THE DESIGN, EXECUTION, AND EVALUATION OF A WEATHER MODIFICATION EXPERIMENT

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1. Introduction

There are various reasons for disagreement as to the effects of seeding supercooled clouds to produce rain. Clearly, the most basic reasons are our lack of understanding of the natural precipitation processes and their variations throughout the life cycle of the cloud, and an inadequate set of physical measurements to define the state of the system before and after seeding. Sometimes certain complex processes can be changed without understanding and usable results can be obtained. The evidence for the case of weather modification now makes it clear that changing natural events can only be interpreted intelligently against a background of understanding of the natural course of events.

Thus, the logical approach to cloud modification is first to obtain a sufficient physical understanding to enable prediction of the evolution of clouds and, then, to attempt to change the natural behavior of the clouds through properly designed experiments.

A casual glance at any precipitation map or any radarscope showing the distribution of rainfall intensity makes it quite apparent that natural variations are very large. Our present limited ability to observe the necessary physical parameters generally prohibits the designing of a very conclusive experiment. On the other hand, there are certain meteorological situations where a fairly good understanding can be obtained and where, through systematic studies, physical models can be derived and conditions well enough defined to establish physical controls.

It is of the utmost importance that consideration be given to all scales of motion in the design of any weather modification experiment no matter on what scale the experiment is to be carried out. There is no *one experiment* which can be designed to give conclusive answers concerning all the benefits (or liabilities) to be derived from weather control by cloud seeding. The complexity of the microphysical, meso- and macroscale interactions is too great. Conclusive answers will come only from a group of coherent experiments covering the various aspects of natural variations and artificial modifications.