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House Select Energy Independence and Global Warming Committee Holds Hearing on the State of Climate Science

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MARKEY:

Good morning and welcome to the Select Committee on Energy Independence and Global Warming.

For many members of Congress and the public, the concern about global warming may seem like a relatively new development. In fact, scientists, including those advising the U.S. government, have issued warnings about the rising concentrations of carbon dioxide in the atmosphere throughout the last four decades.

After a report from his Science Advisory Committee, President Lyndon Johnson noted in a 1965 special address to Congress that, "a steady increase in carbon dioxide from the burning of fossil fuels has altered the composition of the atmosphere."

In 1978, Robert White, the first administrator of the National Oceanic and Atmospheric Administration, warned that carbon dioxide emissions can have consequences for climate that pose a considerable threat to future society.

More recently, the National Academy of Sciences found in a 2001 report requested by President Bush that "global warming could well have serious adverse societal and ecological impacts by the end of this century."

In a report issued earlier this year, U.S. science agencies concluded that climate changes are underway in the United States and are projected to grow. Administration scientists once predicted the impacts of global warming. Now they can confirm them, and unfortunately families from New Orleans to Alaska are living with the harsh consequences.

Given the upcoming International Climate Conference in Copenhagen and the continuing work on domestic clean energy legislation in Congress, an update on the administration's view of the state of climate science is timely.

In 2007, the Intergovernmental Panel on Climate Change found in their comprehensive assessment that global warming is unequivocal and that this warming is primarily due to human activities. This decade has been the hottest in recorded history with all of the years since 2001 being in the top 10 hottest.

This summer the ocean was the warmest in NOAA's 130-year record. The extent of arctic summer ice -- sea ice for the first -- for the past few years has shrunk dramatically compared to the previous two decades, with the reduction roughly three times the size of Texas.

We must be aware that as the climate system warms, we risk passing certain tipping points of rapid and irreversible change. In the United States, the effects are evident. Daily

record high temperatures are being broken twice as often as daily lows. Our farms are threatened by rising temperatures, water scarcity and pests.

In the Northeast, extreme rainstorms and the risk of flooding have increased. In Alaska, villages are finding the land they call home literally melting out from underneath them as the permafrost thaws. In the West, the shrinking mountain snow pack and increasing droughts strain our water resource system.

Fortunately, after decades of warnings, President Obama is partnering with Congress to realize a new vision for America, an America free from dependence on foreign oil and thriving as a leader of the new clean energy economy.

The American Recovery and Reinvestment Act included more than \$80 billion for clean energy investments to jump-start our economy and generate new clean energy jobs. The cash for clunkers program took gas guzzlers off the road. Fuel economy standards were raised for model year 2011 cars and trucks, saving drivers money and spurring companies to develop more efficient affordable vehicles.

In June, the House passed the Waxman-Markey American Clean Energy and Security Act. This legislation that will put us on a pollution-cutting path and at the same time creates millions of new jobs, making America the global leader of the clean energy economy.

The act will also create a National Climate Service that will provide decision makers with vital climate science information. As we move forward, we must continue to stay abreast of the most recent findings and to ground our policy in the latest climate science.

Our witnesses today, Dr. John Holdren, the president's science adviser, and Dr. Jane Lubchenco Administrator of the National Oceanic and Atmospheric Administration, will help us do that.

Now, I would like to turn and recognize the ranking member of the committee the gentleman from Wisconsin, Mr. Sensenbrenner.

SENSENBRENNER:

Well, thanks very much, Mr. Chairman. And what we've just heard from the chairman is a case of denial on what's happened recently. Sound science depends on sound policy. Sound science policy depends on sound science.

When the science itself is politicized, it becomes impossible to make objective political decisions. Scientific policy depends upon absolute transparency. As policymakers, we should all be concerned when clean key climate scientists write in private correspondence that they found a trick to hide the decline in temperature data documented in climate studies.

Less than two weeks ago, some 160 megabytes of data containing over 1,000 e-mails, including one from today's witness, Dr. John Holdren, and 2,000 other documents from the climate research unit at the University of East Anglia in the U.K. were posted on the Internet.

While the e-mails don't undermine everything we know about climate change, their contents are shocking. And in the words of Clive Cook, senior editor of the Atlantic Monthly a columnist for National Journal and a commentator for Financial Times, the stink of intellectual corruption is overpowering.

The temperature records from the climate research are one of only three major datasets which considerably overlap and which have been used as the bedrock for the assessments by the Intergovernmental Panel on Climate Change and the United States Global Change Research Program.

The dataset in question is the basis for virtually all peer-reviewed literature. The document shows systematic depression of dissenting opinion among scientists in the climate change community, intimidation of journal editors, and a journal who had deigned to publish articles questioning the so-called consensus.

Manipulation of data and models, possible criminal activity to evade legitimate requests for data and the underlying computer codes filed under Freedom of Information Act, both in the U.S. and in the United Kingdom, and demonstrate that many climate scientists and proponents of climate change legislation have vested interest, a clear conflict of interest.

Those with the most to gain from climate change have tried to dismiss these e-mails as out of context, so I'm going to read a few examples. From Kevin Trenberth, quote, "The fact is that we can't account for the lack of warming at the moment and it is a travesty we can't. The CERES data shows that there should be even more warming, but the data are surely wrong. Our observing system is inadequate," unquote.

From Phil Jones, quote, "I've just completed Mike's nature trick of adding in the real temps to each series for the last 20 years, that is from 1981 onwards, and from 1961 for Keith's to hide the decline," unquote.

From Andrew Manning, quote, "I'm in the process of trying to persuade Siemens Corporation to donate me a little cash to do some CO2 measurements here in the U.K., looking promising. So the last thing I need is news articles calling into question again observed temperature increases. I thought we'd move the database beyond this, but it seems like the skeptics are real diehards," unquote.

From Keith Briffa, quote, "I tried hard to balance the needs of the science and the IPCC, which are not always the same. I worried that you might think I gave the impression of not supporting you well enough while trying to report on the issues and uncertainties," unquote.

From Phil Jones, quote, "I'm getting hassled by a couple of people to release the CRU station temperature data. Don't any of you three tell anybody that the U.K. has a Freedom of Information Act," unquote.

From Michael Mann, quote, "This was the danger of always criticizing the skeptics for not publishing in the peer-reviewed literature. Obviously, they found a solution to that, take over a journal. So what do we do about this? I think we have to stop considering Climate Research as a legitimate peer-reviewed journal. Perhaps we should encourage our colleagues in the climate research community to no longer submit to or cite papers in this journal. We also need to consider what we tell or request of our more reasonable colleagues who currently sit on the editorial board," unquote.

From Phil Jones, quote, "If anything, I would like to see climate change happen so the science could be proved right regardless of the consequences. This isn't being political, it's being selfish," unquote.

Now, these e-mails show a pattern of suppression, manipulation and secrecy that was inspired by ideology, condescension and profit. They read more like scientific fascism than scientific process. They betray economic and ideological agendas that are deaf to

disconforming evidence.

Hopefully, this scandal is the end of declarations that the science is settled and the beginning of a transparent scientific debate. The seriousness of this issue justifies additional consideration. The majority did not permit us to invite a witness to this morning's hearing.

And therefore, I am requesting a minority day of hearings and am filing with the chairman a letter signed by all six of the Republican members of this select committee pursuant to Rule 11(j)(1) of the House of Representatives to have a minority day of hearings.

And I yield back the balance of my time.

MARKEY:

I thank the gentleman very much.

The hearing today is for the purpose of hearing from administration witnesses. In my 34 years here, I -- whether it be a Democrat or Republican administration -- I had no memory of another witness sitting with administration officials at the time of their testimony, but I will...

SENSENBRENNER:

Will the gentleman yield?

MARKEY:

I will be glad to yield.

SENSENBRENNER:

When I was chairman of the Judiciary Committee, I did not allow anybody to sit with cabinet-level or cabinet-rank witnesses, but there were other people who sat with administration witnesses and in many cases contradicted them, including witnesses that were proffered by the Democratic majority on the Judiciary Committee.

MARKEY:

Well, in the 15 years that I have chaired a committee here in the House, I have always offered as a courtesy to the Reagan administration, to the first Bush administration, and to the second Bush administration the courtesy of having their administration officials sit and make their presentations. And that's how I've conducted myself since 1981 chairing committees, and I extended that courtesy through three Republican administrations.

So that is my own personal history and I did not think it was appropriate to have another witness sitting with these representatives of President Obama since I did not allow that to happen with President Reagan or the two Bush presidencies. But I will be more than willing to discuss future hearings with the gentleman and the minority if they would like.

Let me now turn and recognize the gentelady from South Dakota.

SANDLIN:

Thank you, Mr. Chairman. I don't have an opening statement. I'll reserve for questions.

MARKEY:

Let me recognize the gentleman from Colorado.

SALAZAR:

Well, thank you, Mr. Chairman and good morning. I'm looking forward to hearing the testimonies today. We have a complex problem before us today and I'm interested to hear where we are in the science.

I also want to know what we can do better to adapt our communities and practices to prepare for the anticipated climate changes. The information found in the recently released report entitled Global Climate Change Impacts in the United States is quite comprehensive. However, I'm glad to see that both of you in your testimony say that we need more regional specific information to help decision-makers plan in the future.

Colorado, in the 3rd Congressional District, has rich agricultural resources and millions of acres of forest. We also depend in large part on a limited amount of water for our survival. I'm concerned about how we can effectively prepare for the changes you predict.

As I mentioned, water is one of the natural resources my district heavily depends on. While we have a lot of snow in the mountains, the valleys see very little water. And I'm very proud of the \$5 million appropriation for the Arkansas Valley conduit that was approved this year.

That's the first round of conduit funding, which will be used for the environmental analysis in planning and design. The Arkansas Valley conduit is designed to provide clean drinking water to approximately 40 cities, towns and water providers in the lower Arkansas Valley.

These communities are in dire need of a source of water that will help them comply with the Clean Drinking Water Act in a manner that they can afford. Every community that will receive water from the conduit is currently rated below the 85 percent level of average household income.

The roots of the Arkansas Valley conduit stretch back in 1962 when the conduit was authorized by Congress as part of the (inaudible) Arkansas project. And the reason that I bring this up is that it took over 45 years, close to 47 years to get the funding for this critical project.

And if it takes that long for something this critical, we need to better prioritize needs and support for our communities. I'm a farmer. Agriculture is the cornerstone of my life and also the district that I represent.

In my district, we produce wheat, potatoes, barley, beef and many other crops. Agriculture is one of the top three economies in the district. The demand to produce more food will only increase as the population increases.

And according to the report I mentioned before, climate change has the potential to

negatively affect growth and yield of many crops, as well as increased populations and bigger of a variety of weeds and insect species. And if this is true, how soon do we anticipate these changes and how do we accommodate them?

We've already seen the effects of warmer weather and drought in our forests. Over 2 million acres of forest in Colorado are dead because of the mountain pine beetle. This epidemic will change the landscape of Colorado for decades.

We need to manage our forests for resiliency in the future so that they can withstand the changes in weather. So I do look forward to your testimony today, and I want to -- I want to thank you for being with us.

I yield back.

MARKEY:

Great. The gentleman's time has expired.

