

Datalogger assignment

Often, various sorts of datalogging instruments are used to monitor various environmental parameters in environmental physiology research. In the field or greenhouse, you might want to track air, soil or leaf temperature; wind speed, irradiance or humidity during an experiment. You might want to monitor air temperature or humidity in a growth chamber, to check that the chamber is working or determine how widely it varies from your set points.

Objective: learn to use a Campbell Scientific datalogger (model CR10X) to log air and soil temperature, and irradiance.

Specific tasks include:

- making the right physical connections: sensors and battery to the datalogger, datalogger to the computer
- finding and uploading the CR10X program from a computer to a datalogger
- getting the datalogger to recognize the program and record measurements
- downloading the measurements (data file) from the logger to the computer
- reading the data file in Excel, and making some adjustments to the file in Excel
- getting familiar with the programming software to the extent that you can change a couple of parameters, e.g. how often measurements should be made, what datalogger channel a sensor is connected to (we will give you a program that works, and ask you to make minor revisions)

Due date: assignment is due to Augé by **November 16** (students work in teams of 2, but each student turns in their own report).

Assignment steps:

There are two parts to the assignment: part 1 is a how-to session, part 2 is the actual gathering of data to submit to Augé.

1. Schedule an appointment with Heather Toler or Bob Augé for part 1, the how-to session. We'll walk your team through using the CR10x in our lab, PSB 229 (plan on ~1.5 hrs).

For the how-to session, the detailed protocol passed out in class August 31 involves:

- Obtaining CR10X program file, and working with the LoggerNet datalogger software
- Making a thermocouple (as demonstrated in class) (each student makes one).
- Getting the program to work:
 - Connecting data logger to laptop computer,
 - Connecting datalogger to power source,
 - Connecting LiCor PAR sensor to datalogger, in channel indicated in program,
 - Connecting the two thermocouple your team made to datalogger, in channels indicated in program,

- Uploading program to CR10X logger from computer,
- Viewing real-time data, once program is successfully downloaded, to see if the system is working,
- Downloading the data file from the datalogger to the laptop, calling it up in Excel and determining if the values make sense.

2. Schedule an appointment with Heather Toler or Bob Augé to do part 2, the data collection session. We need to know when you plan to start and finish, so we can schedule a system to be free for your use for a day or two, also so we know when to cause an environmental anomaly (to make your data a little more interesting).

Using the Loggernet software, adjust your program to indicate the logging parameters given to your team:

| | Channel # | | |
|--------------------|-----------|-----------|------|
| | Air temp | Soil temp | PPFD |
| Yu-Ting – Nick | 1 | 2 | 4 |
| Drew – Casey | 2 | 3 | 5 |
| Steve – Jay | 3 | 4 | 6 |
| Amy – Christina | 4 | 5 | 1 |
| Rodney – Matt | 5 | 6 | 2 |
| Brian – Ben | 6 | 1 | 3 |
| Denita – Phil | 1 | 2 | 4 |
| Reggie – Christy | 2 | 3 | 5 |
| Adam – Alison | 3 | 4 | 6 |
| Martha – Catherine | 4 | 5 | 1 |
| Nan – Richard | 5 | 6 | 2 |

Attach PPF sensor and thermocouples to channels as listed above.

Carefully bury soil temperature thermocouple in one of the pots provided

Upload the program to the datalogger, wait awhile, then download some newly logged data, to test that the revised program works.

Adjust program to log PPF and thermocouple data every minute during the 24 h period.

Upload your program to the datalogger, use the real-time feature to test that it is logging correctly.

Send Augé an email near the start of your 24 h period.

Log data for 24 h, download the data file, organize it in Excel.

3. Each student prepares the following and submits to Augé by November 16:

CR10X datalogger program file (paper copy), revised as per instructions for your team.

Highlight instruction statements that you revised in yellow highlighter.

Excel file (paper copy) containing 24 h of logged data for air temperature, air relative humidity and irradiance, with data organized clearly (one column for air temp, one for soil temp, a third for PPF, with column headings, time and date clearly given).

Note any surprising deviations or anomalies in yellow highlighter.

Give maximum and minimums for each sensor during the 24 h period.