Weather and Climate
Do you know the difference between weather and climate?

The main difference between weather and climate is the time scale over which the conditions are described. Weather generally describes the atmosphere during short time frames like hours or days. Climate generally refers to conditions that span months, years, or even decades. One way to remember this is that weather tells us what to wear on any given day, and the climate tells us what kind of wardrobe to own. Knowing this, join me, Arch the Dog, as we explore much more about weather and climate!

Georgia 4-H is a partner in public education and strives to incorporate Georgia Standards of Excellence in the education materials for in-school use. The following Georgia Standards of Excellence are correlated to the content delivery included in this publication.

S4E3. Obtain, evaluate, and communicate information to demonstrate the water cycle.
   a. Plan and carry out investigations to observe the flow of energy in water as it changes states from solid (ice) to liquid (water) to gas (water vapor) and changes from gas to liquid to solid.
   b. Develop models to illustrate multiple pathways water may take during the water cycle (evaporation, condensation, and precipitation).

S4E4. Obtain, evaluate, and communicate information to predict weather events and infer weather patterns using weather charts/maps and collected weather data.
   a. Construct an explanation of how weather instruments (thermometer, rain gauge, barometer, wind vane, and anemometer) are used in gathering weather data and making forecasts.
   b. Interpret data from weather maps, including fronts (warm, cold, and stationary), temperature, pressure, and precipitation to make an informed prediction about tomorrow’s weather.
   c. Ask questions and use observations of cloud types (cirrus, stratus, and cumulus) and data of weather conditions to predict weather events.
   d. Construct an explanation based on research to communicate the difference between weather and climate.

Climatologists create graphs using weather observations that have been collected over long periods of time (at least 30 years). The observations are collected from land-based weather stations, ships, buoys, and satellites passing over Earth. Climatologists study these graphs to identify trends in weather patterns. A trend is a long-term movement in a series of data points. Trends can go up or down, or move very little.

WHAT’S TRENDING WITH WEATHER AND CLIMATE?

Please explore the example below and answer the questions provided to learn more about trends in weather patterns.

1. On average, how much rainfall does Fulton County, GA receive in the month of July? ________ inches
2. On average, which month receives the lowest amount of rainfall in Fulton County, GA? __________________
3. On average, which month receives the highest amount of rainfall in Fulton County, GA? __________________

Now, let’s build our own graph. Create a maximum temperature graph below using the data provided to the right.

To learn more or find data for different parts of Georgia, please visit: http://agroclimate.org/tools/climate-risk/
**GAUGE YOUR KNOWLEDGE**

**2008 – U.S. Drought**

The United States experienced drought conditions throughout 2008. Record low lake levels were reported in areas of the southeast, and the heat and drought conditions also caused agricultural losses across a large portion of the U.S.

**2011 – Tornado in Joplin, Missouri**

On Sunday, May 22, 2011, an EF-5 tornado hit the city of Joplin, Missouri. The tornado had wind speeds greater than 200 mph, was three-quarters of a mile wide, and had a track lasting six miles. This tornado was also a part of a larger outbreak of an estimated 180 tornadoes in the central and southern states over the course of several days.
MEET THE EXPERTS

Dr. J. Marshall Shepherd is a leading international expert in weather and climate. Dr. Shepherd was the 2013 President of American Meteorological Society (AMS), the nation’s largest and oldest professional/science society in the atmospheric and related sciences. Dr. Shepherd is Director of the University of Georgia’s (UGA) Atmospheric Sciences Program and Full Professor in the Department of Geography. He is the Georgia Athletic Association Distinguished Professor of Geography and Atmospheric Sciences. Dr. Shepherd is also the host of The Weather Channel’s Award-Winning Sunday talk show Weather Geeks, a pioneering Sunday talk show on national television dedicated to science and contributes to Forbes Magazine. In 2014, Ted Turner and his Captain Planet Foundation honored Dr. Shepherd with its Protector of the Earth Award. Prior recipients include Erwin Brokovich and former EPA Administrator Lisa Jackson. He is also the 2015 Recipient of the Association of American Geographers (AAG) Media Achievement award, the Florida State University Grad’s Music Good Award and the UGA Franklin College of Arts and Sciences Sandy Brewer Award for Excellence in Teaching. In 2015, Dr. Shepherd was invited to moderate the White House Champions for Change event. Prior to UGA, Dr. Shepherd spent 12 years as a Research Meteorologist at NASA-Goddard Space Flight Center and was Deputy Project Scientist for the Global Precipitation Measurement (GPM) mission, a multi-national space mission that launched in 2014. President Bush honored him on May 4th 2004 at the White House with the Presidential Early Career Award for pioneering scientific and technological advancement in the field of meteorology and climate science. Dr. Shepherd is a Fellow of the American Meteorological Society. Two national magazines, the AMS, and Florida State University have also recognized Dr. Shepherd for his significant contributions. In 2016, Dr. Shepherd was the Spring Commencement speaker at his 3-time Alma Mater, Florida State University and was recently selected for an SEC Academic Leadership Fellows program.

