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BOOK DISCUSSION ON "UNSTOPPABLE GLOBAL WARMING: EVERY 1500 YEARS," BY S. FRED SINGER AND DENNIS T. AVERY (ROWMAN AND LITTLEFIELD)

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HUDSON INSTITUTE

INTRODUCTORY REMARKS:
KEN WEINSTEIN, CEO,
HUDSON INSTITUTE

PRESENTERS:
DENNIS T. AVERY, SENIOR FELLOW,
HUDSON INSTITUTE, AND DIRECTOR,
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Transcript by:
Federal News Service
Washington, D.C.

KEN WEINSTEIN: (In progress) – and welcome. I am Ken Weinstein, CEO of Hudson Institute, and I'm delighted to welcome everyone to Hudson Institute today for the book forum on the publication of, "Unstoppable Global Warming: Every 1500 Years," by S. Fred Singer and Dennis Avery. This is a unique and well-written book that challenges much that passes for serious science today on global warming. And the book makes a very powerful case that in fact the current climate trends we're currently seeing are part of a product of a solar-linked cycle that creates harmless naturally warmer conditions approximately every 1500 years.

The book is a fascinating read, and is really quite thoroughly documented, and will create quite a controversy when the mainstream press starts to review it. I should note the book itself was inspired by a beloved Hudson Institute trustee, Wally Sellers, who is a bit under the weather today, and who regrets being unable to be here for the book's debut event. So let me now have the honor of introducing our – the co-authors of this book. I will first introduce S. Fred Singer, who is, as everyone knows, a distinguished climate physicist, and then I will also then introduce the no-less distinguished Dennis Avery, who is a senior fellow here at Hudson.

Now, S. Fred Singer, for those of us who follow science and public policy, really needs no introduction. He is a professor emeritus of environmental research at the University of Virginia, currently a distinguished research professor at George Mason University. He has had a long and distinguished career. He was the first director of the U.S. National Weather Satellite Service, and he is the author of a dozen books, and monographs, including, "Global Climate Change," which he published first in 1989.

And Professor Singer will be speaking second. But first, it's now my distinct pleasure to introduce my colleague and friend, Dennis Avery, senior fellow at the Hudson Institute, and director of Hudson Institute's Center for Global Food Issues, which is – when people think of Hudson Institute, they think of New York, they think of Manhattan, they think of 15th and K Streets. What they don't think of is that we are actually – we have a small little office based on a farm, a beautiful farm down in Swoope, Virginia, which is about two-and-a-half hours south of here, which I have had the pleasure of being at.

Dennis joined Hudson Institute in 1989 after a very long and distinguished career as an agricultural economist, and a number of federal departments, including the U.S. Department of Agriculture, and the Department of State. He was a senior analyst in the Department of State, and was awarded the National Intelligence Medal of Achievement in 1983 by then secretary of State, George Schultz.

Dennis is well known as a columnist on science and environmental issues, and his articles have appeared in The Wall Street Journal, the Reader's Digest, and dozens of other publications. Dennis's first major book was, "Saving the Planet with Pesticides and Plastics: The Environmental Triumph of High-Yield Farming."

Ladies and gentlemen, it's my pleasure to introduce Dennis Avery. Dennis.

(Applause.)

DENNIS T. AVERY: Thank you, Ken, and I am sorry that Wally isn't here to thank as well.

A little over 20 years ago, Wally and Ken called me, and I had done a little writing on – well, quite a lot on environmental issues, and a little bit on the Medieval warming, and they asked me if the world needed another book on global warming. And said, yeah, I think we need a book on the physical evidence of past warming.

And I'll tell you why I said that, because wine grapes are one of the most accurate and sensitive barometers of climate change that we have, and I knew that he Romans had grown wine grapes in Britain during the first century, that when William the Conqueror and his Normans took over the country in the 11th century, their tax records showed nearly 50 vineyards. And we know that it is not yet warm enough in the modern warming to grow wine grapes in Britain. They are up to two years out of 10 and hopeful.

But this does two things. It first of all introduces the concept of a cycle – first century, 11th century, 21st century – and it tells us that today's temperatures are by no means unprecedented.

And so we decided to do the book. I am an agricultural economist. I would not have presumed to do it without prodding. And I certainly wouldn't have presumed to do it without the advice, council, and assistance of Fred Singer, who has been my favorite expert on the climate of the Earth for a number of years. And let me say that we cite in the book over a hundred peer-reviewed studies, none of which were paid for by Exxon. (Laughter.)

We did the British wine grape thing. Let's come closer now to the current day because it's really only within the last 25 years that we have had a handle on this moderate natural, massive, but difficult-to-discern cycle, completely unrecognized by people who lack thermometers and written records – too long, too moderate. The people of Iceland lived through the medieval warming, the little ice age – 1920, they were still arguing whether there had been any climate change out there on the climate frontier. And they decided, well, no, there had been no climate change; we just had a lot of bad weather.

They had had climate change, and we learned this in 1984 with the first analysis from the Greenland ice course – 250,000 years of climate history, ice layers with varying

ratios of oxygen-16 and oxygen-18 isotopes. The lighter isotopes evaporate to a greater degree. And a guy named Hans – Willi Dansgaard and Hans Oescher – I believe Willi was a Dane, Hans was a Swiss – in 1984 came out with an absolutely fabulous report on this new ice core.

They said we expected to find the big ice ages and the warm inter-glacials, like our own. We had not expected to find this moderate, abrupt 1500-year cycle running all the way through both the warmings and the ice ages. And they said the way that the Carbon 14 and the Beryllium 10 isotopes in the ice correlate with sunspot numbers, we think there's a linkage with the sun. And that's all proven to be very true.

