

## Book Review

Title: *The Thunderstorm in Human Affairs*  
Second Edition; Revised and Enlarged  
Edited by Edwin Kessler

Copyright: 1983

ISBN 0-8061-2152-X

QC968.T48 1983 Vol. I. 363.3'492s 83-47836

University of Oklahoma Press

Publishing Division of the University

200 pp., 100 photographs, 49 maps.

83 charts, graphs, drawings and tables.

References, Index; Paperback; Price: \$16.95.

The title of this book certainly reflects the current increased concern of the public for such atmospheric phenomena as thunderstorms and their associated characteristics of lightning, hail, torrential rain, turbulence, and of course, the tornado. Each classification of these phenomena is analyzed by an expert researcher knowledgeable in each particular realm. Moreover, this well written book consistently stresses the impact of these storms upon mankind and his developments such as homes, buildings, airports, other transportation facilities, and the like.

In Chapter One (Kessler and White) sociological aspects of thunderstorms are introduced; benefits, costs or liabilities, and various choices available to man are reviewed. This unit also discusses concepts of risk assessment along with proposed damage control procedures and social responses.

Chapter Two (Hoxit, Lieb, Chappell, and Mogil) explores the impacts of certain devastating floods that have occurred during recent years; such floods were the Black Hills, South Dakota Deluge in 1972 and Hurricane Agnes disaster in the same year. One particular flood event examined in minute detail is the Big Thompson Canyon, Colorado debacle which occurred in July 1976. Many analyses are presented; these include mesoscale maps, radar charts, diagrams, soundings and photographs. For example, the photographs depict the severe damage and aftermath of this terrible event. The social impacts of this flood were incredible when one considers the victimized people. Many of these people decided to ignore the warnings when they were issued; still others heeded the same and thus saved their own lives. One highlight which is stressed is the methodology by which the warnings were disseminated to the public; individuals ignored warnings which were broadcasted by way of television and radio, but then heeded them when police and firemen cruised through the neighborhoods announcing the impending danger using bullhorns and sirens. Apparently person to person contact was substantially more effective than the mass media.

Tornadoes and their immense damage potential are discussed in Chapter Three (Abbey and Fujita). The prime example reviewed is the major outbreak of tornadoes during the 3rd and 4th of April 1974. A substantial number of charts and tables enumerate the fatalities and injuries sustained during this meteorological disaster. Charts also summarize various magnitudes of damage which resulted from this event in midwestern United States. Besides this, synoptic and radar summaries and charts are included along with photographs of several infamous tornadoes during this outbreak which were particularly destructive. One very intriguing feature of this study was the presentation of a set of photographs of tornadoes upon which bits of debris were tracked and their

respective velocities computed. This innovative research is indeed helpful in determining the wind velocities at the fringes of the funnel cloud. These data are crucial in the investigation of these terrible manifestations. Cycloidal ground tracks and tornado paths are analyzed with accompanying excellent photographs.

Chapter Four (DeCoursey, Chameides, McQuigg, Frere, and Nicks) examines the concepts of forest management and agriculture conservation. Although not as dramatic as the previous unit on tornadoes, this unique discipline nevertheless is crucial to the agriculture industry and lumbering operations in the United States. After all, nearly everyone requires food and shelter! Such important parameters as crop moisture replacement or replenishment, irrigation water supplies, and nitrogen fixation are carefully considered. During this time of apparent increasing probabilities of drought, this chapter becomes significantly important in terms of the principles of forest and agriculture conservation and management. The final section surveys the negative impacts of thunderstorms including hail damage, field-soil erosion, leaching of soil nutrients, surface water pollution (particularly from fertilizer), stream flooding, and last but not least, the perennial problems of lightning and resultant forest fires. Therefore this chapter indeed has much to offer when one considers the recent climatological disasters during 1988.

Wind stresses upon buildings of various types are examined in Chapter Five (Minor). Numerous diagrams and drawings illustrate how certain wind flows impact upon specific designs of buildings and the amount of damage which may be expected; such structures include homes, churches, and office buildings. Photographs depict resultant damage to these edifices, even ones which are constructed with concrete blocks or bricks! The latter section of chapter suggests methods by which reinforcement designs may be incorporated into the structure which will minimize or even eliminate damage. In conclusion, the author presents two appendices which contain engineering equations to aid in the wind engineering safety concerning buildings. Some readers may find these data helpful. Chapter Six (Krider) is exclusively dedicated to the well known and feared phenomenon of lightning, an occurrence in every thunderstorm. Cloud to ground lightning is the type of lightning with which everyone is concerned. Excellent photographs of several strikes depict unique characteristics of this lightning; the step process of these strokes is well documented. Effects of these strikes upon man-made objects and buildings is portrayed. Moreover, lightning sometimes strikes ordinary flat ground or terrain. In conclusion, this chapter explores several methods by which lightning protection may be achieved.

