

# Climate Change in the Federated States of Micronesia

Dr. Charles Fletcher (University of Hawai'i)

Dr. Art Sussman (WestEd)

Pacific Islands Climate Education Partnership



You may have heard the term **climate change**. What does this term mean? In what ways is the climate changing? How does climate change affect the Federated States of Micronesia? The purpose of this booklet is to answer these questions.

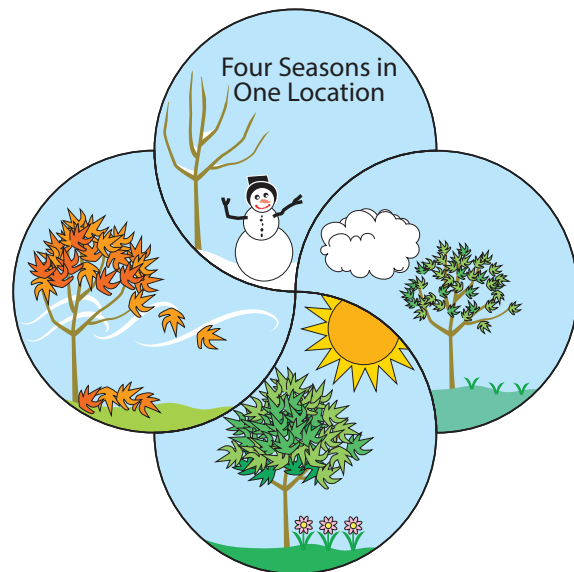
## What are weather and climate?

To learn about climate change we need to understand the difference between weather and climate. **Weather** is the short-term condition of the atmosphere in a specific place, such as where you live. Is it raining today? Where is the wind blowing from and how strong is it blowing? Is the air hot or cool? How cloudy is the sky?

**Climate** is the long-term average weather pattern in a specific place or larger area. When scientists describe the climate in a place, they use measurements and observations of the weather that have been made over periods of 30 years or even longer. The climate in a place has very big effects on the plants, animals and people who live in that place.

The Federated States of Micronesia have a climate where the weather does not change that much over the course of a year. Other places on our planet have climates where the weather changes a lot over the course of a year. For example, many places have very cold snowy winters, and very hot summers (see **Figure 1**).

**Figure 1** Many locations on our planet have four seasons, such as a very cold winter (top), a warmer spring (right), a hot summer (bottom), and a cooler fall (left) when leaves change color and fall off the trees.



Climate describes what kind of weather you can expect to happen. Weather describes what is actually happening. If you visit a place in the winter that has a climate with very cold winters, you should expect that it will be very cold. However, the week that you visit, the weather could actually be warm. It was probably cold the week before, and it will probably become cold again the week after you leave.

## What is the climate in the Federated States of Micronesia?

### Warm and Humid

The climate in the Federated States of Micronesia is generally warm and breezy with lots of water vapor in the air (this is known as high **humidity**). The map (see **Figure 2**) shows two factors that play the biggest roles in causing this climate:

- The Federated States of Micronesia (FSM) is located near the equator
- FSM is surrounded by the ocean in all directions

Places near the equator get a lot more energy from the Sun than places that are farther away from the equator. This location is the main reason that the islands in FSM are warm. Air above warm ocean water is heated by that water, and also has a lot of water vapor in it making the air humid. The warm ocean around FSM helps keep the temperature warm at night, and makes the air warm and humid.

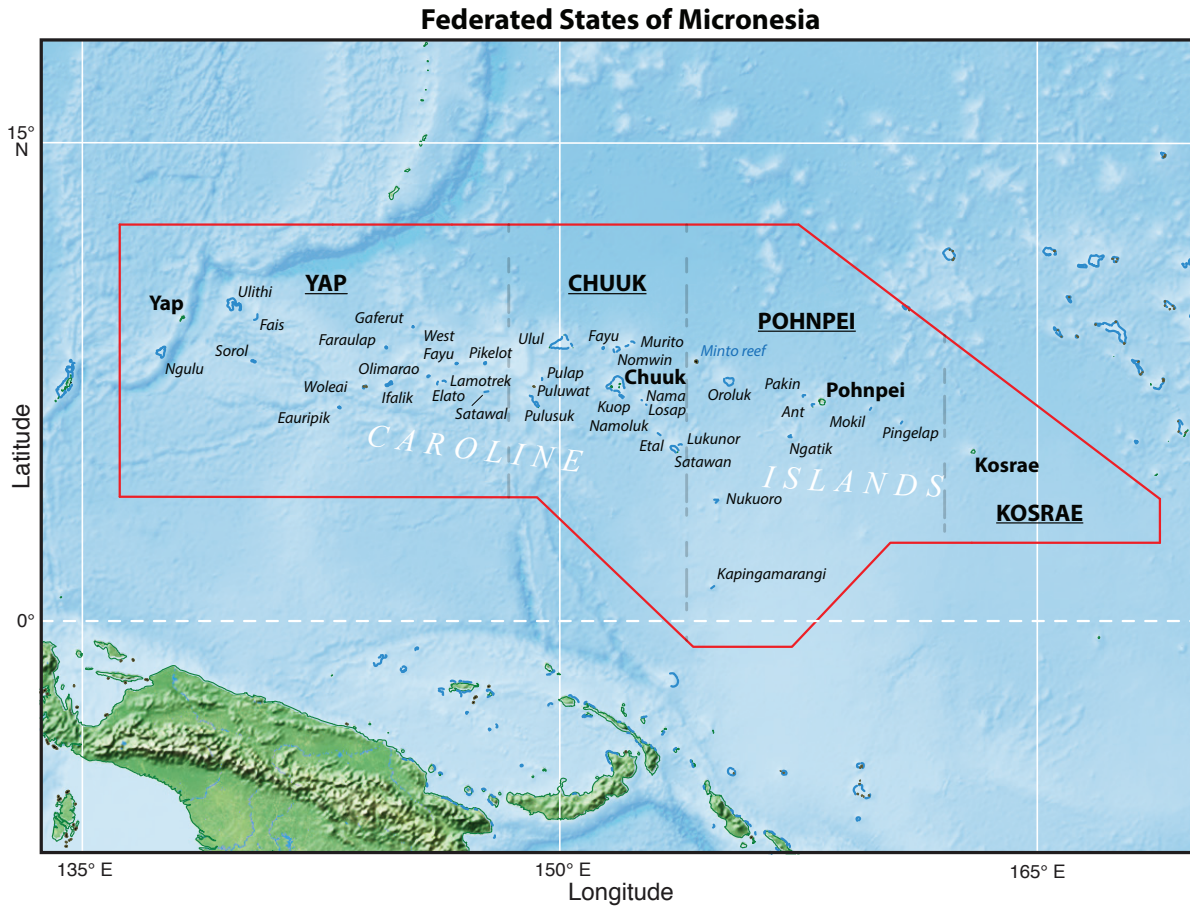
**Federated States of Micronesia in the Equatorial Pacific**