And four years later, down in the Antarctic, at the other end of the Earth, they dug up an even longer ice core, 400,000 years –Russian team, led by a Frenchman – and here was the 1500-year cycle running all the way through it.

And since then, we have found the 1500-year cycle in the seabed of six oceans, including the Atlantic, the Pacific and the Arabian Sea; tiny, little one-celled fossils from the phytoplankton that thrive in the oceans. Their varieties and their number vary with temperature, and our scientists have learned to turn their electron microscopes on these tiny, little one-celled organisms and read the temperatures in the layers. And we now have one seabed core that goes back a million years, from near Iceland – Maureen Raymo of Boston University – and the 1500-year cycle runs through the whole million years, roughly 600 of these moderate natural cycles.

Tree rings from around the Northern Hemisphere. Some of the trees are very old. Some of our trees go back 4,000 years, still alive, bristle cone pines in the Sierra Nevada of California among them. Some of the trees are dead. They've been buried in peat bogs or under – submerged under lakes. And the scientists have been very creative at finding these old pieces of wood and tracing the tree rings, which demonstrate temperature by their summer widths, although you have to be careful about insect attacks and drier or wetter – but these tree rings are important clues.

None of these proxies by themselves would be adequate, but there are dozens of proxies sought out in thousands of places. We have, as I say, over a hundred peer-reviewed studies in the book. We could have done 300, probably 500, all of them showing physical evidence that this cycle is real and has been with us, and there's no reason to believe that it has stopped with the modern world.

Cave stalagmites – layered history, annual layers. Some of them are nicely light and dark, depending summer or winter, and they can be red like the ice layers and the tree rings. We have them showing the 1500-year cycle from every continent plus New Zealand.

There's been some talk, even in the scientific community, that the medieval warming and the Little Ice Age were Europe-only events. No. No. We have found lots of evidence, lots of physical proxies in the Southern Hemisphere: cave stalagmites from

both South Africa and New Zealand; 130 glaciers in New Zealand advanced and retreated with the medieval warming and the Little Ice Age at roughly the same times as the glaciers in Europe advanced and retreated; archaeological evidence of prehistoric village locations which marched upslope in the Andes during the medieval warming at the same time they were marching upslope in the Alps in Europe, and then in both cases retreated back down again when the cold, unstable Ice Age came along.

Fossil pollen – pollen is very tiny, but our microscopes now can seek it out and identify it, and each plant's pollen is unique. And the North American Pollen Database shows nine complete reorganizations of our trees and plants in the last 14,000 years. That's one every 1,650, for you who are challenged without a calculator like I am.

In Ontario, Environment Canada says what that meant was during the medieval warming, beech trees were the predominant trees in the forest. As the Little Ice Age set in, the oaks took over; in the depths of the Little Ice Age, pines were predominant. We're now 150 years into the modern warming; the oak trees are coming back and the beech trees are waiting their next turn.

Some people say, gee, I don't like to think of the polar bears having to go through 600 global warmings in the last million years. The polar bears may not prefer it, but they have obviously survived it. We'll talk about that a little bit more later on.

It's not my favorite, but it's kind of kinky. The tooth enamel of dead Vikings – they literally have examined the oxygen isotope ratios in the corpses buried in the Greenland Viking colonies early in the life of the colony and 400 years later, when it was near its expiration – one and a half degrees Celsius change in average temperature during that period. If any of those Vikings had lasted until 1700, there would have been a more extreme temperature change, perhaps three degrees Celsius, but we ran out of Vikings.

Shifting rainfall. Near the equator, we don't get a temperature change, we get a rainfall change as the tropical rain belts move north with the climate cycle. This is why during the Holocene warming 5,000 years ago, the Sahara had rhinoceros, giraffes, hunters, cattle and sheep pasture. They hunted and raised the Barbary sheep. The Nile Valley was too wet and wild. Nobody lived there. And then by 3,000 years ago, the cycle had shifted, the Sahara had dried out, and people were raising wheat in the Nile Valley. Not disaster, but change.

[Inaudible]

We did that.

Sun-climate connection, how can this happen? There's a new book coming out next March by a Danish scientist named Svensmark, and it'll be called the "Chilling Stars," and it will be on his experiments duplicating the impact of additional cosmic rays on the Earth's atmosphere and its temperature. Suffice it to say, that when the sun is

weak, we get hit by more cosmic rays, they ionize the water vapor in the air and create more low, wet clouds which deflect heat back into space and cool the Earth. And a tiny change in the irradiance of the sun, a tenth of a percentage point, is enough to drive a significant temperature change here on Earth. I won't belabor that point more than that, particularly since I'm not qualified to do so.

Why the climate models can't forecast. Interesting question. And we know they can't. First of all, they can't model clouds worth a damn, and apparently clouds are the key factor in our climate changes. Secondly, nobody has ever figured out the proper X factor for CO2 (forces ?). Early on, the models predicted far more warming for today than we've had. The Hadley Center has gotten recently an approximation of the actual temperature observations by cutting their X factor by two-thirds. Apparently, these zoomy numbers about how much the Earth is going to warm have been based on a radical overestimate of how much CO2 changes the temperatures.

Why the models can't cope? Because we have a massive, cloud-controlled heat vent over the warm pool of the Pacific. This was discovered by NASA in collaboration with Richard Lindzen at MIT, published in 2003 in Science magazine. When the sea surface hits 28 degrees Celsius, rainfall becomes more efficient. The number of high-ceilinged cirrus clouds, full of ice, radically reduced; the number of low, wet reflecting clouds radically increased. The Earth's temperature cools back down until the sea surface temperature is comfortable for the planet, comfortable for the planet.