The chair recognizes the gentleman from Arizona, Mr. Shadegg.

SHADEGG:

Thank you, Mr. Chairman, and I apologize. I have another hearing so I will have to leave for a portion of my time here.

But I want to begin by noting something that I think everyone in the room knows, but nobody wants to acknowledge. It is that there is an elephant, a large elephant sitting in the middle of this room. You can ignore it if you like. Members of the minority can ignore it if they like. Members of the majority can ignore it if they like. Members of the staff or the press or the audience can ignore it if they like. But that elephant is the credibility of the entire scientific community which has told us that the science behind manmade global warming is resolved.

Make no mistake about it. When you read in the e-mails which have been made public recently that that science was politicized, that its proponents were unwilling to release their data, that they were unwilling to have their theories tested, that they were threatened by anyone and everyone who dared challenge them -- when you realize they were that insecure, then you have to understand that their credibility, the entire credibility of the theory is placed on the line.

Now, that does not mean it cannot be rehabilitated, but it's interesting to me those who have not simply accepted the claim of manmade global warming, man-caused global warming, have been called deniers.

I would suggest that when the White House reads of these e-mails and the press secretary for the White House steps forward and says they mean nothing, the science has already resolved, maybe the term "deniers" best applies to those in that position.

Public policy is a difficult business. It is hard for those of us who sit on this side of the dais to make decisions and to make those decisions in the best interest of the nation. At times, we are asked to call upon our citizens to sacrifice, to pay more in taxes, to lose jobs, to give up lifestyle, to pay more for energy. We simply cannot do that when the evidence we are supposed to be basing our decisions upon has been clearly politicized, when there is a grave question about its credibility.

Until we address the evidence -- I'm sorry -- until we address the elephant in the center of this room and resolve the questions raised by the appalling e-mails which have been made public, it is impossible for this Congress to set public policy in this area and to make the people of America accept and give of the sacrifices they will have to give to make the changes called for by the legislation that's before this Congress.

Anyone who thinks that those e-mails are insignificant, that they don't damage the credibility of the entire movement, is naive. We cannot expect people in a free society to make sacrifices on anything other than hard evidence. Here, that hard evidence has to be hard evidence that in fact global warming is caused by man and that the sacrifices called for in the legislation are necessary.

These e-mails repeatedly show that the scientists involved and who authored them, the scientists who are behind global warming or the argument that global warming is caused by manmade factors, the e-mails demonstrate that they are afraid to reveal the fact that they have been unwilling to have their theories tested, that they have been unwilling to provide their data, and they are unwilling to have their theories openly challenged.

Now, because their own defenses and justifications for hiding these facts and their data has changed so many times, we now learn that maybe the data does not even exist. It is critical for this Congress to find out and to get to the bottom of the question of what the elephant in the room is and what the real science is, and whether money and politics has eroded the credibility of that science.

Thank you, Mr. Chairman. I yield back.

MARKEY:

The gentleman's time has expired.

The chair recognizes the gentleman from Oklahoma, Mr. Sullivan.

SULLIVAN:

Thank you, Mr. Chairman.

MARKEY:

Excuse me. I did not see the gentlelady from Michigan.

The chair recognizes the gentlelady from Michigan, Ms. Miller.

MILLER:

Thank you, Mr. Chairman. I appreciate you having this -- this hearing.

I think it's an interesting title of the hearing, the State of the Climate Science. I think it's particularly interesting in light of what is happening, and I'd like to associate myself with the remarks made by the ranking member and the others on the minority side here of the panel.

It -- I come from the state of Michigan. We have the highest unemployment in the nation. Everybody is well aware of that. As well we derive about two-thirds of our

electricity from coal. And for these reasons and others, I really looked very closely at the cap-and-trade legislation and finally decided that it would just be so devastating for Michigan's economy and our nation that I could not support it.

But, you know, we had been told that we had to pass this legislation because the debate was over, the science was absolute, the science was incontrovertible about climate change, and regardless of what it means economically to us, we need to do this to protect our environment and our very way of life.

And, you know, particularly hard hit with the cap-and-trade would be states like Michigan. In fact, the Detroit News editorialized that the cap-and-trade legislation, as they said, would be a dagger through the heart of Michigan's economy.

So when I saw this notice, this committee hearing notice, I was very enthusiastic because I thought we were going to be able to talk this morning about what many people are calling climate-gate, which I think is an appropriate analogy because it is totally a cover-up of what is happening.

And as the ranking member has -- I won't go through any of the e-mails, I had a list of them here as well, but he certainly has articulated many of them already. But I thought we were going to have a hearing about that, and if we're not, I would mention that I had also respectfully sent a letter earlier this week to the chairman and the ranking member to ask this committee to have a hearing.

I think it is important that the committee investigate these e-mails and what has happened in climate-gate. I think transparency is the most appropriate thing, and I think it is very important that we have transparency and that we -- that we look at these things because certainly the central arguments about manmade climate change is certainly in question. I think the science is not settled and the debate is raging around the United States and around the globe right now, particularly on the eve of Copenhagen.

And I would simply just mention one other thing if I could, Mr. Chairman. We did have a hearing just a couple of months ago about a dozen fraudulent letters that were sent during the cap-and-trade legislation, and I thought that was an appropriate thing. But certainly if we could have a hearing about a dozen fraudulent letters, we could have a hearing in this committee about climate-gate.

And thank you and I yield back.

MARKEY:

The gentlelady's time has expired.

The chair recognizes the gentleman from Washington state, Mr. Inslee.

INSLEE:

Thank you.

I understand that those people who have been refusing to accept science for years are enjoying their moment talking about language from some e-mails that were taken out of context.

I understand their enjoyment of continued to deny obvious facts. And if you could take

those e-mails and chop them up and put them in a C-130 and sprinkle them over the Arctic and stop the Arctic from melting, it would be a good thing, but that won't happen.

If you could take those e-mails and chop them up into fairy dust and sprinkle them over the Greenland icecap and stop the accelerated melting going on there, that would be a good thing, but that won't happen.

And if you could take those e-mails and chop them up and sprinkle them over the oceans and stop the incredible ocean acidification that is so damaging, that would be a wonderful thing, but that won't happen. The fact of the matter is plain and clear for anyone who is willing to dispassionately look at the evidence.

And I would encourage for those who want to look at the most recent evidence on this to take a look at a group called the Copenhagen Diagnosis. They're found at www.copenhagendiagnosis.com. It is a -- it is an update of the IPCC information, and the update is that since 2007 the sequelae of both ocean acidification and global climate change have been either accelerating or at least worse than what's predicted in the IPCC report.

The global deniers are right. The 2007 IPCC report was not entirely accurate. It was not entirely accurate because this problem is worse than the last IPCC report indicated. Surging greenhouse gases are worse than predicted. Recent global temperatures demonstrate human-based warming.

The acceleration of melting icecaps in the Arctic is worse than expected. The rate of decline in glaciers is worse than expected. The disappearance of the Arctic summer ice is worse than expected. The current sea level rise estimates are worse than expected in the IPCC 2007 report.

So the point of the current science is that what we had in 2007 is indeed out of date. This problem is worse than expected. And I'll just comment on one thing that I learned. Sometimes you can -- you can learn things from silence, as well as people talking.

I was at my old school at the University of Washington last week and we were talking about this issue, and this young man stood up and he was a global climate change denier and he was having field day with some e-mail language that he thought showed some massive conspiracy by the Trilateral Commission or something to take over the Earth.

And I just said, "Look, if you're right and if there's no global warming, if you're so right, what are you going to do about ocean acidification? What do you say about that?" And he was silent and that silence speaks volumes.

If people over here want to deny clear science about global warming, they cannot deny the fact that the oceans are becoming acidified, that no reputable science anywhere in the world -- recognizes this is happening caused by CO2 going into the atmosphere, going (inaudible).

So I just say the science is clear. I wish it was otherwise, life would be easier, but this is a challenge of the (inaudible). Thank you.

MARKEY:

The gentleman's time has expired.

The gentleman from Oklahoma, Mr. Sullivan, is recognized.

SULLIVAN:

Thank you, Mr. Chairman. I appreciate you holding this hearing today, but unfortunately we were not allowed a minority witness.

Yesterday, I was pleased to sign onto a letter by Ranking Member Sensenbrenner and my Republican colleagues on this committee requesting a day of hearings to consider the scientific evidence for climate change, the observed and anticipated impacts of climate change, and the key areas of further research. I hope you will honor this request as we are on the eve of the Copenhagen climate conference.

In light of the recent disclosure of e-mails between several prominent climatologists revealing possible deceitful manipulation of important climate data uncovered that the world leading Climate Change Unit at the University of East Anglia in England, I think it is imperative that we launch an investigation into this issue and reexamine all the scientific evidence surrounding climate change.

With the United Nations Climate Change Conference in Copenhagen set to begin in less than a week, we need to have all the facts before us as we consider whether this is in the United States' best interest to agree to a binding international climate treaty.

For the record, I'm opposed to any climate treaty that does not recognize the right of every country to protect its own national energy interests and would place the United States at a competitive economic disadvantage worldwide.

I'm interested in learning from our panel today whether or not they would support an independent investigation into the Climate Change Unit e-mails and whether or not they were -- these e-mails raise concerns about the integrity of the scientific process.

I yield back my time.

MARKEY:

Great. The gentleman's time has expired. All time for opening statements from the members has been completed.

We'll now turn to our very distinguished witnesses. Our first witness is Dr. John Holdren. He serves as assistant to President Obama for science and technology. He is the director of the White House Office of Science and Technology Policy and co-chair of the President's Council of Advisors on Science and Technology.

He was a professor at Harvard. He was director of the independent nonprofit Woods Hole Research Center. He is a member of the National Academy of Sciences. He has received the MacArthur Foundation prize, the genius award.

We welcome you, sir, before our committee. Whenever you are ready please begin.

SENSENBRENNER:

Mr. Chairman, I would request that the witnesses be sworn before they testify today.

MARKEY:

The committee will stand in a brief recess.

(RECESS)

MARKEY:

The gentleman -- the ranking member of the committee has made a request to have the witnesses sworn in. The chair has the right to -- in his discretion to make that determination, and I do not think it is necessary. I think that the administration is going to testify truthfully before our committee today and we will operate under that premise.

And we will begin the hearing with the testimony of the -- of Dr. Holdren, the president's science adviser.

HOLDREN:

Thank you, Chairman Markey, Ranking Member Sensenbrenner, members of the committee. I do thank you for inviting me to testify on this timely and important topic today.

I had planned to summarize in my brief oral statement the written statement that I provided to the committee addressing current and projected impacts of climate change and also climate science research activities, needs and products, as the letter of invitation requested.

But given the emphasis in some of the opening comments on the e-mails, I'm going to divert from that program and say a few words about the -- about the e-mails, and then finish with the concluding part of my original oral statement.

The e-mails are mainly about a controversy over a particular dataset and the ways a particular small group of scientists have interpreted and displayed that dataset. It's important to understand that these kinds of controversies and even accusations of bias and improper manipulation are not all that uncommon in science, in all branches of science.

The strength of science is that these kinds of controversies get sorted out over time as to who is wrong, who is right, and how much it matters, by the process of peer-review and continued critical scrutiny by the knowledgeable community of scientists.

