meteorology

Based on papers presented at the International Conference on Weather Modification last week in Canberra, Australia

Lessons from the La Porte anomaly

The so-called La Porte anomaly has been a subject of continuing controversy and interest in the last three years among meteorologists concerned with man's possible inadvertent effects on the weather. The case involves data indicating that sizable increases in precipitation have occurred in the La Porte, Ind., area, downwind of the Chicago-Gary industrial complex. The conclusion, that particles from steel mills and other industries have apparently stimulated the additional rainfall (SN: 7/26/69, p. 83), has received varying degrees of acceptance within the meteoroiogical community.

The events since the anomaly data were first reported in 1968 have revealed four major lessons applicable to the evaluation of inadvertent precipitation modification, says the investigator who has been most closely involved with analyzing the La Porte data, Dr. Stanley A. Changnon Jr. of the Illinois State Water Survey.

First, he suggests, all existing historical weather data at the location of such anomalies must be thoroughly analyzed and a theoretically sound explanation for the anomaly offered. All corroborating geophysical data must be sought and examined. Studies of other locales near urban-industrial complexes should be done. And finally suspected effects must be substantiated by physical measurements in the atmosphere.

The latter lesson has led to the development of a major field-research program in the St. Louis area (SN: 7/27/70, p. 62), where similar anomalies have been reported (4/18/70, p. 390). The first summer of major operations has just been completed.

Cloud-seeding experiment in Tasmania

A cloud-seeding experiment conducted in Tasmania from 1964 to 1970 has produced variable results according to the time of year. Seeding of supercooled clouds with silver iodide smoke from an aircraft was conducted over a hydroelectric catchbasin for a total of 201 days during the seven-year period.

During the autumns and winters the increase in precipitation was 19 percent. Increases were noted in all seven autumns and winters in which seeding took place. No significant change was detected in the springs and summers.

Other findings: Results in the western half of the target area were better than those in the eastern. Rainfall increases were observed on days with appreciable natural rain but not on days with little or no natural rain. Seeding of stratiform clouds produced rainfall increases but not seeding of cumuliform clouds.

The results were reported by E. J. Smith and E. E. Adderley of Australia's Commonwealth Scientific and Industrial Research Organization.

Hail studies in Alberta

Several cloud-seeding experiments were carried out last summer in Alberta, Canada, as part of an effort called Project Hailstop. A severe storm is selected for seeding, seeded with silver iodide from an airborne droppable pyrotechnic flare and then monitored closely by observing techniques developed by the Alberta Hail Studies Project. The experiment emphasizes physical rather than statistical evaluation.

Two seeded hailstorms on July 9 and July 11, 1970, were particularly well documented. Some differences between the radar characteristics of seeded and unseeded cloud cells were noted, and one interpretation, according to Peter W. Summers and James H. Renick of the Research Council of Alberta, is that the hailstones from the seeded cells were smaller.

The extreme variability of the hail pattern on the ground made evaluation difficult. No serious damage was reported from the seeded cells. The same was true of some unseeded ones, but several of the unseeded cells did produce moderate to severe damage.

Legal aspects of weather modification

Few legal jurisdictions in the United States are adequately prepared to cope with disputes that might arise from cloud-seeding efforts.

In Australia, Victoria has a more comprehensive legal structure for governmental control of weather modification than any American state. Australian practice has been for cloud seeding to be a government monopoly, and Victorian law follows this pattern.

But it is not necessarily a perfect model. Ray Jay Davis, a University of Arizona law professor who has been prominent in urging more legal attention to the subject in the United States (SN: 5/9/70, p. 462), points out that the Victorian legislation has a provision not found in the law of any other jurisdiction. It states that no "person carrying out rain-making operations authorized by the Minister . . . shall in any way be liable in respect of any loss or damage caused by or raising out of the precipitation. . . . " What recourse do persons have who might be injured by rain-making activities? The government's answer is that they would be given state aid under provisions relating to losses from natural weather phenomena such as floods and droughts. But, Davis points out, these laws do not afford a system of complete compensation.

Silver iodide in the environment

Almost all cloud-seeding efforts use particles of silver iodide as the seeding agent. Evidence about where all the material eventually ends up is sparse.

The University of Nevada's Desert Research Institute collected several hundred precipitation samples in and downwind of six cloud-seeding projects in the United States and analyzed them for their silver content. All the projects were conducted between 1967 and 1971 for the purpose of modification of supercooled clouds. Most of the projects were conducted over mountainous areas.

Concentrations of silver in the precipitation in the primary target areas during seeding periods ranged up to 1,000 times the amounts normally present, reports Dr. J. A. Warburton. The exact amounts varied with the project location. Similar high concentrations were observed downwind or generally outside the target areas.