Why the models can't forecast? Chapter Four: "Sudden Ocean Cooling." I don't know how many of you have noticed recently a report by John Lyman of NOAA, National Oceanographic (sic) and Atmospheric Administration, says that between 2003 and 2005, the oceans, a thousand times more heat than the atmosphere, lost 21 percent of the heat they gained in the previous 50 years. No cycle, no prediction. We don't know where the heat went; we just know that it's not anywhere they can find it on Earth. The folks at NASA say it didn't go out through their heat vent. But we had a massive, sudden ocean cooling. And the data that documented it came from 2500 new smart floats that are scattered around the oceans today, have been out there for just a few years. Previously our ocean temperature data was very sketchy and unreliable. And this new data allows NOAA to say that a sudden ocean cooling occurred earlier, between 1980 and 1983, with a similar massive heat reduction in the waters.

The models can't forecast this. Their forecasts are built up year on year based on trends. There is no reason to expect the models will ever be able to forecast this unless we identify some sort of cycle. It looks pretty unlikely at the moment.

Why Mr. Gore can't cope? I had the dubious pleasure of sitting through his movie – two big problems with it for me, aside from the fact that he doesn't understand the 1500-year cycle.

First of all, he showed us a graph with temperature and CO_2 concentrations in the atmosphere at the Antarctic in the ice cores tracking closely together through 400,000

years and four ice ages. And that was a good graph to show. But he didn't show the second graph that shows the CO_2 changes occurring about 800 years after the temperature changes. In other words, higher temperatures produced more CO_2 in the atmosphere, not the other way around. And that's entirely logical because the oceans hold 75 times a much CO_2 as the air, and cold water holds more gas, so when the oceans warm, they have to release CO_2 to the air. There should be nothing surprising about it, and nothing intimidating.

My other problem is with the melting of the Antarctic, which is supposed to raise sea levels suddenly by 20 feet. Ladies and gentlemen, the Antarctic is the coldest place on Earth. It doesn't get – it's 30 degrees from melting. The ice there does not melt, first of all, because it aggressively deflects heat; and secondly, with the very low temperatures, you may get a tiny bit of surface melting at the height of the summer in a warm period, but you will not actually melt. If you look at an aerial photograph of the Antarctic surface, you will see huge blocks of ice flowing downhill. And that's why when they get to the edge of the Antarctic they fall off in big blocks, some of them as big as the state of Rhode Island, because they haven't melted. And we have this peer-reviewed study that says they have been flowing at about the same rate for the last 7,000 years, and that rate is changed with a lag time only by the ice ages themselves.

Will we lose a million species to extinction with the warming? A high-level biologist from Stanford University told us that the Edith's checkerspot butterfly is going locally extinct in Baja, California. Well, if you look at the habitat map of the Edith's checkerspot butterfly, it covers the entire Western quarter of the United States from Baja, California, to the Canadian border. As the temperatures warm, that whole habitat map is shifting slightly north. And this is true of birds in England, insects in Europe, and species all over the planet. They are colonizing newly warmer areas, mostly without leaving behind the temperatures where they flourished before, because trees and plants are cold-limited but rarely heat-limited. And we can expect this warming to create a greater biodiversity in our forests.

I will tell you that they somehow caught a fish from the Antarctic, and they put it in a tank and they warmed the tank, thinking that this poor Antarctic fish, which was adapted to virtually freezing temperatures for maybe a million years – it swam cheerfully in waters nine degrees Celsius warmer. We may not understand how the species cope, but any species on the planet today has coped, believe me.

Malaria – well, the biggest outbreak of malaria in history was in Russia in the 1920s. And malaria was eradicated here not by colder temperatures but by DDT and window screens.

As a closing note, let me point out that three-fourths of our modern warming occurred before 1940, which was before much human-emitted CO_2. If we give industrial CO_2 emissions credit for half of the warming since 1940, that's .75 to – what do I want here? – .15 to .075 – a teeny bit; a teeny bit. From that amount of warming, you cannot construct five degrees or 11 degrees warming. It just does not compute.

I would point out also that we've had no warming now since 1998. The last time that we saw a pattern like this in the Earth's temperature was 1940 – strong run-up, high peak and then a 35-year decline. I'm not predicting that, but I'm saying that it could happen.

Before I close, I would like to introduce the editors of the book who happen to be here today. My wife, Anne, who did the first edit – (applause) – and Martin Wooster, who is a Hudson author himself and who did the second professional edit. (Applause.) And if and when you do read the book, I think you'll agree with me that it was well edited.

MR. WEINSTEIN: I should say that I was negligent in my duties. I should note the book is available for sale, purchase and signing in the back when the event is over, so please avail yourself.

MR. AVERY: At a discount price.

S. FRED SINGER: Well, Dennis has given a great overview. All I have to do is add a few short remarks.

It's been a very eventful year. You know that we've had Al Gore's science fiction movie, which I've seen, and we've had – just had a report in Britain by Sir Nicholas Stern.

MR. SINGER: – in which he does the economics, strange economics, which no one really accepts, in which he argues strongly for heroic measures to stop global warming and stabilize the planet.

Well, what they have in common is, of course, that they assume the science is settled. They don't assume it; they actually explicitly say so in the case of Al Gore. And nothing could be further from the truth. And our book, I think, is living proof, as it were, that the science is quite different from what they imagine.

What we maintain is that there are natural cycles of cooling and warming going back at least a million years. These are small excursions of temperature, global temperature, much smaller than the ice ages, which is why they haven't been noticed until the last 25 years or so.

