

# Golden Gate Climate Update Transcript

Interview with Dr. Robert Cahalan

NASA Climate and Radiation Branch, Goddard Space Flight Center

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James Osborne interviewer

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*James* - Hi, I'm Ranger James Osborne, and welcome to Golden Gate Climate Update..., your source for information on climate change and sustainability. Join us as we hear from people helping your National Parks understand and adapt to climate change.

Today we are talking with Dr. Robert Cahalan, head of NASA's Climate and Radiation Branch, based at Goddard Space Flight Center.

Bob, can you tell us a little about your research at NASA and how it relates to the study of climate change and global warming?

*Bob* - I'd be happy to. I'm part of the Laboratory for Atmospheres here. My group is the Climate and Radiation Branch. We look at the climate on time scales from a few years to millions of years. We look at changes due to various forcings of the climate, such as volcanic eruptions, solar variations, greenhouse gases like carbon dioxide, but we also look at natural changes in the climate, such as El Nino and the Southern Oscillation. We use what's called the earth observing system, which is more than twenty satellites that are observing the whole earth every day and we also monitor the sun's variations.

*James* - We hear a lot about global warming and how weather will become more unpredictable and extreme as warming progresses. Can you tell us why scientists think there will be more extreme weather?

*Bob* - Yea, and I think probably the best way into seeing that is to sort of imagine yourself standing on our sister planet, the moon, and looking back at the earth, much like we did actually back in the early seventies with the Apollo mission. The first most obvious feature of the earth are the cloud systems on the earth and probably next you'll notice the polar ice caps of Greenland, and sea ice in the Arctic and then you'll notice the ice cap of Antarctica and the third thing is in between the clouds you'll see through to the dark ocean surface. So, the earth is the water planet. If you were somebody coming like on Star Trek from some other solar system, some other planet, you'd be quite amazed to see this planet. This is the only one in the solar system where you have all three phases of water, because the distance from the sun is just about right to get the temperature near what's called the triple point and most of the sun's energy that gets absorbed on the earth, or at least half of it, goes into evaporating water. So, it

evaporates water from the ocean into the atmosphere, so then you have water as a gas, water vapor, and that condenses into little fine particles in the air and forms clouds and, of course, they precipitate out as snow and hail and rain. That's the water cycle. So, what happens to that when the earth warms up? That water vapor will form more clouds and we get more precipitation and that's why we get more extremes in the weather.

*James* - Thanks Bob. Sounds like we are in for a steamy as well as a stormy future. Before we move on to our next question, its time for the climate update challenge. Today's question is: "What is the Maunder Minimum and who discovered it?" The answer after the next interview segment. Now back to Dr. Cahalan. What do you consider to be the biggest threats of global warming to the whole planet and humanity in the next 50 years?

*Bob* - Well, if we look out fifty years, first of all, our climate models cannot predict what will happen in detail. If we look at different models and we look say at something like soil moisture over the United States, which is something our plants and agriculture depend on. Different models give different answers over the United States. But, the droughts we've seen in the west could easily extend over a broader area and impact our crops and that is shown in many of the models and so that certainly will be an issue for food supply, and we should keep in mind when we are thinking of our Canadian friends, that it could be that they have a climate more conducive to agriculture in 2050 than we do. But, lets think about say twenty different climate models and this is what we tend to do, is we'll take twenty different models from different groups around the world and we'll try to forecast what happens in 2060 and we get some differences between those models over scales like the whole United States. But, all of the models are predicting warming, so there is a general agreement on a larger scales. The bigger uncertainty is the uncertainty of what to assume people are going to do, what will our population be and most of the models assume that our population will level out at something under ten billion. We're already at almost 6.7 billion people. What's harder to know is what will people decide to do about their life styles and their use of energy. The United States right now is the largest per-capita emitter of carbon dioxide which is a major greenhouse forming gas. There's talk of going in the US and in other places to more reliance on so called renewable energy, solar, wind, geothermal, others. If you look at scenarios where we rely more on our energy from those other sources and less on for example coal, then we don't get as extreme a warming. So, that uncertainty between whether we get all of our new energy from coal or get much of our new energy from renewable sources of all kinds is a bigger uncertainty than the uncertainty between the different models.

*James* - So, it sounds like regardless of how well the models agree, it's what we do as individuals and governments that really matters in how extreme climate change will be. Given that, do you have any suggestions for what our listening audience can do to slow global warming?

*Bob* - Well, first of all we do need to pay attention to government policies, state by state. You know if you have a national park in your state the park is playing a key role in preserving threatened species. I recommend people pick a species that's threatened and adopt it. I have my own I like, which is the bog turtle which used to be very common in the Chesapeake water shed, but bogs are drying up so they're threatened. So, these kind of impacts are different in different places. But, they are things that are happening commonly globally, and we can only find solutions by changing government policy and by cooperative work with other people. It may seem that we are helpless in some way, but we just need to remind ourselves we got into this problem of global warming by a lot of small decisions and small steps and I think we get out of it the same way. We make a lot of small decisions in the right direction and we be patient and over the next few decades we're going to move away from this problem.

*James* - Well with that encouragement I hope you are all inspired to get involved and do your part in doing the right thing. Thanks for joining us Bob.

*Bob* - Thank you.

*James* - Now it's time for the answer to our climate update challenge. The 'Maunder Minimum' was a period of 70 years between 1645 to 1715 when the SUN was unusually inactive, and Europe had a "Little Ice Age." The period began 36 years after Galileo first observed sunspots. This minimum was identified and named by the eminent scientist John Eddy, who died in June 2009. There is now a petition circulating to name the current solar minimum, which has so far lasted a year longer than expected, after Jack Eddy. Until our next podcast this is James Osborne. Thanks for listening.

*Music fades in and then out*

*Male voice* - Golden Gate Climate Update is produced by Will Elder and is a product of the Earth to Sky Program, an innovative partnership between the National Park Service and NASA.

Music from *A Walk in the Desert* by Electronic Symphonic