

 **Spotlight on Climate****Flagstaff Scientists Contribute to Understanding Climate Change****STEFAN SOMMER**

(700 words)

There are some who are still unsure about climate change. Is it happening? Is it natural? Is it caused by us? What will happen? With so many sources of misinformation, who can you trust? For scientists, the answer is clear. Look at the evidence. The data tell the story, and the global scientific community has been certain about anthropogenic climate change since 1990.

So, what do scientists know about climate change? And who are these scientists anyway? It turns out that some of the world's top climate scientists live right here in Flagstaff, conducting their research at NAU and Lowell Observatory. Indeed, Flagstaff has a long history of climate change research, dating back to the late 1800s.

In 1889, C. Hart Merriam published surveys of plant and animal species of the San Francisco Peaks and the surrounding region to define the "Life Zones" of the Earth. Early surveys like his are now used by climate scientists, who study how species are moving northward and fleeing higher on the mountain to escape rising temperatures.

Another foundation of climate research was discovered by A.E. Douglass, an astronomer working at the Lowell Observatory in Flagstaff in 1894. Back then, there was an abundance of tree stumps, as forest was being cleared for the developing town.

Douglass was fascinated by the patterns of tree rings on those stumps and wondered if the pattern of narrow and wide rings could help him track the timing of sunspot cycles back into the past. The answer was yes, but he discovered that tree ring widths were much more strongly correlated with rainfall. In the process, Douglass founded the field of dendrochronology and gave us a way of tracking climate back through time. So far, such tree ring records have been able to tell us how climate has changed as far back as 11,000 years ago.

From these and many other records, we now know that current climate change is different from the natural cycles of the past. Yes, tree ring records show that there have been past droughts, but how do those compare to what we are seeing now? Last year, Dr. Park Williams from the Earth Observatory at Columbia University spoke at NAU about his research showing that the southwestern US is currently experiencing a "megadrought" brought on by climate change. This megadrought has become evident over the last 20 years, and Williams' studies suggest that we can expect even drier conditions ahead.

How different is current climate change from what we have seen in the past? Research from Regents Professor Darrell Kaufman, in NAU's School of Earth and Sustainability, tells us it is very different.

In 2020, Kaufman and colleagues published their study showing that for the last 6,500 years the Earth has been on a slight cooling trend. Now in the last hundred years it has been warming extremely fast. They analyzed records from tree rings, coral growth rings, pollen from layers in lake sediments, fossilized packrat middens, ancient layers of glacial ice, cave deposits, and marine sediments, among others, and these records all showed a similar cooling pattern prior to the Industrial Revolution in the 1800s. That was when we began emitting huge amounts of greenhouse gases, especially by burning fossil fuels, which have changed a cooling Earth into a rapidly warming planet. Professor Kaufman says, "Global temperatures during the past decade were warmer than for all of human civilization before."

There are many details to the story of what science can tell us about climate change. This Daily Sun column, "**Spotlight on Climate**," will continue to tell this story in hopes that a better scientific understanding can lead us towards the best solutions and to a better future. Science can tell us what challenges we face. Science, engineering, and the human spirit will help us to find the best path forward. This column will reveal what science knows and explore ways that we can reduce our impacts, build our economy through renewable energy, and sustain all plants and animals that are the nuts and bolts of our life support systems. These things won't come easy. We will all need to roll up our sleeves individually and collectively to reduce our carbon emissions.

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