No one doubts their existence. The – and evidence is firm, and we quote some hundred or so peer-reviewed papers by competent authorities.

So what's the problem? Well, the problem is that many people would like to believe that the current warming is caused by human activities, specifically by the release of carbon dioxide in fossil fuel burning.

And this raises a very interesting question. How can you decide whether the current warming is human-caused, anthropogenic, or whether it is natural?

It's a very difficult question to answer. How would you do that? Think for a moment. You can go up and ask the thermometers. If you ask them, they won't talk back. They won't tell you. So that's useless.

You can do as Al Gore did. Al Gore simply says, well, there's a scientific consensus. Well, he's wrong. There isn't a scientific consensus. That should be obvious by just looking at the literature, published papers. Of course he quotes an article in Science Magazine, which was written by an incompetent so-called authority, and Science has refused to publish a correction. So he can't work that.

The other thing he does is to say, well, look at all the glaciers; they're melting. Well, in the first place, they're not all melting; some are growing. And secondly, that's what you would expect if the climate is warming, you'd expect places to melt, and you'd expect them to grow where the climate is cooling. These are consequences of climate change; they don't tell you anything about the cause. There's a logical error here that these people make, which they don't seem to recognize: Consequences don't tell you anything about the cause.

Well, what about the other factor he quotes, the correlation between carbon dioxide and temperature? It's already been mentioned by Dennis – first of all, a correlation is not causation. We should all recognize that. And secondly, the correlation is imperfect. In the ice cores, for example, we've seen that the temperature increases before the increase in carbon dioxide. And in the last century, we've had cooling between 1940 and 1975 – continuous cooling of the climate while carbon dioxide was growing. So that doesn't work either.

Well, what's the final recourse these people have? Well, they say the models predict warming; therefore, this must be man-made. That's not a good argument. Model results are not evidence.

So what evidence can you use? The only evidence that we have been able to think of – and when I say "we" I'm speaking about the whole scientific community – is to compare the pattern of warming – there's a geographic pattern and an altitude pattern of warming – with what greenhouse models calculate. And the IPCC tried to do that, that is the U.N. science group, and they published their results, and they're clearly wrong. They haven't republished them. They published them in 1995, and they haven't republished them since then, recognizing that they were wrong.

However, we're lucky. The U.S. government, after spending $18 billion on climate research, at the rate of roughly $2 billion a year, came up with its first report last May. You can look it up; it's called the Climate Change Science Program report 1.1. It's their first report, and really the only one that one needs to look at because it's important. It compares the pattern of warming with greenhouse models. And guess what? They

don't agree. They diverge strongly. Of course, they don't draw the right conclusion from this, but the data are evident. You just have to look at the graphs in the report.

I've written about this in several places and pointed out that this report exists, that these graphs – show the discrepancy between data and models. And the believers pay no attention.

We have something called – a blog called Real Climate. You might have heard of it. It was started by people who wanted to defend the so-called hockey stick graph. It's now degenerated into a general attack on skeptics, written by the same people. It's really a funny, funny blog. I call it the unrealclimate.org or the nonrealclimate.org.

They'll quote, for example, the article I've written on the CCSP report that shows a discrepancy, but they won't quote the discrepancy. They will – in the last iteration they mention unstoppable global warming, but they won't reference our book. It's sort of funny.

And then they say or claim that there was no 1500-year cycle during the Holocene, during the recent – during our present interglacial, which is clearly wrong. They do this in order to preserve the fiction that the 20th century is the warmest in 1,000 years or 5,000 years, give or take. It's all wrong; it isn't even as warm as it was during the medieval warming when the Vikings were able to grow crops in Greenland.

Well, so what are we up against? Well, we're up against, then, Al Gore, Nicholas Stern, and now the elections, which will bring, I'm afraid, a lot of people into the Congress who are believers in global warming, and what's even worse, who are believers in strong action. These actions will probably consist of greater subsidies to uneconomic boondoggles that were started during the Bush administration, but they will continue and grow bigger.

My advice to you all is invest in ethanol, wind farms and anything else that you can think of that won't work. (Laughter). Because you'll be making a lot of money off the other guys who pay taxes.

Our only hope, so to speak, is the Supreme Court, which has agreed to examine the question as to whether carbon dioxide should be classified as a pollutant under the terms of the Clean Air Act. It's a legal point. The petitioners – that is, the plaintiffs, the Commonwealth of Massachusetts is the plaintiff; the EPA – that is, the U.S. government – is the defendant. Interesting case. They lost in the appeals court, so they've taken it to the Supreme Court.

I've studied the scientific brief produced by the plaintiffs, or for the plaintiffs. It's full of holes. It's very weak, easily taken care of. Unfortunately, the response brief doesn't take advantage fully of the weak points in the initial brief. But oral arguments will take place, I think, on November 29, and we will get some kind of a decision probably by early next year.

This is important because when the Supreme Court comes down and says that CO_2 is not a pollutant, it will be much more difficult for any future administration or for any future EPA to try to regulate carbon dioxide.

So there you are. We have Al Gore, Nicholas Stern on the one hand, and the political establishment. So we have unstoppable politics against unstoppable global warming science. Let's hope we win.

Thank you. (Applause.)

MR. WEINSTEIN: Well, thank you two very much for those fascinating presentations. I'd like to open it up for questions from the audience and answers from our authors.

Sure. Michael. And please identify yourself and if you have organizational affiliation as well. Thank you.

Q: Michael Horowitz at the Hudson Institute.

