Reviewer: Joseph M. Hilbe
Arizona State University

Hurricane Climatology: A Modern Statistical Guide Using R

Hurricane Climatology is the only text devoted to the statistical analysis of hurricane data. R code is used throughout to allow the reader to replicate the analyses described in the text, and an emphasis is made to provide readers with the ability of being able to adapt the code for their own study projects.

The book is partitioned into two divisions. First the authors provide a rather detailed look at the basics of statistical analysis using R relevant to the study of hurricanes. The second part is a tutorial that guides the reader to applying the statistical techniques covered in the first part to the analysis of hurricane related data.

Part One, *Data, Statistics and Software*, covers the basics of R and how R is used in constructing a variety of plots and graphs including time series graphs, graphs using coordinate reference systems, mapping, and so forth. Statistics covers the use of R in analyzing table data, dealing with probability and combinations, various parametric and non-parametric tests, correlation analysis and the basics of linear and multiple linear regression. The authors also address Bayesian analysis, describing the use of MCMC modeling using Albert's **LearnBayes** package, **JAGS**, and **WinBUGS**.

Part Two, *Models and Methods*, is comprised of seven chapters where the following methods are used to model hurricane data. Chapter 7, *Frequency Models*, uses Poisson, zero-inflated Poisson, random forest methods, and logistic regression to model hurricane data. Chapter 8, *Intensity Models*, explores quantile, EDA, extreme value theory, and Pareto and extreme intensity models to better understand hurricanes. Chapter 9, *Spatial Models*, is a key chapter in the book, applying spatial modeling techniques to hurricane data. Mapping software is seriously introduced in this chapter, with complete code provided to replicate the examples provided in the text. Chapter 10, *Time Series Models*, is only twenty pages in length, but addresses the standard time series models to hurricane analysis. Chapter 11, *Cluster Models*, discusses time, spatial and feature clustering methods that can be used for hurricane data. Spatial clustering is emphasized. Chapter 12, *Bayesian Models*, is forty pages in length and aims to provide readers with the basics of Bayesian modeling and how such methods can be

more appropriate for handling hurricane data than more standard frequency-based methods. The authors provide Bayesian examples employing both non-informative and informative priors. Examples use both R and **OpenBUGS** for modeling. Code is provided to replicate all examples and graphics. The final chapter, Chapter 13, *Impact Models*, is only twelve pages, but it contains information on hurricane catalogues as well as discussion and code on how to analyze extreme loss data.

I have written about hurricane statistics before, but wish I had read this book prior to writing and submitting the earlier manuscript. I feel confident that others in my situation feel the same. *Hurricane Climatology* is very much a guide that researchers can use to statistically examine hurricane data, including issues related to wind speed, direction, and impact, damage and costs, and so forth. The authors are experts in this area of research, and have provided the tools to help others to effectively evaluate hurricane and related data as well. I have found a number of other applications for the analyses discussed in the book, in particular applications to astronomical and planetary data. But with respect to those who are involved in hurricane research, I advise you to obtain a copy of this text and to keep it next to your desk as a ready resource.

Appendix A provides the reader with nine pages of R functions that are used in the book, together with their application and the chapters in which they are used. This is a very helpful feature of the book, and one that I frequently accessed when working through the text and examples.

Appendices B and C list the R packages and data sets respectively that are used in the text. R packages also display the version number used for examples run for the book.

Reviewer:

Joseph M. Hilbe
Arizona State University
T. Denny School of Social and Family Dynamics
Tempe, Arizona
E-mail: hilbe@asu.edu
URL: http://works.bepress.com/joseph_hilbe/