Of course, openness in sharing of data and methods is very important to this process. And as I think you all know, this administration is a strong proponent of openness in science and in government. And Administrator Lubchenco will have some things to say about public access to the climate data maintained by her agency and maintained by other agencies in the United States.

In this particular case, the dataset in question and the way it was interpreted and presented by these particular scientists constitute a very small part of the immense body of data and analysis on which our understanding of the issue of climate change rests.

The question being addressed by these data was: Have there been natural periods of warming in the past -- in the last 1,000 or 2,000 years in particular that have been stronger than the episode now being experienced? That's an interesting question. And because of the controversy around it at the time most of these e-mails were written, that is in the early 2000s, the National Academy of Sciences undertook a thorough review of all of the relevant datasets and all of the methods of analysis, not just the dataset used by these particular authors or the methods used by these particular authors.

The National Academy's report on this matter was published in 2006 and it concluded that the preponderance of available evidence points to the conclusion that the last 50 years have been the warmest half century in at least the last 1,000 years and probably much longer.

There is and there will remain after the dust settles in this current controversy a very strong scientific consensus on the key characteristics of the problem. Global climate is changing in highly unusual ways compared to long-experienced and expected natural variations.

The unusual changes match what theory and models tell us would be expected to result from the very changes in the atmosphere that we know have been caused by human activities, above all burning fossil fuels and tropical deforestation.

Significant impacts on human well being from these changes in climate are already being experienced, and continuing with business as usual in the fossil fuel burning and tropical deforestation activities that are the largest contributors to these changes in the atmosphere, is highly likely to lead to growth of the impacts to substantially unmanageable levels.

Details in support of those propositions are in my written testimony. Let me turn to the closing part of my remarks.

I've tried to indicate in the -- in the written testimony and here that we in fact know a great deal about global climate change -- what its causes are, how it works, what its impacts are and are likely to become.

But of course there is more to learn, and the federal government is doing a lot in support of the research needed to learn more and its translation of that research into products our society can use to better cope with climate change. But there again, we need to do more.

With that said, I emphasize again that in my judgment and that of a great majority of other scientists who have seriously studied this matter, the current state of knowledge about it, even though incomplete, as science always is, and even though controversial in some details, as science almost always is, is sufficient to make clear that failure to act promptly to reduce global emissions to the atmosphere of carbon dioxide and other heat-trapping substances is overwhelmingly likely to lead to changes in climate too extreme and too damaging to be adequately addressed by any adaptation measures that can be foreseen.

The United States is the largest contributor to the cumulative additions of anthropogenic, that is human-caused, greenhouse gases to the atmosphere since the beginning of the industrial revolution, and still today the second-largest emitter after China.

And as the world's largest economy and preeminent source of scientific and technological innovation, we have the obligation and the opportunity to lead the world in demonstrating that the needed emissions reduction can be achieved in ways that are affordable and consistent with continued economic growth, that create new jobs, and that bring further co-benefits in the form of reduced oil import dependence and improved air quality.

President Obama is going to Copenhagen to underline that his administration is fully committed to assuming this leadership role. The administration, obviously, will need the support of the Congress in delivering on this promise.

And I'd like to thank you, Chairman Markey, and this committee for your own

leadership in this critically important domain. I thank you as well for your attention.

MARKEY:

Thank you, Dr. Holdren, very much.

Our second witness is Dr. Jane Lubchenco. Dr. Lubchenco is the undersecretary of commerce for oceans and atmosphere and the administrator of the National Oceanic and Atmospheric Administration. She has been a distinguished scholar on these issues.

She is one of the most highly cited ecologists in the world, a member of the National Academy of Sciences, and similarly a recipient of the MacArthur Fellowship, as was Dr. Holdren.

We welcome you, Dr. Lubchenco. Whenever you are ready, please begin.

LUBCHENCO:

Thank you, Chairman Markey, Ranking Member Sensenbrenner, members of the committee. I greatly appreciate the opportunity to testify today. I appreciate your interest in the science of climate change and the spectrum of climate sciences and services needed in this country and abroad to make critical decisions for now and for the future.

As President Obama said to the National Academy of Sciences, science is more essential for our prosperity, our security, our health, our environment and our quality of life than it has ever been before. As head of NOAA, one of the nation's premier science service and stewardship agencies with responsibilities for both oceans and atmosphere, I strongly support the focus on science-based decisionmaking.

Science can help inform the understanding of opportunities and challenges presented by climate change. Through sustained federal and extramural partnerships and collaborations, the nation has made very significant progress in our understanding of climate change.

The core capabilities needed to understand the state of the climate and make projections about future climate and associated impacts include integrated and comprehensive observing systems on land and the oceans, the atmosphere and space, research into the physical system and its interconnectedness to the human ecological and biogeochemical system, modeling from intraseasonal to multidecadal to centennial time scales, and a means to assess and communicate the climate information about current and future impacts.

Three entities, the Intergovernmental Panel on Climate Change, the IPCC, U.S. Global Change Research Program, and the National Academy of Sciences have all published several peer-reviewed syntheses of the latest climate science findings and associated impacts.

NOAA scientists have played a significant role in all of these assessments. For example, NOAA played a lead role in the development of the U.S. GCRP's global change -- global climate change impacts in the United States report, a landmark assessment report that Dr. Holdren and I proudly announced just this last June. And NOAA scientists made up 73 percent of the federal authors in the IPCC's Fourth Assessment Report for Working Group I, the basis of the physical understanding of climate.

Since the IPCC process began in the late 1980s, a wealth of global scientific information has cumulatively provided stronger and stronger evidence that the Earth is warming and that humans are primarily responsible. As stated in the Global Change Impacts 2009 report, global warming is unequivocal and is primarily human-induced. This warming can be seen in increases in global average surface air and ocean temperatures, widespread melting of snow and ice, rising sea levels, and changes in many other climate-related variables and impacts.

Most of the observed increases in global temperature since the mid-20th century are due primarily to human-induced increases in concentrations of heat-trapping greenhouse gases. When I served on the very first National Academy of Sciences study on policy implications of global warming in the 1980s, we talked about what human-induced climate change might look like at some point in the future.

Today, we know that it's happening now. We are already seeing the effects of climate change on our landscapes, our neighborhoods, our farms, as well as our forests, oceans and mountains. We are able to measure these changes through significant advances in our observing systems over the last 20 to 30 years, many of which are the result of NOAA's responsibility and innovation, and through collaborative global and national efforts to provide systematic and widespread monitoring of the climate system and associated environmental and social changes.

As a result, we have a much better understanding of present and expected impacts of climate change. Widespread climate change impacts are occurring now and are expected to increase. I emphasize that climate change is not a theory. It is a documented step of observations about the world.

A key element of the U.S. Global Change Research Program emphasizes the importance of multiple independent analyses and datasets to quantify uncertainties, and therefore we have the benefit of this policy when it comes to global change analyses.

The NOAA data used in the IPCC report are open and available widely -- openly available. They are used heavily in the IPCC results of temperature change similar to other major global datasets maintained by other U.S. agencies such as NASA, and that maintained by other countries such as the United Kingdom.

So what are these datasets? What is this -- what do these observations tell us about climate change? What do we know with certainty about trends to date and what do we think is highly likely in the future?

Global average surface temperature has risen by 1.5 degrees Fahrenheit since 1900 and is projected to rise another 2 to 11.5 degrees by 2100. The current atmospheric carbon dioxide concentration is estimated at about 385 parts per million, which is higher than the highest point in the last 800,000 years.

Temperatures in the next couple of decades will be primarily determined by past emissions of greenhouse gases, but increases thereafter will be primarily determined by future emissions. Current observed global emissions of carbon dioxide emissions are beginning to exceed even the upper range of the 2007 IPCC scenarios.

There is strong agreement and much evidence that with current climate change mitigation policies and related sustainable development practices, global greenhouse gas emissions will continue to grow over the next few decades.

As we continue to learn more about the climate system, I would like to reiterate the

importance of looking at the Earth's system holistically and understanding the interconnected nature of the ocean atmosphere and terrestrial systems.

In particular, I want to emphasize the importance of continuing our work to better understand the oceans and the potential impacts of climate change on them. I believe we've been championing the notion that we do not have, but urgently need, a strong focus on ecosystem-based science to inform decisions about adapting to climate change.

An ecosystem-based approach also provides a broad array of possible tools for adaptation to climate change. Climate change interacts with and exacerbates other changes, ranging from over-fishing to nutrient pollution to invasive species and habitat destruction. Removing one or several of these stresses is likely to enhance the resilience of the system to other stresses.

Equally important is the need to acknowledge that we are likely to see surprises as human actions disrupt many fundamental biogeochemical and ecological processes. The now-routine appearance of dead zones, areas of low or no oxygen on the coast of Oregon and Washington during the summertime, is an example of an unanticipated change with possibly serious consequences. What does managing with the expectation of surprises look like? These are rich areas for future research and management alike.

And finally, ocean acidification, which I call the equally evil twin of climate change, provides yet another major threat to coastal and ocean ecosystems. Getting a better handle on rates of change in ocean chemistry and the consequences to marine biota are high priorities. The seemingly persistent hypoxic events off the Pacific Northwest coast and this increasing corrosiveness of the water because of acidity are two examples of potential consequences from increasing CO₂ in the atmosphere.

In addition, climate change can exacerbate other human-induced stresses to aquatic systems, such as those caused by nutrient loading, invasive species and over-fishing. As water resources are stressed, coastal areas are at increasing risk from sea level rise, inundation and storm surge. North Atlantic fish populations are shifting north due to warming -- warmer oceans, and the threat to human health increases due to heat stress, air quality and of water-borne diseases.

We must continue to enhance our scientific capacities, including research, observation, modeling, predictions, projections and assessments to ensure that we are providing policy and decisionmakers, planners and the public with the best possible science-based information to take on the challenges and opportunities posed by climate change.

Thank you again, Mr. Chairman, for the opportunity to provide you with this review and update of the climate change science and ocean acidification. NOAA looks forward to continuing to provide national and international leadership in collaboration with our partners to ensure the solid foundation of climate science and service necessary to inform critical decisions about our future as a nation and a global society.

MARKEY:

Thank you.

Now, I know you want to give us as a brief demonstration of the science. And if you would like, could you please do that at this time and then we will go to questions.

LUBCHENCO:

OK. Thank you very much, I appreciate that.

What I'd like to do is just start here briefly and then move over and describe what I would like to share with you. I greatly appreciate the opportunity to not only present the oral testimony that I did, but to provide a demonstration of some basic scientific concepts of ocean acidification.

Ocean acidification is a global-scale change in the basic chemistry of the oceans that is underway now as a direct result of the increases of CO₂ in the atmosphere. We are just beginning to understand the impacts of ocean acidification on life in the ocean. The moniker "osteoporosis of the sea" gives you a hint about some of this impact.

The basic chemistry of ocean acidification is understood and is not controversial. Here are three basic concepts. Number one, the chemistry of the oceans is dependent upon the chemistry of the atmosphere. More CO₂ in the atmosphere means more CO₂ in the ocean.

