will undergo due to global warming. If humans do not want to be forced to deal with these ramifications, major changes must be made now in order to save the future.

### **Impacts on Aquatic Life:**

Continuous global warming is ultimately going to lead to much devastation on Earth. When it comes to plants and animals, their survival will not be easy. Their natural habitats will change, making it hard for them to adapt. Not only will plants and animals on land suffer consequences, but those plants and animals of the oceans will



*An image of coral that has lost its color due to coral bleaching.*

too. While the Earth warms, the ocean waters will too. The rise in water temperatures will put a lot of stress on the ecosystems of the waters, causing devastation. One key example of this is coral reefs. If the water temperatures increase too much, the high temperatures will cause a damaging process called coral bleaching. During the process of coral bleaching, coral reefs push out the algae that give them their color and nutrients. A result of this process is the corals turning white, and eventually dying (Global Warming, 2005). The coral reefs are just one example of many sea beings that will be negatively impacted by global warming.

### **Human Devastation:**

Plants and animals are not the only creatures roaming the Earth that are going to be viciously impacted by global warming. If some theories prove to be correct, there is a lot in store for humans. The warming temperatures that impact the plants and animals will also be harmful to humans. If not directly impacted by the heating of the Earth, humans will be indi-

rectly impacted in a negative manner. For example, the droughts that are expected to occur will put tremendous amounts of stress on food supply. The droughts will ultimately lead to crop devastation. With no crops to harvest, food supplies will diminish quicker than most people would think. Also, threats to human health will skyrocket. With longer-lasting and more intense heat waves, the spreading of diseases will thrive. Spreading diseases such as Malaria and Dengue (Global Warming, 2005) in such an easy manner will have a harmful impact on humans. If nothing is done now to slow down global warming, humans will ultimately suffer greatly.

### **Taking Action Against the Issue:**

There are many actions that are being taken to help slow down the process of global warming. One big achievement that has occurred is the Kyoto Protocol Agreement. This is an international agreement that is part of the United Nations Framework Convention on Climate Change (Kyoto Protocol, 2007). The main goal of the Kyoto Protocol Agreement is to reduce the emission of greenhouse gases. It targets thirty-seven industrialized nations, setting standards to regulate the amount of greenhouse gases being emitted into the atmosphere. With the Kyoto Protocol in place, countries' greenhouse gas emissions have been monitored and records have been kept, keeping a close note on the tiniest of details. Under the protocol, many actions are taking place. For example, groups that work for the United Nations now do various reporting. In these reports consist annual emissions inventories and national reports with records of greenhouse gas emissions. Another outcome of the Kyoto Protocol is Registry Systems. Registry Systems track and record transactions based on greenhouse gas emissions, therefore nations have more of a control on their knowledge of their gas emissions.

Global warming is a major issue facing Earth today. Scientists have proven that human action is a main cause to this catastrophe. If humans do not take action now, their actions in fu-

ture years could potentially be futile. Scientific predictions show that if action is not taken now, by the year 2100, Earth could potentially increase in temperature by four degrees Celsius. Catastrophic events would soon follow this increase in the Earth's average temperature. By taking steps towards becoming more environmentally friendly, humans are saving the future of the planet, and ultimately saving Earth from a global tragedy.

Sarah Janjua

## Global Warming References

<http://www.nasa.gov/centers/goddard/news/topstory/2003/1023esuice.html>

[http://www.nasa.gov/centers/goddard/news/topstory/2007/moist\\_convection.html](http://www.nasa.gov/centers/goddard/news/topstory/2007/moist_convection.html)

[http://www.nasa.gov/worldbook/global\\_warming\\_worldbook.html](http://www.nasa.gov/worldbook/global_warming_worldbook.html)

<http://earthobservatory.nasa.gov/Features/GlobalWarming/>

<http://www.epa.gov/climatechange/science/recentcc.html>