What argument can – can an argument be made that even if these are cyclical climate changes that are inevitable, that it is not exacerbated, and can't Al Gore shift his argument and say: Are these two guys right? Yes it's coming, but it's going to be worse than it's ever been before because of the levels of carbon dioxide and industrial pollutants and so forth that are out there. Is that an argument that these guys can make?

MR. AVERY: Well, it's an argument that can be made. The problem is that the price – the premium on the insurance policy is so high. We're not talking about the Kyoto changes to 2012, the 5 percent cut. We're talking about globally a 60 to 80 percent cut, and for the United States we're talking about something like 100 percent cut in greenhouse gas emissions. That means you're not buying a hybrid car, it means you're buying a skateboard.

Q: (Off mike.)

MR. AVERY: Pardon?

Q: (Off mike.)

MR. AVERY: A hundred-percent cut in our fossil fuel emissions –

Q: (Off mike.)

MR. AVERY: – in order to stabilize greenhouse gases at the same time that unregulated economies in China and India are building new coal-fired power plants at the

rate of one or two a month. The cost to our economy of virtually eliminating fossil fuels is radical. It's –

MR. SINGER: Two comments here. One, of course, there must be some consequence of the increasing amount of carbon dioxide in the atmosphere.

MR. SINGER: What we show is that it's minor compared to natural changes. That's all you can say.

Q: (Off mike.)

MR. SINGER: In other words, we cannot deny the greenhouse effect, that's real, but it's small. It's a lot smaller than calculated from the models. The second point I'd like to make in answering your question is you implicitly assume – and I get it from your question – that warming is bad. I would question that. I would ask – you think a colder climate would be better than the present one? No one would say that. So what – how can you say – how can you argue logically that a warmer climate is worse? Or would you say that the present climate just happens to be the optimum climate? That would seem to be very unlikely.

Economists pretty much agree that a warmer climate is actually better overall. Of course, there will be some losers, but there will be more winners. They haven't carried it all the way. It's difficult to do. But the published papers – the published book by this group at Yale University says that a moderate warming is good for the economy, raises incomes, raises the standard of living, et cetera, et cetera.

Q: To follow up – Klaus Heiss from High Frontier – and also SEPP.

To follow up on the point – I mean, if you go to Paleoclimate scales – 600 million years – CO_2 has sunk consistently and dramatically over these times, and over the last 50 million years as well. Before then, of course, it was very low and we had ice-ball Earth and so on. So basically, returning some of the CO_2, which came from the atmosphere to begin with, has only beneficial effects. I mean, the burden of proof that it's bad is contrary to 600 million years of life organisms and activity and diversity. You also find extinctions when it's cold and again blooming when it's warm. So why don't we here make a real effort to find out what the costs of the Ice Age are without modeling?

All we have to do is go back 20,000 years and say, Massachusetts, do you want to be covered by one mile of ice and where are the species, and we don't have to simulate. I mean, here are the facts, and what are the economic impacts – Russia disappears, half of Europe disappears 20,000 years ago – as against what if the ice actually continues disappearing and the consequences will be we can grow wine again in England. But we owe that to the people. Nobody is doing it. You know –

MR. AVERY: I think we have a nearer model to look at, and that is the history of the medieval warming and the Little Ice Age. I'd recommend to you a book on the Little

Ice Age by a guy named Fagan – I've forgotten his first name – graphic depiction of the famines and the climate instability and the huge storms. And any examination of the medieval warming can start right here at this moment. Any of you who have been to Europe who have seen travel logs of Europe – those famous castles and cathedrals were all built during the global warming during the last overheated planet period. And the people were so grateful that they built the Cathedral of Reims that soars to the sky with flying buttresses – A, lots of food, B, lots of people, C, everybody felt really good.

Q: My name is – (off mike).

The question is, in terms of the cause of this 1500-year – are you talking about the angle of the sun?

MR. AVERY: No.

Q: What are you talking about taking place?

MR. AVERY: We're talking about an actual change in the solar irradiance. And now that we're measuring it outside the obscuring atmosphere of the Earth from a satellite, we're finding a tenth of a percentage point change. And the proxy that comes closest is the length of the solar cycles. It's not even the number of sunspots. And if you check a graph of even sunspot numbers, then you find a lagged response in the sea surface temperatures on the Earth. The angle and the distance to the sun are part of other cycles. But the 1500-year cycle is irradiance.

Q: Thank you.

MR. SINGER: The solar sunspots, that is, were only discovered relatively recently, a few hundred years ago. What evidence we have shows that during a minimum of the sunspot cycle, that so-called Maunder minimum, this coincides with the maximum cold period. That is, with the coldest period of the Middle Ice Age.

The other suggestions we have – we have proxies for the sun – some radioactive materials, like Carbon-14, in – which has been measured in tree rings; Beryllium-10, measured in ice cores. So we can trace back solar activity some hundreds of thousands of years and correlate that with climate. That seems to work.

Then another heroic effort has been done by a Canadian geologist, Veizer, and Nir Shaviv in Jerusalem, who were able to correlate, in this case, cosmic rays with climate change going back as far as 600 million years. That should be enough.

MR. WEINSTEIN: John, and then we'll go here – (off mike).

Q: John Weicher, Hudson Institute.

Following up on what Dennis was saying about cathedrals and so forth, if I understood you earlier, the 19th century would have been the trough in terms of climate, you said, going back about 150 years. And that would imply that the fourth century was the previous trough and something like the 11th or 12th century was the peak. If I have that right, I have a couple questions.

MR. AVERY: Okay. The cycles are not as regular during the warming periods, apparently, as they were during the ice ages. I'm told that during the ice ages, it was 1470 years, plus or minus 10. That's very regular for a natural cycle.

