FINDING a CAREER

Careers If You Like Math

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Atmospheric Scientist

A Few Facts

Number of Jobs
As of 2014, about 10,850

Salaries
As of 2014, the mean annual salary was $88,090

Educational Requirements
Minimum of a bachelor's degree

Personal Qualities
Good critical-thinking and computer skills; adaptable; likes working outdoors

Work Settings
Indoors and outdoors

Future Job Outlook
Job growth of 10 percent through 2022, which is about as fast as average

It's All About the Weather

"Everyone talks about the weather, but no one does anything about it," an old saying goes. When it comes to atmospheric scientists, that saying isn't entirely correct. Atmospheric scientists are weather experts. They study short-term weather systems in order to predict the weather and its impact. They also research long-term climate conditions in an effort to predict future climate events, such as global warming, drought, and ozone depletion. They use mathematical instruments like thermometers and barometers to collect data and algebra to figure out how different variables like wind speed or humidity might affect the weather. The information they collect and analyze does more than help people decide whether to take an umbrella—it saves lives by warning the public about dangerous weather events so that they can prepare for what's coming. It also alerts the world to dangerous long-term climatic changes. If you find weather intriguing but you want to do more than just *talk* about it, an atmospheric scientist career might be worth considering.

Are All Atmospheric Scientists the Same?

There are a number of different types of atmospheric scientists, making this a field that offers lots of career options. Meteorologists are probably the most well-known type of atmospheric scientist. Meteorologists study short-term weather systems. But exactly what they do depends on the type of meteorologist they are. There are several kinds.

Operational meteorologists are the largest group. They collect data related to air pressure, wind velocity, humidity, and temperature from satellites, radar, and nearly ten thousand weather stations located all over the world. Using statistics, mathematical calculations, and sophisticated computer software, they analyze this data in order to predict the weather.

Research meteorologists are another group. As the name implies, they do research related to climate and weather. For example, in an effort to make air travel safer, British research meteorologist Helen Hewson is studying airflow over mountains. In an interview in *Plus* magazine, she comments on her job: "The aim is to tell aircraft pilots if it's windy in a particular way over specific mountains then you may get effects which are dangerous and you have to avoid them, but if it's windy in another way then you should be able to fly over them." Research meteorologists also develop new data-collecting instruments and weather-prediction software.

Broadcast meteorologists are still another group. Also known as weather forecasters, they report the weather on television, radio, and the Internet. In making their forecasts, they depend on data gathered by operational meteorologists as well as local weather maps and charts. On the air, they use specialized graphic software to illustrate their forecast. In many cases, they write the scripts for their reports. In an interview on the Job Shadow website, Matt Meister, chief meteorologist at station KRDO in Colorado Springs, Colorado, explains, "I make and present the forecast for our website, mobile apps, news radio station and 5, 6 and 10pm newscasts [Monday through Friday]. Additionally I supervise the other members of Stormtracker13 . . . and I oversee

the maintenance of our 20+ weather computers. . . . In simplest terms my job consists of two things: 1) making the forecast and 2) giving it out!"

Studying and forecasting short-term weather events appeals to some atmospheric scientists—but not all. Those who prefer to focus on long-term global climate conditions are called climatologists. Climatologists study past weather patterns in order to forecast shifts in climate that are likely to occur in the future. For instance, in an effort to predict global warming trends, climatologists have been taking samples from different levels of Antarctica's ice core. By analyzing the thickness of the ice samples at various levels, and the amount of carbon dioxide (which rises as temperatures rise) trapped in the samples, they can determine what the climate was like at different points in time. This gives them a long-term view of changes in climate. Climatologists use this information to develop three-dimensional global climate models, which illustrate past climate events and how even the smallest changes in climate affect the ice core. These findings make it possible for them to make predictions related to future climate change, such as how much longer the ice core can continue to exist under the current rate of global warming.

What Does Math Have to Do with Atmospheric Science?

Although atmospheric science sounds interesting, you might be wondering what in the world this career field has to do with math. The answer is, plenty. Even though math is not the primary focus of atmospheric science, a strong math background is important to the job. Atmospheric scientists use calculus, geometry, and algebra in predicting the weather and climate trends. And they rely on their skills in graphing, data collecting, recognizing patterns, and problem solving. To forecast weather, for example, meteorologists collect numerical data concerning wind speed and direction, temperature, humidity, and air pressure from weather balloons, satellites, and radar. They plot this data on graphs, charts, and weather maps, which they analyze looking for patterns related to

weather trends. Mathematics figures prominently in their analysis. They also use computer software to solve complex equations that help them understand the relationship between different atmospheric factors and how changes in any of these variables affect the weather. According to Barry Lough, the creator of Stuff in the Air, a meteorology website, "The mathematics used in meteorology could, and does, fill textbooks quite extensively."

Preparing for This Career

If you decide to become an atmospheric scientist, you'll need a minimum of a bachelor's degree. Research meteorologists need a master's or doctorate degree. In college, the best choice of a major will be atmospheric science or a related field like geology. Atmospheric science classes cover subjects like meteorology and climatology and include hands-on classes in the use of forecasting instruments. In addition, you'll take courses in computer science, statistics, calculus, and other advanced mathematics. In fact, math is so important in this field that successful completion of four years of high school math is often a prerequisite for this major. In addition, if your goal is to become a broadcast meteorologist, you'll take classes in speech, journalism, and broadcasting.

