**Lab Assignment 3. Setting Up A Weather Station and Collecting Weather Information**

**Objective**: Work as a group to deploy a weather station to record observations of wind, moisture, and temperature. Set up the weather station recognizing site and representativeness issues at the Mountain Meteorology Laboratory. Collect data for several days and analyze the changes. Set up and take down the weather station following appropriate safety procedures.

**Timeline: Jan. 30.** Lecture on instrumentation.Random assignment to one of 6 groups consisting of 4-5 people. **Feb. 1**. Set up weather station. **Feb. 6**. Take down the weather station. **Feb. 8.**  Lecture on measuring precipitation. **Feb. 13.** Turn in Lab 3 assignment. Lab 4 prelab assignment due and Lab 4 begins.

**Before the Feb. 1 Lab Session**

1. You must complete the preliminary assignment for Lab 3 by 10 AM Feb. 1.
2. **Read through the entire assignment so that you understand what is being required. Ask questions, if things don’t make sense.**

**1. Lab Session. Feb. 1**

1. **Logistics.** You must get yourself to the Mountain Met field site by 1:30. The prelab assignment has the lat/lon coordinates**. If you don’t know where it is or how to get there, ask**. I expect this lab may run long, so plan on being there until you are done, likely 3:30.
2. **Weather and clothing.** We will set up the stations no matter what the weather is. So, be prepared. Have what you need to stay warm, clean, and safe: gloves and a hat, etc. The equipment and site is dirty, so don’t come wearing really good clothes.
3. **Bring a USB stick to download a sample of data collected on site**
4. **Equipment List. You will check out at the Mountain Met lab, be responsible for, and return the following:**
   1. Laptop
   2. Tripod and stakes
   3. Waterproof enclosure with CR1000 data logger and battery
   4. CS215 temperature and relative humidity sensor inside shield
   5. 05103 R.M. Young Wind monitor
   6. USB to serial cable adapter, gender changers, and serial cable
   7. Keypad display

**You will share the following from the tool box and make sure they are returned:**

* 1. Screwdrivers and wrenches
  2. voltmeters
  3. compasses
  4. Tape measures and levels
  5. Hammer for stakes

1. **Setting up the Station**
   1. There are three types of tripods, so follow directions given on site as to how to set up. Generally, don’t tighten anything until you are sure you have everything where it goes but also realize you need to tighten before raising the mast out of reach:
      1. Anemometer at top of mast with sensor box facing true south not magnetic south
      2. CS215 and shield on north side at 2 m above ground
      3. Enclosure box high enough so that CS215 cable is not stressed
      4. Make sure station is level
   2. Communication check.
      1. Check battery voltage.
      2. Monitor Public table variables with keypad to verify for example proper orientation of wind vane
      3. Attach serial cable from logger to laptop and connect using loggernet to the logger
      4. Monitor public table variables
      5. If everything is ok, then tighten and secure the station
   3. Custom Data Collection
      1. Select custom collection. Verify the following:
         1. Data since last connection
         2. Create new file
         3. Array CSV format
         4. Collecting only Lab3 table and it is going to a file name on the desktop
         5. SELECT Start Collection
         6. View Data File
         7. Do not load FSL
      2. **At this point, you should be able to open on the desk top a file with a time stamp that contains csv data: YYYY,DD,HHMM,REC,MIN BATT, TEMP,RH,WSPD,PEAK WSPD,DIR**
      3. Verify that you are collecting data and save to a stick at least 15-30 minutes worth of data
   4. Siting
      1. Take photos of your station
      2. Identify site characteristics including distance and height of nearby obstructions
   5. Return tools and laptops/cables, etc.
2. Plotting the Data
   1. It is highly recommended that you work on the program to plot the data using the small data sample collected on Feb. 1. Which programming language you use is up to you. I prefer you use matlab, but that is not required.
   2. In all cases you will be plotting time on the x axis and variable on the y axis. x and y axes must be labeled. Time is in MST. The x axis must have labeled both day of month and hour of the day. Tick marks at 3 hour intervals with labels every 6 hours (0,6,12, 18). Y axis should have labeled the name of the variable and units (i.e., Temperature (C)). The range of the y axis should extend from slight above/below the max/min values and tick marks should be at some reasonable value (e.g., 1C for temperature, etc.).
   3. Required plots: 1) battery voltage 2) temperature 3) relative humidity over the entire range 0-100% 4) wind speed (solid line) and peak wind speed (dashed line) 5) wind direction (plotted as points, i.e. open or closed circles, not connected by a continuous line).
3. Final Steps
   1. Create a lab report. This must be typed and submitted into canvas as a **pdf file**. Use the following template.

**Project Report. Laboratory Assignment 1. Due January 30. Must be submitted as a pdf into Canvas.**

**Your Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Group Member Names \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Restate the lab objective in your own words. Do not repeat verbatim.**

*Question 1*. Describe the siting of your station. Attach a photo of your site. Using google earth and the lat/lon from the pre-lab assignment, attach an image that shows the location of your station and the surrounding terrain features.

*Question 2.* Based on your data, how many days could data have been collected without recharging the battery?

*Question 3.* Describe briefly the large-scale weather changes that took place during the data collection period.

*Question 4.* Describe any obvious changes in temperature, relative humidity, and wind observed during the data collection period that recurred each day, i.e., reflect diurnal changes.

*Question 5.* Describe any obvious changes in temperature, relative humidity, and wind observed during the data collection period that did not take place each day, i.e., synoptic or mesocale weather. Indicate at what time or over what time period these changes took place.

*Question 6*. Describe the siting of your station. Attach a photo of your site. What siting factors are likely playing a role in the data collected? How representative would this site be for the campus area as a whole?

*Question 7.* Use MesoWest to compare very briefly the observations collected at your site to those at WBB and NHMU. You may need to focus on a very specific event or look at the changes over a single day. Are there any noticeable differences in the weather reported between the three locations? What factors might be contributing to those differences?

*Question 8.*Attach the 5 required figures.

*Question 9.* Attach the code you used to plot the figures.