

THE EFFECT OF NATURAL RAINFALL VARIABILITY IN VERIFICATION OF RAIN MODIFICATION EXPERIMENTS

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1. Introduction

Operation of two concentrated raingage networks in central and southern Illinois in recent years has provided a unique set of data to determine the natural variability of rainfall in time and space. The central Illinois network has been in continuous operation for the past eleven years, whereas the southern network has been operated for eight years. Definition of the natural rainfall variability is essential in the planning and evaluation of rain modification experiments in which rainfall measurements are employed to verify the results of seeding. This paper is devoted primarily to illustrating the magnitude of the natural variability in midwestern, warm season rainfall and the influence of this variability upon the interpretation of rain modification experiments. The results presented here should be applicable also to other areas of similar rain climate and topography. The vast reservoir of data from the networks has only been barely tapped in the analyses presented in this paper. Further expansion of the analyses is planned for the future.

In this particular study, storm rainfall data from the two raingage networks during the summer season (June to August) were employed. These data were classified into two categories consisting of (1) air mass or nonfrontal storms, and (2) all summer storms combined. The air mass category was selected for special attention because some scientists have suggested that nonfrontal convective rainfall offers the greatest opportunity for augmentation through seeding activities. However, others have attempted to seed all types of rainfall; and, for this reason, an evaluation of the natural variability for all summer storms was performed also. In Illinois more than 75 per cent of the average summer rainfall comes from thunderstorms, and much of the remaining rainfall is from rain-showers [2].

The analysis was based on five years, 1960-64, of southern Illinois data from the Little Egypt Raingage Network, which consists of 49 raingages in a 550 square mile area, and on ten years, 1955-64, of central Illinois data from the East Central Illinois Network consisting of 49 raingages in 400 square miles [4]. As shown in figure 1, both networks occupy square shaped areas with nearly equal gage spacing.