Comparing the Year 2013 Hurricane Predictions for Gulf Coast and Texas

Dongmei Pan and C. Vipulanandan, PhD., P. E.
Texas Hurricane Center for Innovative Technology (THC-IT)
Department of Civil and Environmental Engineering
University of Houston, Houston, TX 77204-4003
Tel: 713-743-4291: email: dpan3@uh.edu

Abstract: It is a challenge to predict the number of hurricanes expected during the hurricane season. Total hurricanes for 2013 in the Atlantic region predicted by the Colorado State University (CSU), Florida State University (FSU) and National Oceanic and Atmospheric Administration (NOAA) varied from 7-11. Based on THC-IH prediction, the probability of one hurricane for the Gulf of Mexico and Texas in 2013 varied from 17.6% to 36.8% and 30.2% to 36.8% respectively.

1. Introduction

Several institutions keep predicting the hurricane probability and total number for the Atlantic hurricane season each year. CSU has been predicting hurricane for the past 30 years. The CSU Tropical Meteorology Project has made forecast of the upcoming season's Atlantic basin hurricane activity. Its research team has shown that a sizable portion of the year-to-year variability of Atlantic tropical cyclone (TC) activity can be hindcast with skill exceeding climatology. This year's June forecast was based on a statistical methodology derived from 30 years of past data. The Center of FSU for Ocean-Atmospheric Prediction Studies (COAPS) in the College of Arts and Sciences was officially formed in August 1996 by the Florida Board of Regents. COAPS is a center of excellence performing interdisciplinary research in ocean-atmosphere-land-ice interactions to increase our understanding of the physical, social, and economic consequences of climate variability. The Texas Hurricane Center for Innovative Technology (THC-IT) has developed in a hurricane prediction model based 162 years of data with a Poisson distribution and started to predict hurricane for Gulf of Mexico (GOM) and every state along GOM since 2009. Total hurricane in the year 2012 predicted by CSU, FSU and NOAA varied from 4 to 8. For year 2012, THC-IH predicted probability of no hurricane for Texas and GOM varied from 6.6%-70% and 1.8%-53% respectively, and there was no hurricane in Texas or GOM. The Climate Prediction Center (CPC) at NOAA predict the climate variability, real-time monitoring of climate and the required data bases, and assessments of the origins of major climate anomalies.

2. Objectives

The objective was to review and summarize the hurricane predictions by the CSU, FSU and NOAA for 2013 Atlantic hurricane season. Also the probabilities of hurricanes predicted by the THC-IH for Texas and Gulf Coast of the United States in 2013 are compared to other predictions.

3. Analyses

Hurricane prediction by CSU, FSU, NOAA for 2013 Atlantic hurricane season are summarize in Table 1 with remarks (TNS-total number of storms; H-number of hurricanes).Compared to the actual hurricane number in the past four years, the predictions were either higher or lower than the actual number of hurricanes. For 2013, the number of hurricanes varies from 7-11. The Frequency of Hurricane per year as estimated by THC-IT using $f(h)=\exp(-\lambda)x\lambda^{h}/h!$; (h=0,1,2,…), where h is the number of hurricane per year, λ is the expected number of hurricanes during a year. By analyzing 162 data (1851-2012) from NOAA, the parameter λ for Texas and the Gulf Coast of the United States were 0.36 and 1.1. It means the probability for hurricane in Texas and the Gulf Coast of the United States is 0.36 and 1.1 each year respectively. The probability of h hurricanes occurring in T years is, $f(h|\ \lambda,\ T)=\exp(-\lambda T)x(\lambda T)^{h}/h!$; (h=0,1,2,…), prediction of hurricane probability in 2013 is based on different year cycles (T = 1,2,... ,10) simulation and calculations (Liu and Vipulanandan,2010; Elsner and Bossak,2001).

