

# Scientists Conclude That Man Can Make Rain—Under Certain Conditions

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A national panel of distinguished scientists including the University of Arizona's Dr. James E. McDonald has concluded that man can make rain—under certain conditions.

Formed two years ago by the National Academy of Science to decide if human beings really can control the weather, the panel released its report this week.

It recommends that the nation increase its present annual budget for weather modification research from the present \$5 million to \$30 million by 1970. And it suggests a national agency be created to coordinate the effort.

The report is worded cautiously. But it could be a monument in the human effort to manage nature, for most scientists have felt any such claims about weather were foolish arrogance.

The panel—including such famous men as Dr. Edward Teller, the "father" of the hydrogen bomb—sweated hard over this phrasing on rainmaking:

"There is increasing but still somewhat ambiguous statistical evidence that precipitation from some types of cloud and storm systems can be modestly increased or redistributed by seeding techniques."

And later:  
"Specifically, we find some evidence for precipitation in-

creases of as much as 10 or even 20 per cent over areas as large as 1,000 square miles over periods ranging from weeks to years."

Aside from rainmaking, the panel also saw possibilities in suppressing hail and lightning. The military and airlines already are clearing cold fog over airports through seeding.

One of the central figures in the revolutionary report is McDonald, who did not join the panel until March. At that time, the panel still reflected the general skepticism of the scientific community toward the claims of commercial rainmakers.

McDonald was so doubtful that he thought the group's name, "Panel on Weather and

Climate Modification," was a gross exaggeration of present human power.

Out of his desire to quiet the bragging of the rainmakers, McDonald began an exhaustive research into the facts. Through last spring and summer as he analyzed the figures, McDonald found himself gradually forced to change his attitude.

No matter how he looked at the numbers—and the panel had the Rand Corp. and the U.S. Weather Bureau run them through its computers too—they added up to positive effects when ground generators began pouring silver iodide into clouds.

"I began to think that to talk of modest changes in the weather

might not be hogwash," said McDonald, who took his figures to a panel meeting at Woods Hole, Mass. last August. After intensive debate, the panel swung to the positive side.

Particularly, McDonald was impressed by the results of a large commercial seeder on the East Coast who got 15 per cent more moisture downwind from seeding both winter and summer storms.

And he carefully analyzed the figures of Pacific Coast rainmakers. Their estimate of 10 per cent increase in snow pack from seeding orographic clouds (uplifted by mountains) led to a positive report by a presidential advisory committee in 1956

which was generally scoffed at by scientists.

"There are eight more years of results now," McDonald said. "Altogether, we analyzed 41 project-seasons by measuring runoff flow in streams, and they still show about a 10 per cent increase."

In addition to these commercial findings, positive figures also have been reported recently by scientists from Israel, Japan, Australia and Russia which are making believers out of more and more scientists.

The panel scientists still are worried that if the commercial rainmakers seed any time there is a promising cloud in the sky, the scientists cannot make random sampling analyses.

They are mystified as to why there should appear to be positive results 150 miles downwind.

They say there is evidence that seeding sometimes may decrease rain — as well as increase hail and lightning.

Although it can be shown in the laboratory that silver iodide will cause ice crystals to form by furnishing a nucleus, nobody understands what really goes on in a cloud.

The great difficulty with controlling the weather is that nature is so variable and complicated. Changes may be due to her whimsy rather than man's control and even modern computers are 50 times too slow to

model a cloud in all its complexity.

And McDonald is concerned that charlatans will take the panel report and persuade communities to invest unwisely.

But with all the groping in the dark, there is still no getting away from those positive figures, McDonald said.

Immediately, the panel hopes its reports will encourage meteorologists to look on weather modification as a long range goal equal in importance to weather prediction.

A long range benefit should be international cooperation, for tampering with nature is a worldwide problem.

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## Rainmaking Issue Is Revived In Arizona

The new positive results released this week by the National Academy of Science panel have raised the rainmaking question again in Arizona, where much pioneering already has been done.

The first commercial rainmaking effort anywhere in the world took place in Southern Arizona in 1950, sponsored by a group of ranchers.

A year later, a large rainmaking project was attempted by the Salt River Water Users Association, which seeded winter storms trying to bring more snow to the watershed.

In 1956, the University of Arizona Institute of Atmospheric Physics conducted one of the most careful experiments in rainmaking ever undertaken. The results of seven years of seeding summer cumulus clouds over the Catalina Mountains with silver iodide by aircraft, however, were that the scientists couldn't show statistically that they had affected anything.

Of this experiment, Dr. James E. McDonald, senior physicist

in the institute and a national panel member, said, "We don't know for sure why there were not positive results. It could be that the ice crystal process is not the one nature uses to make rain here."

Dr. Louis Battan, associate director of the institute, concluded that the collision and merging of raindrops caused the rain and this would be immune to the influence of silver iodide.

While he contemplates his own newly changed attitude toward rainmaking, McDonald hesitates at the moment to advise any group or community to hire commercial seeders.

"The time is not yet ripe for large scale operational efforts in areas where there has been no extensive testing," he said. "In Arizona, nothing less than a carefully designed randomized seeding trial experiment makes any sense at this point.

"But it could be that there should be a new look at the possibility of increasing the snow pack on the Mogollon Rim."

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