Lesson 4: Precipitation Measurement

Spatial Sampling

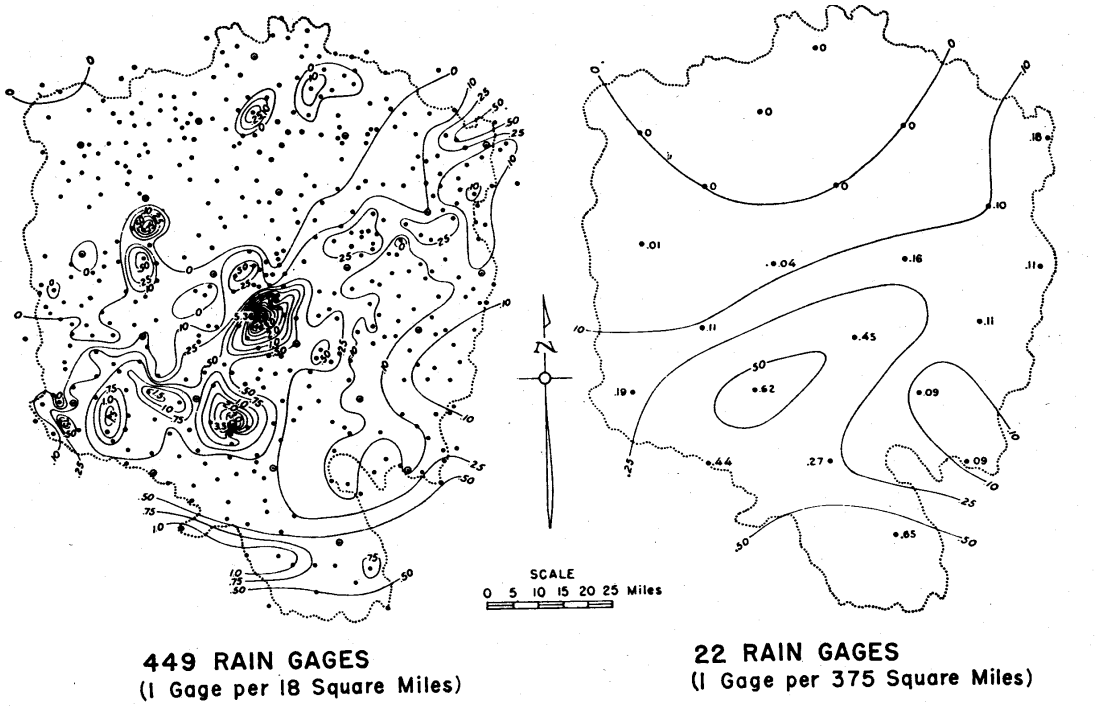
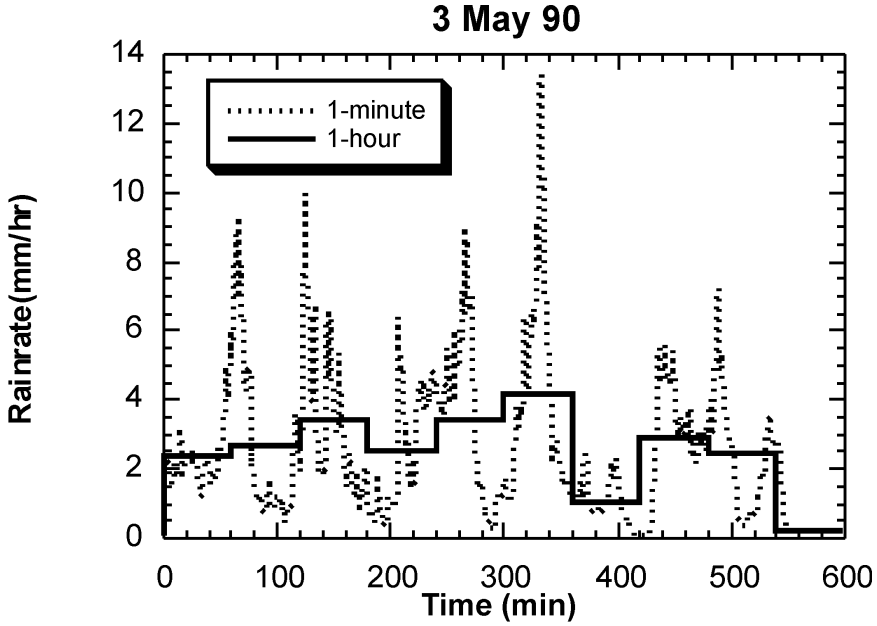


Figure 3-6 Isohyetal maps of the storm of Aug. 3, 1939, in the Muskingum Basin, Ohio, showing the effect of network density on the apparent storm pattern. (*U.S. National Weather Service.*)

