# Correlation between Hurricanes and Rainfall in Galveston, Texas

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**Abstract:** Galveston Island is considered to be one of the important islands in the United States because of its relatively high population density and commercial activities. However it has had the largest number of hurricanes in Texas during the last 100 years. In this study, correlation between the rainfall and hurricanes were investigated. Based on the investigation, rain precipitation correlated to the hurricanes in the past decade.

## 1. Introduction
Among the meteorological events, tropical cyclones have attracted much attention, due to the devastating damages that are produce when they strike the populated areas. They are generally known as hurricanes when they are formed over the Atlantic and the Northeastern Pacific oceans (Mendoza et al., 2009).

Galveston Island is notorious for having affected badly by hurricanes particularly for the past two decades. In the past two decade hurricanes killed several hundreds of people and damaged billions of dollars of properties. Over the years, the possible correlation of hurricanes with other natural systems has been investigated by many researchers. Recent studies concerning solar activity and hurricanes show a significant correlation between north Atlantic hurricane intensity changes and the kp index (The K-index quantifies disturbances in the horizontal component of earth's magnetic field with an integer in the range 0-9 with 1 being calm and 5 or more indicating a geomagnetic storm) of geomagnetic activity, but not with cosmic rays (Elsener and Kavlakov, 2001; Kavlakov et al., 2008). Another study suggests that peaks and trends of major north Atlantic hurricane activity concur with lower total solar irradiance, i.e. lower solar activity, and vice versa, during several periods between 1730 and 2005 (Nyberg et al., 2007). The relation between meteorological phenomena and space weather has been investigated in many reports for over two hundred years. Reports showed that the two-month period immediately following Hurricane Katrina, was generally characterized by low rainfall and river discharge (NOAA, 2008; USGS, 2010).

## 2. Objective
To evaluate the relationship between annual rainfall and hurricanes for the Galveston, Texas.

## 3. Correlation between Rainfall and Hurricane Occurrence
The rainfall data for Galveston, Texas was collected from the National Climatic and Data Center. The data was analyzed to determine the correlation between hurricanes and rainfall rate.
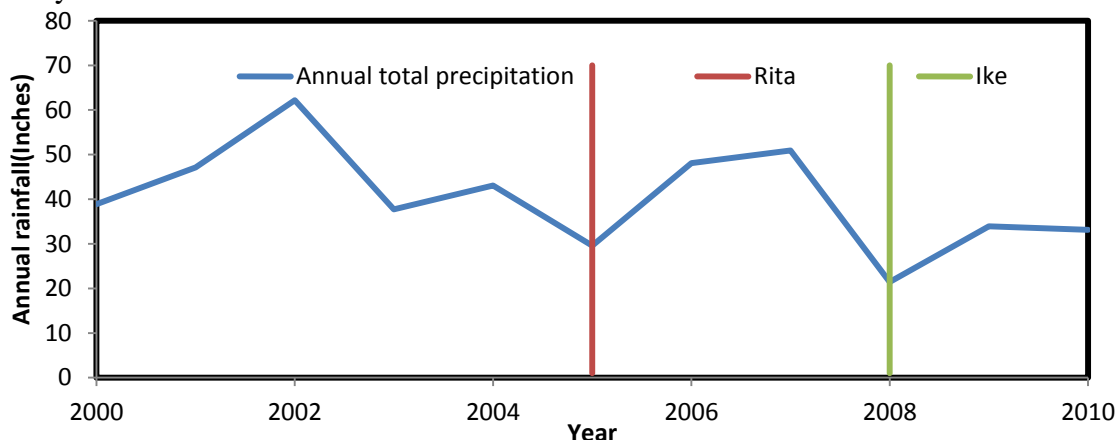


