# Expert Group- Weather and Climate in Gypsum, Kansas


*Figure 1:Developed using Google Maps*

As the nation's leading wheat producer, Kansas has long been known as the "*Breadbasket of the World*". There are over 60,000 farmers in Kansas, many of whom are female, and a third of these farmers grow wheat. Gypsum is a small city in Saline County that is deep in the heart of wheat farming country. Although it is a small city of only about 400 people, there are many farms in the area outside Gypsum.

In Kansas, wheat is planted in September and October, and is harvested in June and July. The wheat will sprout and grow in the fall until a winter freeze occurs, and then it will become dormant until spring. The wheat will mature until it is harvested during the summer. You can learn more about Kansas's wheat farmers here.

*Weather and Climate:*

Weather and climate are different. Weather helps you decide what to wear when you go outside, and climate helps you know which clothes to have ready for possible weather conditions during that season. Weather is what is happening outside right now in the atmosphere. Climate is an average of the weather conditions over the past, and usually includes at least 30 years of weather data to determine these typical conditions. Watch this video (6:24) to learn the difference between weather and climate.

It is important to know the difference between weather and climate to understand how our climate is changing and why it is hard to predict the weather, but easy to determine the climate. Climate is based on mathematical averages and not dependent on

atmospheric variables that are changing by the minute. Climate is determined by altitude, latitude, geography, and topography. Most people think of weather in terms of temperature, humidity, precipitation, cloudiness, brightness, visibility, wind, and atmospheric pressure, as in high and low pressure.

Earth operates as a complex series of interrelated systems. As you can see in Figure 2, both natural and human-made processes are continually interacting and causing changes in our weather, which results in changes being noted in our climate. As change occurs in one system, such as a volcanic eruption, it results in changes in the atmospheric composition and modifications in the geologic structure. As humans modify the land for different purposes, they also are creating changes in the atmosphere, the carbon cycle, and in the water of water resources.

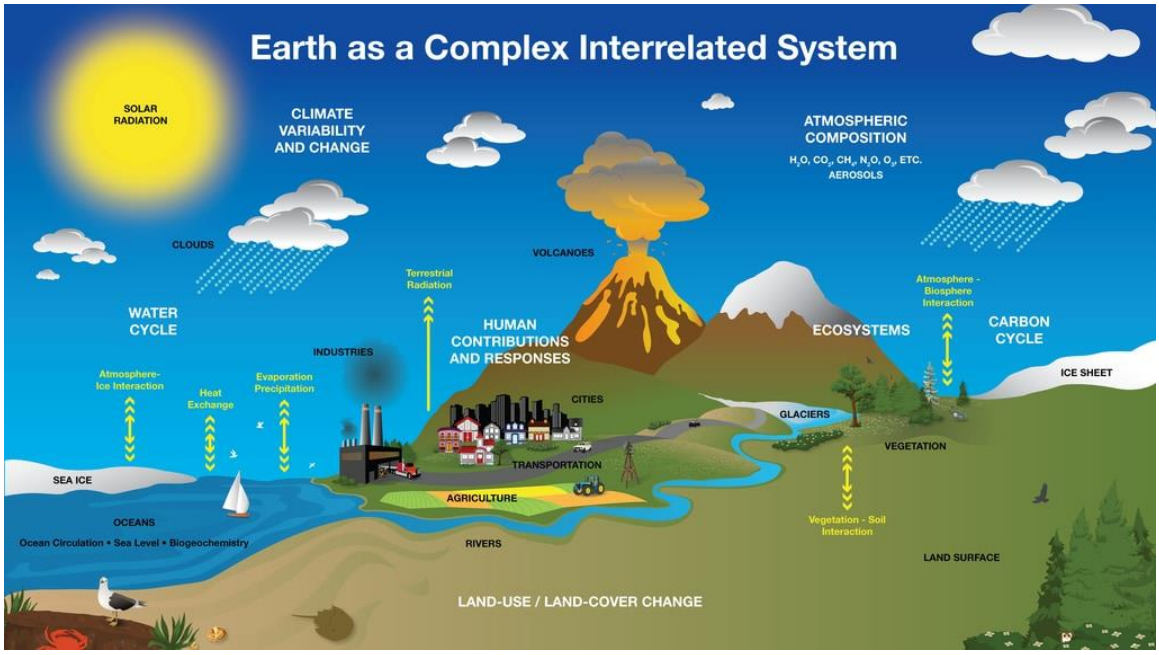


*Figure 2: Image credit: NASA GSFC*

Like the human body, Earth comprises diverse processes and systems that interact with one another in complex ways. The purpose of NASA's Earth science program is to advance our scientific understanding of Earth as an integrated system and its response to natural and human-induced changes. NASA works with its domestic and international partners to support a large number of Earth-observing satellite and airborne missions to observe and understand our planet on global and regional scales. These missions are able to collect measurements of surface temperature, winds, water vapor, clouds, precipitation, soil moisture, ocean salinity, and other aspects of the environment. While scientists learn a great deal from studying individual phenomena, improved observational capabilities, coupled with process-level and global numerical models increasingly allow them to study

component system interactions, leading to unprecedented insight into how Earth functions as one integrated system of systems. In this short animation (0:58) you can see the patterns of vegetation emerge and retreat over the seasons as measured by NASA satellites.