Aviation is yet another activity of man which is often adversely affected by thunderstorms. Chapter Seven (Lee and Beckwith) deals with the impact of these storms upon aircraft, particularly while in the air, as well as on the ground or in take-off status. Tables present data concerning accidents which result in fatalities and damages. Besides this, the phenomenon of turbulence is introduced. Aloft, the two classifications of turbulence are storm induced and clear air turbulence. Both often inflict hardships upon airborne craft. Additional tables describe the various degrees or severity of turbulence with eventual results. Another and rather recently investigated phenomenon of thunderstorms is the dangerous outflow, micro-burst, or squall wind which occurs in close proximity of a storm. This down-burst, as it is also called, is a major surface event which is becoming more significant in terms of the taking off or landing of aircraft. Extreme vigi-

lance is required at or near airports when a thunderstorm is nearby or approaching. Recent aircraft accidents may be blamed upon this down-burst action of thunderstorms. Increased research is needed to further explore this hazard. Other characteristics which are dangerous to aircraft operations are heavy to excessive rain, low or ragged ceilings, poor visibilities, and rapid pressure changes. The last item is particularly crucial in altimeter settings of low-flying aircraft. The concluding section addresses the problem of how these menaces may be either avoided or minimized. Such tools as airborne and ground-based radar, satellite photography, gust-front detector systems, electrical discharge sensors (aboard aircraft), Doppler (NEXRAD) radar, better forecasting and communications, all may be employed to increase the safety of the flying public.

Disaster preparedness and severe thunderstorm prediction are introduced in chapter Seven (Pearson). This writer stresses that the prediction of severe weather requires as a basic prerequisite, an excellent surface observation support system or network. Forecast preparation and dissemination are equally crucial when one considers the situation described in Chapter Two concerning people who willfully chose to ignore warnings. Currently, disaster preparedness programs have been instituted in twenty-two states; possibly more have been established since this book went to press. In any case, obvious expansion is needed. Finally, the primary goal

to attain is to convince the public that *something* is going to happen, and permit no room for doubt!

The final unit, Chapter Nine (Lavoie) lists various organizations in the United States which are currently involved in active research of thunderstorms. With the armed services included, there are fourteen groups engaged in this very important work. The challenge which faces our society is that further expansion and outreach is required to better protect the people and property. Moreover, the transportation industry will benefit as well from the research.

This book is a very well written as is the illustrated documentation of the subject under consideration. The reviewer is fully convinced that this publication is one of the best, if not the best, on the current market treating the subject of the thunderstorm's impact upon society. Since this is the first volume of a three volume series, it is hoped that the remaining two will soon be available. All three treatises will be valuable assets to the library of a university, foundation, meteorologist, sociologist, or any interested person. The series will depict very well, the impact of thunderstorms upon mankind; if all volumes are as well written and constructed as the first one, the reviewer has not doubt that they will.

Merlin W. Zook  
Book Review Editor  
Camp Hill, PA 17011

### NWA Corporate Members

ACCU-WEATHER, INC.\*  
ALDEN ELECTRONICS\*  
AUDICHRON\*  
IMET\*  
INTERCON WEATHER CONSULTANTS\*  
KAVOURAS, INC.\*  
MOUNTAIN STATES WEATHER SERVICES\*  
TEXAS A&M UNIVERSITY\*  
THE WEATHER CHANNEL\*  
WEATHER CENTRAL, INC.\*  
WEATHER CORPORATION OF AMERICA\*  
WSI CORPORATION\*  
ZEPHYR WEATHER INFORMATION SERVICE, INC.\*  
ENVIRONMENTAL SATELLITE DATA, INC.

GLOBAL WEATHER DYNAMICS, INC.  
PLANNING RESEARCH CORPORATION  
RUTGERS STATE UNIVERSITY  
SATELLITE INFORMATION SERVICES CORPORATION  
COMPUTER SCIENCES CORPORATION  
LYNDON STATE COLLEGE  
GEOMET TECHNOLOGIES, INC.  
ELECTRONIC DATA SYSTEMS, INC.  
RIVER SERVICES, INC.  
A.P.T. ASSOCIATES  
SUNSOR, INC.  
SURFACE SYSTEMS, INC.

\* Charter Member