STEM Interview with NASA Scientist, Greg Elsaesser

We asked Greg a few questions to better understand his job as a climate modeler and how he decided to pursue this STEM-related career.

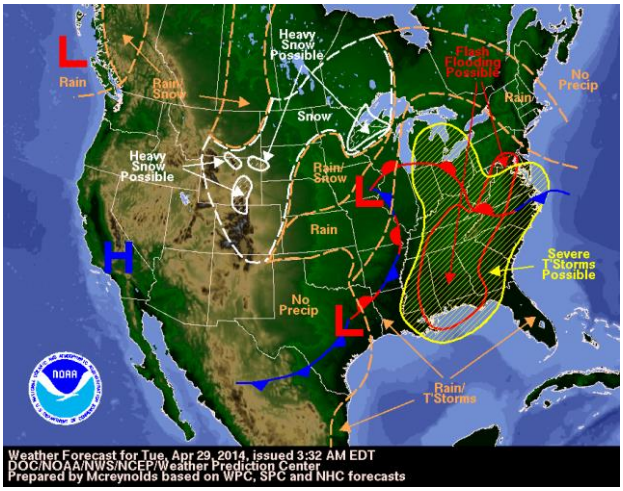
What is your career?

I'm a Research Scientist working at NASA Goddard Institute for Space Studies (GISS) in New York City. I use satellite and field campaign observations to learn about how thunderstorms and clouds work, and I try to use what I learn to help improve the NASA-GISS global climate model.

Learn more about NASA-GISS global climate model HERE.

How did you get involved in your career?

In summer 1989 (when I was 10 years old), my family went on a summer vacation to South Carolina. A day or two after we left, the area we visited was ravaged by Hurricane Hugo. I couldn't believe the pictures! I was shocked. From then on, I was obsessed with weather events. That obsession expanded, and in my early teens, I began making my own weather maps for fun where I would draw cold fronts moving through the U.S. sparking thunderstorms, maps of snowstorms, etc. … I would draw the U.S. states so often by hand, that to this day, I can draw the entire contiguous U.S./states by memory! And, well, as they say, the rest is history…



An example of an official weather map from NOAA showing areas sparking thunderstorms in the U.S. The image shows NOAA's National Forecast chart for April 29, 2014 illustrating a large area in the Eastern U.S. that has the potential for severe weather (yellow).

What kind of education did you need to get your position?

I completed my PhD in Atmospheric Science. In atmospheric science fields, most research scientist positions require a PhD.

What other skills or experiences do you have that help you to be successful in your career?

Students learning to code. Credit: NASA

Computer programming is a crucial skill! I had to learn how to code on-the-fly while in graduate school, and you need to learn how to do this so you can analyze large data sets, read in data files, and make nice images to show in presentations. I'd recommend learning to code as early you can, before graduate school, if possible. I also took a public speaking course in high school, and this not only helped me be less nervous when speaking to larger crowds, but it also helped me learn the importance of something my parents taught me when I was young: use peoples' names as often as possible. Talking science with others is much more impactful when you address them by name. And, believe it or not, typing skills have proven really useful (especially with the increasingly virtual environment we live in today). I had a computer typing course in high school where we learned proper finger placement on keyboards, and how to type quickly and accurately. It is amazing how well this skill has served me as I try to reply to emails efficiently and quickly with limited time available during workdays, participate in text chats with colleagues about science, and make quick edits to multiple in-preparation journal articles with science collaborators!

Learn more about computer programming HERE.

What high school classes did you take that helped you in your career path?

Mathematics and physics courses were crucial. And, as I mentioned above, public speaking!

What do you do in a typical day at your job?

Meetings and replying to emails do comprise a majority of my day, to be honest. The rest I usually spend coding! I code up new analyses to analyze data, or I write code to make new images to put into presentations or publications. I spend some time scanning peer-reviewed science articles or perusing other peoples' presentations, and spend some days sketching out new equations to use in new analyses of data using pens on the backs of envelopes!

