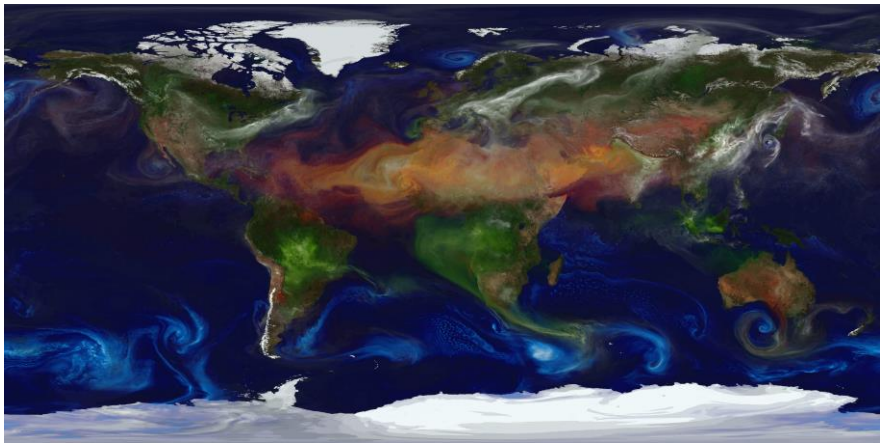
STEM Interview with NASA Scientist, Min-jeong Kim

We asked Min-jeong a few questions to better understand her job as a climate modeler and how she decided to pursue this STEM-related career.

What is your career?

I am a NASA climate research scientist in the Global Modeling and Assimilation Office (GMAO) in Greenbelt, Maryland. Specifically, I help make data assimilation systems that use satellite observations to improve predictions in NASA's Goddard Earth Observing System (GEOS) model. This model simulates and predicts the Earth's climate conditions that helps enhance our understanding of the interconnected Earth system processes and climate change.



GEOS 5 model simulating different types of aerosols, or tiny fine solid particles, in the atmosphere. Credit: NASA SVS

How did you get involved in your career?

I grew up in Pusan, South Korea, which has a beautiful port and beaches. When I was in undergrad, I was an avid student in Physics, and I wanted to apply those physics principles in real world problems. Thus, I decided to be a scientist. I majored in Atmospheric Sciences and minored in Physics in Pusan National University in South

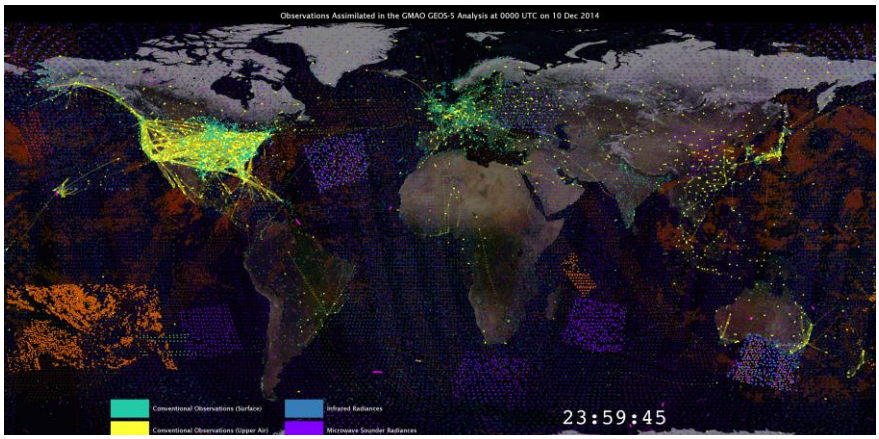
Korea. After graduating college, I enrolled in Seoul National University for graduate school. I specialized in using a mesoscale numerical weather prediction model to understand how topography, or land surface features, affects the precipitation distribution in the Korean Peninsula and received a Master of Science degree. Afterwards, I wanted to study abroad. I came to the U.S. in late 1998 to attend a graduate school program in the Department of Atmospheric Sciences at the University of Washington in Seattle, Washington under the supervisions of Professors Robert Houze and James Weinman. My graduate research was funded by grants from NASA's Tropical Rainfall Measuring Mission (TRMM) and the Global Precipitation Measuring Mission (GPM). After my PhD defense, I took a post-doctoral position at NASA GSFC to develop snowfall retrieval algorithms while seeking opportunities to work on data assimilation system developments for climate models.

