earth sciences

Gathered at the Conference on Weather Modification of the American Meteorological Society last week at Santa Barbara

MOUNTAIN METEOROLOGY

Summertime seeding over Sierra Nevada

About 95 percent of all the precipitation over the Sierra Nevada in California occurs from October to April. But the maximum irrigation demands are in the summer. A three-year project to investigate the potential for increasing water supplies by seeding summertime cumulus clouds over the high portions of the Sierra Nevada was begun in 1966 by the Fresno State College Foundation.

In the experiment, one of a pair of similar nonprecipitating clouds is seeded. Precipitation is then observed. Stream-flow studies to measure effects of the seeding on runoff are also made.

Of 47 pairs of clouds selected as test cases, seeded ones produced rain in 21 cases; nonseeded ones, in only 3 cases. Stream runoff showed dramatic increases. The results show a high degree of statistical significance.

Increases in runoff of the order of 100 percent to 250 percent can be achieved by seeding summertime mountainous cumuli, say M. C. Williams and D. E. Lehrman. They estimate that some 15 percent of the entire Sierra Nevada may have conditions susceptible to such increases by seeding.

CLOUD SEEDING

Confusing picture in Mexico

Not all cloud-seeding projects produce predictable results. In Mexico seeding operations have been conducted over one particular watershed—Necaxa—for about two decades.

From the beginning of operations in 1949 until a few years ago, more rain fell on days in which seeding was carried out than on nonseeding days, just as weather modifiers would hope and expect. But the difference began narrowing, and now the situation is reversed; more rain is now falling on days when no seeding is carried out.

No adequate physical explanation is yet at hand, says Emilio Pérez Siliceo of the Central Light and Power Co. The problem could be due in part to a persistence of seeding effects from one period to the next. However, the possibility of another type of inadvertent effect is not discarded: the frequent passes over the area of jet airliners that began about the time the effect was first noticed.

In the absence of a good explanation, Mexico plans to stop all seeding over the area for a few years to see what effect that might have.

HAIL SUPPRESSION

Hail on the northern Great Plains

Seeding convective storms reduces hail energy, conclude scientists at the Institute of Atmospheric Sciences of the South Dakota School of Mines and Technology.

Seeding effects on hail in South Dakota were first noticed in 1967. Hailstorms on weekends tended to be more severe than those on weekdays, when seeding was being done. The scientists took a closer look at this apparent effect in 1968 and 1969.

Of the 48 most severe storms 30 were unseeded and 18 seeded. The mean of the average hail energy for the unseeded storms was 2.6 foot-pounds per square foot; for the seeded storms it was 1.1 foot-pounds per square foot. This, according to Dr. R. A. Schleusener, Alexander Koscielski, A. S. Dennis and M. R. Schock of the institute, indicates that the silver iodide aerial seeding is reducing hail energies by 60 percent.

GROUND-BASED SEEDING

Precipitation increases near Santa Barbara

Santa Barbara County in California consists of a series of east-west mountain ridges with valleys in between. During portions of the winters of 1967-68 and 1968-69 cloud-seeding field tests were conducted using a device to release silver iodide from the top of a 3,500-foot mountain ridge. A ground site was preferred to aerial seeding because of the hazards and difficulties of flight under storm conditions. The seeding material was released whenever a convective band, a visible component of a winter storm front, passed overhead.

The technique, report Drs. Robert D. Elliott and John R. Thompson of North American Weather Consultants after analyzing the data, is highly effective in increasing precipitation downwind from the seeding site.

Dr. Lewis O. Grant's studies in Colorado have emphasized the importance of cloud temperatures on seeding (SN: 4/1, p. 365). The California researchers therefore analyzed their results by temperature. The warmer seeded clouds produced up to 2.8 times as much precipitation as the nonseeded ones. The cooler clouds showed little positive effect.

HAIL SUPPRESSION

Reducing hail losses in Kenya

The Kericho area of Kenya in East Africa is afflicted with what may be the highest incidence of hail of any area in the world. Thunderstorms occur there more than 200 days a year. More than 85 percent of these thunderstorms produce hail somewhere in their life cycle.

Despite this disadvantage the area is the site of a thriving tea-growing industry. In the fall of 1967, Atmospherics Inc., of Fresno, Calif., began a three-year operational hail-suppression program privately supported by tea growers. In the first two years of the program, 1,300 cumulus cloud cells were seeded with silver iodide on 431 days.

A comparison of hail damage to tea from seeded versus nonseeded cells shows encouraging positive results, reports Thomas J. Henderson, president of the firm. The damage figures were supplied independently by the tea estate managers. Seeded storm cells yielded an average tea loss of 2,863 pounds per reported hail instance. Nonseeded ones produced an average loss of 6,894 pounds per hail instance.

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