

AFTER 29½ YEARS

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It is with great pleasure that I meet with you on this 25th Anniversary of the founding of the Weather Modification Association.* I was involved in some of the early discussions with Gene Bollay, Stuart Cundiff and Albert Cage, which helped determine the programs, philosophy and cooperative efforts which have typified the direction which has been followed by this organization over the 25 years that have elapsed since that time. We met in a mountain camp at Lake Arrowhead during a mixed snow and rainstorm in April of 1951 and discussed, among other things, the need to blend field research with practical problems. Despite much progress, these are still among our urgent needs.

When I discovered in 1946 that it was simple, practical and inexpensive to produce tremendous numbers of ice embryos using dry ice or other very cold substances--to actually produce more of such ice-forming nuclei than is normally present in the air of the natural atmosphere--this discovery opened the door to many intriguing possibilities as well as a host of problems none of us anticipated in those less hectic days!

My discovery, although serendipitous, in actuality was not a random event. I had been searching for such a mechanism for several years and thus was alert to recognize, understand and exploit it when it occurred.

As frequently happens when one has an experiment to test out in the free atmosphere, that summer and fall of 1946 were noted for the absence of supercooled clouds and even ground fogs. When suitable conditions finally occurred, we were ready and eager to test out our ideas. That we were successful is demonstrated in Fig. 1,* which is a composite of the pictures I took during our flight on November 13, 1946. Almost as though it had been prearranged, my original article announcing the discovery was published in Science on the very day I successfully demonstrated that the laboratory findings could be transferred to the atmosphere.

The following day, November 14, Bernard Vonnegut, who was a member of our group at the General Electric Research Laboratory, demonstrated that silver iodide could also be used to produce tremendous numbers of ice-forming nuclei. Not long afterward our "boss", Dr. Irving Langmuir, carried out some waterdrop seeding for warm cloud modification, and laid the basis for an understanding of the coalescence mechanisms that were involved and

*A large number of lantern slides were used in presenting this talk but are not referred to in this summary. They showed early laboratory and field work conducted at the G.E. Research Laboratory, the Mohawk and Schoharie Valleys, and over the Adirondacks, the Berkshires and in the southwest near Albuquerque and Socorro, N.M.

which would limit the effectiveness of seeding warm clouds with salt and other hygroscopic and watery materials.

The 1940-52 period of our atmospheric research activities at the G.E. Research Laboratory was an exciting and highly productive experience. We were able to do many things that had not been done before, and in the process greatly broadened our own horizons.

Our earlier studies of ³snow crystal replication, ¹particle filtration, ²artificial fog production, ⁴precipitation static, ⁵aircraft icing, ⁶particle and condensation nuclei detection, ⁷ice nuclei monitoring, ⁸atmospheric electricity, ¹⁰superimposed on our earlier studies of surface chemistry, ¹¹turned out to be an ideal sort of preparation for our later field and laboratory research under Project Cirrus.

I recently published in the Journal of Weather Modification, two sketches which disclose the type of activities I envisaged in 1947, most of which were tested out by our group during the next five years. We have reprinted a number of our earlier papers which had become unavailable. ^{12,13,14} There are still many unknowns which can be demonstrated with this equipment. I believe we and others will continue to make important discoveries for some time to come.

My current interests, besides including progress in the intentional modification of clouds and weather, ¹⁵are concerned with inadvertent weather modification, especially as it relates to the formation of vast regions of ice crystals in mid-latitude region, which can be observed frequently at low levels in the atmosphere downwind of all major cities, ¹⁶and the quality of air on the global scale. I am also very much interested in the field of solar energy, which I ¹⁷began to study more than 20 years ago, and in the conservation of energy.

One of the funniest, and also thought-provoking, of the many cartoons which followed my early work, was shown at the conclusion of my talk and appears as Fig. 2. It appeared in the magazine section of the New York Times shortly after my first seeding flight in the atmosphere. I was so intrigued with the skill and humor displayed that I obtained the original drawing from the artist (Doty), and it is one of my cherished possessions.

It has been a source of great satisfaction and pleasure to me that I was invited to give the lead paper of this program, as well as the final commentary at the Awards Luncheon. I deeply appreciate your kindness in presenting to me the first of the Special Awards,** and look forward to continuing progress in this exciting field for many years to come.

* Figures shown as part of slide presentation.

** The Vincent J. Schaefer Award

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