

Types of Rain

What causes rain? Some rain forms when warm air parcels rise high into the troposphere and water vapor in the air condenses into liquid. However, that's not the whole story—the formation of rain can be more complicated than a single rising air parcel. One type of rain, called orographic rain, can form when air parcels run into certain landforms on Earth's surface. Another type of rain, called frontal rain, can form when air parcels of different temperatures collide.

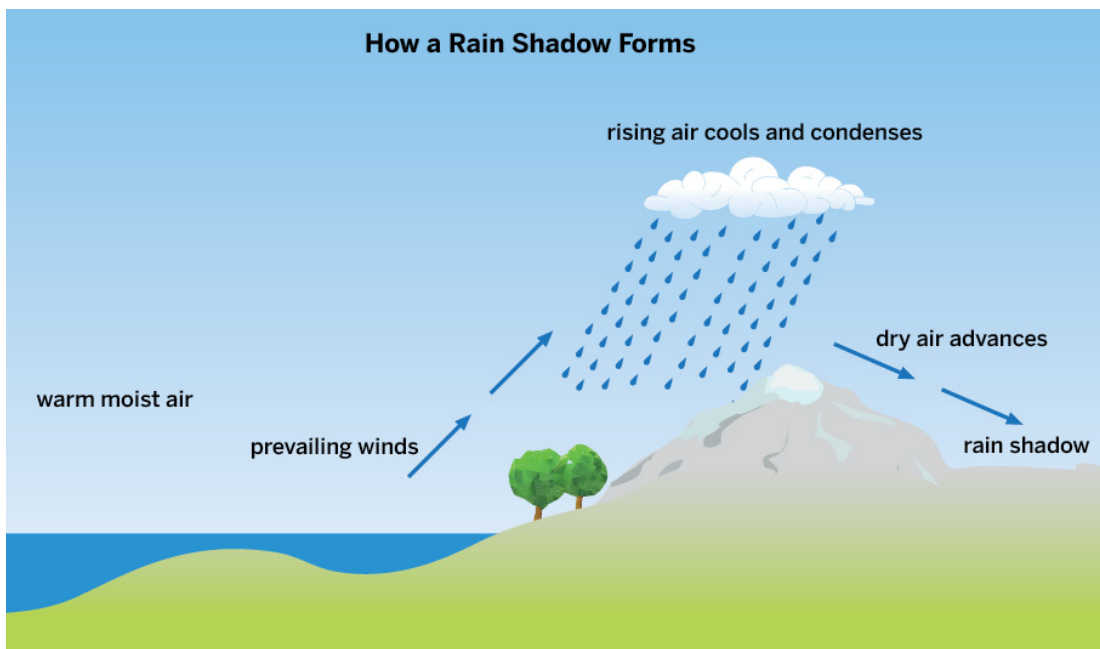


Hilo, Hawaii, is one of the rainiest places on Earth, thanks to something called orographic rain.

Orographic Rain

Hilo, Hawaii, is one of the wettest places on Earth, receiving more than 100 inches of rain each year. However, just a few miles away from Hilo, on the same island, is a desert landscape that only gets about one tenth as much precipitation as Hilo does! How is this possible? The answer has to do with a kind of rain called orographic rain. Hilo is located on

the eastern side of Hawaii, between the ocean and high mountain peaks. These landforms are an important factor in Hilo's weather. The wind almost always blows toward Hilo from the ocean, moving warm, humid air parcels in Hilo's direction. As air parcels hit the island, they are forced upward by the mountains. The air parcels lose energy as they rise, and water



When air parcels are forced upward by landforms such as mountains, they produce orographic rain on one side of the mountains. A dry area called a rain shadow forms on the other side.

vapor in the parcels condenses into liquid water, producing clouds and frequent rain. This type of rain is called orographic rain.