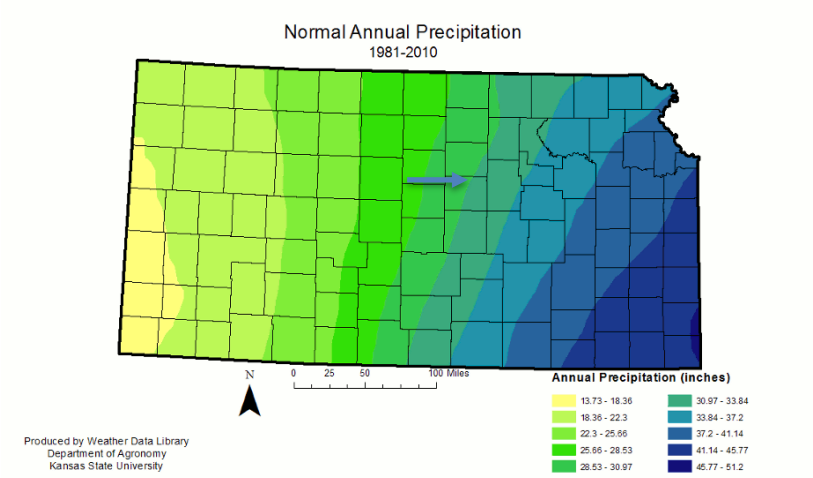


*Figure 3: Normal Annual Precipitation*

Figure 3 above shows the average amount of precipitation, in inches, that fell in Kansas over a 29-year period. The arrow shows approximately where Gypsum is located. You can see the variability of how much precipitation Kansas receives over the year. Variability refers to the way that the amount of precipitation varies across time or location. What factors do you think might be responsible for the variability of precipitation in Kansas? View this video, entitled "NASA's New View of the Daily Cycle of Rain" (3:33) to see how GPM is measuring global precipitation and monitoring precipitation patterns.

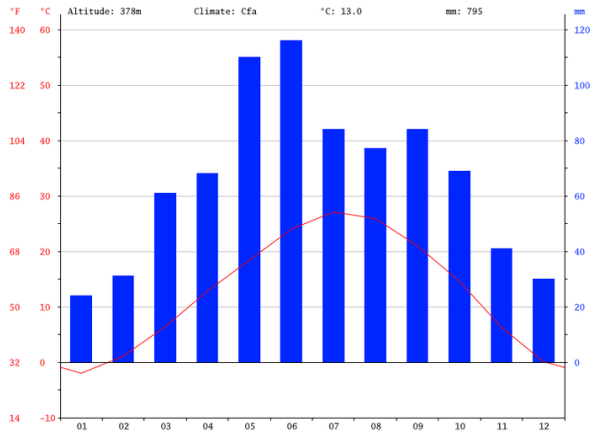


*Figure 4: Mean Air Temperature and Precipitation- Image credit: Climate_Data.org*

The Köppen-Geiger Climate Classification is a widely used, vegetation-based system which was initially developed by German botanist-climatologist Wladimir Köppen in

1900. Köppen developed a climate classification system for world climate types using annual and seasonal patterns of temperature and precipitation as well as vegetation types. In 1954, Rudolf Geiger updated Köppen's system and made it available as a world map.

Today, this system, known as the Köppen-Geiger Climate Classification system is widely used and identifies 31 different climatic regions. There are five major climate types: Equatorial (A), Arid (B), Warm Temperate (C), Snow (D), and Polar (E). Köppen was able to devise formulas that defined climatic boundaries to correspond to those of the vegetation zones (biomes) that were being mapped for the first time during his lifetime.

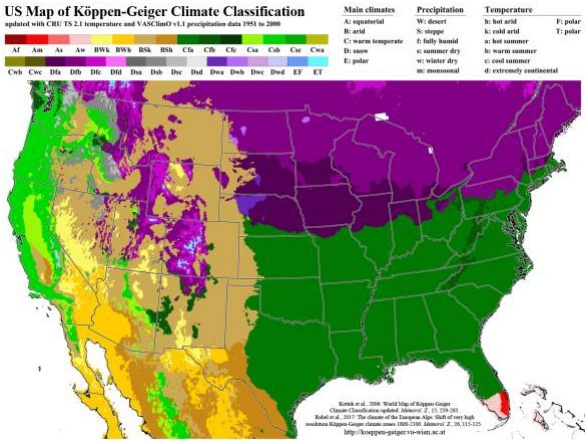


*Figure 5: U.S. Map of Köppen-Geiger Climate Classification*

Kansas lies in the center of the United States, and mainly experiences three different types of climate. A small western part of the state has a semi-arid steppe (Köppen climate classification BSk) with hot summers and cold winters. The significant eastern portion has hot and humid summers and falls under the humid continental (Köppen Dfa) type. Southeastern Kansas displays a humid subtropical type (Köppen Cfa) with mild winters. Missouri in the east, Oklahoma in the south, Colorado in the west, and Nebraska in the north, border the state. Kansas has no major water bodies that influence its climate.

Kansas has elevations that generally range from 200 meters in the east to 1232 meters in the west. The topography of the state mainly consists of vast acres of fertile farmlands in the west to green hills and forests in the east. Mount Sunflower, the highest point in Kansas, has an altitude of 1232 meters and stands just half a mile away from the Colorado border. Western Kansas lies in the great central plain of the United States. The Missouri, Kansas, and Arkansas rivers, along with their tributaries, cover a major part of the state. The rain shadow effect of the Rocky Mountains and the altitude differences is having a noticeable impact on the precipitation.

*Resources:*

- Wheat Facts
- What's Growing in Kansas?
- U.S. Wheat

- The Wheat Beat
- Encyclopedia Britannica
- NASA's Weather versus Climate
- CoCoRaHS Weather versus Climate
- NASA Scientific Visualization Studio
- Climate-Data.org