In our warming period, it is varied by several centuries. The Roman warming is usually dated from 200 B.C. – (audio break, tape change) – well, now remember, these tend to be front-loaded; the initial changes are fairly abrupt. So it isn't a nice smooth curve, it's a shift and then an erratic climb, and then another shift to the next phase.

It is, I think, very difficult to predict just how long, just how warm, just when.

Q: Well, if the 19th century is the trough, you said going back about 150 years –

MR. AVERY: Well, that was the shift point. It was colder in the 1700s than it was at 1850.

Q: Those two centuries are also periods of dramatic economic growth and technological change. And certainly people living in 1900, in general, were a lot better off than they were in 1700, from all the non-statistical evidence we have about standards of living, whereas earlier, that period of – talking about the Romans – is certainly a period of collapse. But I'm wondering how – if you've tried to relate the economic and social and cultural changes in our societies with those trends, with those patterns.

MR. AVERY: We've tried, and it's complex. I will say that it looks almost as though the fall of Rome was related to the onset of the Dark Ages. From this distance we can't know.

And as an agriculturalist, I can tell you that some of the changes in European agriculture, which we are benefiting from to this day, were driven by the famines which occurred early in the Little Ice Age. Remember, we had a 50 percent increase in European population during the 11th and 12th centuries, then suddenly we have a cold, unstable climate, and we're back to the previous population the hard way. And that drove the development of the cedar, drove the development of crop rotation with pasturing animals. A lot of the progress made in agriculture was driven by starvation.

Q: Charles Balogh. I represent nobody. You mentioned the fact that you'd have to have 100 percent. That tells me absolutely no carbon dioxide, is that correct?

MR. AVERY: What other people have suggested, including the Intergovernmental Panel on Climate Change, is that in order to stabilize the climate, so to speak, we'd need to reduce global emissions of fossil fuels by 60 to 80 percent.

Q: Okay. Well now I'll get to the question. Does that mean we're going to have to go nuclear, which is the only way I can think of producing our power without us having any greenhouse gases.

MR. AVERY: This is up to the voice of the people. And I have told – I have said that the Green movement and the U.N. are boxing us into a nuclear corner. But it's not my decision to make.

Q: The other question is, okay, you did say you watched Al Gore's movie. Okay, could you comment about him saying about the ice cap decreasing up in the Arctic area? You mentioned Antarctic in your previous book.

MR. AVERY: Yeah. Actually, Fred is better qualified on this than I am.

MR. SINGER: We have data on the Arctic, published data, going back approximately to 1920, I think. The warmest years in the Arctic region were around 1935, then it cooled, and now it's warming again but it hasn't quite reached the 1935 level. If you assume that ice cover and everything else is related to temperature, this would suggest that the ice history of the Arctic has varied in a similar fashion.

MR. AVERY: I would also add that Chinese court records say that in 1421 the Chinese sent a naval expedition to the Arctic Ocean and found no ice. This was right at the end of the medieval warming.

MR. SINGER: Oh, yeah, let me mention something else that's some uncertainty. There's a letter from the president of the Royal Society in London to the Admiralty in 1817 informing the Admiralty that the ice has receded, and it is now possible to attempt to have a passage from northern Europe to Japan or what have you unimpeded by ice. And he wanted to apprise the Admiralty of this. We have that letter.

So it seems to vary on some cyclical basis. I don't know the reason for it. I don't think anybody else does.

Q: Jonathan Rauch, National Journal.

Does the observed pattern of warming in this century fit completely within the confines of what would be predicted by the 1500-year cycle or is there something additional going on? As you will detect, this is another way of asking Mr. Horowitz's question, which you did not in fact directly answer.

For Mr. Singer, what is wrong with the science paper that found that 900 studies included not a single one that took exception of global warming as a fact?

MR. AVERY: We can't know whether all of the warming that we've had since 1850 is due to the cycle and none of it due to the CO_2. And as Fred suggests, logic would tell us – experiments tell us that more CO_2 in the air has some warming fact – some warming affect. What we're suggesting is that both history and the recent pattern of things, particularly the warming before 1940, would indicate that the CO_2 impact is a good deal smaller than the climate models which are telling us to be frightened.

MR. SINGER: Well, let me answer the other question. I think experience tells us that scientific consensus is a fallacious concept, number one. In other words, that's not how science advances. It advances because there's not a consensus. Someone thinks differently and puts forward his ideas, whether it's Isaac Newton or someone else, or Einstein. So scientific consensus is not necessarily a good thing.

But now let me talk about the article in Science magazine, which came out, for those who are interested, in December of 2004, was it, or 2003; 2003. It was written by Naomi Oreskes, a professor of science history at the University of California in San Diego, and she claims, and still does, that out of the 932 abstracts which she got from the ISI database on the Internet, not a single one disagreed with the consensus about man-made global warming.

Subsequent to this remarkable article, which many people tried to reply to but none of the replies were published by Science, she found that she had overlooked 11,000 other abstracts, and published a correction, but still maintained her original position. She didn't examine the 11,000. But it's interesting that someone who works in the field would be unaware of the fact that there were 11,000 – 12,000 papers published in the last 10 years and she only ended up with 900.

MR. AVERY: You will find in the footnotes in our book something on the order of 500 authors whose work testifies in and of itself to the fact of the 1500-year climate cycle.

MR. SINGER: Now, someone took it upon himself – Benny Peiser, professor at the University of Liverpool in England – to look at those 932 abstracts. And he did. And he got very different results. He found that more disagreed with the consensus than agreed, but most of them were noncommittal and just didn't comment.