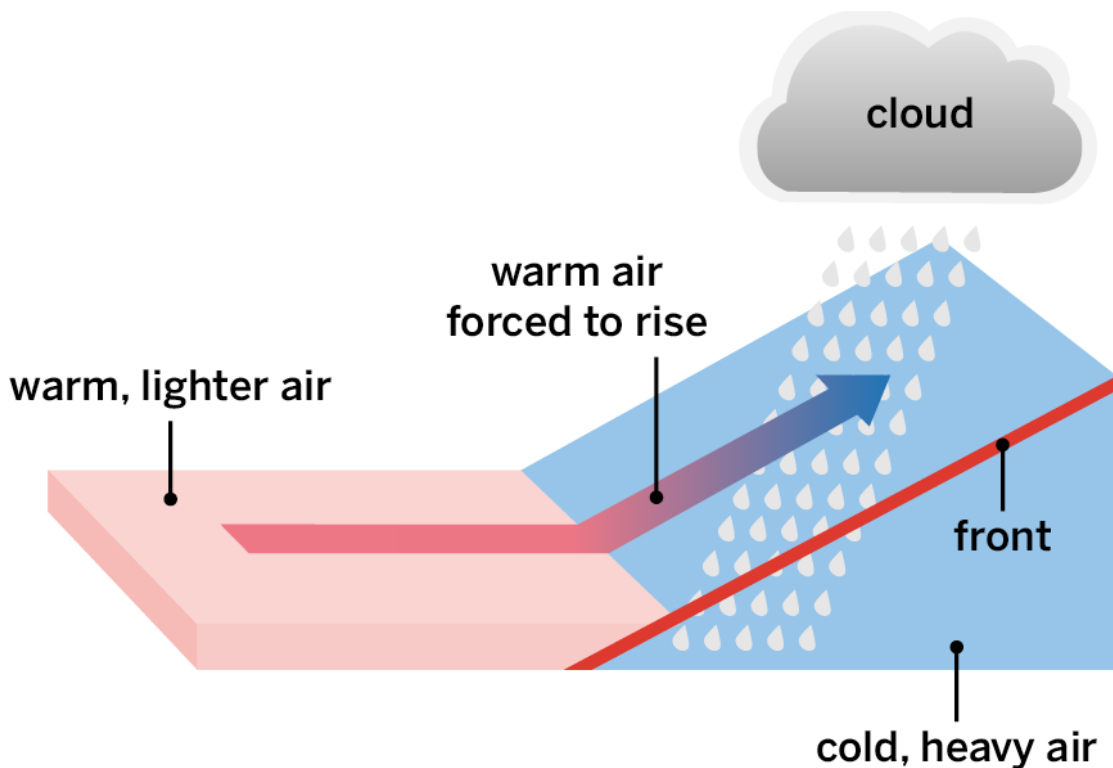
Hawaii's mountains are also a factor in the weather on the other side of the island, where there is a desert landscape. Because the clouds produce so much rain on the Hilo side of the mountains, there is very little water left in the air once it reaches the other side. The mountains block rain from reaching the other side. This is called a rain shadow, and it means there can be a desert just a few miles across the mountains from one of the wettest places on Earth.

Frontal Rain

Wind is another factor that can contribute to rainfall. Winds can blow in all directions, moving air parcels around. Sometimes air

parcels moving in different directions run into each other. A place where two air parcels meet is called a front, and fronts are places where dramatic weather tends to happen. Rain formed at fronts is called frontal rain.

Why does so much wet weather happen at fronts? Frontal rain can form when a cold air parcel and a warm air parcel meet. The air in cold air parcels is denser and heavier than the air in warm air parcels. When the parcels meet, the dense air of the cold front moves underneath the less dense air of the warm front, pushing the warm air up into the troposphere. From there, the story of frontal rain is just like other types of rain formation: the warm air cools as it rises, causing water vapor to condense and form droplets of liquid water. The droplets collide to form larger drops, and when they get heavy enough, they fall as rain.



The place where two air parcels meet is called a front. Frontal rain forms when a mass of cold, heavy air moves under a mass of warm, light air and forces the warm air parcel upward.