Temporal Sampling



Gage Undercatch

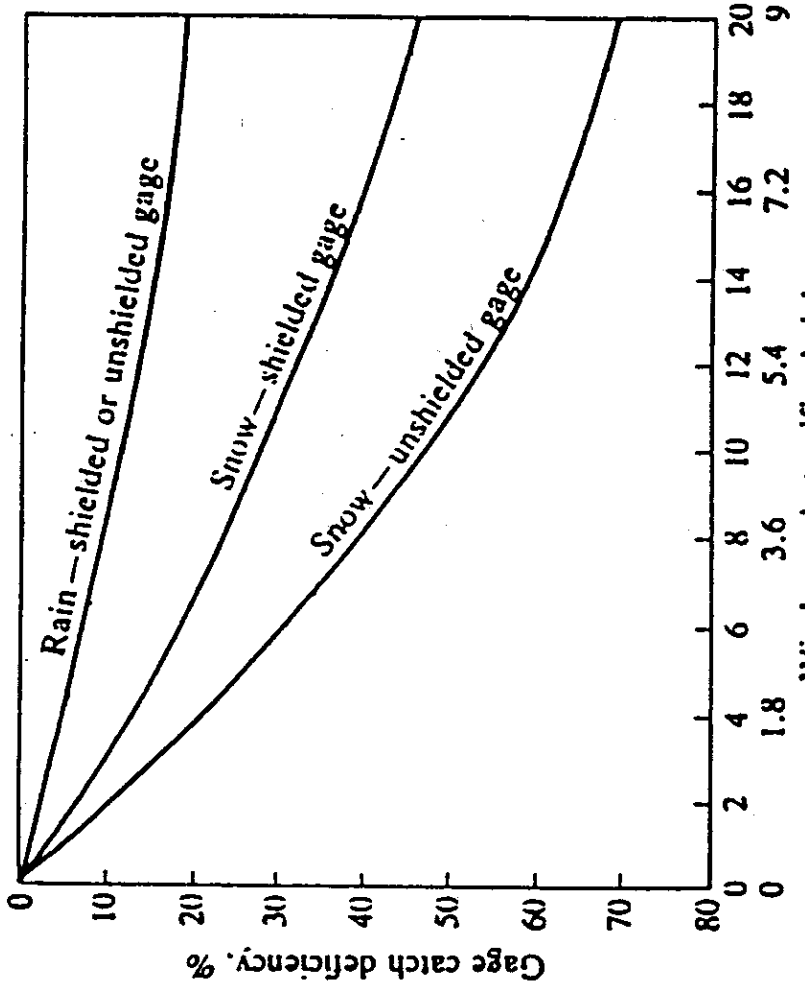


FIGURE 4.16 Effect of wind speed on the catch of precipitation gages. Source: L. W. Larson and E. L. Peck, "Accuracy of Precipitation Measurements for Hydrologic Modeling," *Water Resources Res.*, 10(4):859, 1974. Copyright by the American Geophysical Union.

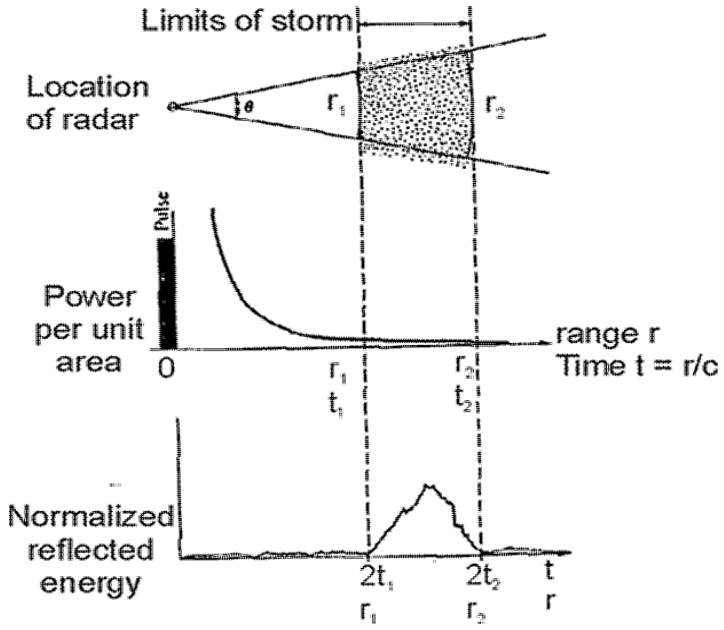
Lesson 4: Precipitation Measurement

Radar

Acronym for **ra**dio **d**etecting **a**nd **r**anging

Radar Principles

Radar emits EM energy in narrow bands. Portion of the energy is reflected. The amount reflected and the time delay provides information about objects.



Z-R Relationships

There is no one-to-one relationship between Z and R. The relationship is usually based on theoretical and/or empirical (data fit) relationships.

Some well-known relationships:

- Marshall-Palmer (1950s) $Z = 200R^{1.6}$
- Austin (1987) $Z = 230R^{1.4}$
- Austin (1987) Thunderstorms $Z = 400R^{1.3}$