

Geology 472: Project 2

Fall 2007

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See also: [Geology 472/572 Syllabus](#) | [GIS Exercise](#) | [Report Template](#)

Introduction

Precipitation in the Lake Whatcom Watershed varies in magnitude in both space and time. The objective of this project is to examine the seasonal distribution of rainfall, the spatial variability of rainfall, the magnitude frequency of rainfall, and the accuracy of areal estimates in the Lake Whatcom watershed.

Rainfall Data

The data and files required for this exercise are in *J:\Saldata\Geol472\Project2*. The data are in an Excel file called "Project2.xls" in the *Geol 472* folder in *Saldata* in *Data1 on 'Echo 2'(J:)*. Copy this file into your Excel workspace folder (C: temp). The data set represents the daily rainfall recorded at four precipitation gauges in the watershed (Brannian Creek Hatchery, Geneva Gatehouse, Blodel Donovan, and Smith Creek). The data were recorded between October 1, 2005, and September 30, 2006, (the 2006 water year (WY)).

Analyze the Data Using Excel

1. Determine the monthly sum for all the gauges. Create a table displaying these values. Put the yearly total rainfall recorded by each gauge at the bottom of the table. Observe the seasonal pattern.
2. Create a cumulative precipitation plot for the year for each of the 4 gauges. Place all four plots on a single figure. To create a cumulative plot, type `=SUM(B$4:B5)` in a new column. This assumes column B are the daily rain values for a gauge that starts at row 4. The "\$" means that the value in cell B4 is fixed. Now use the drag down option and fill up the rest of the column. The last cell in the column should read the value defined by `=SUM(B$4:B369)`. Observe the seasonal patterns. What do the similarities in shape of the four plots indicate?
3. Use the daily values to determine the amount of rain that the Brannian Creek gauge recorded between October 1, 2005 and April 30, 2006. What percentage of the total rainfall recorded at the Brannian gauge does this represent?
4. Sort the Brannian data from high to low (use the Z→A sort icon). How many days of measurable rain did the gauge record? Determine the amount of days when the measurable rainfall was 0.2 inches or less. What percentage of the total days of measurable rainfall does this represent?
5. Use the measurable rainfall data set that you determined in problem 4 to create a histogram representing the frequency of daily rainfall magnitudes for the Brannian gauge. To create a histogram, go to the "Tools" icon, then Data Analysis and then Histogram. Create your histogram using a bin size of 0.2 inches that goes from 0.0 to 4.0 inches (0.0, 0.2, 0.4, 0.6... 4.0). Examine the histogram and determine what the most frequent magnitude of rainfall is in the watershed. No need for an example calculation here.

Estimate the Areal Average Using ArcGIS

Estimate the yearly weighted areal average precipitation for the watershed using ArcGIS. See [GIS_ex2](#) in the folder in *saldata*.

Deliverables

Use the results above to discuss the seasonal distribution of rainfall, the spatial variability of rainfall, the magnitude frequency of rainfall, and the accuracy of areal estimates in the Lake Whatcom watershed.

Your final report will include:

1. a two-page *written summary* (see *report_template.doc*).
2. a *table* showing the monthly sums and yearly total for the 4 gauges.

3. a figure showing the cumulative rainfall at each gauge for the year (all four on one figure).
4. a figure having a frequency histogram of measurable rainfall at the Brannian gauge.
5. a figure showing the rain gauge locations and Thiessen polygons.
6. a figure of the Iwlaspe grid (with legend).
7. a table that lists the areal average in meters and the total volume of rainfall in cubic meters for the three GIS methods.
8. an Appendix A that contains example calculations for Thiessen Method and your volume estimates.
9. an Appendix B that contains the Project2 and GSI_ex2 handout.

DO NOT print all the precipitation data and attach it to your report.