**Fig. 1 Annual Rainfall for the years 2000 to 2010**

Annual rainfall trend for the period of ten years is shown in Fig. 1. The two lowest amounts of annual rainfalls have been observed for the years of 2005 and 2008 with 29.58 inches and 21.44 inches respectively. Notably, these two years had the hurricanes Rita and Ike respectively. Fig. 2 shows the total monthly rainfall. It can be observed from Fig.2 that amount of precipitation for September (2005 & 2008) was considerably lower than the average rainfall in the same year. Also from Fig. 3 it can be concluded that deviation of average annual rainfall higher in years 2005 and 2008 considerably when compared with other years.
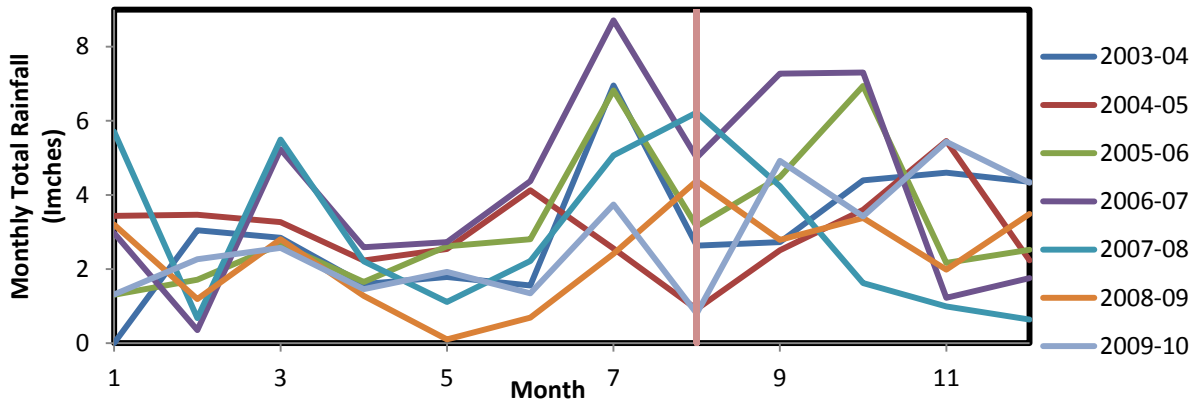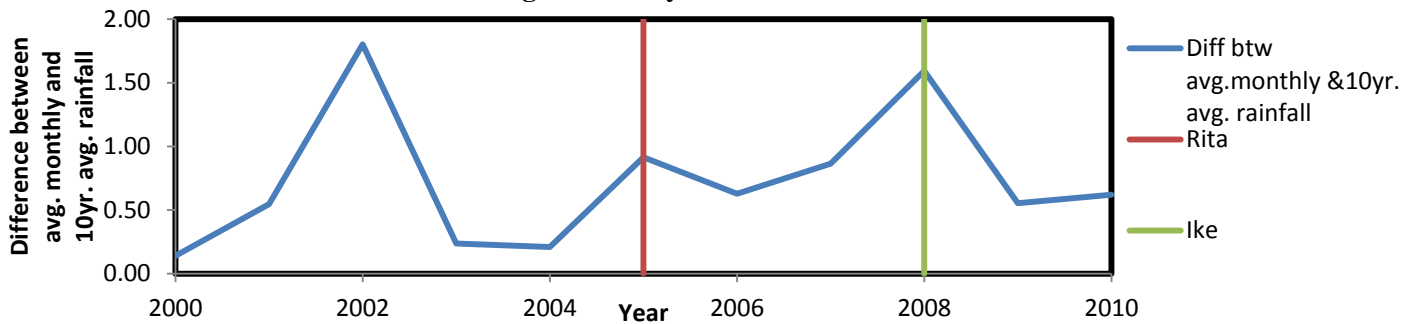


**Fig. 2 Monthly Total Rainfall**



**Fig. 3 Difference between Average Annual and 10 year Average Rainfall**

## 4. Conclusion

The annual rainfall (January through December) was lower in the years 2005 and 2008 when compared to other years. These two years had the major two hurricanes in the Gulf of Mexico. Also notable difference was observed in monthly total rainfall amount and rate of deviation in average annual rainfall from 10 year average rainfall in the years 2005 and 2008. From the above observation, it is evident that occurrences of hurricanes and amount of rainfalls were correlated well.

## 5. Acknowledgement

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