Number two, as CO₂ from the air is dissolved into the oceans, it makes the oceans more acidic. The resulting changes, number three, in the chemistry of the ocean disrupt the ability of plants and animals in the sea to make shells and skeletons of calcium carbonate. And those chemical changes also dissolve shells that are already formed.

So who in the oceans is affected by this? Any plant or animal that has a shell or a skeleton made of calcium carbonate. The hard parts of many familiar animals, such as oysters, clams, corals, lobsters, crab, such as those on this table and those on the posters, are made of calcium carbonate.

Many microscopic plants and animals at the base of the food chain also have calcium carbonate shells or skeletons. Some of these microscopic plants and animals are so abundant that when they die they form massive deposits as they accumulate on the sea floor.

The famed White Cliffs of Dover are a familiar example of calcium carbonate or chalk deposit, the skeletons of microscopic organisms. More acidic ocean water is corrosive to all of these calcium carbonate shells and skeletons, but let me focus on two quick examples.

Number one, corals that provide the fundamental structure for those world's treasured coral reefs make their skeletons with calcium carbonate. More acidic ocean water makes it harder for corals to make their hard parts. If the ocean becomes too acidic, coral reefs may well disappear.

Pteropods, number two, also called sea butterflies, are small shelled animals about the size of a lentil bean. They occur in the millions off the coast of my home state of Oregon, but also throughout the world's oceans. They are a key or the primary source of food for juvenile salmon and many other fish around the world.

Pteropods are particularly susceptible to increasingly acidic ocean water, as you'll see in a moment. And I mention them in part because they illustrate the broader consequences of disruption of one part of the ocean ecosystem reverberating throughout other parts of the system, potentially affecting jobs, food security, tourism and more.

The severity of ocean acidification's impacts is likely dependent in part on the interaction of acidification with other environmental stresses, such as rising ocean temperatures, over-fishing, and pollution from the land. Early evidence suggests that some species are better able to thrive in increased acidity, but the adaptability of most organisms to increased acidity is unknown.

While our understanding of ocean acidification's impact are still unfolding, the basic

science of how the ocean is acidifying and the effects of increased acidity on some marine organisms is well known. And I'd like to now demonstrate two of the basic concepts that I just mentioned.

The ocean does a great service -- the ocean does a great service by absorbing tremendous amounts of carbon dioxide from the atmosphere. And in fact, the oceans have absorbed already about a third of the carbon dioxide that humans have contributed to the atmosphere over the last two centuries.

This greatly reduces the impact of these heat-trapping pollutant gases on the Earth, but the carbon dioxide that is absorbed by oceans changes the chemistry of sea water, making it more acidic and more corrosive. When carbon dioxide dissolves in water, it forms carbonic acid, making the water more acidic.

And to illustrate how this occurs, I brought a vessel of water, some common laboratory blue dye that changes color as the acidity in the solution changes, and some dry ice, which is simply compressed frozen carbon dioxide.

So I will first squirt some of this dye into the pitcher of water, twirl it around a little bit. Actually, I was going to do that (inaudible), wasn't I? I will put it in here. Thank you, John. OK, I'm just going to add a little more dye here.

MARKEY:

Why don't you move that microphone over?

LUBCHENCO:

Do we need the microphone?

(OFF-MIKE) I used tap water to demonstrate this concept, but the same phenomenon happens with sea water as with tap water. As it absorbs carbon dioxide, it changes -- the carbon dioxide changes into carbonic acid and becomes more acidic. Over the last two centuries, the oceans have now become 30 percent more acidic because of the CO₂ that they have absorbed from the atmosphere.

The second demonstration that I want to do for you involves -- I'm going to set this aside, thank you -- illustrates another very important principle, and that is that calcium carbonate, which is the basic building block of all of these calcifiers -- oysters, clams, mussels, oysters. Those are all made of the same stuff as chalk.

Now, chalk in the olden days when I was growing up, most chalk that we would use in school was pretty pure calcium carbonate. Today other substances have been added to it to make it less dusty, less breakable, et cetera. So if you want to try this at home, you need to get almost pure chalk, which is what this is.

Now, what I'm going to do is to show you what happens to chalk or other types of calcium carbonate when it is in regular water, when it is in water -- half water-half vinegar solution, which is more acidic. As you know, vinegar is a weak acid. So I've combined water and vinegar there. And in this container, this is all vinegar.

So we have an increase in the amount of acidity from normal water, half water-half vinegar and pure vinegar. And what I want you to notice is that when we put calcium carbonate chalk into the water, and the same would happen if you put it into sea water,

nothing happens. This is the way the ocean has been for a long time. Shells are fine in water. They don't dissolve.

If you put chalk into half water-half vinegar, you can see some bubbling start to happen. That is carbon -- the calcium carbonate that is beginning to dissolve in the weak acid and releasing carbon dioxide, bubbles of carbon dioxide. And if we put the chalk into pure vinegar, you can see that it starts bubbling much more quickly, much more rapidly and is in fact dissolving much more rapidly.

So here we have just a couple of simple demonstrations that illustrate some very basic principles of what happens in oceans as they absorb -- as they absorb the carbon dioxide that we have put into the atmosphere.

I want to be crystal clear here. The ocean will never be as acidic as vinegar is. I have used it here simply as a visual demonstration of what happens when you increase the level of acidity in a solution, what happens to calcium carbonate shells.

To show you what actually happens in sea water, the sea water that is projected to be affected by increased CO₂ by the end of this century, I have a video clip and I want to tell you a little bit about what it shows and then start the clip.

The first 10 seconds will show you a living, swimming pteropod, one of these small animals that I spoke of earlier. It's a beautiful creature about the size of a lentil bean. It's incredibly important as a food source for juvenile salmon, for mackerel, for pollock, for herring. They are very, very abundant in oceans throughout the world.

After that, you will see what happens to a pteropod in sea water that is the same chemically as sea water that is projected by the end of the century. So let's start the video clip if we could. please, and you will see first, once we get to it, impacts of ocean acidification.

This is a swimming pteropod, a sea butterfly, swimming through ocean. It's a small-shelled mollusk. This is the way it looks naturally. This is a pteropod shell that you'll see time-lapsed photos of what happens to the shell in sea water after 45 days projected for the year 2100.

And finally this last clip is an animation illustrating from the year 1765 to 2100 the effect of increasing ocean acidity on the availability of the calcium carbonate minerals that pteropods, corals and other organisms need to create their shells and skeletons.

This is under a business as usual emission scenario, and the change in color from purple to blue to yellow to red indicates increasing ocean acidity and decreasing availability of the calcium carbonate that is needed for shells and skeletons.

Ocean acidity has increased by 30 percent since the beginning of the industrial revolution just over 200 years ago. This increase is 100 times faster than any change in acidity experienced by marine organisms for at least 20 million years.

By the middle of the century, it's expected that coral calcification rates will decline by a third, and at that point erosion of corals will outpace new growth, making many coral reefs unsustainable.

And by the year 2100, vast areas of the ocean, ultimately shown here in red, will have reached levels of acidification where pteropods, corals and other important marine species will likely be severely compromised.

So in conclusion, our understanding of the impacts of ocean acidification is relatively new. Roughly two-thirds of the published research has come to light since 2004, which is why you probably haven't heard a lot about this issue.

Thanks to Congress' action in passing the Federal Ocean Acidification Research and Monitoring Act, more attention will be given to this subject, particularly by scientists at NOAA and our partners at the National Science Foundation and in academia.

Nonetheless, our fundamental scientific understanding of the basic chemistry of ocean acidification is sound. More CO₂ emitted into the atmosphere will increasingly lead to more CO₂ being absorbed by oceans. That will make oceans more acidic. And we are now beginning to understand the oceans' very capacity to absorb CO₂ from the atmosphere is being degraded by ocean acidification.

These mechanisms can only be addressed by decreasing the amount of CO₂ that enters the atmosphere. The dramatic impacts that ocean acidification can and will have on marine ecosystems are clear.

Thank you, Mr. Chairman.

MARKEY:

Thank you, Dr. Lubchenco, very much. And I think you all brought us back to our sophomore and junior years in high school with some of these elemental explanations of how our planet works.

And I think to a very logic extent you explained to us why just about everyone under the age of 25 wants us to do something about this problem because they've recently been in science classes in high schools, grammar schools, colleges all across the country. So they might be a little bit more familiar with this than people who are a little bit older, but I think that's why we call them the "green generation" because they're reflecting the science that is being taught to them today across our country and across the planet.

So let me begin by recognizing myself for a round of questions, and I'll begin with you, Dr. Holdren.

Reconstruction of global temperatures over the last millennium shows a dramatic rise over the course of this century. That has produced the so-called "hockey stick" graph, which is being questioned in some circles. Can you clarify for us the evidence that supports the significant rise in temperatures over the past century?

HOLDREN:

Sure. When one talks about reconstruction of past temperatures, one is talking about using a variety of indicators of what the temperature of the Earth was in the period before we had adequate thermometer measurements to meaningfully determine the average surface temperature of the Earth.

Those methods include the analysis of bubbles in ice cores, analysis of tree rings, of fossil pollens, of sediments, and a variety of other so-called paleoclimatological indicators.

The "hockey stick" metaphor came about when an analysis of the last 1,000-plus years of temperature, based on a variety of reconstructions available at that time from these different proxies -- the ice cores, the tree rings, the sediments, the fossil pollens, and so on --

came out with a temperature trace that with some bumps was relatively flat for most of the last 1,000 years and then rose rather sharply in the 20th century, indeed then extremely sharply, so the thing had the shape of a hockey stick, a long relatively flat section and then a steep rise.

This was the particular graphic that led to a considerable amount of controversy at the end of the '90s and the beginning of the 2000s as to whether the particular approaches to developing that graph used by the group of scientists who did it and published it in the journal *Nature* in 1998 were absolutely correct.

There was a flurry of activity at that time, a flurry of controversy about whether their statistical methods were right, whether they had used the right proxies, whether they had interpreted them correctly. It's important to understand that there were a variety of other research groups around the world doing proxy analyses and getting similar results, with some variations because proxies are difficult to interpret.

The different proxy measures typically relate to different specific areas in the world where the proxy indicators have been preserved and you need to merge them together in a way that ultimately makes sense and is scientifically rigorous, and that's very challenging.

But in the end, as I mentioned before, the effective resolution of the controversy was when the National Academy of Sciences conducted a major study looking at all of the proxy datasets, all of the methods that had been used to interpret them.

Their results, published in 2006, led to the conclusion, which I mentioned before, in fact it was even a little stronger than the conclusion I mentioned before. They said it was highly likely that the temperature increase of the 20th century was unprecedented in the last 2,000 years. There was some greater degree of bumpiness in some of the proxy records than the 1998 *Nature* publication had included, so it was kind of a warped hockey stick, but still a hockey stick.

MARKEY:

Thank you, Dr. Holdren.

And Dr. Lubchenco, there's been a -- kind of a series of stories going around -- making the rounds that the planet is actually not warming, but cooling, and that evidence over the past decade indicates that we're in a cooling period and not in a warming period, historically. What would your response to that be?

LUBCHENCO:

If you look carefully at the climate records, the warming that has occurred is not gradual. It's jerky. And you get periods of time where there are steep increases and other times where it's relatively flat, other times where there are slight dips.