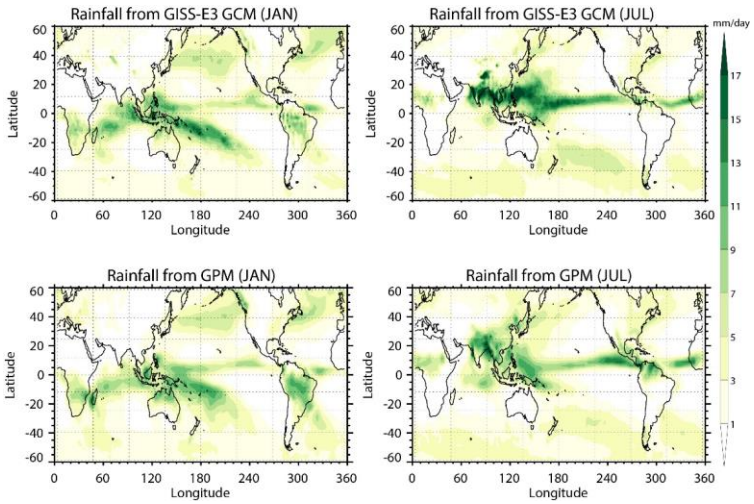
How do you incorporate NASA Earth-observing satellite data into your work?

So many satellites – Global Precipitation Measurement (GPM) mission, Tropical Rainfall Measurement Mission (TRMM), Aqua, and more – provide data on Earth's clouds, thunderstorms, and how humid or warm the atmospheric environments are near the clouds. I use these data to test equations for clouds and the connection to the environment we have coded in climate models. I also use these data to make nice maps of how Earth's clouds vary by location, which we can then compare to climate model output to see how well the climate model is doing.

In order to study the Earth as a whole system and understand how it is changing, NASA develops and supports a large number of Earth-observing missions including missions such as GPM that measures near global precipitation and Aqua which collects measurements to understand Earth's water cycle. These missions provide Earth science researchers the necessary data to address key questions about global climate change. Images from left to right: Earth is a system of systems, learn more at NASA GSFC, image of NASA-JAXA's GPM satellite and image of NASA's Aqua satellite.

What do you enjoy about your career?

It is nice to chat with science friends about things we know little about – but, when I am alone, and can spend a few solo minutes of a day sketching the next analysis I need to do to "advance" my work, that is the most enjoyable!



A climate model output (top images) and visualizations of precipitation (bottom images) that Greg helped develop as part of GISS E3 model activities.

How does your work using NASA's GPM data benefit society?

NASA's satellite imagery and model forecasts regularly help agricultural and aid agencies to monitor the performance of crops worldwide and prepare for food shortages. Credit: USDA/FAS/Curt Reynold

GPM data tell us a lot about Earth's global rainfall patterns and how these vary, on average, by year. This matters to those folks who work in agriculture, to those folks who have to endure droughts, and to those who are affected by terrible storms and floods. I use these GPM data to evaluate how well our climate model is performing, which then helps us to have more confidence in our statistical climate model predictions for the next years, decades, and century!

What is your advice for someone who is trying to decide what career path is best for them?

I would recommend doing an internship, if possible, or shadow someone who has the scientist title you are interested in. And I would advise that you very clearly ask that person if you can shadow on a day that is "normal" and not one that is more eventful than "normal"; in this way, you get an honest depiction of what that career path is really like at present.

Learn more about interning at NASA HERE.

How do you see your job changing over the next decade?

Computing and the use of machine learning continues to advance. This will likely mean that new, improved simulations of Earth's atmosphere will be available, and I imagine my role in developing simulations will increase over the next decade. However, I became a scientist because I wanted to better understand clouds and thunderstorms, and improved simulations does not necessarily equal improved understanding. So, I hope that crafting new analyses using data collected from satellites or ground based measurements and developing simple back-of-the-envelope models to explain why the data shows what it does will continue alongside model simulation improvement.