If your goal is broadcast meteorology, you should get all of the public speaking and broadcasting experience you can to build your confidence and speaking skills. This may include working at a school radio or television station or a community-access television station. For instance, while still a

A Passion for Weather

"I've had a passion for atmospheric science since about the age of 8 when I first realized a winter storm forming in the foothills of the Colorado Rockies often meant a snow day off from school in Montreal 3 days later. Watching with awe as summer lightning and hail storms formed overhead further solidified this passion in Earth and atmospheric sciences."

Bill Coulter, quoted in "Exclusive: Q & A with CP24 Breakfast Meteorologist—Bill Coulter," MediaCareers.ca, August 29, 2012. www.mediacareers.ca.

young teenager, Matt DiPirro, a meteorologist at KSWO in Lawton, Oklahoma, gained his first on-air experience by reporting live during snowstorms for his local community-access television station. He continued honing his broadcasting skills by working at his college television station. He says that these experiences helped assure him that he'd chosen the right career path and gave him the confidence he needed to succeed as a broadcast meteorologist.

A summer internship working on a research project involving weather is another great way to gain hands-on experience in atmospheric science and network with people already working in the field. Organizations like the National Weather Service, Significant Opportunities in Atmospheric Research and Science, and Young Leaders in Climate Change (YLCC) all offer such programs. For example, in 2015 YLCC interns stationed in national parks studied how issues related to climate change impacted the parks. Colleges can help their students find this program and others. Many of these programs offer paid internships along with free or subsidized housing and a travel stipend.

Making a Difference in People's Lives

"I have wanted to be a Meteorologist since I was 9. There's a saying 'If you love what you do, you never work a day in your life.' That certainly holds true for me! This is my hobby that fortunately I get paid for! But . . . it's not about the dollar, it's about doing your job right, doing it accurately, and making sure you tell the people what they NEED to know. Your forecast makes a difference in people's lives, at times it even may save lives! . . . And man do I love it!"

Kevin Arnone, quoted in "Interview with Meteorologist Kevin Arnone." WXedge.com, January 31, 2015. http://wxedge.com.

A climatologist monitors solar activity at a North Pole research station. Climatologists use this type of information to develop models that help scientists study climate change.

Skills and Adaptability

You can't be an atmospheric scientist and *not* like science, math, computers, weather, and climate-related issues. But there's much more to this job. To succeed as an atmospheric scientist, you need to have strong critical-thinking skills, and you need to be a problem solver. Atmospheric scientists use these skills to analyze weather data, taking into account variables such as geographic factors that affect local weather conditions and past weather history in order to make accurate forecasts. And because they spend a lot of time in front of a computer

Mathematical Association of America (MAA)
website: www.maa.org

The MAA is a professional society that provides lots of information related to math and math careers, including information about a career as a statistician.

World of Statistics
www.worldofstatistics.org

This international organization is dedicated to promoting careers in statistics and educating the public on the importance of statistics. It has lots of information about careers in statistics.

INTERVIEW WITH A FINANCIAL ADVISER

Gregg Boone is a financial adviser with LPL Financial in Arlington, Texas. He has worked as a financial adviser for twenty years. He spoke with the author by phone about his career.

Q: Why did you become a financial adviser?

A: I wanted to help other people and it was a way of making a good income while helping others. It's a rare place where the customer benefits and you benefit, too, so everybody wins.

Q: Can you describe a typical workday?

A: That's a good question! The first thing I do when I come into the office in the morning is check my e-mails and phone messages. Then, I call all the clients who have left messages and e-mails. Next, I pull up the stock market and check what's going on; then I look at my plans for the day. Then, I make calls to clients. I probably spend half the day calling clients. I spend the rest of the day doing an analysis of the economy, the stock market, and investment choices. I also work on financial plans for my clients.

Q: What do you like most and least about your job?

A: What I like most is helping clients' financial portfolios grow, so that they can reach their life goals—so that they can retire and not worry about money, and so that they can send their kids to college. It's great to know that I help people to reach a point where they don't have to worry about money.

What I like least is when the stock market drops and clients call me in a panic, despite the financial education about the ups and downs of the stock market that I've given them.

OTHER CAREERS IF YOU LIKE MATH

Accounting clerk
Air traffic controller
Astronaut
Astronomer
Auditor
Banker
Bookkeeper
Cashier
Chef
Chemist
Claims adjuster
Cloud architect
Construction manager
Cost estimator
Database administrator
Data miner
Demographer
Economist
Electrical engineer
Electrician
Financial analyst
Forensic analyst
Geologist
Hospital administrator
Industrial engineer
Insurance underwriter
Logistician
Mathematician
Mechanical engineer
Nurse
Operations research analyst
Pharmacist
Physician
Physicist
Real estate agent
Sales representative
Stockbroker
Surveyor

Editor's note: The online *Occupational Outlook Handbook* of the US Department of Labor's Bureau of Labor Statistics is an excellent source of information on jobs in hundreds of career fields, including many of those listed here. The *Occupational Outlook Handbook* may be accessed online at www.bls.gov/ooh.

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