

Happy Earth Day, everybody!

I'd like to begin by sharing an *imaginary* greeting from the *actual* current head of the Environmental Protection Agency:

Dear Eugene Science Marchers,

I know you mean well, but you really should acknowledge that the Sun revolves around the Earth, rather than vice versa, as has been suggested by that glassy-eyed fanatic Galileo Galilei.

There is no convincing evidence that atmospheric carbon dioxide from fossil fuel consumption is a significant driver of anthropogenic Global Warming.

Please go home! Sincerely, Scott Pruitt

Well sorry Scott, but we aren't going anywhere!

I spend my workdays teaching about and investigating molecular quantum mechanics, and it's a thrill to join in the most spirited assembly of nerds rampant ever witnessed in the Pacific Northwest!

We're here in support of scientific research, education, and communication. The practice of science can be fun, informative, and worthwhile. It can offer insights and choices that would not otherwise be available.

Science doesn't make those choices for us, nor supersede other creative, compassionate, thoughtful modes of engagement with each other and with our environment.

It is troubling to see that right now some of our leaders would prefer neglect and disengagement from science in particular and from factually informed decision-making in general.

There are many possibilities and perils that we could discuss on Earth Day.

But let me pick a big one on which we can help to educate Scott Pruitt and our other political leaders, the topic of global climate change induced by human actions since the Industrial Revolution.

If you want to know more about this topic, I recommend John Houghton's book, *Global Warming*, the third edition of which is available for free online.

So let's all go like this (flap arms up and down).

When you do that, you are a carbon dioxide molecule: your chest is a carbon atom, and your two hands are oxygen atoms.

And instead of flapping your arms several times a second, you're actually vibrating a trillion times faster than that.

Now let's imagine that each of us carbon dioxide molecules is two miles above the surface of the Earth, about the height of South Sister and fully a third of the way through the troposphere; the troposphere is actually rather thin. We might have gotten there from gasoline burnt in someone's car, from deforestation in the Amazon Basin, or—though it's much less likely—from one the many exhalations of former Oregon Track-and-Field great, Jordan Hasay, as she ran her debut marathon in Boston last Monday.

As we vibrate 20 trillion times per second, we can absorb thermal radiation from the Earth's surface, capturing heat that was headed out to space. When we re-radiate that energy, we may send it on its way to outer space, or we may help warm the Earth by delivering it back to the planet's surface. In doing so, we are participating in the *Greenhouse effect*, which has been recognized for more than a century as a natural warming process; like a nice blanket over Planet Earth that keeps it cozy for people, plants, and other living things.

The problem is that, since we started burning fossil fuel like it's going out of style, especially in the last fifty years or so—and it really should be going out of style about now—we've got way too much of a good thing: too much atmospheric CO₂, along with other greenhouse gases like methane, and too much global warming.

It's like we're piling on more blankets than we need to stay comfortable, and are starting to overheat.

We could speculate about why people like Scott Pruitt find it *so hard* to understand this concept...

But today we're taking a break from our studies and our lab work to participate in an urgent conversation with fellow citizens about this and other important issues, before Mother Nature herself resolves them to our detriment.

Thank you all so much for being here!

Jeffrey A. Cina
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