
WEATHER MODIFICATION
INCORPORATED

Learn More

To learn more about the work of Weather Modification, Inc., please take a look at some of the questions we typically answer from curious or concerned individuals.

FAQS

GLOSSARY

REFERENCE LIBRARY

LINKS

General

What is weather modification?

What are the common applications of cloud seeding?

What is the difference between warm and cold cloud seeding?

How can the effectiveness of cloud seeding operations be determined?

Does cloud seeding "steal" precipitation from neighboring areas?

Seeding clouds does not remove enough moisture from the atmosphere to affect precipitation downwind.

This is one of our most common questions, and to fully understand this answer, one must look at the entire hydrologic cycle.

There are three sources of water: the ground, the surface, and the atmosphere.

Ground Water
Ground water supplies change more slowly. Though water can be pumped from the ground fairly quickly, recharge can be slow. Ground water recharge is typically measured in years.

Surface Water
By far the most water exists on the surface – in the form of lakes, rivers, and oceans. In some locations significant amounts of water are also found in aquifers. Surface water is most accessible, and it can be easily diverted or pumped from lakes and rivers. Surface water recharge is also more rapid. A wet season can produce runoff that swells streams and reservoirs within months.

Atmospheric Water
Atmospheric water includes water vapor (humidity) and clouds. It's the most variable source of water. Because the atmosphere's capacity to hold water is directly linked to air temperature, more atmospheric water is found in temperate and equatorial regions than at the poles. The only way to access this water is through precipitation. What doesn't fall to the ground moves on by – wherever the wind takes it. The availability of atmospheric water changes quickly – often as fast as the wind changes direction.

When we look at how cloud seeding affects the atmospheric water supply, we have to consider the following:

- How much of the total water condenses to forms clouds?
- How much of that condensed water forms precipitation and becomes surface water?
- How much will cloud seeding affect the amount of water that falls to earth?

Water Condensation and Cloud Formation
Clouds form when moist air is sufficiently cooled. This usually happens when air rises, either as a result of surface heating (spring and summer cumulus clouds and showers), or forced flow over barriers, such as mountains. When air rises to form clouds, it must sink somewhere else, which usually happens somewhere nearby.

When clouds do form, the adjacent cloud-free air is not free of moisture. It just didn't get cool enough to condense the moisture that exists. In general, a third of the moisture in the atmosphere might actually condense to form clouds. So, we can assume that 33% of the moisture has formed clouds while the other 67% is still present, but remains uncondensed.

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Development of Precipitation
Clouds never convert all of their condensed water into precipitation. Less than one-third (33%) of a cloud's condensed moisture falls to earth as rain, snow, hail or drizzle.

If we have very efficient natural clouds that deliver a full 33% of their condensed water, then the total fraction of water vapor removed by natural precipitation would be a third of a third! That is about 11% of the existing atmospheric water.

The Effects of Cloud Seeding
If a cloud seeding project seeds clouds at the right time, from the right places and at the right time, it is possible to achieve increases in precipitation from 10-15%. If nature is being very efficient and it converts 11% of the total atmospheric water vapor to precipitation, then an increase from cloud seeding of 15% (0.15) of the 11% (0.11), or (0.11 x 0.15 = 0.017) just 1.7% of the total atmospheric water.

After taking other factors into consideration, the true impact of a cloud seeding operation is smaller yet.

- **Seeding is conducted only a small fraction of the time.** Seeding does not occur around the clock.
- **Target areas for seeding projects are limited.** The areas upwind and crosswind of a location are not affected.
- **In winter projects targeting mountain clouds, much of the flow that occurs is actually around the mountain, not over it.** Air at the top of the mountain would not be seeded. Imagine a boulder in a shallow river; some water flows over the top, but much more flows around it. In such cases the fraction of air moisture that condenses to form clouds reduced even further.

It's also important to realize that the atmosphere itself recharges (re-humidifies) by simply passing over water, snow, and vegetation. The water vapor that supplies storms that move west to east across the United States, typically comes from the south.

Studies of wintertime water budgets in the mountainous western United States, suggest that cloud seeding might reduce the humidity by up to 1% for a short period of time. Other studies that examined precipitation downwind of cloud seeding projects could find no impact at all.

What are the environmental consequences of weather modification?

Are cloud seeding activities subject to regulation or control?

How quickly can Weather Modification, Inc. , launch a project?

Why should I choose Weather Modification, Inc. , over other companies?

Do I need to have my own aircraft, or does Weather Modification, Inc. , supply them?

What does a cloud seeding project cost?

If I am interested in starting a weather modification project, where do I begin?