

I PRO 331

Global Warming: Research and Community Outreach

History

- ❖ The suspicion of global warming went under investigation starting in the early 20th century. German scientist, Guy Stewart Callendar, was the first to compile international temperature recordings from other scientists to conclusively state that the Earth's temperature had indeed risen between 1890 and 1935 by as much as half a degree Celsius. The findings were confirmed by the U.S. Weather Bureau's Division of Climate and Crop Weather. Callendar was also the first to propose the idea that carbon dioxide emission by the burning of fossil fuels leads to the greenhouse effect. This paved the way for future climate research.
- ❖ The Intergovernmental Panel on Climate Change (IPCC) was first established in 1988. In 1990, they released their first report concluding that the Earth's temperature had risen, however discrepancies remained in the role of industry versus natural processes. The IPCC's latest report, released in 2007, conclusively states that serious effects of global warming have become evident.
- ❖ Al Gore brought the issue of global warming to the forefront of American homes with his Academy Award-winning documentary "An Inconvenient Truth", released in 2006. Leonardo DiCaprio also released his documentary on the state of the natural environment, "The 11th Hour", in 2007.
- ❖ On February 4th, 2007 Professors Gosz and Lykos gave a presentation on Global Warming in Western Springs. Their success lead to the formation of the Fall 2007 I PRO 331 group. That group began the preliminary work of researching the scientific facts and formed the ground work for this I PRO group.

What is Global Warming?

- ❖ The increase in average earth temperature near surface air and oceans since the mid twentieth century and its projected continuation.
- ❖ 1.33°F over the past 100 years.

Problems and Objectives

- Problems
- ❖ There are too many reports on global warming, with several taking on politically and financially biased views. The society is not being clearly informed of the important issues; rather they are bombarded with too much information too quickly. A lot of the information presented is misleading, and therefore leads to the second problem: lack of awareness of the issue.
- Objectives
- ❖ Evaluate and incorporate previous presentation feedback (I PRO 331 Fall 2007) into new methods of addressing the scientific aspect of global warming.
 - ❖ Focus on solid, scientific data from credible and reliable sources that define why and how global warming is occurring, without indulging in the political and financial issues related to it.

Method

- ❖ The first step was to evaluate the original presentation and divide the content into four categories: carbon dioxide, polar regions, solar energy and biofuels. There were approximately 2-3 members in each team, with 10 members in total and 45 minute PowerPoint presentations were developed for each of the subdivisions, creating four focused lectures.
- ❖ We expanded the outreach in order to contact multiple organizations. A contact list was generated by a team member devoted to outreach, using information available on the internet and word of mouth. Several organizations were contacted, and potential audiences were identified.
- ❖ The evaluation procedures are similar to what was used in the Fall 2007 I PRO. Pre and posttests will be handed out to the potential audience prior and after to the presentation respectively. The goal of these evaluations is to realize if the new focused lectures are more effective than the general presentation delivered in the previous semester

Team



Professor Lykos and Carol DeBiak



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Trevor Dickson - 4th Year Architecture



