Monitoring pressure, humidity and temperature with Arduino: Bari-01 set-up

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Set-up

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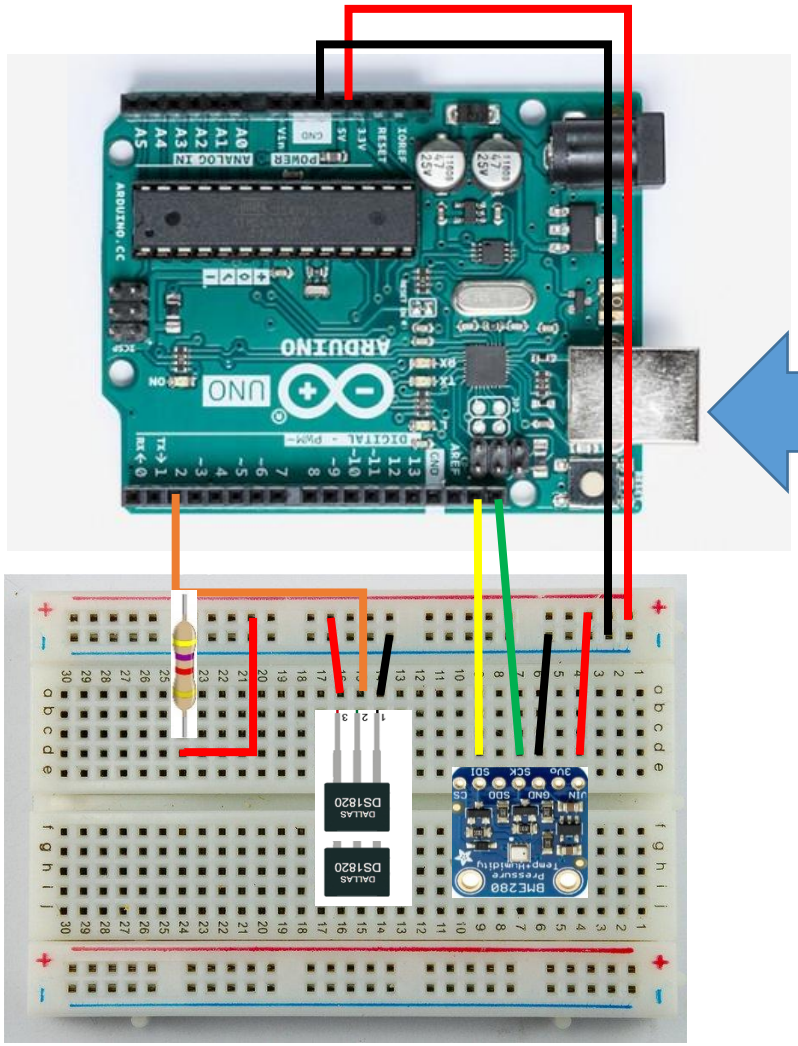