Table 1 Hurricane Prediction of Atlantic Hurricane Season by FSU, NOAA, and CSU (TNS: Total Named Storms, H: Hurricane)

Year	FSU		NOAA		CSU		Actual number	Remark
	TNS	H	TNS	H	TNS	H	H	
2013	15	8	13 - 20	7-11	18	9	unknown	unknown
2012	13	7	70% chance of 9-15	70% chance of 4-8	10	4	10	Lower than real number
2011	17	9	12-18	6−10	16	9	7	close to real number
2010	17	10	14-23	8−14	18	10	12	close to real number
2009	8	4	9−14	4−7	11	5	3	close to real number

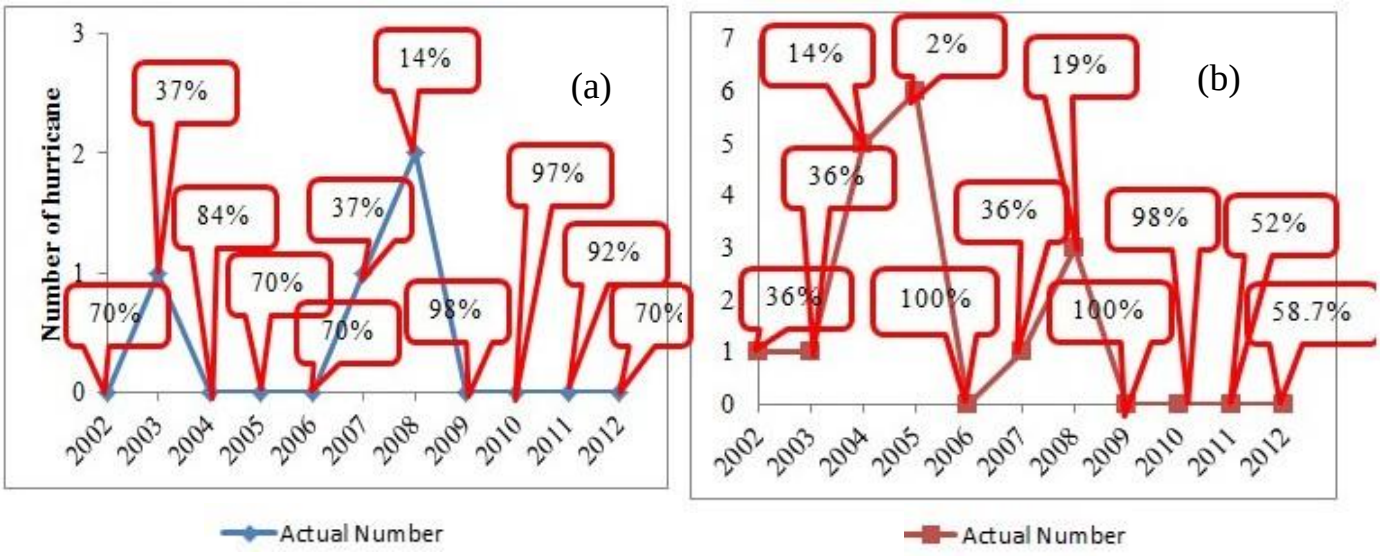

Figure 1 Actual Hurricanes and Probability Predicted by THC for the past decade (a) Texas and (b) U.S. Gulf Coast

4. Conclusions

According to the prediction by CSU, FSU and NOAA, 2013 Hurricane numbers varied and between 7 and 11. Based on the past 162 years of data, predictions by THC-IH for hurricane in the last three years have been good. The frequency of hurricanes in Texas and Gulf Coast of the United States was 0.36 and 1.1 per year. The probability of one hurricane in Texas varied from 17.4 to 36.8%. The probability of a second hurricane varied from 4.4% to 27%. The probability of zero hurricanes in U.S Gulf Coast varied from 1%-58.7% this year. The probability of one hurricane along the Gulf of Mexico varied from 30.2% to 36.8%. The probability of a second hurricane varies from 8.4% to 27%.

5. Acknowledge

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6. References

[1] Liu, M. and Vipulanandan, C. (2010) "Prediction the Hurricane Probability of 2010 In the Gulf Coast of the United States ", Proceedings, THC 2010 Conference, Houston, Texas.

[2] Elsner, B. J. and Bossak, H. B. (2001) "Bayesian Analysis of U.S. Hurricane Climate", Journal of Climate, 14, 4341-4350.