And the key point here, I think, is to really understand global trends you need to look at long enough periods of time that you get a clear signal. It is quite possible to have a decade in which you see very little change, but if you look at the entire century, you see some remarkable changes.

And in fact, if I could have the slide that I brought, I was hoping someone would ask this question, so thank you, Mr. Chairman, for doing so. And what you will see on this slide are the actual temperature data from, if it will boot, from -- thank you. You see here on the

far right data from the last decade -- oops, that's not what it was supposed to do. Can we do that again?

OK. So what I wanted to do -- yes, OK. So let's just do -- yes, OK, stop right there. Can you go back one? Go up, nope. There you go. OK.

So this is the most recent data trend, and if you take just that period of time, there is no discernible, no obvious trend in that.

If you then go and add -- take a longer interval of time -- next one please -- and keep going back through time, you see more and more information that gives you a better sense of what the actual real overall trend is. And so in that entire record, it is possible to have some ups and some downs. The point is that the overall record is an upward trajectory.

MARKEY:

Thank you, Dr. Lubchenco, very much. My time has expired.

The chair recognizes the gentleman from Wisconsin.

SENSENBRENNER:

Well, thanks very much, Mr. Chairman.

I want to go back to the e-mails that ended up being placed in the public record, and I don't want to get to whether or not they were legally placed in the public record. The question is whether or not they were accurate. Because if they were accurate, it's profoundly disturbing and it does end up putting into question all of the science of climate change.

Now, the data from the Climate Research Unit at the UEA in England is one of only three major datasets, but they considerably overlap. And they have been used as a basis for the IPCC report, as well as the U.S. Global Change Research Program.

And that means that these two booklets that were passed out this morning, you know, at best need to have a thorough review in the light of this information that has been disclosed, and at worst it's junk science and it is a part of a massive international scientific fraud.

Now, Dr. Holdren, you have been in the middle of a lot of this, and I've got a couple of questions based upon your statements before you joined the Obama administration. You gave an interview in August of 2006 with BBC News in the U.K., and you said that a sea level rise of up to 13 feet was in the realm of possibility. However, that's 11 feet higher than what the IPCC has estimated over this period of time, which is somewhere between seven and 23 inches.

Now, with respect to the "hockey stick" theory, which the chairman has referred to, that's been pretty much discredited in the scientific community, and yet in your October 13th e-mail, which is now in the public record, you aggressively attacked the two scientists that put this together, a Dr. Willie Soon and a Dr. Sallie Baliunas, for that.

Now, I think it's pretty clear that in both cases you were wrong. And I guess I'd like to know if you're concerned now that you're in the White House and representing all of the public, whether you're concerned about the misrepresentation of the state of science with

respect to global warming.

And I'd also like to know if you still support the principal critic of the -- those who trashed the hockey stick theory, and that is a Dr. Michael Mann, knowing of his efforts now to hide his data and to encourage his colleagues to shut out journals like Climate Research that publish works contrary to his own bias.

HOLDREN:

Congressman, let me try to take those in the -- in the order you asked them. And the very first part of your statement, with respect, I would disagree with you that this current uproar calls into question all of climate science. I do not believe that it remotely...

SENSENBRENNER:

Well, sir, I didn't say that. I said it ought to be looked at again. And you know, there's increasing evidence of scientific fascism that's going on and I think as policymakers we're making decisions about the state of the American economy for the next several generations that we ought to have accurate science. And it appears there's enough question on whether the science we have is accurate. That's got to be resolved and I wish we could have done it in this hearing, but the chairman wouldn't let us. But go ahead.

HOLDREN:

I -- I very much agree that we need to resolve the current issue. It's important to understand what has really gone on here, to get to the bottom of it. As I indicated before, that's been one of the strengths of science over the years, the capacity to get to the bottom of the controversies that emerge, and I believe we'll get to the bottom of this one.

But the key point is however this particular controversy comes out, the result will not call into question the bulk of our understanding of how the climate works or how humans are affecting it.

You mentioned an interview of mine a few years ago in which I talked about the possibility of a sea level rise in this century, as much as 13 feet. That was based on scientific peer-reviewed publications that appeared in the early 2000s that indicated that over geologic time in periods of natural climate change, there have been episodes in which the rate of sea level rise increased by as much as two to five meters per century, and that this could not be ruled out if the temperatures for which we were heading in the 21st century as a result of our activities...

SENSENBRENNER:

You were -- you were still 11 feet above what the IPCC -- the IPCC was recommending.

HOLDREN:

Sir, if -- if you will...

SENSENBRENNER:

You know, my time is almost up and I'd just like to, you know, state that there's an awful lot of scientific McCarthyism, meaning name-calling going on. As I quote from your e-mail of October 13th, 2003, saying, "Doing this will reveal that Soon and Baliunas are essentially amateurs in the interpretation of historical and paleoclimatology records of climate change."

Now, you're -- you're not dealing with their issue. You're calling them names. And I think we ought to get to the bottom of this without having the name-calling. And I wish that you as the president's science adviser and a former employee of one of the most distinguished universities in the world would be able to get beyond the name-calling and get to it.

My time is up and I yield back.

HOLDREN:

I -- I would be happy to answer all of the congressman's questions if I'm allowed.

(CROSSTALK)

MARKEY:

You will be given enough time, but let me turn right now and recognize the gentleman from Washington state, Mr. Inslee.

INSLEE:

It is continuing stunning to me that people can sit and watch the evidence before their eyes of what the seas are going to look like in a century that might melt pteropods, and somehow blow that off and be more interested in e-mails from London.

It's interesting to me. And the only way that I've been able to understand it is that some people believe there's a massive global conspiracy that's intent on world domination associated with phonying up information about pteropods and the fact that the Arctic is melting.

So I just want to ask you if you're part of that massive international conspiracy? Are either one of you members of the Trilateral Commission, SPECTRE or KAOS?

(LAUGHTER)

I just need an answer?

HOLDREN:

Congressman Inslee, I am not a member of any of those organizations and I do not believe that there is -- a conspiracy would be an amazing thing indeed if the academies of science of virtually every country in the world that had one, and if the earth and planetary sciences departments in every major university that had one around the world, were all engaged together with the United Nations Environment Program, the Intergovernmental

Panel on Climate Change, and all of the other bodies that have reviewed this matter, in a conspiracy. That really defies imagination, that the great bulk of the scientific community all around the world looking at these matters has come to the same conclusion.

INSLEE:

Well, I'll just tell you how I look at this. The National Academy of Sciences has looked at this with -- in great detail and great summary from a wide variety of data sets, not just from the individuals who wrote the e-mails, but in fact from a wide variety of datasets, including information generated by NASA and NOAA and a whole host of United States agencies.

And they concluded that in fact both there are changes in the atmospheric climate and that there's increasing acidification, or at least NOAA has, associated with CO2. In -- be that -- if that is true, isn't it fair to categorize, as much as we want to get people to use the right language in their e-mails, that this is a tempest in a teapot coming out of England? Isn't that a right characterization of this?

HOLDREN:

Well, I think we need to wait to -- until all the facts are in to find out exactly what some of these e-mails mean in terms of how the scientists in question behaved. I mean I would -- I would point out that scientists are human and from time to time they experience frustration, anger, resentment, and from time to time they display defensiveness and bias and even misbehavior of some kind. So like any other group of human beings, they are subject to human frailties.

I think the facts are not entirely in on this particular case as to how much and what kinds of frailty might have been displayed here. But the key point is that when we get to the bottom of it, no matter how it comes out, the great bulk of the data on which our understanding of the climate system rests will not have been affected, and our basic understanding of where we are, where we're headed, and by how much we would need to change course to avoid really unfortunate consequences, will not have changed.

INSLEE:

And is that -- let me ask you, is there anything about these e-mails that affect ocean acidification at all, Dr. Lubchenco?

LUBCHENCO:

Congressman, I haven't read all of the e-mails, but I've seen nothing in them -- in those that I have read about ocean acidification. It really is not an area that is something that that particular research group was focused on.

And in my view, the e-mails really do nothing to undermine the very strong scientific consensus and the independent scientific analyses of thousands of scientists around the world that tell us that the Earth is warming and that the warming is largely a result of human activities.

INSLEE:

So let me if I can, I -- I have some concerns about the state of our science that are reflected in the fact that everything that I'm reading suggests that the predictions were not -- were not sufficiently dire as to what we're experiencing.

Now, I am not a scientist as you are, but it seems to me the evidence that I am seeing come in -- I am looking at this Copenhagen Diagnosis Report I made reference to in my opening statement -- that the Arctic ice sheets are melting much more fast in the summer than we anticipated, that there's been a 40 percent greater than average ice sheet melt than predicted in the IPCC report in 2007, excuse me, 2006, that we've seen an increasing rate in sea rise than -- than was expected.

And to me, just my lay approach is, the evidence seems to be coming in in the last 24 months either on the direst end of the spectrum that was considered or outside of that spectrum. What -- is that a fair characterization of a -- a huge dataset or what -- what are we to make of this?

HOLDREN:

Well, let -- let me, Congressman, take the opportunity of this particular question to answer part of Congressman Sensenbrenner's, because he referred to the IPCC's finding in its fourth assessment report about sea level rise.

In that report, the IPCC made clear that they were only considering the thermal expansion of sea water and a small contribution from the melting of mountain glaciers in their sea level rise estimate for the 21st century, leaving out deliberately the mechanisms thought to have caused the more rapid rises in sea level that have occurred from time to time in the geologic past.

And the reason they left out those mechanisms that are capable of causing more rapid sea level rises, they explained in their report, was that we do not yet understand those mechanisms well enough to model them and arrive at the sort of quantitative conclusion that the IPCC was emphasizing. And in addition, we didn't know at that time, we didn't have enough data to know whether on balance the Antarctic ice sheet, the larger of the two, was gaining mass or losing mass.

Since that IPCC report, there has been a great deal of additional work on these questions. We now know that both the Antarctic and the Greenland ice sheet are losing mass. We know that the rate of sea level rise today is more than twice the rate of sea level rise averaged over the 20th century, and the current best estimates of the peak sea level rise to be expected in this century are one to two meters.

That's not as high as my number from 2006. The advancing science has ruled out the high end of that range, but it makes me wrong in 2006 by about a factor of two, and it makes the IPCC wrong by a much larger factor, by which their numerical estimate understated the possible rise of sea level in the century we're now in.

INSLEE:

Doctor?

LUBCHENCO:

Congressman, let me just add to that that the scientific assessment process that the

IPCC uses or that National Academy of Sciences uses are inherently conservative, and scientists are by and large fairly reluctant to make statements that they can't back up without good data.

And so -- and I think the sea level rise example is a classic case in point. Scientists knew when they were projecting a 23-inch sea rise increase by the end of the century that there were important factors that they couldn't account for, but they -- but they couldn't include them because they couldn't -- they didn't understand them well enough and so they erred on the side of caution.

And I think we see this over and over in many of the IPCC conclusions. They are inherently conservative, and so when the reality plays out, it's sometimes more than what was predicted because of that need to have agreement and -- and levels of certainty.

INSLEE:

Thank you.

MARKEY:

OK. The gentleman's time has expired.

The chair recognizes the gentlelady from Michigan.

MILLER:

Thank you very much, Mr. Chairman, and I've listened very closely. I think it's all very interesting listening to you all and some of the other questions as well from some members of the panel here.

