

THE ISRAELI ARTIFICIAL RAINFALL STIMULATION EXPERIMENT. STATISTICAL EVALUATION FOR THE PERIOD 1961-65

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1. Introduction

A rainfall stimulation experiment is being carried out in Israel by silver iodide seeding from an aircraft in a randomized crossover design. The operations are directed by Electrical and Mechanical Services (Mekorot, Ltd.), Mr. M. Cohen, Director, and are financed by the Israeli Ministry of Agriculture. The experiment is conducted under the guidance of the Rainfall Committee whose chairman is Professor E. D. Bergmann, and the related research work is performed at the Hebrew University, under the direction of Professor J. Neumann. The author is responsible for the statistical design and evaluation. Daily rainfall data are provided by the Israeli Meteorological Service from its regular network of raingage stations.

The present statistical design of the experiment [9] was adopted when an earlier design based on weekly units [8] was abandoned after a few weeks because those units were considered unsuitable for detailed analysis.

Earlier analyses excluded a small number of days, twelve, on which the aircraft could not be operated. Since the decision to ground the aircraft was not independent of atmospheric conditions, this exclusion might have introduced a slight bias. Therefore, the present analysis includes these few days and the results differ very slightly from those published earlier [10], [11], [12].

The experiment is based on comparison of amounts of precipitation in two areas of Israel: the North, and the Center, as shown in figure 1. These are separated by a buffer zone to avoid contamination of the atmosphere in one area when the other is being seeded. (The southern, more arid, part of Israel has been excluded from the experiment because its rainfall regime is different.) The interarea comparison reduces day to day variability of observations on precipitation, as rainfall in the two areas is highly correlated. The correlation between daily amounts of precipitation in the two areas was found to be $r = 0.81$, when means of eight stations were taken in each area and a square root transformation used to reduce heteroscedasticity and nonnormality. The amount of precipitation in each area is estimated by a simple average of daily precipitation re-