**Discharge frequency distribution curve**

1. In a separate file gather hourly discharge data for a given station for a given year. Save file.
2. Make sure there are no omissions (missing dates). A few days without data is ok. More than a week, then consult with me. I can suggest some ways to try to automate this process a bit but there might be more efficient ways of doing this.
3. Make sure there are no crazy large numbers or any negative numbers. (Plot)
4. Convert flow rates to cubic meters per second.
5. Use the FREQUENCY function in Excel to determine the frequency distribution of flow rates for that year (you are basically building a histogram). Use the flow rate classes in Column A of the sample database (RG Anasco worksheet) [‘Cubic meters per second’ column] as the Bins Array selection for the FREQUENCY function (the flow rates classes)
6. Stack the frequency distribution column with their accompanying flow rate classes in a separate master worksheet (Excel file) to avoid having to deal with a very large file.
7. Repeat steps 1 – 6 for every year between 1995 and 2015. Every frequency distribution for every year will then consist of a column in the master worksheet. Use appropriate labels for each column.
8. Add the frequencies for individual years across columns. The sum in each cell in the resulting column will equal the number of hourly discharge measurements observed within that particular range of values. Label this column ‘Total frequency’
9. Sum the added frequency values column vertically. This number should be the total number of 15-min periods in 20 years (if I am not mistaken this should be: 20 years x 365 days \* 24 hrs \* 4 fifteen minute periods in one hour = 700,800)
10. In a new column called ‘Proportion’ divide each of the summed frequency values in the ‘Total frequency’ column by the total sum calculated in step 9. Format cells into a percentage. Each cell value represents the average proportion of time that discharge rates remained within that given range for the 20 years of record.
11. In a new column called ‘Total time per year (hours)’ calculate the actual average time in hours discharge remained within that specific range every year. Simply multiply the values in the ‘Proportion’ column by 365 x 24.
12. In a new column called ‘Total time per year (min)’ calculate the actual average time in minutes discharged remained within that specific streamflow rate every year (Total time per year (hours) x 60]
13. Calculate flow in m^3 in a new column called ‘Total flow (m3)’ by simply multiplying the values in ‘Cubic meters per second’ by ‘Total time per year (hours)’ by 60. The sum of this column is the average discharge in m3 per year. Convert this into mm of runoff per year by normalizing by watershed drainage area. This should equal a fraction of the average rainfall for the watershed.
14. Plot ‘Cubic meters per second’ (horizontal axis) against ‘Proportion’ (vertical axis).
15. More on the sediment rating curve and calculating annual sediment flux later.