ON THE DESIGN AND EVALUATION OF CLOUD SEEDING EXPERIMENTS PERFORMED BY ELECTRICITÉ DE FRANCE

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1. Introduction

It is desirable to make the title of this paper a little more precise and to circumscribe the discussion that follows. Only the experiments performed under the sponsorship of Electricité de France will be considered, and of these, only those designed to obtain statistical evidence of increase in precipitation due to cloud seeding with silver iodide smoke released from ground based generators. The words "statistical evidence" must be emphasized. The operations not subjected to statistical evaluation are outside of the subject of this paper. Also, we emphasize the words "increase in precipitation." Thus, experiments on hail suppression will not be discussed.

The various experimental projects described here were conducted by Electricité de France which alone performed the statistical evaluation. The development of experimental plans, and the work on the site (including the administration of the network of raingages, recording raingages, and generators) were undertaken in collaboration with other organizations, particularly the Ministry of Agriculture and the National Meteorological Service. During one of the experiments, Tignes, an American firm installed and administered the generators.

This paper consists of four parts:

(1) general remarks on statistical design and evaluation used;

(2) a survey of early experiments, Tignes, Truyere, Maine-Touraine-Beauce, (M.T.B.);

(3) a detailed description of the randomized experiment Cere-Maronne;

(4) comments on the basic elements of the problem of design and evaluation.

2. General remarks on statistical design and analysis

2.1. *Structure of an operation.* The inner structure of an experiment consists of the following elements:

(a) a sufficiently dense network of generators of silver iodide smoke;

(b) a fixed or a variable target, its variability depending on the meteorological

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