

RANDOMIZED CLOUD SEEDING IN THE UNITED STATES

ARNOLD COURT
SAN FERNANDO VALLEY STATE COLLEGE

1. Introduction

Randomized experimentation in weather modification is like the weather itself: many people talk about it, but few actually do it. In the 17 years since the artificial nucleation of supercooled cloud was first demonstrated, only 15 randomized field experiments on the consequences of such nucleation have been conducted in the United States. Of these, eight have not been completed, and two others ended so recently that full reports are not yet available. Locations of the 15 experiments, with methods of treatment indicated, are shown in figure 1; dates, institutions, purposes, and some experimental details are given in table I.

Randomization, however, is not the only requirement for a valid experiment in weather modification. Other basic requirements of any experimental design in this field are the subject of this paper, in which the randomized experiments completed thus far are described in the light of these requirements. First to be discussed is the method of treatment, which is so variable and uncontrollable that the actual intensity of treatment cannot be specified even as to order of magnitude. Thus the relevant experiments cannot be used to estimate treatment effects, but must be analyzed as tests of hypotheses.

The hypotheses to be tested in weather modification experiments will be shown to depend primarily on the intent of the experimenter, and also on all the other important foreseeable consequences of any effort to modify weather. After discussion of the experiments thus far completed, and some still in progress on which adequate information is available, the conclusion is reached that no definitive experiment has yet been performed in the field. Some speculations will be offered for this lamentable lack.

To be considered are only those experiments attempting cloud glaciation, by the introduction of solid carbon dioxide ("dry ice") or silver iodide, and not efforts at weather modification by altering electrical fields, surface albedo, or other properties. No attempt has been made to survey the half dozen or more randomized field experiments in other countries, nor laboratory experiments on threshold temperatures and other properties of nucleating agents, even though some of these have been randomized. References are given only to published articles and books, and not to the innumerable contract reports, progress reports, and papers presented at meetings, although some of these are quoted.