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

My coursework centered around the physical sciences and mathematics. In high school, the courses I took were advanced mathematics such as calculus, physics, chemistry, and earth sciences classes. In college, I majored in Atmospheric Sciences and minored in Physics. In graduate school, I took all core courses for advanced atmospheric sciences, applied mathematics, and some extra courses in the Computer Science department and Electrical Engineering department. I found that all the fundamental physics courses, such as classical dynamics, fluid dynamics, electromagnetism, and thermodynamics, helped most especially in solving very challenging problems throughout my career. In addition, I see that computer programming skill is getting more and more useful and vital to be successful in my career.

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

A typical day at my job revolves around building computer codes in data assimilation systems that can read in observation data and use them to improve climate model predictions. I also analyze and test results using various statistical methods, graphs, and

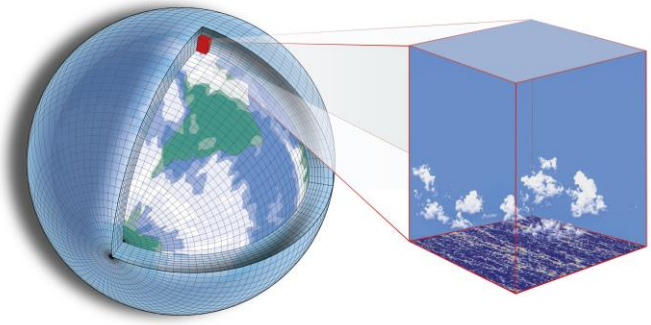


Several observations of Earth from precipitation, wind, and temperature are taken from satellites and used as input into GMAO's GEOS 5 model. Learn more HERE.

plots. I often attend meetings with other colleagues to solve problems or to coordinate tasks and milestones of the projects we are working on as a team.

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

NASA satellite observations are used to analyze and predict various scientific factors affecting Earth's climate. Large number of satellite-based Earth observing sensors developed by NASA provide critical data that enhance our understanding on physical processes of Earth systems and improve the governing physics equations (translated to computer codes) in climate models to be realistic. In addition, NASA satellite observations are vital to establish the initial conditions for climate models to guide realistic climate model solutions.

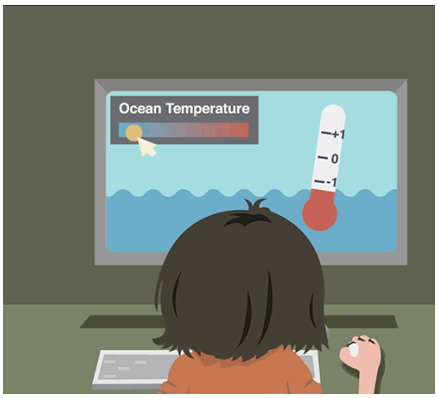


NASA is a leader in making space-based measurements of climate variables, including precipitation, water vapor, and temperature, over long periods of time. Records of these variables develop and inform climate models.

Climate models divide the atmosphere into a 3-D grid. Each grid piece is represented by mathematical equations that describe the materials in it and the way energy moves through it. Credit: Schneider et al., Nature Climate Change.

What do you enjoy about your career?

The problem-solving aspect is most fascinating. Every problem or task is like solving a challenging, yet fun puzzle and I never find it boring. I enjoy experimenting with how observation data can change the model outputs and interpreting the impacts using physics and mathematics. I enjoy working to improve climate models to understand Earth's climate change because climate models are very useful tools for enhancing our understanding of climate processes and for predicting the future climate so that people can be better prepared.



Taking NASA observations to observe climate. Climate models work like a laboratory in a computer. They allow scientists to study how different factors interact to influence a region's climate. Credit: NASA Climate Kids

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

My advice for anyone is for that person to find a career that he or she will enjoy and get satisfaction from. If science is one's passion, then I recommend a career in the physical sciences.

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

Here are my thoughts on how my career may evolve over the next decade: most of climate modeling centers are investing resources in artificial intelligence (AI) and machine learning system developments. In addition to good understanding of fundamental sciences such as physics, chemistry, biology, or mathematics, being specialized in applied statistics and computer programming will be very helpful.