Harshil Parikh - 4th Year Electrical Engineer



Thomas Kennedy - 4th Year Mechanical Engineer



Ravi Iyengar - 4th Year Biochemistry



Amber Juilfs - 3rd Year Chemistry



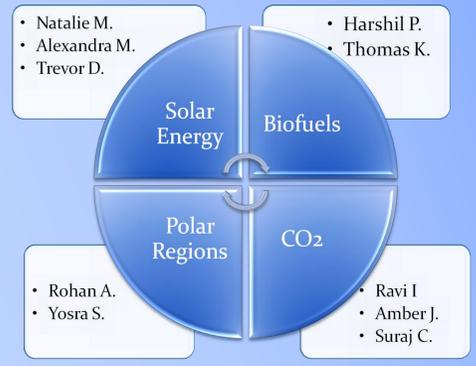
Rohan Amin - 4th Year MBB



Yosra Shaaban - 2nd Year Biology



Suraj Chandrasekar - 3rd Year Biomedical Engineering



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Biofuels

The burning of fossil fuels produces carbon dioxide and other greenhouse gases, which are driving forces behind the Global Warming debate. Over 85% of the world's energy from the burning of the fossil fuels: coal, oil, and natural gas. We know these sources are going to run out, and we are working to increase their power generation efficiency and decrease their impact on the environment through technologies such as gasification and carbon sequestration. Bio-fuels are an alternative that may lead us into a green future, but some studies have found that not all of them are actually green. The production and use of second generation bio-fuels may be the green answer we are looking for.

Polar Regions

The effects of climate change are not the same in all parts of the world. The polar regions are highly sensitive areas where rising temperature induced changes are happening at rates exceeding those between the polar regions. Higher temperatures in the Arctic and Antarctic have a direct global impact and are an indication of further changes in the offing. Here we examine the abundant evidence of reduction in snow and ice as measured by researchers working during the International Polar Year (IPY). The IPY, a program running from March 2007 to 2009, seeks to encourage awareness of and sensitivity to the global consequences of the rapidly changing polar regions. Not only are terrestrial and marine ecosystems being affected, but there are global consequences on coastal cities and global sea levels as well.

Solar Energy

Solar Technology relates to Global Warming in that it is one of many ways to reduce greenhouse emissions, which is just one of the many contributors to Global Warming. We are looking at Solar Technology from an architectural approach, which is especially relevant because we each have somewhere that we call home. The objective for this particular presentation is to look at a real-life solar smart home, and look at the science behind it. From there, we can learn what each of us can do to help save the earth as well as our wallets; since after all, sunlight is FREE!

Carbon Dioxide

The EPA and IPCC have determined carbon dioxide to be the largest air pollutant in the atmosphere among the greenhouse gases, making it an important compound to study in terms of its relation to climate change. Here we note the basic principles of this linear molecule, including spectroscopic characteristics that contribute to the greenhouse effect. Furthermore, we examine the sources of carbon dioxide in the atmosphere and how the gas is distributed accounting for changes in temperature and carbon sinks. These sinks directly correlate with the ocean as a natural process of CO₂ removal from the atmosphere, where it is essentially cycled back into the air. Plants remain another source for carbon sinks, due to their photosynthetic ability to absorb CO₂. From this information, we can determine future projections of CO₂ in the atmosphere along with its effect on temperature.

Results

- ❖ 5 out of 6 people said they strongly agreed with the the statement that the material was presented in an organized, and easily understood manner.
- ❖ 5 also said they strongly agreed with the statement that the presenters were educated and experienced in the subject matter.
- ❖ Other comments were, "The arctic presentation was very good." and "Clear and nice pictures."

Pictures



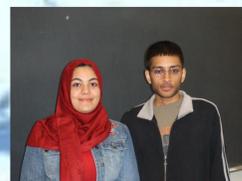
CO₂ Subgroup



Solar Subgroup



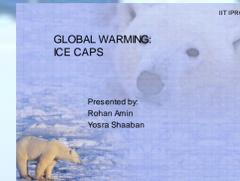
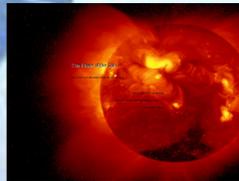
The Team



Polar Regions Subgroup



Fuels Subgroup



Differences from Fall '07

- ❖ We separated into four subgroups rather than the ten that we separated into last semester. We did this because we learned from last semester that having ten was too much, inefficient, and did not work out as well as we would have liked it to.
- ❖ We chose 4 subgroup leaders rather than one overall team leader. And this has proved successful.
- ❖ This semester we began with an outreach committee as last semester, however towards the end of the semester, we found it more effective to have everyone take part and do their own part.
- ❖ We presented on separate days, some groups presented at locations that other groups did not. This is different from last semester where we only presented at one location all together at the same time.