University of Colorado
Department of Civil, Environmental and Architectural Engineering
Data Summary and Visualization
CVEN 5454

Homework: 1 Date: 01/25/2005

Class webpage: http://civil.colorado.edu/~apipatta/CVEN5454

Choose a streamflow gauge (preferably from South Western or North Western US) that has long (50+ years) record from the USGS website http://waterdata.usgs.gov/nwis/sw
Download the monthly flow data for the chosen location.

An index for ENSO (El - Nino Southern Oscillation) is available on the class webpage. This data is the NINO3 index [average sea surface temperatures over the region of 5N – 5S; 90W-150W]. The data is in a columnar table starting from Jan. 1900 – Dec. 2004, they are monthly average values.

1. Calculate the monthly mean, variance and skew of the streamflow for each month. Plot the mean and variances, so as to show the variation of these throughout the year. Comment on what you find (particularly, in which season is the flow highest).

2. Calculate the robust measures of mean, standard deviation and skew and plot them. Comment on the differences with 1.

3. Boxplot the monthly values and overlay the monthly mean. (All the boxplots should be in one figure).

4. Plot histograms showing the distribution of rainfall in each month and comment on the features you observe.

5. Do a time series plot of the annual (water year, Oct – Sep.) streamflow and comment on what you find.

6. In these regions, it is well known that ENSO impacts the streamflows. Positive values of NINO3, typically, go with increased streamflows in the S. Western US and decreased in the N. Western US, and vice-versa. Test the differences in the seasonal streamflows between the ENSO phases. To do this you have to do the following:
(a) Calculate the seasonal streamflow total.
(b) Calculate the seasonal NINO3 total (corresponding to the season of the streamflow)
(c) Get all the streamflow values corresponding to the NINO3 values below -0.75 (i.e. La Nina phase) – say this is in a vector named X. Likewise, get all the streamflows with NINO3 values above 0.75 (El Nino phase) – say this is in a vector named Y.
(d) Boxplot X and Y. Comment on what you find.