JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 95, NO. D2, PAGES 1965–1972, 1990

Estimation of mean rain rate: Application to satellite observations

Benjamin Kedem
Department of Mathematics and Institute for Physical Science and Technology, University of Maryland, College Park

Long S. Chiu
Applied Research Corporation, Landover, Maryland

Gerald R. North
NASA Goddard Space Flight Center, Greenbelt, Maryland

Abstract

A method for the estimation of the mean area average rain from dependent data is developed and applied to the GARP Atlantic Tropical Experiment GATE data. The method consists of fitting a mixed distribution, containing an atom at zero, by minimum chi-square in combination with certain time-space sampling designs. In modeling the continuous component of the mixed distribution it is shown that the lognormal distribution provides a very close fit for the nonzero area average rainrates. A comparison with the gamma distribution shows that the lognormal distribution is a better choice as expressed by the minimum chi-square criterion. Some of the time-space sampling designs correspond to satellite sampling. The results indicate that a satellite visiting an area of about 350×350 km^2 in the tropics approximately every 10 hours over a period can provide a rather close estimate for the mean area average rain rate. © American Geophysical Union 1990

Index Terms: 3354 Meteorology and Atmospheric Dynamics: Precipitation.

Citation: Kedem, B., L. Chiu, and G. North, Estimation of mean rain rate: Application to satellite observations, *J. Geophys. Res.*, *95*(D2), 1965–1972, 1990.