

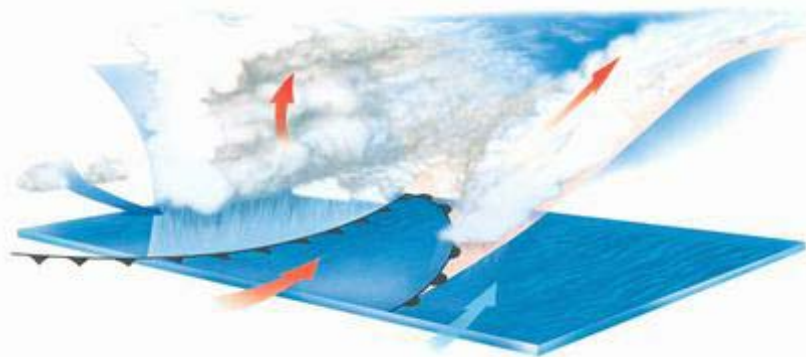
7. Fronts

There are three types of front:

- Warm front - When a warm moist air mass rises above a cold air mass, a warm front forms. The gradient of the front is very shallow. Warm fronts occur at the forward edge of a depression (a low-pressure system).
- Cold front - A cold front marks the advance of colder air undercutting warm air. The gradient of the cold front is steeper than that of a warm front, and the rainfall is usually heavier. Thunderstorms sometimes form along a cold front.
- Occluded front - Depressions and other frontal systems have a three-dimensional structure. Most depressions weaken when the cold front catches up with the warm front and cuts it off from the ground. If the cold front rises over the warm front, this is a warm occlusion. If the cold front undercuts the warm front this is a cold occlusion.

When two air masses meet, they do not mix readily due to differences in temperature and density. The place where they meet is called a frontal zone. This is the three dimensional boundary between two air masses. The front is the intersection of this zone with the ground. Even when air masses have similar humidity characteristics there is generally a large temperature gradient across a front.

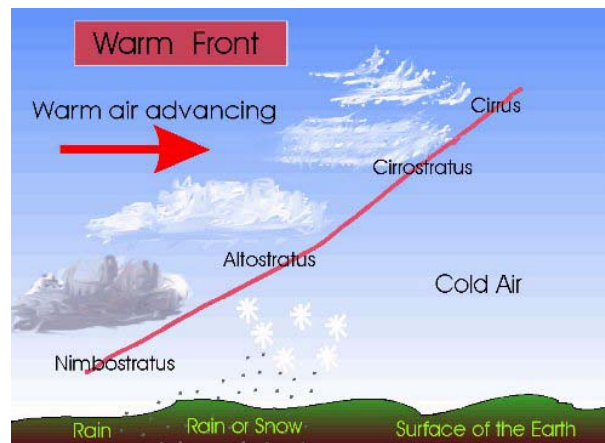
A warm front is found when warm air is advancing and is forced on top of cold air. A cold front is when cold air is advancing and is forced beneath a body of warm air. In both cases the name of the front is specified by the temperature of the moving air (i.e. cold air moving into stationary hot air means a cold front). In both cases the rising warm air cools and produces clouds. An occluded occurs when a cold front catches up and overtakes a warm front forcing the warm air to rise up.



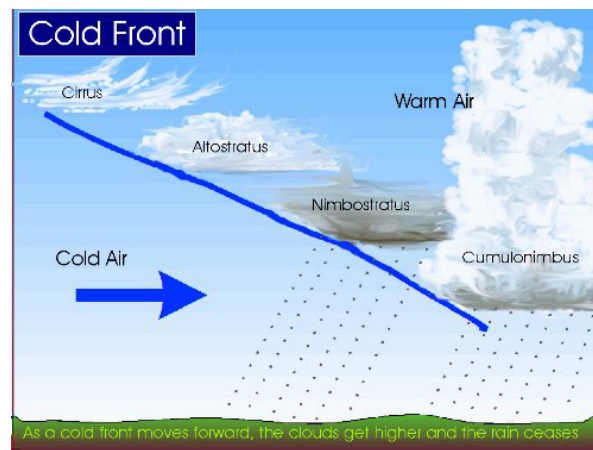
Fronts can be several hundreds of kilometres wide and they extend at relatively gentle gradients up into the atmosphere. Warm fronts are usually wider than cold fronts as they have a less steep angle. Warm fronts are often 150 km wide whereas cold fronts are of the order of 10-50 km. The most notable type of front is the polar which forms when warm, moist air (e.g. Tm) collides with colder, drier, air (e.g. Pm). The polar front is where depressions form.

In general fronts are very unstable because the normal horizontal layering of the atmosphere is replaced by boundaries which are at an angle to the Earth's surface. This induces a lot of vertical movement.

Warm Front



Cold Front



Occluded Front

