

## ESCI 1010 Lab 9 Climate Classification

**Before Lab:** Review pages 417-447 in your Weather and Climate textbook. Pay special attention to the sections entitled “The Wet Tropics”, “Tropical Wet and Dry”, “The Dry Climates”, “Humid Middle-Latitude Climates with Mild Winters”, “Humid Continental Climates with Severe Winters”, and “The Polar Climates”. Also make certain to look at the climate diagrams (climographs) description in Figure 15-5 on page 421.

**Summary:** In this lab you will use monthly average temperature and precipitation data to identify the climate type or climate sub-type of a particular station. You will also use climate data to construct your own climograph.

### LAB EXERCISE

For Questions 1-5, we will use a slightly modified version of Figure 15-2 on page 419 to identify the climate type. This modification is necessary because you need to go in a particular order so that polar and dry climates are handled correctly. Follow the 5 steps outlined below to identify the climate type:

#### Climate Classification Steps:

1. Polar (E):
  - a. Is the average temperature of the warmest month below 10°C?
    - i. Yes => Climate type is **Polar (E)**
    - ii. No => Proceed to 2
2. Dry (B):
  - a. Estimate the evaporation using one of the following formulas (E = evaporation, T = annual mean temperature)
    - i. If more than 70% of the annual precipitation occurs during the summer (April-September in the Northern Hemisphere; October-March in the Southern Hemisphere) half of the year, then  $E = 2T + 28$
    - ii. If more than 70% of the annual precipitation occurs during the winter (October-March in the Northern Hemisphere; April-September in the Southern Hemisphere) half of the year, then  $E = 2T$
    - iii. If no winter or summer concentration of precipitation, then  $E = 2T + 14$
  - b. Is Annual Precipitation less than Evaporation (your calculated value of E above)?
    - i. Yes => Climate type is **Dry (B)**
    - ii. No => Proceed to 3
3. Tropical (A):
  - a. Is the average temperature of the coldest month 18°C or higher?
    - i. Yes => Climate type is **Tropical (A)**
    - ii. No => Proceed to 4
4. Humid Mid-Latitude, Mild Winters (C):
  - a. Is the average temperature of the coldest month less than 18°C and above -3°C?
    - i. Yes => Climate type is **Humid Mid-Latitude, Mild Winters (C)**
    - ii. No => Proceed to 5
5. Humid Mid-Latitude, Severe Winters (D):
  - a. Is the average temperature of the coldest month -3°C or lower?
    - i. Yes => Climate type is **Humid Mid-Latitude, Severe Winters (D)**
    - ii. No => Mistake has been made somewhere go back to 1

1. Classify the climate of this Northern Hemisphere station as A, B, C, D, or E.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temp (°C)	-18	-16	-8	3	11	17	20	19	13	6	-5	-13	3
Precip (cm)	2.6	2.1	2.7	3	5	8.1	6.9	7	5.5	3.7	2.9	2.2	51.7

2. Classify the climate of this Northern Hemisphere station as A, B, C, D, or E.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temp (°C)	26.1	26.7	27.2	27.6	27.8	28	27.4	27.3	27.3	27.2	26.7	26.3	27.1
Precip (cm)	28.5	16.4	15.4	16	13.1	17.7	16.3	20	12.2	18.4	23.6	30.1	228.2

3. Classify the climate of this Southern Hemisphere station as A, B, C, D, or E.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temp (°C)	-32.1	-44.3	-57.8	-64.8	-65.7	-65.2	-66.7	-68	-66.1	-57.2	-42.7	-31.9	-55.2
Precip (cm)	0.1	0.1	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	2.2

4. Classify the climate of this Northern Hemisphere station as A, B, C, D, or E.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temp (°C)	14	14.5	17	19	22	24.5	26.5	27.5	25.5	23	20	16.5	20.9
Precip (cm)	3.3	1.5	1.3	1	0.3	0	0	0	0	0.8	1	2	11.2

5. Classify the climate of this Southern Hemisphere station as A, B, C, D, or E.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temp (°C)	22.2	22.4	21.7	19.8	17.6	16.4	15.8	17.1	17.8	19	20.3	21.2	18.5
Precip (cm)	24	25	16	8	7	6	4	3	7	13	14	19	146

Both stations in Questions 6 and 7 below are from A climates, use only the A climate portion of Figure 15-2 on page 419 to fully classify the two stations as Af, Am, or Aw (note: ignore As).

