Comparing the Year 2016 Hurricane Predictions for
Gulf of Mexico Coast and Texas

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Abstract:
It is of interest to predict the number of hurricanes expected during the hurricane season in the year 2016 the Gulf of Mexico. Total hurricanes for 2016 in the Atlantic region predicted by the Colorado State University (CSU), and National Oceanic and Atmospheric Administration (NOAA) varied from 3 to 8. Based on THC-IH prediction, the probability of no hurricane for the Gulf of Mexico and Texas in 2016 was 34% and 71% 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. 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 165 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 2015 predicted by CSU, FSU and NOAA varied from 3 to 8 For year 2015, THC-IH predicted probability of no hurricane for Texas and GOM varied from 6.4%-71% and 1.8%-54% (1 year to 10-year cycle) 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 hurricanes predicted by the CSU, and NOAA for the 2016 Atlantic hurricane season. Also the probabilities of hurricanes predicted by the THC-IH for Texas and Gulf Coast of the United States for the past several years are compared to actual hurricanes.

3. Analyses

Hurricane prediction by CSU, FSU, NOAA for 2015 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 2016, the number of hurricanes varies from 4 to 8. The Frequency of Hurricane per year as estimated by THC-IT using $f(h)=\exp(-\lambda) \times \lambda^h/h!$; $(h=0,1,2,\ldots)$, where h is the number of hurricane per year, λ is the expected number of hurricanes during a year. By analyzing 165 data (1851-2015) from NOAA, the parameter λ for Texas and the Gulf Coast of the United States were 0.35 and 1.1. It means the probability for hurricane in Texas and the Gulf Coast of the United States is 0.35 and 1.1 each year respectively. The probability of h hurricanes occurring in T years is, $f(h|\lambda, T) = \exp(-\lambda T) \times (\lambda T)^h/h!$ $(h=0,1, 2, \ldots)$, prediction of hurricane probability in 2016 is based on different year cycles $(T = 1,2,\ldots,10)$ 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	
2016	NA	NA	70% probability of 10-16	70% probability of 4-8	14	6	Unknown	Unknown
2015	12-17	4-8	70% probability of 6-11	70% probability of 3-6	8	3	0	Higher than real number
2014	70% change of 5-9	70% chance of 2-6	70% probability of 8-13	70% probability of 3-6	9	3	0	Higher than real number
2013	15	8	13 - 20	7-11	18	9	0	higher than real number
2012	13	7	70% chance of 9-15	70% chance of 4-8	10	4	10	Lower than real number
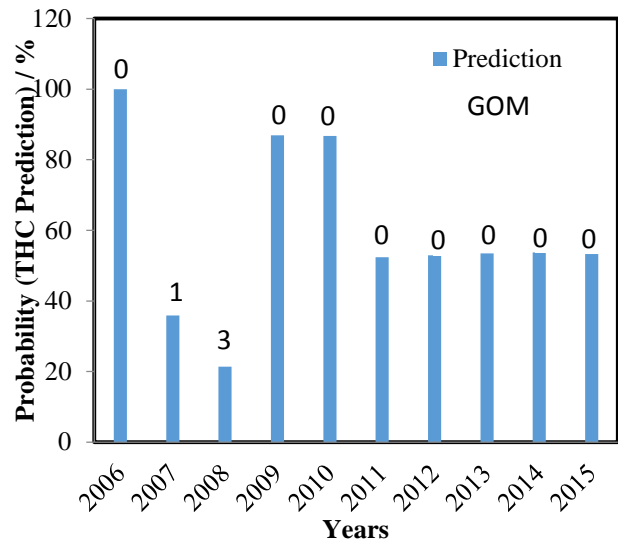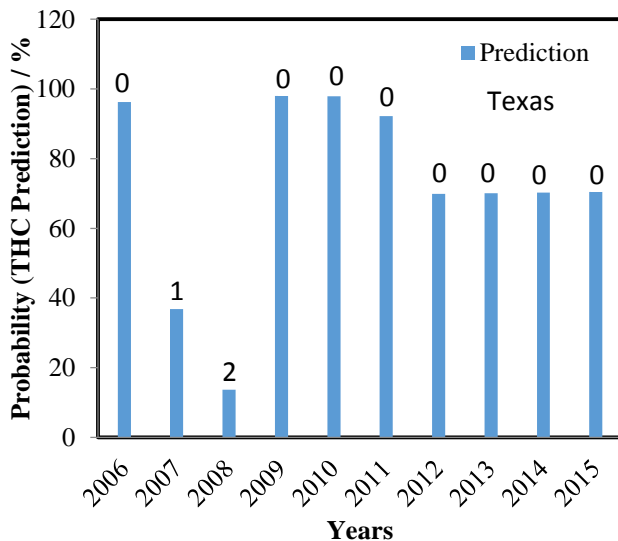
Figure 1: Actual Hurricanes and Probability Predicted by THC for the past decade
(a) Texas and (b) U.S. Gulf Coast

4. Conclusions

According to the prediction by CSU and NOAA, 2016 Hurricane numbers varied and between 4 and 8. Based on the past 165 years of data, the frequency of hurricanes in Texas and Gulf Coast of the United States was 0.35 and 1.07 per year. The probability of one hurricane in Texas varied from 17.1% to 36.8%. The probability of a second hurricane varied from 4.2% to 27%. The probability of zero hurricanes in U.S Gulf Coast varied from 3%-34% this year. The probability of one hurricane along the Gulf of Mexico varied from 0% to 37%. The probability of a second hurricane varies from 0% to 26.8%.

5. Acknowledgment

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.