Transcript of the Video
Graham Mortyn

Hello, my name is Graham Mortyn, professor at the Universitat Autònoma de Barcelona, at the Institute of Environmental Sciences and Technology, as well as at the Department of Geography.

So, I am going to try to describe global climate change in only 5-10 minutes. So to do that, I'm going to rely on a few figures. And I understand that these my talk will be pasted into the PowerPoint where the figures exist later off line. So I'm not actually showing you the figures right now.

So to do this, I'm going to describe the NASA point of view of the global temperature at the end of the most recently completed year , which is the year 2019 , of course . And this is something they do every year that we will in a few months to have that for the year 2020 present year. So basically they show their annual mean for the year 2019 versus a global perspective of temperature difference and how that is different from place to place around the globe.

So in other words, there are parts of the world that have warmed up more than other parts of the world. And so in some sense, global warming is actually a bit of a misnomer because in some places it actually cooled. And in other places, it warmed by a lot. In other places it warmed by a little. In other places, it didn't warm or didn't cool, but it actually remained more or less the same.

And this is different from year to year based on dynamics and variability and so forth. But another thing they present, which I'll show in a later figure, is that how 2019 compared to other years and that decade versus other decades and so on. But the year 2019 was definitely accentuated in terms of warming in the high latitude northern hemisphere. And this is a process known as Arctic amplification, a part of the world highlighted in the northern hemisphere that has seen more warming than other parts of the world, not only for the year thousand and nineteen , but over several decades now really going back to the 1970s or so.

So overall in the year 2019 was zero point nine , eight degrees Celsius above the long term average , which is taken from the year 1951 to 1980 as a form of baseline by which any year is sort of compared against as an example .

So not only the high latitude northern hemisphere , but in general , we see more warming over the landmasses and warming over the oceans , but not as much as on the landmasses . And in particular , Europe and Asia stood out with particular warming , although other continental landmasses as well .

And NASA reports that the year 2019 was the second warmest year of their long term record . So this second figure is showing how 2019 compared to other years , 2017-18 were relatively cool , although still very warm . Two thousand and 17 still stands out as the warmest year on record . And when you look at this graph showing a whole bunch of dots , you sort of get a sense not only of the multi decade sort of long term increase in the global temperature , but also the entire annual variability in how , despite that long term trend of an increase , you do have a certain amount of noise in this record by virtue of things going on from one year to the next . And I'll highlight that in a subsequent figure . But another thing to point out from this figure , which I think is actually perhaps even more important , is taking the decade by decade comparison .

And so if you look at the year 2010 through ten thousand 2019 or prior decades , for example , 2000 and 2010 or 1990 to two thousand and so on , from that more collective time perspective , the annual global

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temperature increase and the amount of the warming is basically just going up from decade to decade , really going back to the 1970s or so.

And that is considered a time of sort of a regime shift when that global warming pattern in the media annual temperature record really started to go up and remain going up now for several decades , basically probably throughout the lifetimes of most people who are listening to this presentation . So that is a very significant observation about the global climate system.

Now to point out how inter annual variability can play a role . This third figure that I'm showing is the impact of El Nino Southern Oscillation on the NASA analysis. Now , I'm not going to take the precious time that I have and get into the details of what is El Nino Southern Oscillation , but take it at face value that it is a big temperature anomaly , among many other things , in the world's largest oceanic basin . And that is the Pacific . And because it's happening in the world's largest oceanic basin , it has impacts on the atmosphere . It has impacts on adjacent landmasses with tell a connection to other parts of the world . And so big El Nino events actually impact the global pattern .

And so in the lower left of this diagram , you can see that the so contribution to specific years like 2015 and 16 were positive as it was for the year two thousand and nineteen . And those values are 0.03 for the year 2015 , 0.11 degrees Celsius for the year 2016 and 0.07 degrees Celsius for the year 2019 . So by contrast , during La Nina conditions the opposite phase to El Nino . When you actually have a a cooling anomaly in the Pacific Basin , that number becomes negative and 2017 and 18 were like that .

So there are inter-annual changes that take place like El Nino , Southern Oscillation or El Nino and La Nina cycling that can give rise to one particular year’s variability . And another thing to point out on this record is volcanic eruptions as well , because sometimes from large emissions of volcanoes and their particles into the atmosphere and even as high up as the stratosphere , you can have short term cooling events . And so Mount Pinatubo in the 1990s is probably the most recent large scale example of this on a global basis where that particular eruption is shown , as well as other volcanic eruptions , amount of going and LTE children in prior decades . But in the 1990s , for example , Mount Pinatubo had a very notable global cooling on a short term basis of about a year or so after that eruption took place . So despite the long term warming trend , you do get inter-annual effects and features that can make any one year sort of stand out or be different on a short term basis .

So that's not to be taken lightly and not to be confused with the long term trend . So now the last point , my fourth slide here is showing you the oceanic heat content from the National Oceanic and Atmospheric Administration . And last year at the end of 2019 , it was the first year that they reported this , to my knowledge , down to a depth of two thousand meters . So this is really significant because it implies that not only are the global oceans continuing to warm , as the graph suggests , but they are now reporting this warmth to deeper depths than prior times . So this is implying that the warming is propagating from the top down in our global ocean system . And whether you look at the red curve here versus the black curve versus the blue curve , different ways of averaging time such that smaller amounts of time to larger amounts of time going from three months to five years , from red to blue to black with the black being annual record , you see a long term increase . And this increase in global ocean heat content is really disturbing in many respects because of things like hurricanes and storms and how the warming of the oceans is basically fuel for increasingly strong storms born from the oceans like hurricanes . As time goes on . So this does not bode well for our planet . And it does not bode well for us as the human species that is increasingly inhabiting coastal cities , for example , that are prone to hurricanes and other such disasters . So that's a global climate change in a nutshell . And I hope that is useful and interesting for you . And I will now sign off . Thank you.