

Air Masses and Fronts

Terms to Learn

air mass
front

What You'll Do

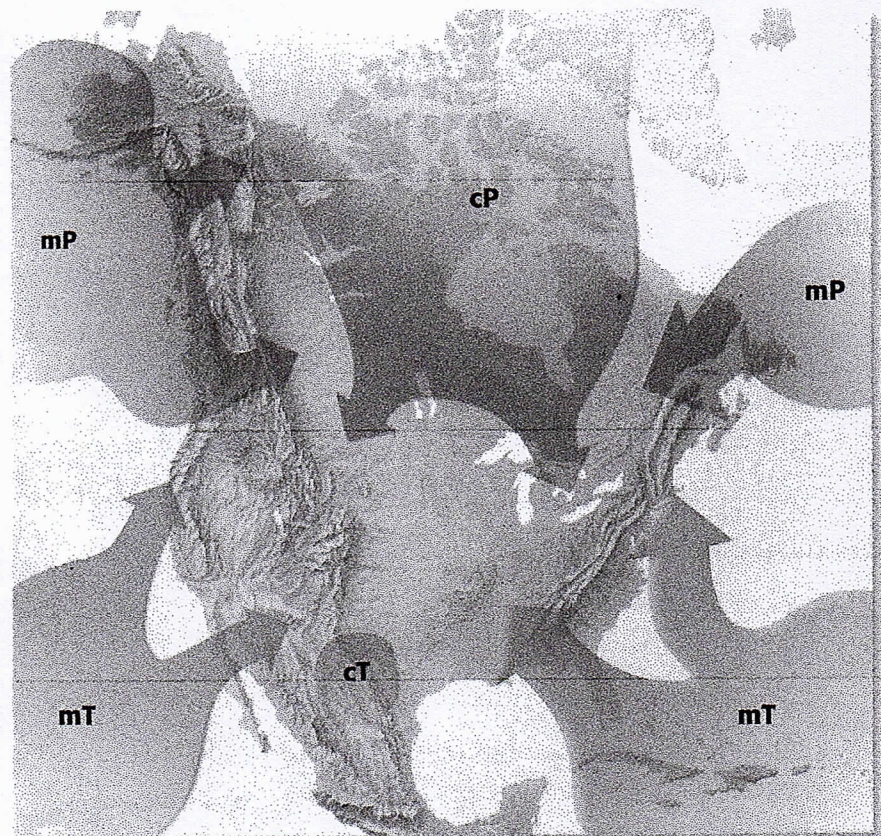
- ◆ Explain how air masses are characterized.
- ◆ Describe the four major types of air masses that influence weather in the United States.
- ◆ Describe the four major types of fronts.
- ◆ Relate fronts to weather changes.

Have you ever wondered how the weather can change so fast? One day the sun is shining and you are wearing shorts, and the next day it is so cold you need a coat. Changes in weather are caused by the movement and interaction of air masses. An **air mass** is a large body of air that has similar temperature and moisture throughout. In this section you will learn about air masses and how their interaction influences the weather.

Air Masses

An air mass gets its moisture and temperature characteristics from the area over which it forms. These areas are called *source regions*. For example, an air mass that develops over the Gulf of Mexico is warm and wet because this area is warm and has a lot of water that evaporates into the air. There are many types of air masses, each associated with a particular source region. The characteristics of these air masses are represented on maps with a two-letter symbol, as shown in **Figure 14**. The first letter indicates the moisture characteristics of the air mass, and the second symbol represents the temperature characteristics of the air mass.

Figure 14 This map shows the source regions for air masses that influence weather in North America.



maritime (m)—forms over water; wet

continental (c)—forms over land; dry

polar (P)—forms over the polar regions; cold

tropical (T)—develops over the Tropics; warm

Cold Air Masses Most of the cold winter weather in the United States is influenced by three polar air masses. A continental polar air mass develops over land in northern Canada. In the winter, this air brings extremely cold weather to the United States, as shown in **Figure 15**. In the summer, it generally brings cool, dry weather.

A maritime polar air mass that forms over the North Pacific Ocean mostly affects the Pacific Coast. This air mass is very wet, but not as cold as the air mass that develops over Canada. In the winter, this air mass brings rain and snow to the Pacific Coast. In the summer, it brings cool, foggy weather.

A maritime polar air mass that forms over the North Atlantic Ocean usually affects New England and eastern Canada. In the winter, it produces cold, cloudy weather with precipitation. In the summer, the air mass brings cool weather with fog.

