

## Oceans ROCK Talk:

Good evening everyone. I know some of you may think we are crazy, telling you our planet is warming. We had two ice storms in Wilmington this winter, how can this be? Tonight, I'm going to discuss Climate change with all of you. Climate change is the natural and human changes in the earth's overall climate over a long period of time. There are many many components that affect the earth's climate. But to really understand what climate change really is, we have to know the difference between climate and weather.

If I was to tell you that you were taking a vacation to this destination on the screen and could only pack one bag, how many of you would pack snow boots? I don't see many hands out there. Conversely, if I told you were going to this destination, how many of you would pack shorts? This is climate. These are long term weather patterns over a long period of time. Take a look down at what you're wearing today; you're dressing for the weather. Here in North Carolina at this time of year, it's anybody's best guess.

Our Earth is beautiful and complex, as is you climate. There are lots of different things that control climate. The sun, the amount of ice on earth, and even our oceans have an impact on climate. There are also natural variations in the way the Earth moves, both on its axis and around the sun.

We can use ice cores to take a look back into Earth's history and get an idea as to what the conditions were like up to several hundred thousand years ago. We find that temperature increases, and CO<sub>2</sub> follows a few hundred to a thousand years behind. The earth's climate has been changing naturally for billions of years. Why should we be so concerned? What is so different about the way we are warming now?

We know that the CO<sub>2</sub> in the atmosphere is coming from fossil fuels because the type of carbon created from the burning of fossil fuels is different from carbon we would find in the atmosphere. Fossil fuel CO<sub>2</sub> is much lighter than what we would typically find in the atmosphere, and scientists are finding more of the lighter CO<sub>2</sub>.

We are outputting carbon dioxide at a rate faster than even the most dramatic climate changes in Earth's history. SO what's the connection between CO<sub>2</sub> and fossil fuels?

Coal, oil, and natural gas are all carbon based sources of fuel. We call them fossil fuels because they are made from organic material from plants and animals that were alive long ago. The diagram you see behind me is a simplified version of the carbon cycle. Everything is in balance. Fossil fuels are not involved in this carbon cycle. All that carbon is locked away in those fuel sources underground out of the reach of anything that can use them. However, when we burn these fuels to power our homes, cars, and lives, we are reintroducing that carbon back into the system, producing a net gain or a plus one every time we burn these fuels.

Carbon dioxide is a naturally occurring part of our atmosphere. We're producing it right now, just by breathing. It isn't harming us down here, why is it such a bad thing? That has to do with our greenhouse layer, which is located between 20 and 30 km from where we are sitting. It would take 53 Empire State Buildings stacked on top of each other to reach the ozone layer. You all are going to be learning a little more about that in the next talk by the 5<sup>th</sup> graders.

I want everyone to envision a summer evening here in Wilmington, pretend you're lying in bed and you've turned your AC off. You might have a sheet on, because it is so warm, but you're pretty comfortable. Now imagine if somebody put a comforter on you instead, that extra insulation causes the air under your covers to get warmer until it becomes uncomfortable. That is what CO<sub>2</sub> is doing in our atmosphere.

Where are we now? This year, we reached over 400 ppm CO<sub>2</sub> in the atmosphere. If we continue business as usual, this is where we are heading by 2050. What does this CO<sub>2</sub> do?

This extra insulation will cause temperatures to rise on the planet. Temperature is expected to increase globally between 2 and 11.5 degrees F by 2100 (EPA.gov). This will cause major changes on our Earth.

What does all of this mean for our oceans? The oceans will absorb heat and expand, causing the sea level to rise, but that extra CO<sub>2</sub> will do something else in our oceans as well.

I've given you a lot of information, let take a few deep breaths. Remember those phytoplankton we discussed earlier? Besides giving us half the air we breathe they also do something really awesome for our climate. These phytoplankton intake CO<sub>2</sub> for photosynthesis, some of them are eaten, both others when they die sink to the bottom of the ocean. This carbon stays there for a long time, and we consider the ocean a carbon sink, or a place that stores extra CO<sub>2</sub>.

Our ocean supports us in many ways, however we are not supporting the ocean. It is our responsibility to change what we are doing and start supporting our oceans for our future generations.