

My Earth science educator story – Paul Ruscher What I did, why I did it and what happened



Paul Ruscher at the Pacific Ocean on a recent field trip to the Oregon coast.

From sheet metal worker in New York...

I am a former sheet metal worker, born in 1955 just outside of New York City, who was the first of my family to graduate from college and university. I was an over-achiever in school and a junior high chemistry teacher facilitated my interest in meteorology by allowing me to build a functioning barometer instead of something more mainstream, chemically-speaking. I also became an algebra tutor in high school – thus my combined interest in science and teaching.

I want to start my real story in graduate school, because there was an experience that completely changed my life. The first day of my graduate school program began at Oregon State University (OSU), on a day in early July in 1978. I had started at University of California, Los Angeles (UCLA) and that did not work out. We learn from our mistakes.

In June 1978, I received a call at my New York sheet metal factory job, where I'd taken refuge after Los Angeles, offering me an early start to my graduate work – as a research assistant on a smoke management project in Oregon's Willamette Valley – my response: "I'll be there next week."

...to field work in Oregon

The project was funded at OSU to examine how to improve the air quality when grass seed farmers burned hundreds of thousands of acres of grass stubble (post-harvest) each summer – beautiful Oregon summer days were often ruined as smoke proliferated in valleys, basins and against the Coast and Cascade Range foothills. (I had thought at the time that *not* burning the fields might be an option rather than burn only on days when winds and stability were favorable.) Day 1 had me reporting to a field near the Corvallis Municipal airport south of town.



Field burning in the Willamette Valley, Oregon.
Courtesy Rep. Paul Holvey.

The area was populated with numerous 100-acre fields of grass stubble that had been left in mats about 12-18 inches thick, after the seed was harvested. It had not rained in about a month, and the fields were ready to be burned to prepare them for the next year's crop. I did not know what to expect. I was briefed about that day's work – we would set up ground monitoring equipment including something called a Knollenberg counter (to detect particulates), and we painted temperature-sensitive paint on copper strips for use later when we would actually burn some fields and test for temperature. A Beechcraft Queen Air research plane would pass over the field at 30 m (about 100 feet) above field elevation, and burn some chemical flares that would drop small particulates and chemicals over the field to be used to calibrate and test the Knollenberg. Okay so far. Several hours of preparation and getting acquainted (I was

the new guy) later, and we were ready to go.

We got word on our two-way radios that the plane was in the air and approaching the field so we turned on the detector. Here it comes – looks good – we see the plume coming out of the back off the wing, and, gee, that plane looks low, in fact it was flying at *30 feet!* 30 feet above a tinder-dry field full of straw. And we were in the middle, and ... we were lit. Our crew sprung into action by taking all of the sensitive equipment into the irrigation ditch that bisected the middle of the field, and which did not have straw in it, thankfully. The farmer's crew sprung into action too by getting his water truck there, and we were sprayed down after covering the instruments.

We had a little clean up to do. My first day on the job was over 12 hours of strenuous work, almost burning to death, and then cleaning up; our copper strips recorded temperatures above 1,000°F. I smelled and looked like I had been camping for a week. I got home to my new apartment about 9:30 PM, hours late, after this long first day of work and my wife looked at me and said, "Oh, my God, what have you done?" and, "Are we staying?" I convinced her that everything was okay, and I was hooked. Field work was it for me. Accuracy in using proper units (and crew safety!) was also important, I should add. The project was very successful, I should also add!

Transition to studying our boundary layer

I worked in the field all summer and gained an appreciation for day-to-day forecasting and the complexities of the sea breeze interacting with mountain-valley winds and large-scale wind patterns. Although it was indeed a case of practical synoptic meteorology, the smaller scale aspects were creeping in to my curiosity. Small-scale dynamics were fascinating. Turbulence and convection and instrumentation followed, and my path was anchored. I would concentrate on boundary layer meteorology. The boundary layer is the lowest 1 km or so of the atmosphere in which the bulk of heat,

momentum, moisture (and pollutant) exchange between Earth and the free atmosphere occurs. It is arguably the most important part of the atmosphere in terms of Earth's energy balance, which drives the climate. It is where the biosphere meets the atmosphere (along with all of the other spheres). It is home. The combination of teaching and research eventually brought me to a faculty position at Florida State University (FSU).

On to a teaching career in Florida

The research, instructional and outreach programs we created at FSU were fully engaged with students, including high school interns, undergraduate students, graduate students, and postdocs. My research effort while at FSU always included students with opportunities for them to travel, present their research, and participate in our educational outreach programs. Students were able to travel to Australia, Alaska, Mexico and numerous other places in the lower 48 states as a result of our programs, which attracted continuous external funding over twenty years. Our students have ended up as professors, emergency managers, stock traders, corporate leaders, private and National Weather Service forecasters, and on television. I'm proud of all of them! Many projects involved field work including work offshore in the Gulf of Mexico and collaborations with the Citizen Weather Observer Program (CWOP). 25 years later, though, I was still not completely fulfilled.



From FSU outreach days: (left to right): Alec Bogdanoff, Paul Ruscher, Emma Ruscher, and Elizabeth Vickery – educational outreach event during hurricane hunter aircraft visit to local airport.



From FSU research days: A successful research voyage to our tower observation 20 miles offshore in the Gulf of Mexico: (left to right): Austin Todd, Jeremy Rolph, Jim Waller, Josh Griffin, Paul Ruscher on the R/V Seminole.

Return to Oregon, the field, and home

Ultimately, I found my calling at Lane Community College in Eugene, Oregon in 2012 when they created a program that is designed to train watershed science technicians, combining it with an Earth & Environmental Sciences faculty position; my own children all started at a community college and I'd been a proponent for a long time, so I thought I would give it a try, and it would get me back to Oregon! I have now been here for four years, and it will be my last job, I'm sure.




We disturbed the wetlands this day by installing one of several water level/temperature data loggers. Jen Kyle, Chris Cousins and Paul Ruscher are shown. I'm the one with the stick in the mud...

Even though I'm now serving as Dean of the Science Division (as of Spring 2016), I am continuing to do field work, designing and implementing a watershed monitoring program for the creek that runs through

campus including through a rather important natural and partially disturbed wetlands area. I work with great faculty here and our students, many of whom share the same challenges that faced me when I was younger. I'm also continuing to do educational outreach through the GLOBE program.

That day our experiment caught fire in a 100-acre field 38 years ago truly changed my life, and I know it has, as a result, changed the lives of so many others. I love science and investigating science. And as the former captain of the FSU's research vessel *R/V Seminole* once told me, "a bad day on the boat is always better than a good day in the office." Likewise for any day in the field!

Paul Ruscher, aged 61, Eugene, Oregon, August 2016, ruscherp@lanecc.edu
You can follow me @paul_ruscher on  or find me on Facebook.



On approach to our Gulf of Mexico tower for the first time in 2008 (left); close-up of our check to see if anybody is home before we deploy our instruments! This project is part of the collaboration between NOAA and several universities, the Northern Gulf Institute (<http://www.northerngulfinstitute.org>).

Notes:

Citizen Weather Observer Program: <http://wxqa.com>

EXPLORES! Outreach: Ruscher, P., K. Kloesel, S. Graham, and S. Hutchins. "Implementation of NOAA direct readout satellite data capabilities in Florida public-schools." *Bulletin of the American Meteorological Society* 74.5 (1993): 849-852.

GLOBE Program: <http://www.globe.gov/>

Lane Community College Science Division: <http://www.lanecc.edu/science/>