I'm not a scientist, but I don't question that the Earth climate is changing. You know, we used to have dinosaurs and there's still a lot of debate about what happened to the dinosaurs. Then we had the Ice Age. There was a lot of debate about what happened during the Ice Age.

I was noticing an article in our -- one of our papers just the other day. They are -- they're doing some studies on Lake Superior along the Pictured Rocks, which they are indicating that they think a couple of thousand years ago the water levels there could be anywhere as much as 50 or 60 feet higher than they are currently.

So the climate of the world is never static. It is never going to be static. The climate is going to change. And -- and for me, the question is, as you say, the science is -- I'm -- I'm paraphrasing what Dr. Lubchenco said -- that -- that science is incontrovertible, that it's unequivocal, that it is all -- that this climate change is human-induced or human-produced.

And that is the question that I'm struggling with. That's why I think all of these e-mails coming out are -- are very interesting. I think it's unfortunate that anybody that questions the ideology, the absolute science that man is creating all of this is somehow that we don't care about the planet? I mean it's -- it's ridiculous. And it is -- I think it is -- it is unfortunate that that happens, but whatever.

I do think that the question, as I say, for me is whether or not it is human-induced, particularly when this Congress has been traveling down a path with cap-and-trade

legislation that is going to, in my opinion, decimate the American economy and that of my state.

I think that we look at these e-mails and -- and, you know, it's -- it's an attempt in many cases just to silence any dissent, which I think is very unfortunate. And I would just read one. I'm not sure that the ranking member read this previously, but here is one.

You know, there weren't e-mails during the dinosaur age, by the way, either the Ice Age -- but here's an e-mail saying, "I think we need to stop considering the Climate Research Journal as a legitimate peer-reviewed journal and perhaps we should encourage our colleagues in the climate research community to no longer submit to or cite papers in this journal."

How ridiculous. How unfortunate that here's this Climate Research Journal that if they question the incontrovertible science, that they are, you know, just dismissed and made to feel as though, you know, they can't even question this.

I think it's a travesty. And I do recognize that the e-mails are an inconvenient truth, perhaps; are an embarrassment, particularly on the -- on the brink of Copenhagen, but I think one of the most important jobs of the Congress is to exercise its oversight responsibility. And because of these e-mails, because, in my opinion, there is at least a debate -- a debate on whether or not climate change is human-induced or man-produced.

For instance, I was just reading the other day that in Indonesia where the peat moss is naturally composting, that that is the third- largest producer of carbon dioxide in the planet, more so than many other kinds of things. I'm not sure how our cap-and-trade legislation is going to address that. You know, as I say, the climate is never going to be static.

So with that, Mr. Chairman, I guess I would just use my time here again to ask that this committee consider a hearing into this "climate-gate" debate that is exploding around us, and I would also ask that Dr. Holdren, who made a comment, you said that you thought that the uproar should be resolved, and I guess I would just ask you how.

Do you think we could do that without completely being dismissive of anyone who would ask such a question in light of all these e-mails? And how would you think it could be resolved with the best transparency and with the interests of the American people and our economy certainly at heart?

HOLDREN:

Absolutely, I think it can be resolved, and I think it can be resolved without name-calling and without being dismissive. There are actually -- notwithstanding occasional exceptions -- there's a long history of respectful and civil debate among scientists who have differing views on many of the details of virtually any issue.

In this particular case, one already sees a very substantial amount of activity of scientists who are going to be looking at these data, who are going to be looking to try to understand what the e- mails are really saying, who are going to re-examine the questions that were at issue then.

I think that there's no question that this will happen whether or not this committee or any other holds a hearing on the subject. That's the way the science community works. When results are called into question, scientists flock to the scene, as it were, in order to figure out what was really going on there and what the best approximation to the truth we can get at at the current state of understanding is.

And that is constantly changing. One needs to understand that as new information becomes available, anybody who is a good scientist looks at the new information in the context of the old information and tries to develop a better picture of what's happening. I believe that that will happen here.

LUBCHENCO:

Congresswoman, may I offer a comment?

MILLER:

Certainly.

LUBCHENCO:

Could I draw your attention to page six of this document? There is a figure here that I think addresses the very important question that you asked earlier, and that is what is the role -- what's the human contribution to global climate change and how do we know if humans are having an influence?

You're absolutely correct that climate has changed a lot in the past. We've got good evidence of that. We have been able to model those changes and understand more through time about what the natural changes are and what factors are influencing them.

This particular figure shows what the climate would be doing without the additional carbon dioxide that humans have put into the atmosphere along with other greenhouse gases, and that's what's shown in this blue, the dark blue band. This is 1900 to 2000.

MILLER:

If -- if I could, I know my time has expired, let me just ask you, does that graph take into consideration what is happening in Indonesia? And do you consider what's happening in Indonesia man-induced?

LUBCHENCO:

There are many sources of carbon dioxide, some of which are natural and some of which are a result of changes in land- use practices so they are affected by human activities, as well as burning of fossil fuels, and these kinds of analyses take into account our current understanding of the sum total of emissions from multiple sources.

And they tease apart what -- what is the human contribution from what would be happening naturally. And there's clear evidence that what is happening now is strongly influenced by human activity.

MILLER:

I'm not sure if that was a yes or a no, but my time is completed. Thank you very much.

MARKEY:

The gentlelady's time has expired.

The gentleman from Oklahoma, Mr. Sullivan.

SULLIVAN:

Thank you, Mr. Chairman, and thank you both for being here.

I was going to ask first about the e-mails, too. Do you think the -- the scandal and this seems to be a culture of corruption in the scientific community right now on these e-mails, and manipulation of data for a purpose to get their own results -- do you see that as a problem, yes or no?

LUBCHENCO:

Congressman, I don't believe that the exchanges that you saw are typical of the broader scientific community.

HOLDREN:

I would add that I, too, do not believe that these e-mails are remotely sufficient to demonstrate a culture of corruption in the scientific community. They are e-mails from a relatively few people involved in a particular controversy that was attended by a good deal of frustration and anger.

And as to exactly what went on in the way of manipulation of data, I think that remains to be seen. To the extent that there was manipulation of data that was not scientifically legitimate, and I emphasize that scientists manipulate data all the time in order to make them comprehensible and consistent -- but if there was manipulation of data that was not scientifically legitimate, yes, I regard that as a problem, and I would denounce it.

And I think, again, that the merit of the scientific system is that over time it tends successfully to unearth those kinds of instances, to unmask them and to correct them. And that is what I assume will happen here.

SULLIVAN:

Well, since we do know now that some people are manipulating data and have perverted -- tried to pervert the system or this final analysis, do -- would you -- do you both support an -- an independent investigation into this?

HOLDREN:

I'm not sure an independent investigation, if you mean by the Congress of the United States, is the right way to get at scientific truth. I think the scientific community has well established mechanisms for doing that, and I believe they've already been set in motion by -- by these disclosures. We will find out what went on there. It's not clear at this point.

I haven't read all the e-mails either. It's not clear at this point what some of them mean.

I would point out, for example, that the term "trick" is often used in science to describe a clever way to get around a difficulty that is perfectly legitimate. The use of the word "trick" does not in itself in science demonstrate that there was manipulation.

I think we need to hear all sides of the story before we decide what happened there. If it turns out there was improper manipulation, again, I would denounce it and I would be grateful that the scientific process had run its course and disclosed it.

If this committee or others want to have hearings that end up calling as witnesses people, scientists, who are involved in trying to sort that out, I think of course that's fine.

SULLIVAN:

Now, both of you are -- are scientists. What is the -- when you were talking about manmade and natural causes of CO₂, if you could just really quickly simply break down how much is manmade and how much is natural, percentage-wise.

HOLDREN:

Well, first of all, what you need to understand is the natural flows of carbon dioxide in and out of the atmosphere, out of the atmosphere by photosynthesis and absorption in the oceans, back into the atmosphere from outgassing from the oceans, and by the decomposition or combustion of organic matter, have largely been in balance for a long time.

They're currently in the range of something like seven or eight times the human input, but the problem is that the natural input and uptake has been in balance and the human input has driven the system out of balance and is leading to an accumulation of additional carbon dioxide in the atmosphere. Now, this is extremely well understood scientifically. Nobody disputes this particular point.

SULLIVAN:

But it's at least seven or eight times greater than its manmade cause is what you're saying.

HOLDREN:

Yes, but it's in balance. It's in and out and so the fact that the flows are bigger...

(CROSSTALK)

SULLIVAN:

... sea creatures and everything it says that -- that the ocean absorbs approximately 25 percent of the CO₂ added to the atmosphere from human activity each year. So if there's seven or eight times more is naturally caused, if you eliminate the human beings from the Earth and all human activity, would -- would ocean acidic -- acidification still occur? It wouldn't?

HOLDREN:

It would for the time required to take the excess out of the atmosphere that has accumulated there. In other words, the -- the oceans are not yet in equilibrium with what we have done to the atmosphere, but they will get there.

LUBCHENCO:

Congressman, I think what you're asking is if humans were not putting -- putting more carbon dioxide into the atmosphere, wouldn't the oceans already be absorbing some. And the answer is yes, but they would also be using some of the carbon dioxide and it would be in balance.

What's different now is that humans have contributed now about 30 percent of the carbon dioxide that's in the atmosphere and some of that has been taken up by oceans, making them more acidic.

SULLIVAN:

But isn't the ocean one of the biggest emitters?

LUBCHENCO:

The oceans and the land both release CO₂ and take it up and that process has been in balance over millennia and that continues. What's happening is that humans are adding more to the atmosphere and more to the oceans, so there's -- the total amount of CO₂ -- it's -- it's being redistributed because of our activity.

SULLIVAN:

So if 97, 96 percent of the emissions are natural and 4 percent are manmade, we have responsibility for that 4 percent. But even if we eliminated it, isn't it a little arrogant to think that we could manipulate the entire process?

LUBCHENCO:

We have manipulated the entire process. That's -- I think that's the point.

SULLIVAN:

Well, I know you have on the numbers and stuff and...

HOLDREN:

And -- and we -- we've...

LUBCHENCO:

So human activities have...

SULLIVAN:

To the extent that you guys can make any data (inaudible) -- I know the (inaudible) of my opponents with polling data. I know how that works. But the...

LUBCHENCO:

These -- these are not data that somebody has pulled out of the air or out of their heads. They're measurements.

SULLIVAN:

You -- you also said that fish -- fish will move to warm spots and they're moving in the Atlantic. You said the fish are moving?

LUBCHENCO:

Yes, sir.

SULLIVAN:

OK. Don't they always move to a warmer spot?

LUBCHENCO:

What's changing in the oceans is where it's warm.

SULLIVAN:

But doesn't that -- it does change. I mean...

LUBCHENCO:

Many fish move. Most fish and many other species stay in the type of water in which their physiological performance is the best. What we're seeing now is that because oceans are warming overall, the places -- if you look at a place on the coastline, for example, in California, the places that used to be a certain temperature are now warmer. And so species that used to live there are moving northward to stay in the temperature zone that they would have been in previously. So species are moving in response to the changing distribution of heat in the ocean.

SULLIVAN:

And doctor, you -- you said in your testimony...