His work is published in another journal because Science accepted his corrections but then decided not to publish it, for reasons which we don't fully understand. So the uncorrected version still stands in the literature unresponded to, at least in Science magazine.

Q: I'm Sam Kazman, Competitive Enterprise Institute.

A year ago, in the wake of Katrina, global warming alarmists were claiming that that was just a foretaste of what was to come. Now, we're very close to the end of the

current hurricane season, which, in terms of that prediction, of course, goes the other way, but on the other hand, one calm hurricane season is not really proof of anything.

My question to you is, based on the patterns that you've identified, how soon can we expect to see anything in the way of natural phenomena that offer a much more persuasive refutation of the alarmist claims?

MR. AVERY: I just happen to have here some historic data from the British Navy, which was keeping close track of Caribbean storms in the 17th, 18th, 19th centuries because they had wooden sailing ships based there, and sugar plantations. The British Navy, between 1700 and 1850, recorded one major land-falling Caribbean hurricane every two years. More recently, between 1950 and 1998, we recorded one major land-falling Caribbean hurricane every five years.

And Fred tells me this accords neatly with theory, because theory says storm intensity and power is gauged – is produced by the temperature differential between the equator and the poles. During a global warming, the temperature at the equator changes hardly at all. In our proxy studies, the temperature in the Arctic may change 4 or 5 degrees Celsius. So the temperatures come closer together; the power available to drive storms is reduced.

MR. SINGER: Yeah, that certainly is true for extra-tropical cyclones. But I'll make a general remark about hurricanes. They're very interesting, but they don't tell you anything about the cause of the warming. Even if there is a consequence of increased hurricane frequency or intensity, which there doesn't seem to be, but if there were, it wouldn't tell you what's causing the warming, which I think is the crucial question. This is just another consequence, possible consequence.

MR. WEINSTEIN: Anyone else?

Q: Alex Avery with the Hudson Institute.

My question is for Fred. I just got an article from a mathematician in London, a Keenan, Dr. Keenan. There was a paper published in Nature in 2004 that purported to estimate summer temperatures based on grape harvest dates. And the paper was published and it said that 2003 – according to their computer model that calculated summer temperature averages based on the grape harvest dates, 2003 was the warmest since 1370. And he went back and compared their model predictions with actual recorded temperatures and found that their model had estimated 2003's temperatures 4 degrees higher than actual, and previous warm periods where we had actual measurements from this portion in France were not modeled accurately.

Nature would not publish his criticism of that paper, and he had to get it published in another scientific journal. And I've had the same exact experience at Nature regarding agricultural scientific issues.

And I ask you, with both Nature and Science seemingly shutting out legitimate and well-founded criticisms of widely publicized studies, what is going wrong with our scientific institutions, which we all rely on to be neutral referees in the game?

MR. SINGER: Well, what you say is unfortunately true. The two leading science journals in the world now are Science and Nature, and they both have editors that – whom I know – who have a very strong personal view on the issue of global warming. And this colors their whole approach to papers that they receive.

Don't forget, editors are not required to have papers refereed in the first place. Their job is to seek the advice of referees. Well, obviously, if they know what they want to do with a paper, they can always take referees who will give them the convenient advice.

The referee system really doesn't seem to work very well. Take, for example, the Hockey Stick paper which was published in Nature, which was proven to be egregiously wrong; wrong not only in the data, but also the methodology. It took two independent scientists who were not even climate experts – they were statisticians – to find the errors and to publish them eventually against great opposition.

MR. AVERY: It was worse than that, Fred. The key data in the Hockey Stick was derived from a paper written by two guys who were measuring the fertilization effect of more CO_2 in the atmosphere, and they specifically said in their paper that the – there was no local temperature change that would have caused the growth spurt in the Bristlecone pines that produced the hook in the Hockey Stick. It's the closest thing I've ever seen to scientific fraud.

Q: I'm sorry. I would like a follow-up though, Dennis, to the question, because I'm still not clear or satisfied with your responses.

I want to get to the question of – you say it's a smaller – it's – the effect of all of the commercial activity in the CO2 is small relative to the cyclical changes – in what ratio, is, I guess, in part the question. And let me ask it in a different way: can Al Gore not accept your data and say – and I want to get a sense of the relative importance of the CO2 emissions – yes, it is cyclical, but this time, it won't grow grapes on England; half of it will be covered over by the Atlantic Ocean. I mean, that is what we hear, that there are going to be just whole sunken parts of the civilized world. And you haven't, at least for me, refuted the notion that it's our incremental CO2 emissions that's causing it. That's the follow-up question.

And the other one I'd just want to ask is whether the good news of this – or whether you would regard it as good news – that if it generated much greater freedom for nuclear power – forget about windmills and the rest – but would you as scientists regard it as a good coming out of all of which you regard as fraud if it freed us up to go nuclear to a much greater degree?

MR. AVERY: Let me try to answer, and Fred can critique me if he differs. As an economist and a lay historian, it looks to me as though 75 to 80 percent of the warming I see can be credited to the natural cycle. If we're talking about 15 to 20 percent of the warming being associated with man-made CO2, and we understand that each additional increment of CO2 has less forcing power and at some point not too far along, each additional CO2 unit as no forcing power, then there is virtually nothing in the outlook from the standpoint of the 1500-year cycle that would drive frightening temperatures; remembering that a huge number of Americans are at this moment voting for global warming by moving to and living in the sunbelt.

MR. SINGER: Just to expand on this – what Dennis says is quite correct. The effect of CO2 – incremental CO2 is what we call logarithmic; that is the effect does not increase lineally with CO2. If you double CO2, you'll get double the effect. The reason for this has to do with physics. There's no disagreement on this, by the way. What happens to the absorption bands of CO2 are very strong and they get saturated. Once they're saturated, adding more CO2 doesn't change the situation. They're already saturated. You get a little more absorption at the edges, and this is what gives you the logarithmic effect.