Warm Air Masses Four warm air masses influence the weather in the United States. A maritime tropical air mass that develops over warm areas in the North Pacific Ocean is lower in moisture content and weaker than the maritime polar air mass. As a result, southern California receives less precipitation than the rest of California.

Other maritime tropical air masses develop over the warm waters of the Gulf of Mexico and the North Atlantic Ocean. These air masses move north across the East Coast and into the Midwest. In the summer, they bring hot and humid weather, thunderstorms, and hurricanes, as shown in **Figure 16**. In the winter, they bring mild, often cloudy weather.

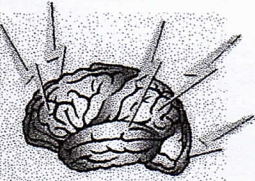


Figure 15 A cP air mass generally moves southeastward across Canada and into the northern United States.



Figure 16 People in Texas experience the many thunderstorms brought by mT air masses from the Gulf of Mexico.

BRAIN FOOD



The term *front* was first used to describe weather systems during World War I in Europe. Meteorologists in Norway thought the boundaries between different air masses were much like the opposing armies on the battle front.

A continental tropical air mass forms over the deserts of northern Mexico and the southwestern United States. This air mass influences weather in the United States only during the summer. It generally moves northeastward, bringing clear, dry, and very hot weather.

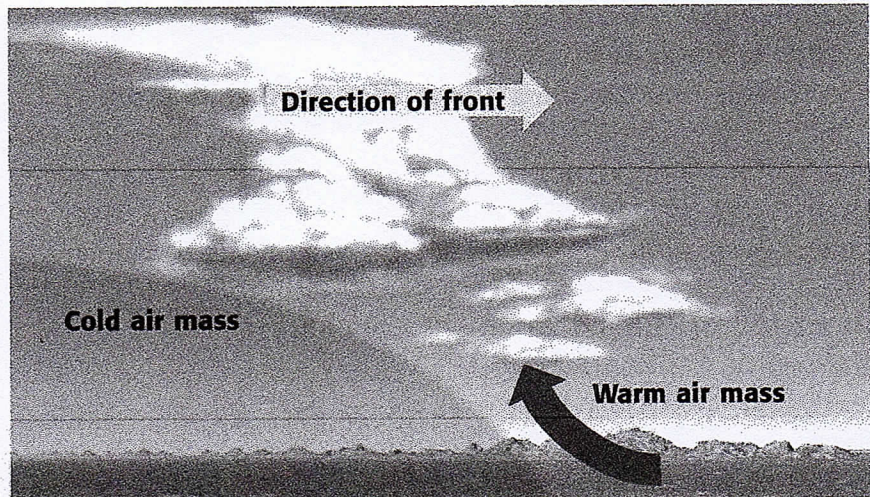
Fronts

Air masses with different characteristics, such as temperature and humidity, do not usually mix. So when two different air masses meet, a boundary forms between them. This boundary is called a **front**. Weather at a front is usually cloudy and stormy. The four different types of fronts—cold fronts, warm fronts, occluded fronts, and stationary fronts—are illustrated on these two pages. Fronts are usually associated with weather in the middle latitudes, where there are both cold and warm air masses. Fronts do not occur in the Tropics because only warm air masses exist there.

Cold Front

A cold air mass meets and displaces a warm air mass. Because the moving cold air is more dense, it moves under the less-dense warm air, pushing it up.

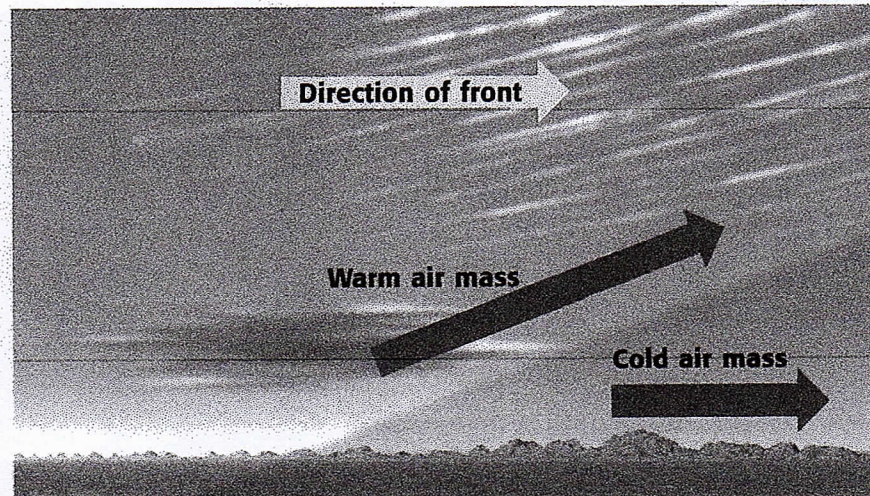
Cold fronts can move fast, producing thunderstorms, heavy rain, or snow. Cooler weather usually follows a cold front because the warm air is pushed away from the Earth's surface.

