



CIV G260 – Hydrology – Fall 2005 – Homework

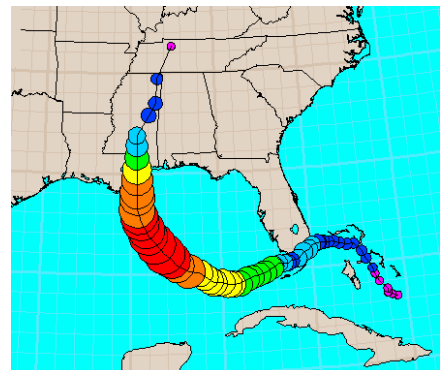
Background. Hurricane Katrina was one of the strongest storms to impact the coast of the United States during the last 100 years. With landfalling winds of 145 mph (a strong category 4 hurricane on the Saffir-Simpson scale) and minimum central pressure the third lowest on record at landfall (920mb), Katrina caused widespread devastation along the central Gulf Coast states of the US. The loss of life and property damage was worsened by breaks in the levees that separate New Orleans from surrounding lakes. At least 80% of New Orleans was under flood water on August 31st, largely as a result of levee failures from Lake Pontchartrain. The combination of strong winds, heavy rainfall and storm surge led to breaks in the earthen levee after the storm passed, leaving some parts of New Orleans under 20 feet of water (<http://www.ncdc.noaa.gov/oa/climate/research/2005/katrina.html>).

In hindsight, it is obvious we were unprepared. But why? I mean we plan for rare events like these. Levees, for example, often get designed for storms with long return periods (e.g. 100+ years). Was it just that Hurricane Katrina represented a storm with an extremely long return period (e.g. 1,000 years)? Let's calculate Katrina's return period.

Data. As summarized by Viessman and Lewis (2003), there are numerous sources for precipitation data. The National Climatic Data Center (NCDC, <http://www.ncdc.noaa.gov/oa/ncdc.html>) New Orleans International Airport station is located 12 miles west of downtown New Orleans, between the Mississippi River and Lake Pontchartrain (Period of record: 1/1/37 – Present, see file www.coe.neu.edu/~ferdi/files/Katrina.txt, inches). Also, data can be obtained from the US Climate Reference Network (CRN, <http://www.ncdc.noaa.gov/oa/climate/uscrn/>), which contains a couple of stations in the area of interest: Mississippi State University in Newton, MS (Period of record: 11/5/02 – Present), University of Louisiana in Lafayette, LA (Period of record: 1/1/03 – Present), see Table 1.

Table 1. Daily Precipitation Totals (inches) at CRN Stations.

Station	8/27	8/28	8/29	8/30	8/31	9/1	9/2	9/3
Newton	0.00	0.00	6.33	0.11	0.01	0.01	0.00	0.00
Lafayette	0.00	0.05	0.47	0.00	0.00	3.04	0.01	0.00



Assignment

1. Calculate the daily P depth for storms of return periods 2, 5, 10, 20, 25, 50, 100, 200 and 500 years at New Orleans.
2. What is the return period of Katrina?
3. Provide a 1-paragraph discussion. What are the methods and assumptions you used (e.g. normal, log-normal distributed data, etc.). How do your results compare to others (e.g. TP-40). Besides the 24-hr precipitation, what other ways are there to quantify a storm. How could you improve on your analysis?