

# Geog 254

Fall 2017

## Lab 1 – Precipitation and Evapotranspiration

Due: Oct 3, 2017 in class

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Data collection:

### *Precipitation:*

For this lab we will be collecting our own precipitation data. You have received a 2 litre water/pop bottle which you will convert into a precipitation gauge as shown on page 27 in Hendricks. You will install this rain gauge in your backyard (or equivalent) and measure the rain after each rain event and record your results in the following spreadsheet: <http://tinyurl.com/Geog254Rain>

### *Evapotranspiration:*

As with precipitation, we will be making our own lysimeters and storing them at BU. We will then use these data to calculate the daily ET rates for the different soils conditions we established. You will be assigned a 24-hour window in which you must weigh the buckets. Please then enter the masses into the spreadsheet in a timely fashion: <http://tinyurl.com/Geog254ET>

See also the *How to calculate ET using Priestley-Taylor with logger data and field weighing lysimeters* document on the website to help you with the assignment.

### *Climate normals:*

If you are having trouble locating the climate normals for Brandon, see: [http://climate.weather.gc.ca/climate\\_normals/index\\_e.html](http://climate.weather.gc.ca/climate_normals/index_e.html)

If you are having trouble finding historical weather data for Brandon, see: <http://climate.weather.gc.ca/>

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Questions:

### ***Question 1: [25 total marks]***

From Sept 9-Sept 28 (the data collection period), what was the average precipitation for the City of Brandon, as determined using the class derived data?

- Calculate the average total rain depth using the arithmetic mean method (2 marks)
- Calculate the average total rain depth using the Thiessen polygon method (8 marks)
  - Include your “weights” as a separate figure in your report
    - I want to see how Brandon was divided up, and what each person’s weight was
  - Show your work (include the equations and an example calculation)
- Calculate/determine the total rain depth recorded by Environment Canada (EC) for the same time period (3 marks), as well as the BU weather station (2 marks)

Create a properly formatted table showing your results using the class data, as well as EC and BU (2 marks) and discuss any differences between the methods and why those differences may have occurred (8 marks, marked on Letter grade).

***Question 2: [15 total marks]***

How has the temperature/precipitation (snow, rain, precipitation) changed between the three available climate normals (i.e., 1961-1990, 1971-2000, and 1981-2010)? Support your answer with a brief (one or two paragraph (10 marks, marked on letter grade)) answer with a figure and/or table (5 marks) as you see fit.

***Question 3: [27 total marks]***

Calculate the average daily evaporation rate (mm/day) (10 marks) as well as the total evaporation loss (mm) (2 marks) for each of the 5 buckets. Display the daily data comparing all 5 buckets on a time series figure (5 marks) and your total losses in a table (5 marks) and write a brief (one paragraph) summary discussing the results (5 marks, marked on letter grade). Note the containers are 21.5 cm x 21.5 cm.

As a reminder the different buckets were:

- A) Full with sand and fully saturated
- B) Full with sand and not quite fully saturated
- C) Full with sand and moist
- D) Half full with sand and fully saturated
- E) Full with water (no sand)

***Question 4: [15 marks]***

Calculate the alpha value using the data supplied from Leclair (2014) using the Priestley -Taylor method.

- Calculate the actual evaporation and report the results as daily (mm/day) values through time (5 marks)
- Calculate the potential evaporation and report the results as mm/day values through time (5 marks)
- Determine the alpha value by plotting the actual vs. potential for the same time period (5 marks)

Total marks for assignment: 82