GLOBE North America Phenology Campaign:
Dr. Logan Berner Q&A Transcript

Dr. Logan Berner: My name is Logan Berner, and I am a research ecologist who lives in Juneau, Alaska, but I work for Northern Arizona University.

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

Dr. Logan Berner: So the research that I do focuses on forest and tundra ecosystems and especially looking at the impacts of climate change on these ecosystems. And so a lot of the work revolves around understanding the growth of plants and how it's changed over time. And most of my work uses some mixture of Earth observing satellites linked up with detailed field measurements on the ground.

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

Dr. Logan Berner: So it took me a while I think to come around to being a scientist, like it was not something that I knew I wanted to be as a little kid. And it really wasn't until my third year of college that I realized that science was a path that I could follow. And a lot of it came from having a couple of instructors and professors who kind of encouraged me to be a scientist. And now that I've have gone down that route, I'm very very happy that I did and I can't imagine being anything else than the scientist that I am now.

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

Dr. Logan Berner: So one of the research questions that I have been very focused on over the last 5 to 10 years is, how is climate change impacting northern Arctic ecosystems, in particular looking at the impacts of climate change, climate warming on the plants that grow in these cold northern lands.

So one of the aspects of this research question has been trying to understand how absolutely green the ecosystems are during the height of summer, each summer over the last 30 to 40 years. So we can use these long-term Earth observing satellites to measure how green the surface of the landscape is during the height of summer and then track that over time.

So the peak summer greenness ends up being this phenological metric that we can use to understand the impacts of climate change on northern ecosystems. What we have found is that in the last 30 years or so about 40% of the Arctic shows a significant increase in vegetation greenness during the height of summer.

And so in essence these northern plant communities are becoming more productive as time goes on. The individual plants are growing taller, leafier, they're growing more each year, we're seeing shrubs spread across these northern landscapes, and that also contributes to this overall increase in how green the landscape is when we look at it using satellites.

And we have tied those changes in vegetation greenness back to summer air temperatures becoming progressively warmer during the last 30 to 40 years. And so if we look on an annual basis, years that tend to be warmer in the Arctic also tend to be greener in the Arctic overall.

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

Dr. Logan Berner: Studying phenology is very important because phenology is the cycle of life and it influences, you know, when we see leaves and flowers showing up in the landscape. It influences, you know, the food that is available for insects and birds and mammals.

It affects also how, for example, Earth's sunlight gets absorbed or reflected back into space. If there's not very many leaves and the landscape is covered with snow, then most of that sunlight is going to bounce off Earth's surface and get emitted back into space. But when you have a deep leafy green canopy it will absorb more of that energy.

And so it affects kind of the local climate as well as the food that is available for wildlife.

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

Dr. Logan Berner: So my research is a blend of very simple and very sophisticated equipment and technology. So on the one hand some of my work, for example, involves taking a little pair of garden clippers and going out into the field and laying down a small quadrat where we will just simply clip out all the plants from this little quadrat, put them in a paper bag, right. It's pretty simple.

But then the other more sophisticated part of the work tends to involve using Earth observing satellite remote sensing. So in that case we're using these technological developments that have been spearheaded by groups like NASA who have developed really sophisticated sensors for reliably measuring how energy bounces off Earth's surface.

And we can look at how energy bounces off of Earth's surface in different wavelengths, like green blue or near infrared, and that will tell us something about what is present on the landscape. And in particular I tend to focus on plants. And so we can use that surface reflectance to understand the amount of plant matter, the extent of canopy development, the amount of carbon that's stored in the living plants, and other aspects of the ecosystems.

And so by bringing together kind of these simple field measurements with more sophisticated Earth observing satellite measurements and also with big data computing techniques we're able to get a richer understanding of Earth's ecosystems and how they're changing over time.

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

Dr. Logan Berner: Ooh, well I have a love-hate relationship with fall because, where I live in Alaska, during fall we lose about three hours of sunlight during that time period, and it starts to get very very rainy. And so I like to kind of go outside when there's little pockets of sunshine and to take pictures, I'm a photographer. And I love to go see the fall colors up in the mountains that are just a feast for the eyes and I love going and seeing those.

But then when the rains come, you just kind of tuck away and, you know, find a book, or try to do some yoga, or just keep moving and not get stuck in the mud.