

17th Annual Interagency Conference on Weather Modification

The major ICAS activity for September was sponsorship of the 17th Annual Interagency Conference on Weather Modification. The meeting, hosted by NOAA, was held on 13–15 September at the Sheraton-Fontainebleau Inn, Ocean City, Md. The General Chairman was Dr. Ronald L. Lavoie, NOAA.

Following registration at 7:45 p.m. on Monday evening the group was addressed by Mr. Stanley A. Changnon, Jr., of the Illinois State Water Survey. His subject was: "Values of Hail and Rain Modification." Space does not permit setting down all of Mr. Changnon's comments, but a few paraphrased points that he made are worth mentioning. His main assertion was that weather modification has been consumed by itself and is stumbling along, making little real progress. He contends this is so because: 1) both the science and management of weather modification programs relating to hail and rain modification are being poorly handled, 2) thus far the existing programs have not been able to conclusively demonstrate success in the field, and 3) weather modification does not, in general, enjoy much public support.

Mr. Changnon discussed some of the research that has been done by his group in Illinois. In analyzing records for the period 1954–67, based on what rain actually did fall, they found that seeding to increase precipitation in seven of those years would actually have reduced crop yields, rather than increasing them. In order to make precipitation augmentation successful, Mr. Changnon feels that we will have to be able to forecast future rainfall for several months ahead, to determine whether or not seeding will be ultimately beneficial. This is particularly true for the months of July and August. He also pointed out that the success of seeding depends heavily on the nature of the soils and the topography of small areas, and that obtaining such detailed knowledge is difficult.

Because of the complications in crop yields introduced by natural rainfall and other factors, Mr. Changnon argues that if precipitation augmentation programs are evaluated for only one year at a time, it is not at all certain that they will show economic success. He did say, however, that over a longer period, five or so years, yields would be favorably influenced by proper seeding. The key question is will weather modification lead to a net gain or a net loss in crop yields. Mr. Changnon

said that at this time, the question is unanswerable. Following the well-received presentation, there was a lively question and answer session, which concluded the evening's proceedings.

On Tuesday morning the group met in plenary session, with representatives from the Department of Agriculture (U.S. Forest Service), the Department of Commerce (NOAA), the Department of the Interior (Bureau of Reclamation), the Department of Transportation (Federal Aviation Administration), the Department of Defense (U.S. Navy and U.S. Air Force), and the National Science Foundation. Prior to the meeting, descriptions of the weather modification research programs of the attending agencies had been distributed. At the plenary session these descriptions were each discussed briefly. Although not represented at the meeting by agency personnel, the NASA and ERDA program descriptions were also made available to those attending. Tables 1 and 2 show the budget summary for the current and planned federal weather modification research programs.

The remainder of Tuesday and early Wednesday were devoted to three workshops. The last activity was another plenary session at which the group addressed the recommendations of the workshops; results are outlined in the following paragraphs.

TABLE 1. Weather modification research funding summary for Fiscal Years 1976 and 1977.*

Agency	FY 1976	FY 1977
Bureau of Reclamation (BUREC)	\$4 649	\$6 400
National Aeronautics and Space Administration (NASA)	125	305
National Oceanic and Atmospheric Administration (NOAA)	10 407	6 547
National Science Foundation (NSF)	4 975	4 300
U.S. Navy (USN)	1 718	365
U.S. Air Force (USAF)	196	2 295
Federal Aviation Administration (FAA)	15	15
U.S. Forest Service (USFS)	84	75
Energy Research and Development Administration (ERDA)	1 425	2 025
Total	\$23 594	\$22 327

* Funds shown are in thousands of dollars.

TABLE 2. Distribution of Fiscal Years 1976 and 1977 federal funding for weather modification research.*

Category	FY 1976	FY 1977	Participating Agencies
Precipitation modification	\$4 060	\$4 394	BUREC, NASA, NOAA, NSF
Fog and cloud modification	603	2 550	USN, NSF, USAF, FAA†
Hail suppression	2 183	2 143	NSF
Lightning modification	409	675	NASA, USFS, NOAA, NSF
Hurricanes and severe storms	1 697	1 694	NOAA, NSF
Modeling	505	705	BUREC, NSF, USN
Instrumentation	548	400	BUREC, USAF, USN
Equipment	7 181	2 918	BUREC, NOAA, USAF, USN
Social, economic, legal, ecological factors	1 216	1 027	BUREC, NSF
Inadvertent modification	2 340	2 725	NSF, ERDA
Support and services	2 704	2 946	BUREC, NOAA
Other	148	150	BUREC, USN
Total	\$23 594	\$22 327	

* Funds shown are in thousands of dollars.

† There were indications during the Conference that the FAA may, in the very near future, substantially increase its participation in fog modification, through a cooperative venture with USAF.

The first workshop considered the topic: "Problems associated with evaluating weather modification field experiments and operational projects." At the plenary session the workshop chairman, Dr. Arnette Dennis (NOAA, Environmental Research Laboratories, Boulder, Colo.), presented his group's conclusions:

- 1) More observations of physical parameters, e.g., ice nuclei counts rather than precipitation at the ground, would improve the capability to make more meaningful statistical analyses.
- 2) It would be valuable if a data bank could be formed, allowing other researchers access to data from completed experiments.
- 3) Competent statisticians should be involved in the planning stages of weather modification experiments.
- 4) The workshop recognized the importance of evaluating operational weather programs but noted that such a procedure is very difficult.

The second workshop addressed the topic: "Problems in achieving a national weather modification program," under the leadership of Mr. Charles F. Roberts (U.S. Forest Service, USDA). Their conclusions were:

- 1) A high-level policy statement concerning necessity and goals should be the essential basis of a national program. Until such a statement exists there will never be a truly national program.
- 2) Commitments from agencies for participation in a major joint weather modification experiment should be obtained through a high-level policy-making entity, such as the Federal Coordinating Council for Science, Engineering, and Technology (FCCSET).

The third workshop group, under the chairmanship of Mr. Currie Downie (Research Applied to National

Needs, NSF), considered the subject: "Problems associated with the transfer of technology in weather modification." Their conclusions were:

- 1) The federal government has a responsibility to transfer appropriate technology.
- 2) To be successfully transferred, a given technology must be adaptable to the needs of its potential users and must also be meteorologically and geographically tailored to the location in which it is to be employed.
- 3) Technology transfer will be most effective when the potential users are involved in both planning and conducting the experiments.
- 4) There must be good communication and mutual trust between those doing research to produce technology and those who are expected to use it.

Each set of workshops was discussed, in turn, by the entire group in the second half of the Wednesday session. It was suggested and agreed that the results be communicated to the ICAS Chairman so that ICAS could discuss them and take actions as it sees fit. In its final formal action, the conference decided that it was essential to continue the meetings on an annual basis.

ICAS Ten Years Ago

67th Meeting, 18 November 1966—The meeting was delayed until December 1966, for an unknown reason.

Next month's column—Because the National Academy's report on the chlorofluorocarbon-ozone issue was delayed in release, the September ICAS meeting was changed from the 10th to the 24th. The results of the discussion of this important topic will be reported in the next column. Future topics include an ICAS visit to ERDA's Brookhaven Laboratory and a review of the DOT High Altitude Pollution Program.