GLOBE North America Phenology Campaign: Dr. Jon Wang Q&A Transcript

Dr. Jon Wang: My name is Jon Wang. I'm an assistant professor at the school of biological sciences at the University of Utah, so I live in Salt Lake City. And I'm, I guess somewhere between an Earth system scientist and an ecologist, so I spend a lot of time worrying about how climate change is affecting terrestrial ecosystems and what happens to forests with the warming planet.

U.S. GLOBE: What kind of research do you do?

Dr. Jon Wang: My research really focuses on using satellite imagery to analyze or map changes in forest ecosystems across the globe and so I'm really interested in understanding how forests are changing in response to rapid climate change. So I've spent a lot of time thinking about, for example, wildfires in high latitude boreal forests so like in Canada and Alaska. We know that this year has been a really crazy year for wildfires there and so I'm really interested in understanding how forests are reacting to this. You know, are they able to recover from these large wildfires or is the environment changing so that they're not able to recover and they end up transitioning to a different kind of land.

U.S. GLOBE: When did you know you wanted to be a scientist?

Dr. Jon Wang: I grew up in California going out to Yosemite and going to National Parks all the time, so I always really loved the outdoors and really appreciated these natural environments. But I think it wasn't until after college that it really became clear to me that science was a career that I wanted to pursue. What happened was that I was working as a consultant for a while, and I really didn't like my job very much. But at the same time, I'd been starting to read in the news all these scary stories about big floods and big wildfires and climate change is happening and there's all these agendas people have, you know. They want you to believe humans are causing it, not causing it or there's all this sort of confusion out there. And so my inspiration for going to grad school and becoming a scientist was to try and really see for myself what was happening, trying to understand what kind of data is out there that leads people to believe one thing or another. And, you know, as far as there is some sort of truth out there, to get a grasp over what's happening to our planet, why is it changing and what can we do about it.

U.S. GLOBE: What is a research question you've tried to answer?

Dr. Jon Wang: So when I was in graduate school, one of my first projects was to understand the effects of the urban heat island on plant phenology, right. And so, the idea here is that in cities because there's lower tree cover, there's all this pavement, it's darker surface than there would be otherwise, the city tends to be a lot warmer by several degrees than the sort of outlying rural areas. And what we wanted to understand was how this urban heat island effect, how it feeds back with the phenology of the urban forests and how it affects leaf out in forests in Boston.

And so we used this satellite data set to characterize the timing of spring, sort of leaf out, and the timing of autumn, so leaf down, you know, senescence, as a function of the level of urbanization, right. And so the denser downtown parts of the city, it's a lot warmer and we found that the trees tended to come out a lot sooner in terms of their leaf cover, almost a week relative to sort of a similar kind of area but further out where it's less urbanized, a little bit less urban heat islands.

But what we found was also there is this feedback between when the leaf cover came out and when the urban heat island effect really starts. And so while the urban heat island is affecting the phenology of the trees, the phenology of the trees is also affecting the sort of seasonality of the urban heat island effect.

U.S. GLOBE: Why is studying phenology important?

Dr. Jon Wang: Phenology is really important because it's a great indicator of the effect of climate change on plants. You can think of phenology as sort of natural thermometer in some ways because it's so sensitive to temperature. So when the leaves come out in the spring, when they come out early then you know that the plants have been experiencing a warm spring and that they're sort of reacting to that change in climate. And so phenology is really great as a sort of natural indicator of climate change and its effects on forest ecosystems.

U.S. GLOBE: What equipment or technology do you use in your research?

Dr. Jon Wang: So I do mostly work with satellite remote sensing. So NASA has flown these satellite observation platforms for the last almost 50 years and they've just been measuring the Earth over and over for all this time, they've been observing changes in land cover and vegetation. And so a lot of the work that I do is really about taking those huge data sets that these satellites are producing every day and analyzing them using supercomputers, these computing clusters, trying to develop, using machine learning and some AI technology, to develop some understanding of the ecological change that these satellites are observing from space.

Those observations from space, they can be hard to interpret sometimes because it's so far away. And so my research is also augmented by a bit of field work, and so for example on my urban heat island study we deployed a network of temperature sensors, basically thermometers with little computers attached, to record temperatures across a gradient of urban intensity.

And in future work I really hope to develop expertise in drone technology and to map at really high resolution, really local scales some of these changes that could be used to help interpret what signals that we see mean in the satellite data.

U.S. GLOBE: What is your favorite fall activity?

Dr. Jon Wang: During the pandemic my wife got really into mountain biking, and moving to Salt Lake City has been really great because we have tons of mountain biking trails. I feel like we could go on a different trail every week and still never hit them all in our lifetime. And so one thing that I have found though living here is that in the summer it gets so hot that it's pretty tough to go mountain biking, but in the fall the weather is just perfect.