As to how much of the current warming is due to human activities, I wouldn't want to guess. One cannot tell from the data. That's all I can say. We know it must be there. We also know it's small. But exactly how much, I have no idea.

Q: (Off mike) – nuclear –

MR. SINGER: On the nuclear, well, that's something that has to be determined by economics and to some extent by regulation. We seem to be lagging behind in the United States. Many other countries are going ahead full blast with nuclear energy. On the other hand, some countries are going backwards. I'm thinking of Sweden, Austria and Germany. But many countries like Finland, Japan, France are moving ahead.

Q: (Off mike.)

MR. SINGER: Oh, I'm pro-nuclear.

MR. AVERY: On the other hand, I'm pro-clean coal. I don't see why we should waste that resource if we have clean-burning technologies that allow us to use it with no pollutant other – well, I won't classify CO2 as a pollutant. But clean coal does produce CO2. If CO2 is not a problem, then why waste the coal?

MR. SINGER: Let me expand on that. I'm also for burning coal, which is a native resource in the United States. We have huge reserves here. We export coal to the rest of the world. You know, we're the Saudi Arabia of coal, basically.

One correction, not of Dennis but of the general discourse on this issue. You hear the words bandied about, "clean coal." To me, clean coal means what it really says, it

means that the pollutants have been removed. You can do that; you can remove the sulfur, you can remove the mercury, you can remove all the pollutants. To many people, clean coal has become a euphemism for coal burning that doesn't emit carbon dioxide. That's nonsense. Of course you emit carbon dioxide. What they mean by this is that we must get it back again, sequester it and bury it somewhere. That's the worst idea I've ever heard of.

On the other hand, if you want to benefit financially, I would encourage you to invest in coal sequestration. The Department of Energy has just decided to spend $450 million on demonstration projects for coal sequestration – and that's in the Bush administration, so you can imagine what's going to happen if the administration should change.

MR. WEINSTEIN: Diana. Let's make this the last question.

Q: Well, speaking of changes, I was wondering what you thought was going to be the result of the next Congress and their positions on global warming, what they might do. And I was specifically wondering about the next farm bill, which is apparently going to have a higher mandate for ethanol content of gasoline. And I was wondering if you might be able to say a few words about that.

MR. AVERY: As the author of a new paper published by CEI , "Biofuels, Food, or Forests (sic\Wildlife)? The Massive Land Costs of Corn Ethanol."

We currently burn 134 billion gallons of gasoline per year, and corn ethanol will net us – net, net – 50 gallons worth of gasoline per acre per year. How many million acres of forest are we willing to sacrifice to get small amounts of another low-grade auto fuel, when Canada has more oil than Saudi Arabia in the Athabasca tar sands, that are now being produced by steam injection at less than $20 a barrel?

I consider the ethanol mandate the greatest danger to the environment in the First World.

MR. SINGER: It is also the greatest boondoggle that's been conceived of in recent years.

Now that the election is over, I would hope that the politicians will no longer move in that direction, because, you know, the question of Iowa, of Nebraska and so on has become somewhat moot, at least until the next election. We –

Q: But I hear they're considering increasing the mandate, increasing the percent of our gasoline that's used from ethanol.

MR. AVERY: Doubling it, yes. Yeah. Yeah.

Q: And that lowers our fuel consumption.

MR. SINGER: Yesterday I listened to a debate between David Pimentel from Cornell, who – an ecologist against ethanol, debating Bill Holmberg, who's the executive director of the – listen to this – the Renewable Fuels Association of America, or something to that effect. And you could imagine how the debate went.

MR. SINGER: I'd like to just add just two remarks here. It's clear to me that – they argued about how much energy is required to make ethanol in relation to the energy you get out of it. In other words, they debated energy ratios. Pimentel argued that it takes more energy – fossil fuel energy to create ethanol, which then gives you some energy back when you burn it. And Holmberg, of course, argued the other way. They're both probably off.

But let's assume that the amount of fossil fuel energy you put into ethanol equals the amount you get out. It still doesn't make any sense. It causes all sorts of problems, and it is sustained only by subsidies.

MR. AVERY: It is sustained only, Fred, by the greens having driven us into foregoing all of the other fuels which are kinder to the environment than corn ethanol.

MR. SINGER: No, no, no, no.

MR. SINGER: No, we still have gasoline. It's sustained by greed, not green, but greed, spelled G-R-E-E-D.

MR. SINGER: And the subsidies are considerable. There's the question of whether ethanol will be taxed as gasoline is, as a road user fuel. But there's even one subtle point as to why the automobile companies have become enamored by ethanol, which I learned about yesterday, which is that they think they can gain points on the CAFE standards. They think they can calculate CAFE based on the amount of gasoline they burn per mile, rather than ethanol.

It's a very complicated subject, but it is completely driven by subsidies, in my view.

MR. AVERY: It is weird that corn ethanol is the only energy source that the American public currently will approve using more of.

MR. WEINSTEIN: Hm. Well, on that note of slight disagreement between our two distinguished authors – (laughter) –

MR. SINGER: It's unstoppable. (Laughter.)

MR. WEINSTEIN: – exactly – we'd like to thank both of them for this fascinating and provocative discussion, which really gives you some of the character of

this fascinating, provocative and rather detailed on the research side book that makes this really unique argument – which, again, I urge all of you to purchase.

I want to also thank a number of Hudson colleagues who helped set up the event today.

(END)