**Figure 2** The Federated States of Micronesia (FSM) is located in the western Pacific near the equator.

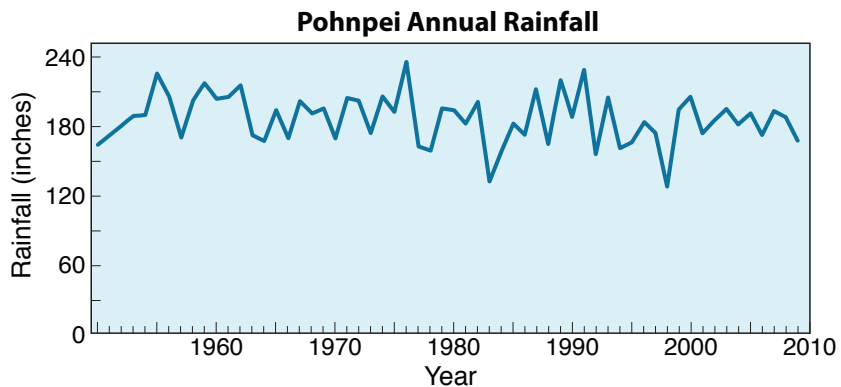
### Wet and Dry Seasons with Variable Rainfall

The weather and climate in Micronesia (**Figure 3**) have been observed and analyzed for centuries, and have been scientifically measured for decades. There are several patterns in addition to being generally warm and humid. One of the most important climate patterns is that there is a wet season and a dry season.



**Figure 3** The Federated States of Micronesia are mostly located at latitudes between 5°North and 10°North.

The wet season is usually from May to October, and the dry season from November to April . **Figure 4** shows the annual rainfall measured in Pohnpei between the years 1950 and 2010. Note that the amount of rain changes a lot from year to year. Some years had 210 inches (533 cm) or more of rain, while other years had 150 inches (381 cm) or less of rain. This kind of change in rainfall from year to year is a natural feature of the climate in many Pacific islands that are near the equator. Scientists say that the amount of rainfall has a lot of **variability** (natural change from year to year).



**Figure 4** The amount of rainfall in Pohnpei has a lot of variability from one year to the next.

## High Islands and Low Islands

There are two main types of islands in the Pacific Ocean: high islands and low islands. Both types of islands have communities of people living on them, growing food, fishing, and drinking the water.

High islands are usually extinct volcanoes that extend to heights above 2000 ft (610 m) where the air is cold. Humid wind blowing across the ocean surface is forced upward along the slopes of high islands into the cold air. Water droplets form (a process called condensation) when warm humid air becomes cold. The water droplets create rain and clouds and act as an important source of freshwater on the island.



**Figure 5** High islands extend into the cold atmosphere where clouds form, typically above 2000 ft elevation. This is an important source of fresh water.

Low islands are usually made of coral sand and gravel. Low islands do not cause humid air to condense because they do not extend into the cold air at high elevations. The primary source of freshwater on low islands comes from rainstorms that move across the ocean and happen to run across an island.

Because high islands influence the winds and create their own rainfall, they tend to receive more rain than low islands. For instance, on the low island of Majuro in the Republic of the Marshall Islands, annual rainfall averages 132 in (335 cm). On the high island of Kosrae in the Federated States of Micronesia, the annual rainfall averages more than twice as much, 300 in (762 cm) in the mountains and 200 in (508 cm) on the coast.

## The Intertropical Convergence Zone Influences the Amount of Rain

The amount of rainfall in FSM can be very different from one year to the next. This is because of certain types of climate patterns that we discuss next: the Intertropical Convergence Zone and the El Niño Southern Oscillation.

The winds near the equator usually blow from the east to the west. Near the equator, the winds from the northern hemisphere and in the southern hemisphere come together and cause a band of rain called the Intertropical Convergence Zone or ITCZ. This very cloudy and rainy area can be seen in satellite photos (**Figure 6**) as a band of thunderstorm clouds somewhat north of the equator.

The Intertropical Convergence Zone is a band of clouds near the equator



**Figure 6** *The strong sun and warm water of the equator heats the air and increases its humidity. The warm humid air rises and becomes colder as it gets higher in the atmosphere. As the rising air gets colder, the water vapor condenses and forms big clouds that release the water in thunderstorms.*

This long band of rainy area near the equator does not just stay in one place. The wet season occurs in the summer when the area of rain tends to move to the north closer to the FSM. The dry season occurs in the winter when the area of rain moves further south away from most of the islands in the FSM.