

# Hydrological Frequency Analysis

## Homework 1

1. Fifty-nine years of hourly rainfall data at a rainfall stations are available (BBL.csv).
  - (1) Find the annual maximum series of 1, 2, 3, 6, 12, 24, 48, and 72-hour design durations. You need to record the time instances of the beginning and the end of the annual maximum data.
  - (2) Find the annual exceedance series of the rainfall data for the 24-hour design duration. [The minimum interevent time = 4 hours.]
2. Using the data in Problem 1, conduct the following analyses:
  - (1) Extract the rainfall data of individual storm events and record their beginning and ending hours. [Note: Ignore all hourly rainfalls which are less than 0.5 mm/hr.]
  - (2) Calculate the duration and total depth of each individual storm events.
  - (3) Plot the frequency histogram of the duration and total depth, respectively.
  - (4) Plot the scatter plot of (duration, total depth).
3. Random variable X has a Gumbel density of expected value 120 and standard deviation 36.
  - (1) Use the frequency factor approach to simulate a random sample of size 60 from X.
  - (2) Use R (rgumbel in the evd package) to simulate a random sample of size 60 from X.
  - (3) Plot and compare the empirical CDF of the above two samples. (plot.ecdf)