MARKEY:

The gentleman's time...

SULLIVAN:

... that -- or you stated before...

MARKEY:

... time has expired.

SULLIVAN:

... before that sea levels -- OK.

Well, thank you, Mr. Chairman.

MARKEY:

You can -- you can complete your question if you'd like.

SULLIVAN:

That sea levels, you -- you -- with the data you've interpreted, will it rise 11 feet by the year 2000 -- or were...

HOLDREN:

No, I did not say that. I said that that was a possible outcome, an upper limit on the amount of sea level rise based on understanding of the processes that was available at the time. It is now considered that the upper limit on sea level rise in this century is about two meters or a little over six feet, and that's what I now say because that's what the current science says.

MARKEY:

The gentleman's time has expired.

Six feet does sound like a very large increase in the water levels of the planet.

The gentlelady from Tennessee, Ms. Blackburn.

BLACKBURN:

Thank you, Mr. Chairman.

And I want to thank all of -- each of you for submitting your testimony in advance. We have had multiple hearings this morning for the Energy and Commerce Committee, so I've been upstairs in a mammogram hearing over the controversy that came there, and I do have a statement, Mr. Chairman, that I'll submit for the record.

MARKEY:

It will be -- without objection, it will be included.

BLACKBURN:

And since I didn't have that, I'll just take all of my time for questions.

So -- but Dr. Holdren, I wanted to talk with you. I was delighted that you were here. Some of the e-mails that have come out recently from CRU indicate some animosity, I guess would be the best way to describe it, in research or for the medieval warm period, the research by Dr. Soon. And I wanted to see if you would elaborate on (inaudible).

HOLDREN:

The great bulk of scientists who've looked at these questions concluded a long time ago that the medieval warm period was a regional phenomenon, and not a global phenomenon. The arguments by Soon and Baliunas to the contrary fared very badly in the scientific community in terms of the rigor and validity of their arguments.

And that is the reason that they were often disparaged in discussions of this matter, in particular because they continued to espouse the view that the medieval warming period was a global phenomenon long after evidence to the contrary became persuasive to everyone else.

One of the characteristics one expects of scientists is to change their mind when data and analysis show that they were wrong the first time. I changed my mind about the maximum sea level possible in the 21st century when the analysis and the data changed. And that's what we expect from others.

When that doesn't happen, a degree of frustration and anger often materializes because of a concern that people are simply muddying the water by repeating discredited hypotheses.

BLACKBURN:

OK. Well, let's apply that statement, then, looking at the climate change data that has been lost. And do you think that the climate change data has been compromised since there was original data lost by CRU?

HOLDREN:

Yes, I think that's unfortunate. Whenever any original data are lost, that is a misfortune. It's -- it's unfortunate that it happened. I wish it had been prevented. I think the robustness of all of the datasets we have available to us is sufficient to survive that loss, but I do regret the loss.

BLACKBURN:

Well, if the -- if further review on all of this shows that the IPCC report in 2007 used

corrupted or tainted data, what do you think they ought to do about it? Should they be willing to go back and say, you know, we're going to have to change our mind on this because we used corrupted data or we didn't give the whole picture or science? If you look at the whole thing it -- it proves us wrong.

HOLDREN:

To the extent that it is shown that data were corrupted and influenced conclusions of the IPCC, of course those conclusions should be revised. And the IPCC in every successive report that it produces, which is roughly every five years, revises a whole variety of conclusions that it reached in the previous assessment because new information has become available.

It's of course unfortunate if the new information that becomes available is that data that were previously used were corrupted, but in terms of the outcome, the revision of the findings based on new information is the same. Scientists do that all the time. The IPCC does it and they will do it if it is determined that any conclusion of the IPCC was based on data that were corrupted. You can be sure that those conclusions will be revised in the next assessment.

BLACKBURN:

We've done some hearings, I think it was in '05, we did some hearings in the Energy and Commerce Committee on the hockey stick theory, and Dr. Mann's hockey stick theory. And I know Dr. Wegman and the National Academy of Sciences have made comments that Dr. Mann didn't use proper statistical methods in his research on that. What's your opinion there?

HOLDREN:

I think there is reason to believe that some of the statistical methods that Dr. Mann used were not the best for the purpose. The Academy pointed that out and it nonetheless concluded that his -- that his basic finding that the last 50 years were the warmest half century in the last 1,000 to 2,000 years, was nonetheless robust.

And again, I would point out that arguments about what the best statistical techniques to use are pervasive in the scientific community, and it's no surprise that one has a difference of opinion. It's no surprise that a scientist may have made a mistake in the method chosen to analyze a particular dataset. Again, the key thing about science is not that scientists are always right. It's that they fix their mistakes over time.

BLACKBURN:

Well, let me ask you this. I know that some of the scientists who have come before us and they advocate limiting greenhouse gas emissions also have stated they think that maybe they have -- the global temperatures have stopped rising over the past 10 years, even though the greenhouse gas emissions have increased.

So how -- how do you go about explaining that discrepancy when you look at what is natural, what is manmade, what is cyclical? How -- how do you explain that?

HOLDREN:

Well first of all, I think, Congressman -- Congresswoman, before you came in, Dr. Lubchenco explained a diagram that's on the board that actually addresses that question. And the key point is that the climate and the surface temperature of the Earth fluctuates all the time for a wide variety of reasons, most of them natural.

What we are seeing is superimposed on those natural fluctuations a long-term trend of increasing global average surface temperature of the magnitude and of the sort expected to result, according to both theory and models, from the increases in carbon dioxide and other heat-trapping substances that humans have imposed on the atmosphere.

If you look at the actual temperature data, and I have in front of me the NOAA dataset for the global average surface temperatures through 2008, what you see is that nine of the 10 warmest years in the 140-year thermometer record, the period of time since 1880 when we've had enough thermometer measurements around the land and the ocean to meaningfully define a global average surface temperature, nine of the 10 warmest years in that period occurred since 1998.

1998 itself was the second-warmest year in the record, 2005 was the first-warmest, all 15 of the warmest years in the 140-year record occurred since 1990. You look at the numbers and you do see a bump as you see up there on the screen on the far right, where in the last few years there is no discernible upward trend. But this is completely consistent with having natural fluctuations, natural ups and downs super-imposed on a long-term warming trend associated with greenhouse gases.

BLACKBURN:

Mr. Chairman, could I ask that...

MARKEY:

The gentlelady's time has expired.

BLACKBURN:

... one other part on this question?

MARKEY:

We will have a second round.

BLACKBURN:

We will have a second round.

MARKEY:

The gentlelady went eight minutes on the -- eight minutes and 15 seconds on that.

BLACKBURN:

Thank you, Mr. Chair.

MARKEY:

The chair recognizes the gentleman from Washington state.

INSLEE:

Dr. Holdren, you have testified several times listening to you that given the extensive review by the National Academy of Sciences and using information based from NOAA, NASA and a whole host of other -- of other datasets, that there is no reason to revise their fundamental conclusion that humans are contributing to change in climate and NOAA not to change a fundamental conclusion that the oceans are becoming more acidic.

Mr. Sensenbrenner suggested that there's some "scientific fascism," and that's a quote. Is there any evidence of fascism in the NASA organization, scientific fascism associated with this?

HOLDREN:

I'm not even sure exactly what that term would mean, but I don't -- I don't -- I'm not aware of any cabals, conspiracies, misbehavior in the characterization and use of data in NASA or in NOAA.

INSLEE:

Well, I'll tell you, it's troublesome to me that people who put the man on the moon, the people who discovered water on the moon, the people who are doing great research figuring out how the oceans are becoming acidic, some of whom are my constituents, it's disturbing to me that people would come to this chamber and call them fascists.

I've got to tell you, I've got a problem with that. I don't think that's right. These men and women are doing the best they can to provide us data and conclusions to the best of their ability. And they, through their professional work, have reached a very, very strong consensus on these scientific issues, who are working for Uncle Sam, and I think it's wrong to say that about them.

And there's a little emotion in my voice because I've seen in my neighborhood what this phenomenon is doing. I'd like to be able to catch salmon, and my grandkid, who celebrated his first birthday Sunday, to catch salmon that live on pteropods maybe 50 or 60 years from now. And when people watch what I watched and say that this is just big -- a big scientific fascist conspiracy that are ginning this stuff up, I've got a problem with that.

I'll just ask you, Dr. Lubchenco, I've -- I was at a pier in Seattle about six months ago when a NOAA ship docked and it had a bunch of NOAA scientists on it who were discovering -- who were investigating, you know, the rate of acidification off the Pacific Coast.

And when they were explaining to me their findings, their jaws were kind of agape

because what they told me is that the rate of acidification was stunning to them, particularly in the shallow waters off our Pacific Coast.

They explained to me that, if I understand this correctly, the waters are more acidic the lower in the water column they had been, but now very acidic levels are becoming very close, within 150, 200 feet of the surface. And this was shocking to them.

And the only explanation they had was that CO₂ was going into the atmosphere and disturbing the equilibrium of this process that's been going on for eons. Could you just tell us about what your information is about that?

LUBCHENCO:

Mr. Congressman, I think the rate of change in ocean acidification has surprised many people. And it is absolutely the case that off the West Coast of the United States, where winds blow along the coastline and push the surface waters away from the coast, which pulls up cold, nutrient-rich low-oxygen and lower-pH water to the surface, that that's where we are seeing some of the greatest increases in acidity happening around the world.

And it is of deep concern because those areas, as you well know, are historically very, very rich, are wonderful productive fisheries off that area, are in large part a consequence of this upwelling.

INSLEE:

I appreciate that. I want to ask, is there anybody in this room, including the two witnesses and my Republican colleagues and my Democratic colleagues, is there anybody in this room who has information to suggest that the oceans are not becoming more acidic? Has anybody got information like that? Anybody?

Has anybody got an explanation why the oceans are becoming more acidic, other than the fact that there's massive amounts of carbon dioxide going into the atmosphere? Has anybody got an explanation for that? I haven't heard any, and yet people are trying to gin up this controversy because you know why? It's not because they're not intelligent. It's because they're afraid that we can't solve this problem.

And I think if we had a little more confidence in ourselves and in our ability to solve this problem, we would open our minds to the scientific information that is becoming available to us. And this idea of equilibrium, I'll just try one more, I don't know why it's so hard for people to understand the idea of equilibrium.

To me it's like this, is this a fair metaphor? A guy goes to the doctor, says to the doctor, "I've gained 10 pounds." "Well, have you changed your behavior at all?" "Yes, I've started eating a huge banana split at lunch and dinner every single day." And he goes, "Well, obviously, you've been eating more food." And he goes, "No, no, it's not the banana split. Look at all the other food I've eaten. It's the other stuff. That's 85 percent of my caloric intake. That's 85 percent of the CO₂ that's going into the atmosphere. Don't look at the banana split. Don't look at the coal-fired plants. Don't look at the cars."

Is that kind of a metaphor for what we're facing here?

HOLDREN:

Not bad.

INSLEE:

Not bad, huh, for an amateur. Thank you very much.

MARKEY:

OK. The gentleman's time has expired.

The chair recognizes the gentleman from Wisconsin.

SENSENBRENNER:

Well, thank you very much, Mr. Chairman.

