Welcome to Earth Matters – field notes on the geology of New Mexico's enchanting landscapes. Celebrating Earth science week, this is Ken Minschwaner.

I work on measuring the **composition** of the atmosphere using sensors on the ground, on balloons and aircraft, and on satellites in space. Atmospheric composition involves the study of trace gases like methane and ozone. Air contains ***very*** tiny amounts of these trace gases – down to a millionth of a percent. But they punch far above their weight when it comes to weather and climate. For one thing, they're powerful greenhouse gases. We've found that levels of trace gases over New Mexico can be affected by events occurring on both local and global scales.

One local example is the occurrence of "methane hotspots" in the San Juan and Permian basins of New Mexico. These are large pools of elevated methane first observed in satellite maps. Methane levels are not high enough to be a health concern, but there is enough gas in these pools to impact the overall level, and thus climate. We know that emissions from fossil fuel extraction and processing are important for creating these hotspots, but other factors can include emissions from natural seeps, commercial agriculture, or even prevailing weather patterns. Now we are using surface and drone-mounted sensors to better understand all of these influences.

On a globa**l** scale, we've seen that the composition of New Mexico's air can be affected by weather systems thousands of miles away. Ozone data from balloon launches in Socorro revealed a high-altitude layer of air that we could trace back to the Pacific Ocean surface just a few days earlier. That air was lofted up within a Pacific hurricane, from the ocean surface to an altitude of 8 miles, and then transported over 3,000 miles by the jet stream, like a fast conveyor belt.

So the next time you look up at the sky, think about how the composition of the atmosphere is connected to phenomena both nearby and far away. Celebrating Earth Science Week, I'm Ken Minschwaner from the Department of Physics at New Mexico Tech.