Dr. Shepherd is frequently sought as an expert on weather, climate, and remote sensing. He routinely appears on CBS Face The Nation, NOVA, The Today Show, CNN, Fox News, The Weather Channel and several others.

Director of UGA’s Atmospheric Science Program

MEASURING WEATHER

Step 1: Choose the Right Instrument

1. An instrument to measure the water vapor content of the atmosphere
2. An instrument that measures the speed or force of the wind
3. An instrument for measuring rainfall
4. An instrument for measuring temperature
5. An instrument used to measure atmospheric pressure

Step 2: Make Your Own Weather Instrument

Materials:
- 5 three ounce paper cups
- 2 straight plastic straws
- Straight pin (or push pin)
- Ruler
- Paper hole punch

Steps:
1. Take four of the three cups and use the paper punch to punch one hole in each, about a half inch below the rim.
2. Take the fifth cup and punch four equally spaced holes about a ¼ inch below the rim. Then punch a hole in the center of the bottom of the cup.
3. Take one of the four cups and push a soda straw through the hole. Fold the end of the straw and staple it to the side of the cup across from the hole. Repeat this procedure for another one-hole cup and the second straw.
4. Slide one cup and straw assembly through two opposite holes in the cup with four holes. Push another one-hole cup onto the end of the straw just pushed through the four hole cup.
5. Bend the straw and staple it to the one-hole cup, making certain that the cup faces the opposite direction from the straw assembly. Repeat this procedure for the other cup and straw assembly and the remaining one-hole cup.
6. Align the four cups so that their open ends face in the same direction either clockwise or counter-clockwise around the center cup.
7. Push the straight pin through the two straws where they intersect.
8. Push the eraser end of the pencil through the hole in the center cup. Push the pin into the end of the pencil eraser as far as it will go.
9. Now your anemometer is ready for use!

GOVERNMENT JOBS

SHEPHERD CLIMATE INSTITUTE

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GAUGE YOUR KNOWLEDGE

2014 – Winter Storms

In late January of 2014, a winter storm caused widespread damage across the Southeast bringing snow, sleet, and freezing rain. The winter weather and limited road-clearing equipment resulted in massive travel disruptions when thousands of vehicles were abandoned on highways around Atlanta.

2015 – Western Wildfires

IS IT WEATHER OR CLIMATE?

The main difference is the time scale over which conditions are described. Weather generally describes the atmosphere during short time frames like hours or days, and climate generally refers to conditions that span months, years, or even decades.

Label these six statements as either WEATHER (W) or CLIMATE (C).

1. Hurricane: A hurricane makes landfall along the West Coast of Florida at 2:00 p.m. on Saturday
2. Drought: Drought associated with the Great Dust Bowl in the 1930s (an extended period during with an extreme deficit in precipitation)
3. Annual Rainfall: The amount of precipitation measured over the course of a year
4. Tornado: A tornado staying on the ground for four hours and tracking 180 miles
5. Clear Sky: A clear nighttime sky in the summer
6. Ice Age: A geological period during which Earth exhibited a reduced global temperature and an increased presence of large glaciers and ice sheets

WEATHER VOCABULARY

In the Meet the Experts feature, you read about three people whose careers center around weather and climate. You may have been introduced to some cool new vocabulary. Take a closer look at these words to learn more.

Agricultural Climatology is the study of climate as to its effect on crops.

Climate Change is a long term change in the earth’s climate, especially a change due to an increase in average atmospheric temperature.

Physical Meteorologist is an individual that studies optical, electrical, acoustical and thermodynamic phenomena in the atmosphere, including the physics of clouds and precipitation.

Research Meteorologist is an individual that studies more specific areas of weather like severe weather or climate change.

Remote Sensing is the collection of information about an object without being in direct physical contact with it, gathering data with radar or infrared photography.

Weather Forecasting is the prediction of what the atmosphere will be like in a particular place by using technology and scientific knowledge to make weather observations.

REFERENCES AND RESOURCES

All activities adapted from Weather and Climate Variability Toolkit, published 2013. Toolkit was made possible through a grant from USDA NIFA: Climate variability to climate change: Extension challenges and opportunities in the Southeast USA and written and compiled by Melissa Griffin (FSU), Kathy Fearon (FSU), and Heather Kent (UF)

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