Published July 15, 2007

Even a nonscientist can learn about global warming

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As the sun beat down mercilessly on South Sound last week, I had a chance to expand my knowledge of solar physics from next to nothing to more than I could absorb.

At the invitation of The Evergreen State College professor E.J. Zita, I attended the morning session Tuesday of a three-day workshop she offered to a dozen college and high school science teachers from around the country.

The class was titled "Fire, Air and Water: Effects of the Sun, Atmosphere, and Oceans in Climate Change and Global Warming."

The goal of the class was to equip teachers with enough information and classroom materials to make climate change and global warming understandable and compelling for their students.

Listening to Zita, a solar physicist, one is reminded over and over how urgent and overriding global warming, primarily caused by human activities, is among the challenges facing human life on Earth.

"This stuff matters," she said. "We really only have this next generation to make a change."

On Tuesday morning, Zita dutifully explained solar variability and its effects on earth to fellow science teachers and one science-challenged journalist.

First, there are the fluctuations every 10 years or so in the number of sun spots and fields of magnetic energy exuded by the sun. They're called solar minimums and solar maximums.

The next solar maximum - lots of sun spots, solar flares and magnetic energy that can knock out space satellites, disrupt cell phones and generate bright, widespread and beautiful auroral effects - is likely around 2011, although they are hard to predict, Zita said.

There also are periods of global warming and cooling measured in tens of thousands of years based on changes in the earth's tilt and orbit. These so-called Milankovitch Mechanisms, named after Serbian astronomer Milutin Milankovitch, are important drivers in and out of Ice Ages.

Finally, the sun - it's about 4 billion years old - is getting steadily warmer as it burns itself out, roughly

3 percent brighter every 1 billion years. This was all explained away in a mathematical formula that accounts for the sun's conversion of hydrogen to helium, leading to fewer particles in the sun, which increases the sun's luminosity. The formula took up the better part of a blackboard and read like hieroglyphics to me.

Zita suggested that anyone worried about the sun burning out - its ability to support complex life forms such as humans will be lost in about 1.5 billion years - refocus on the task immediately at hand, which is reducing our carbon footprint.

"We can't do anything about the sun; we can do something about global warming," she said.

The main thing I learned about the sun Tuesday morning was that there is variation in the radiative force it exerts on Earth, but it pales in comparison to what humans have been doing with their production of long-lived gases spewed into the atmosphere over the past 250 years.

All the natural variation from the sun since 1750 amounts to about 0.12 watts per meter squared. By comparison, long-live greenhouse gases weigh in at 2 watts per meter squared, according to a 2007 report by the Intergovernmental Panel on Climate Change.

"The sun is a huge energy source with a pretty small effect on global warming," Zita said.

If you haven't guessed by now, I'm no whiz at science. For much of the three hours I spent in the classroom Tuesday, I was lost in the stratospheric, or was it tropospheric, ozone.

I found myself harking back to my physics class as an undergraduate student at the University of Washington. I had an A grade going into the final, flunked the final exam and finished with a C. I'm blaming it in part on the professor, whose instructions prior to taking the exam included some critical information - presented in a math formula - that could not be ignored if you wanted to pass the test.

Despite the shortcomings in the left side of my brain, I managed to absorb with some new scientific clarity the big picture message in Zita's lecture. I just hope humankind doesn't ignore the instructions in the global-warming test final and fail the class.

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