I do appreciate Mr. Inslee's metaphors, but let me say that the controversy over the leaked e-mails and their contents cannot be ignored because it goes to the very basis upon which this debate has gone on for the last several years.

And I see an awful lot of attempts by people in this room to shove that concern under the rug. I'm telling you now it will get worse rather than getting better.

And I'll define what I mean by scientific fascism. These e-mails trash the scientific conclusions by those who have disputed Dr. Mann's hockey stick theory. There are information in the e-mails that the publication Climate Research in which they were published ought to be boycotted because they weren't doing the politically correct thing. And I understand that the editor of Climate Research ended up getting fired as a result.

Now, there is intimidation in the scientific community by people who wish to be contrary to what the conventional wisdom is, and we are being asked as a Congress to make major changes in American society, in energy use and in how much the out-of-pocket cost is to every person in this country as a result of this debate.

And we in Congress better get it right. The scientists may be able to change their story and do more research on it, but once Congress passes a law, it will be as difficult to repeal the consequences of that law as putting milk back into the cow. And we know all about cows in Wisconsin.

Now, the denial has not stopped because six weeks ago on October 27th, Michael Mann wrote an e-mail that says in part, "As we all know, this isn't about truth at all. It's about plausibly deniable accusations." We need to know the truth here before we can legislate in the name of the American people.

Now, Dr. Holdren, given the fact that you were involved in the e-mail traffic that has been released from the University of East Anglia in England and the discrediting of the Soon and -- I'm mispronouncing -- Baliunas study on the hockey stick theory, and it's been considerably discredited, how can you be objective on this when you're testifying before Congress, advising the president and speaking to the American public?

HOLDREN:

First of all, Congressman Sensenbrenner, let me -- let me say that science is rough. Scientists are brutal in criticism. Anybody who's ever taken a doctoral exam in natural science understands that very well. So there's nothing unusual about strong language in criticizing results of others that one has concluded are deeply wrong. The...

SENSENBRENNER:

But you were defending the results of others that have since been proven right?

HOLDREN:

Well, let -- let me finish answering the question. If I could...

SENSENBRENNER:

And how can you be objective?

HOLDREN:

... if I may? We are all, when we testify, doing so on the basis of the best information available to us at the time as scientists. The notion that one cannot be objective because one has concluded that a particular study by particular people was deeply flawed, and that was my conclusion from reading the study by Soon and Baliunas, that it was deeply flawed and that has been the conclusion of the great bulk of the rest of the community.

That being so, I cannot be expected to be unbiased as to the merit of that particular study. I am biased by study. I am biased by having read it, studied it, and understood what's wrong with it.

SENSENBRENNER:

OK. And I respect your opinion on that, but it seems to me that other people ought to look into this.

Now, I want to ask you a question that you can answer yes or no. You're the science adviser to the president, and I would like to ask you to guarantee Congress that you will provide the public, including us, access to all documents prepared with government funding relating to science change, and that includes studies that the IPCC has either gotten or utilized, so that nobody can wiggle out of this by saying that the IPCC is exempt from this because they're an international body.

Will you give us that information and then allow the public, including other scientists to be able to see it? After all, the taxpayers have paid for it.

HOLDREN:

I'm not sure what all you're asking, Congressman, but I am absolutely in support of the public and the taxpayers having access to the results of research that they pay for. The only constraints on that are research classified for national security reasons or research that is incomplete. It is a problem where people insist on the release of data that scientists have not

yet even finished assembling because this leads to interpretations immediately on the basis of an incomplete picture.

But once research is complete and is published in the peer-reviewed literature or is submitted as a report for use by government policymakers, I do believe that all of the data behind that, all of the methods, all of the analysis, should be made available to the Congress, the public, the taxpayers, yes.

SENSENBRENNER:

You'll be getting a few letters from us to that effect.

MARKEY:

The gentleman's time has expired.

Let me put up two charts here. The first chart is just a chart reflecting what Dr. Lubchenco and you, Dr. Holdren, have referred to, which is this dramatic spike which has been created in the amount of CO₂ in the atmosphere. This seems to be an incontrovertible fact.

No one actually denies this. It's measurable and it correlates almost directly with the industrialization of not only our country, but Europe and increasingly in China and India as the amount of CO₂ emitted globally has increased. And in fact in 2009, the trend is that this will be a -- a warmer year than last year was.

And so we're -- the spike is going back up again if all data up until the end of November continues on for the concluding month of that -- of this year. So we can see this trend and it's gone unabated since the rise of the industrial era.

Now, I'll show you another chart. This is a chart of the number of home run hitters in major league baseball from 1920 until today. Now, the average was that 3.3 players were averaging over 40 home runs per year from 1920 until the 1990s, which is why Ted Williams and Willie Mays and Babe Ruth were so famous, that they could hit more than 40 home runs.

Then all of a sudden in the 1990s, there was a huge spike in the number of people hitting more than 40 home runs. Now, major league baseball said, well, you know, perhaps the players are getting stronger. Others said, well, perhaps the baseballs are juiced. But once a steroid testing program was put in place over the last three years an amazing thing has happened. There was a precipitous drop in the number of 40 home run hitters, back to normal levels. An artificial substance injected into players, a huge increase in the number of home runs, but once it was removed we went back to normal levels again.

Now, some people are of course arguing that the new normal was people hitting more than 60 home runs and 70 home runs, huh? Well, it turns out that the testing program brought it down dramatically once we dealt with the reality of the science of what was going on in baseball.

Well, here we have the same trend, but we have yet to inject the solution, that is the reduction in the amount of CO₂ being emitted by the United States, by Europe and by other parts of the world. That is our challenge. It is incontrovertible. Artificial substance put into man or nature causes big differences.

And so these spikes are very, very coincidental, huh? Now, there were deniers in major league baseball. They said, oh, no, steroids has nothing to do with it. And by the way, major league baseball wanted to go along with it in the same way that the coal industry, the oil industry, other fossil fuel industries want to go along with the myth that nothing really abnormal is happening.

But the consensus of the science in the world, the national academy of sciences of every country in the world is that this spike in CO2 is manmade and that it is causing dramatic changes in our oceans, to our glaciers, in the Arctic, in the villages of Alaska that see their permafrost melting and their villages falling into the ocean, and droughts being created around the world. And all of this evidence is basically so massive that there's no way to avoid it.

And so what the minority has decided to do, what the deniers, what the oil and coal industry want to do is to use the few e-mails of a few people who are doubting this science, which is a consensus around this country, as a way of trying to cast out the same way major league baseball did on the undeniable correlation between the injection of these artificial sources into the atmosphere are having on our planet.

And so, you know, we can -- we can continue this, you know, pretense and we can use a small number of e-mails, I suppose, to have a larger debate, but I think that it would be better for us to accept the science, to accept this curve, to basically deal with the reality that the minority has no answer for why it has spiked so dramatically, why it's going back up again this year.

They sit over here using a couple of e-mails as a reason why we should stop all efforts to deal with this catastrophic threat to our planet. And so since no alternative theory has been presented -- at least baseball said well, the players are getting stronger, huh? That was their answer. But everyone who was looking at it was saying, how can they be so much stronger than the players just five years ago?

Well, that's the same thing that's happening with this CO2 trend, OK? There is no explanation for it other than that it's manmade. And by the way, you can say well, it's not that big. Huh? What's the difference a degree or two? Huh?

Well, a kid has a temperature of 98.6 normally. Well you add a couple of degrees temperature to that child and they're at 100.6. The doctor says, "Well, you know, you've been at that new normal for 14 days now, so don't worry about it, ma'am. Your son, Joey, he's going to be fine. The new normal is 100.6." Well, who would ever accept that as an answer because it was only a two-degree change in the child, huh?

Well, that's what we've got here for the planet. A two-degree change in the overall temperature of our planet is just as catastrophic as it would be for a small child who would receive no medical attention because the doctor had concluded -- or a small number of doctors would say the child can live with the new normal of two degrees higher, huh? What parent would ever run that risk of not giving treatment to that child, huh? And that's what we're talking about here.

Yes, there's a normal temperature for the planet, but you add on two more degrees, three more degrees, it is catastrophic. You know, you get the consensus, as Dr. Holdren is saying, that there is a six-foot rise in the sea level of our planet. That's not frightening enough for the other side. They want to know why it's not 11 feet anymore.

Well, six feet has catastrophic consequences for Alaska, for the Everglades, for Boston, for Cape Cod, for Southern California, that it's almost unimaginable what the

changes would have to take place in our country. OK?

So what's the answer? Again, we keep saying what are you saying is the answer to why this is -- is -- is spiking so dramatically? Where is your evidence? Just by casting doubt with a few e-mails on a consensus globally and a century-wide study of this subject...

SENSENBRENNER:

Will the gentleman yield?

MARKEY:

No, I will not yield at this time.

... is not -- is not going to deal with this issue. OK. These scientists are our best people in our country and they are joined by thousands of others not only here but across the world in their construction of their analysis.

There is no alternative theory that the minority is proposing, other than that which we know has been funded by the oil and coal and other industries that want to continue business as usual.

Now, we've tried to construct in the Waxman-Markey bill an alternative way in which these issues could be dealt with, and they of course don't want to deal with that issue because they would prefer their denial.

What I'm going to say to you, Dr. Holdren, if you could, is I would like you to go through the other points that you would like to make in response to the questions that were raised by Mr. Sensenbrenner in his opening question of you, which I have allowed all of the minority members to do so, and the courtesy I've extended to each minority member I'm going to extend to myself.

Dr. Holdren?

HOLDREN:

Well, thank you, Mr. Chairman.

I think actually we got to the main points in the further discussion of sea level rise and I wouldn't have anything further I feel I need to add.

MARKEY:

OK, thank you, Dr. Holdren, very much.

Mr. Sullivan, do you have any additional questions? You do not?

OK, well then I will allow any written questions that will be posed to the witnesses to -- to be made by members who were not here.

We thank our two witnesses for their testimony here today. It is extremely valuable at this time in our planet's history for the two of you to be working for our country and for the world. It -- it's an honor for us to have you here today. We thank you for your distinguished

service.

With that, this hearing is adjourned -- the gentleman -- Dr. Lubchenco would you like to be recognized?

LUBCHENCO:

The gentle doctor?

(LAUGHTER)

Mr. Chairman, thank you very much for this opportunity. I especially appreciate the extra time to do this demonstration, and I might draw everyone's attention to sort of the final results of the status of the chalk in the three different solutions, just to bring the message back to an...

MARKEY:

Would you just -- would you -- would you summarize the status of the -- of the -- in the three jars?

LUBCHENCO:

The chalk that is in the water only has not changed at all. The chalk that is in the half water-half vinegar is dissolving, and the chalk that is in the total vinegar has dissolved quite substantially and will continue to do so.

MARKEY:

We -- we thank the -- the expert testimony that we received today. Again, there's a part of us that really needs to go back to sophomore and junior year in high school so we can get a briefing once again on the -- on the essential science that -- that affects our planet. We thank you for everything that you've done here today.

With that, this hearing is adjourned.

HOLDREN:

And we -- and we thank you, Mr. Chairman, and we thank the committee.

MARKEY:

We -- we thank you.

This hearing is adjourned.

CQ Transcriptions, Dec. 2, 2009

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