6. Classify the climate of this Southern Hemisphere station as Af, Am, or Aw.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temp (°C)	28.3	28.1	28.2	28.4	27.1	25.3	19.9	25.9	27.8	29.1	29.3	29	27.6
Precip (cm)	42.7	37.4	32.1	10.1	2.1	0.2	0.2	0.5	1.6	7.1	14	25.2	173.2

7. Classify the climate of this Southern Hemisphere station as Af, Am, or Aw.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temp (°C)	26.9	26.9	27	26.6	26.3	25.9	25.9	26.4	26.8	26.9	27	27.5	26.6
Precip (cm)	27.9	22.7	27.9	31	27.4	19	18.2	16.5	18.9	24.2	26	28.2	287.9

Both stations in Questions 8 and 9 below are from C climates, use only the C climate portion of Figure 15-2 on page 419 to fully classify the two stations as Cw, Cs, or Cf. Also include a third letter a, b, or c.

8. Classify the climate of this Northern Hemisphere station as Cw, Cs, or Cf with third letter a, b, or c.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temp (°C)	10.7	12.2	12.8	13.4	14.2	15.3	15.7	16.4	17.1	16.4	13.7	10.9	14.1
Precip (cm)	11.4	11.3	8.3	3.7	1.8	0.4	0	0.2	0.5	2.8	8	11.6	60

9. Classify the climate of this Northern Hemisphere station as Cw, Cs, or Cf with third letter a, b, or c.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temp (°C)	5.5	5.5	7.8	9.8	13.1	16.1	18.6	18.3	15.7	12	8.3	5.7	11.4
Precip (cm)	5.2	3.8	4.1	4.5	4.7	4.7	4.1	5.2	5	6.9	5.8	5.3	59.3

Both stations in Questions 10 and 11 below are from D climates, use only the D climate portion of Figure 15-2 on page 419 to fully classify the two stations as Dw, Ds, or Df. Also include a third letter a, b, c, or d. However, because d sub-climates have extreme annual variability, you will need to assess d before c (e.g., assess Dfd before Dfc).

10. Classify the climate of this Northern Hemisphere station as Dw, Ds, or Df with third letter a, b, c, or d.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temp (°C)	-45.4	-41.8	-29.5	-12.4	3.8	13.4	16.5	11.5	2.5	-14.5	-34.8	-43.3	-14.5
Precip (cm)	0.6	0.6	0.5	0.5	1.4	2.7	3.4	3.4	1.9	1.1	1.1	0.8	18

11. Classify the climate of this Northern Hemisphere station as Dw, Ds, or Df with third letter a, b, c, or d.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temp (°C)	-4	-1.8	3.8	10.3	16.1	21.7	24.4	23.4	19.2	12.4	5.3	-1.7	10.8
Precip (cm)	5.2	4.9	6.9	9.2	10.5	10.3	10.2	10.1	8.4	8.2	8.7	6.5	99.1

12. The following data below are climate data for Memphis, TN. Use these data to answer 12a-12d.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temp (°C)	5.1	7.5	12.2	17.2	22.1	26.5	28.2	27.8	24	17.9	11.8	6.5	17.2
Precip (cm)	10.1	11.2	13.1	14	13.3	9.2	11.7	7.3	7.9	10.1	13.9	14.6	136.4

a. Memphis is a C climate. Use only the C climate portion of Figure 15-2 on page 419 to fully classify Memphis as Cw, Cs, or Cf with third letter a, b, or c.

b. Create a climograph for Memphis, TN using the blank climograph on the next page.

c. Based on the climograph you created, what two months are the wettest? What two months are the driest?

d. Based on the climograph you created, what two months are the warmest? What two months are the coolest?

### Memphis, TN Climograph