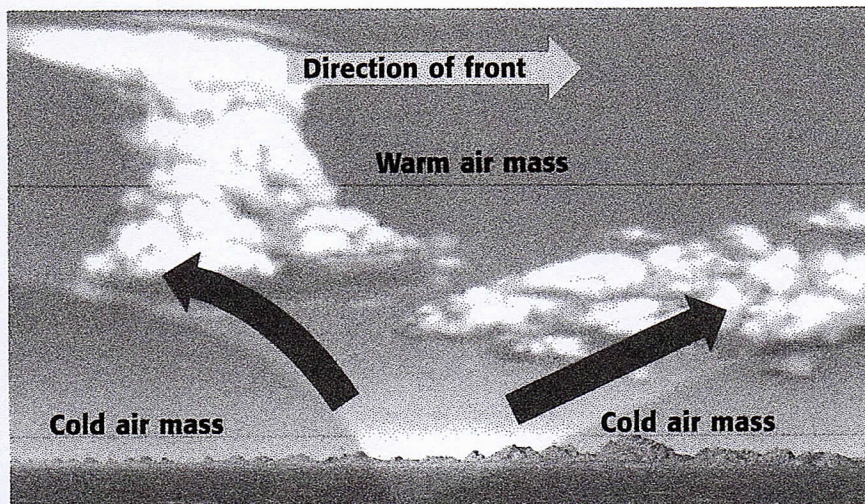


Warm Front

A warm air mass meets and overrides a cold air mass. The warm, less-dense air moves over the cold, denser air. The warm air gradually replaces the cold air.

Warm fronts generally bring drizzly precipitation. After the front passes, weather conditions are clear and warm.

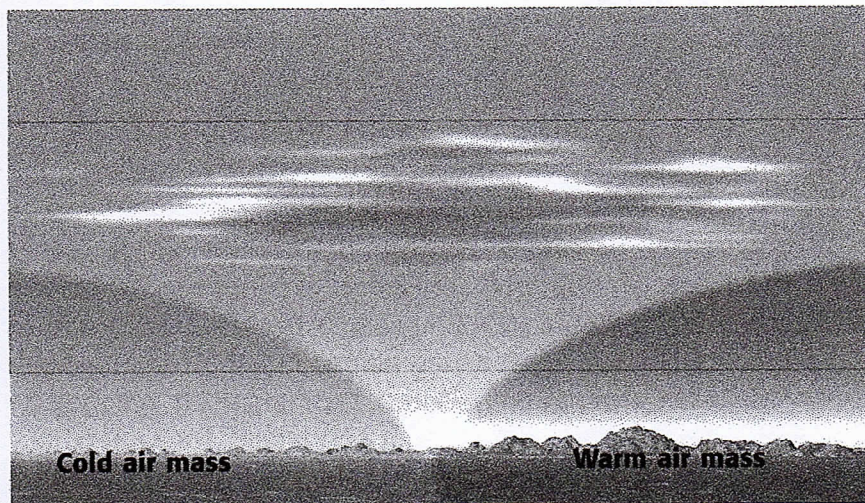




Occluded Front

A faster-moving cold air mass overtakes a slower-moving warm air mass and forces the warm air up. The cold air mass then continues advancing until it meets a cold air mass that is warmer. The cold air mass then forces this air mass to rise.

An occluded front has cool temperatures and large amounts of precipitation.



Stationary Front

A cold air mass meets a warm air mass and little horizontal movement occurs.

The weather associated with a stationary front is similar to that produced by a warm front.

SECTION REVIEW

1. What are the characteristics that define air masses?
2. What are the major air masses that influence the weather in the United States?
3. What are fronts, and what causes them?
4. What kind of front forms when a cold air mass displaces a warm air mass?
5. **Analyzing Relationships** Explain why the Pacific Coast has cool, wet winters and warm, dry summers.

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