Book Review

The Hurricane and Its Impact
by
Robert H. Simpson and
Herbert Riehl,
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Reviewed by

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The Hurricane and Its Impact is probably intended by L.S.U. Press to be the logical successor to Dunn and Miller's Atlantic Hurricanes as the "standard" text on hurricanes, and that will almost certainly be the case. The book is reasonably comprehensive and quite comprehensible, even to readers who are not mathematically sophisticated. The more theoretically oriented meteorologist will probably be disappointed, but applied meteorologists, disaster preparedness professionals, and planners should find it very valuable.

The first two chapters give overviews of the rest of the book and provide a good indication of what is to follow, closely reflecting the organization of the book. But in one respect the summary does an injustice in the interest of brevity by presenting "half-truths," although most are rectified later.

The next few chapters have to do with hurricane formation, structure, evolution, and behavior. "The Summer Tropical Atmosphere" provides a good foundation for succeeding chapters, one example of the book's very logical organization. Although the chapter mainly describes the "average" summer atmosphere, data on variability are also reported. In "The Origin of Hurricanes" the authors state, ". . . . there remains perhaps more scientific disagreement or uncertainty concerning the details of the dominant physical processes responsible for hurricane development than in any comparable problem faced by meteorologists." (p. 52) There is a short section on the climatology of hurricane formation (supplemented by an appendix), a discussion of geographical mechanisms which can encourage or discourage the evolution of rain disturbances into cyclonic windstorms, and examples of several past hurricanes. The chapter includes a number of differential equations, but their comprehension is not critical to understanding the text, which is true throughout the book.

The next chapter, "The Life Cycle," summarizes the stages of hurricane development and decay: formative, immature, mature, and decaying. It includes "behavioral" differences such as variations in tracks as a function of stage of the life cycle. The next chapter, "The Mature Hurricane," is one of the most technical in the book but reveals the most about just what goes on inside a hurricane. Discussion includes surface components (windfield, clouds, precipitation, eye), upper air components (vertical wind structure, radial flow, thermal structure), and the role of surface friction.

The next chapter is the only one that seems misplaced; "Extraordinary Changes of Intensity and Path" might fit somewhat better near the chapter dealing with forecasting, although many readers would disagree. The chapter reports several general behavioral tendencies of hurricanes but also points out several remarkable extreme cases and exceptions. Perhaps most fascinating are storms whose intensification (e.g., Audrey and Celia) or failure to intensify (e.g., Ella) still go without satisfactory explanation.

The next three chapters deal with effects of hurricanes. The wind chapter includes a description and explanation of wind distribution in the hurricane system and the types of damages which result from wind. There is a section concerning structural design criteria to reduce damages and a short description of hurricane-induced tornadoes.

Waves and tides do the most dramatic damage in hurricanes and claim by far the most lives. The chapter dealing with these phenomena includes discussions of wave theory, maximum waves, wave set up, shoaling, storm surge (including computational guides), "backwash" in bays, and several other topics. The chapter was disappointing, however, in that compared to the discussion on wind it contained

very little useful information about the damage relationships which can be expected from waves or water. The authors correctly distinguish between storm surge and storm tide, but the relative contribution to storm tide of its various components is vague. The description of surge heights at distances to either side of the eye at landfall is quite misleading, implying that surge is almost nonexistent to the left of the eye. It is not rare for peak surge height to the left of the eye to be half or even two-thirds of maximum value to the right. The discussion of erosion and scour, in view of the threat they pose to structures, was surprisingly brief. The treatment of hurricane effects ends with a chapter on the hurricane after it moves over land.

The next few chapters address ways to cope with hurricane threat, and their inclusion should facilitate the working relationship and communication between meteorologists, disaster preparedness officials, and planners. "Threat Assessment and Risk Reduction" begins by describing how to assess risk at a particular location and includes procedures for computing return periods. There is no mention of assessing erosion rates or potential, however. The section on land use planning and regulation is the most disappointing in the book. Although the Texas Model Building Code is mentioned, there is no reference to the tremendously important National Flood Insurance Program or Coastal Zone Management Act, the two pieces of legislation by far most responsible for the improvements in coastal development and construction standards in the United States. Under beach protection the controversies involving seawall construction and beach renourishment go neglected.

Social and behavioral scientists are flattered by the fact that meteorologists acknowledge the importance of social and psychological variables in understanding why people react the way they do to hurricane threats. Unfortunately the tendency is for weather professionals to discount social science research findings on these issues and rely instead on anecdotal evidence and their own intuitions, and such is the case in "Hurricane Awareness and Preparedness." The chapter overstates the "cry wolf" problem and the role of experience in affecting hurricane response, for example. The evacuation section is very brief in this chapter but accurately states the early warning dilemma. The "Prediction and Warning" chapter is excellent and should be read by every disaster preparedness professional, public official and planner who uses NWS and NHC forecast information. It mentions the various computer models used to forecast tracks at the NHC and gives the example of alternative predicted tracks in Belle. Probability ellipses are explained, and it is shown how the 24-and 48-hour ellipses are used to determine the "watch" area. Data are given to illustrate the magnitude of error as a function of time before landfall. Preparedness professionals are often underestimated in their ability to comprehend the level of information presented in this chapter. I believe that having read this material, they should have an excellent grasp of the "blackbox" that is hurricane forecasting and appreciate its limitations and consequent implications for their own jobs.

The two concluding chapters were anticlimactic after the forecasting discussion. One chapter gives a number of hurricane development, impact, and response scenarios, and the other brings the reader up to date on Project STORMFURY and briefly reviews other proposed methods of modifying hurricanes or inhibiting their formation. There is a glossary and several very useful appendices which nicely complement the text.

It's impossible to write a book that will be all things to all readers, but Simpson and Riehl have made a noble and largely successful effort at touching a great many bases of interest and value to a wide audience. People who are sophisticated in one hurricane subject area will probably find the book superficial in that area but find considerable "new" information in the book's treatment of other areas. That is the best that can be realistically hoped for, and I recommend The Hurricane and Its Impact to anyone interested in a comprehensive approach to hurricanes and coping with the hazard they pose.