

The Oregon Weather Book

A State of Extremes

George H. Taylor & Raymond R. Hatton

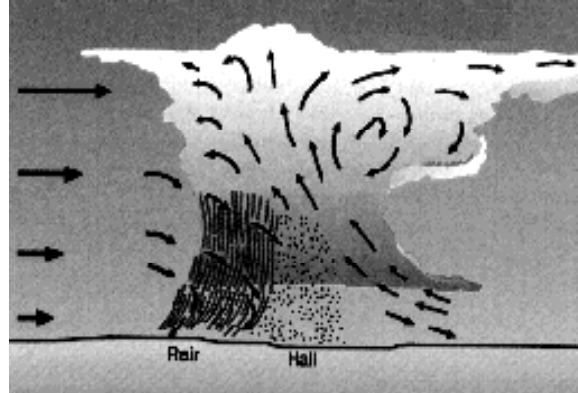
Thunderstorms

The West Coast has the lowest incidence of thunderstorms in the continental U.S., with an average of less than 10 days per year. West of the Cascades and Sierra Nevada mountains such storms are particularly rare. In the Willamette Valley, for example, a period of several years often elapses with no significant thunderstorms. East of the mountains, however, the situation is quite different.

A thunderstorm is a local storm produced by cumulonimbus clouds and containing lightning and thunder. The storm may consist of a line of clouds, a cluster, or a single cumulonimbus. Thunderstorms are most common during the warmer months. They occur when warm, usually humid air rises in an unstable environment. Upward motion may be triggered by uneven surface heating, terrain, or converging air masses. Once triggered, upward motion is enhanced as rising air condenses and releases its stored heat. (See

Thunderstorm chapter for additional details.)

Cool marine air tends to keep western Oregon temperatures moderate through most of the summer. However, the Cascades prevent marine air from penetrating into eastern Oregon. As a result, eastside temperatures are generally



quite high throughout the summer and can become excessive (with the record-setting 119° temperatures at Pendleton and Prineville representing the most extreme cases). On the other hand, eastern Oregon is generally quite dry, since the Cascades effectively block marine moisture as well. Thus, summer days east of the Cascades are often warm, dry, and clear.

But every so often, warm, humid air finds its way into eastern Oregon typically from the south, or southeast, by way of California or Nevada or from the southwest, from the eastern Pacific by way of northern California. As this warm, humid air reaches eastern Oregon, low-level heating or the presence of mountains causes it to rise. Rising air cools, and since cooler air can hold less water in the form of water vapor, the air eventually cools to the point of saturation, and condensation occurs. This results in several things:

- Cloud Formation
- Precipitation (water or ice droplets, which may or may not reach the ground)
- Release of large amounts of latent heat, which warms the air and intensifies the rising motion

The air will usually continue to rise until water vapor is exhausted; in some cases the cloud tops will exceed 25,000 feet. Beneath the cloud, rain or hail are usually observed, and are sometimes very intense. Whereas thunderstorm clouds usually move due to upper-level winds, they occasionally remain stationary for extended periods of time. When they do, heavy rains can fall in a small area for an hour or more, causing local flooding -- the dreaded "thunderstorm flash flood." For a description of some Oregon flash floods, see the Floods chapter.

One of the biggest problems in documenting thunderstorms is that they are not measured in a well-defined way. Temperature, precipitation, and winds, for example, are measured explicitly and reported in specific ways; they are known as "weather elements." We may disagree of what constitutes a "hot day," but 80 degrees is always 80 degrees. Thunderstorms are large, complex systems made up of a lot of weather elements: winds, lightning, hail, rain, and so on, all in different combinations. Sometimes they produce dry lightning events are start plenty of forest fires. They may produce hail which destroys crops. If they're really strong, tornadoes and other life-threatening severe weather may occur. But comparing

thunderstorms, or specifying their intensities, is a very difficult thing to do.

The list below describes some of the most damaging or spectacular thunderstorms which have affected Oregon. Others are listed in the tornado chapter or the flood chapter (and some are listed in more than one chapter). Doubtless there are many others not listed here, and some of those occurred in such remote areas that perhaps no one even knows how strong they were!