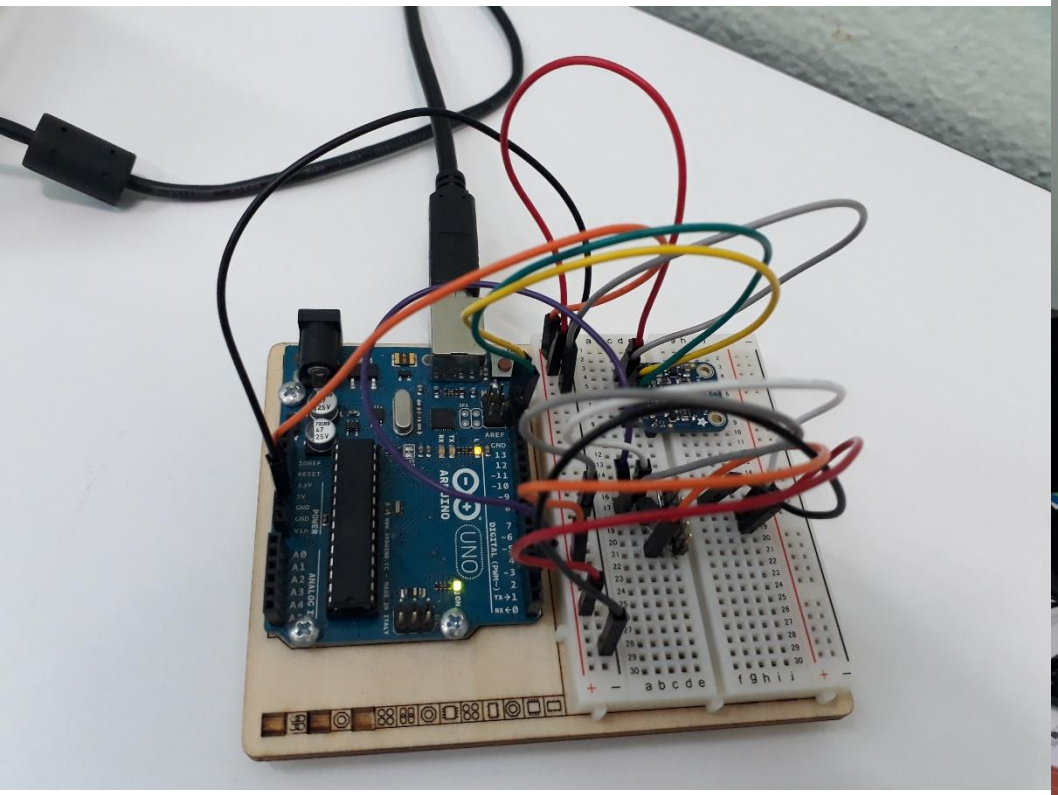
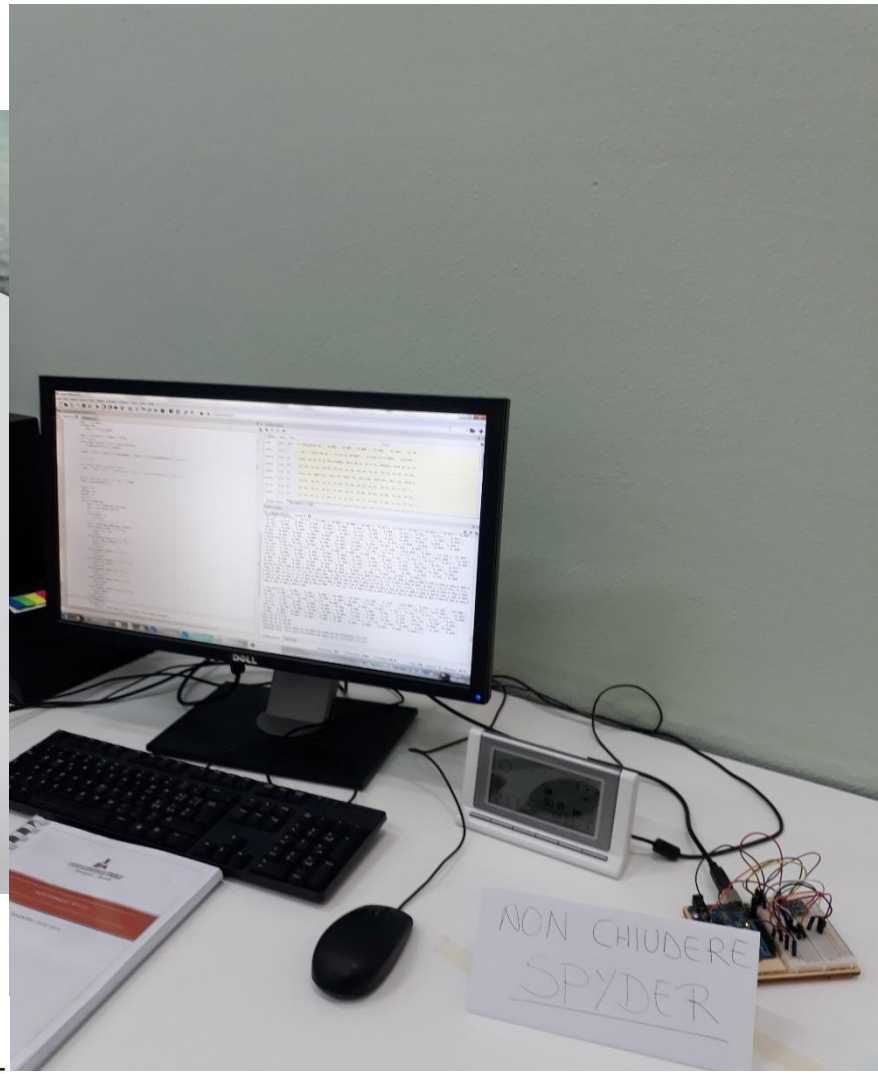


USB

- Arduino UNO
- 2 DS18B20 temperature sensors
  - ±0.5°C Accuracy from -10°C to +85°C
- 1 BME280 Temperature, Humidity and Pressure Sensor
  - Humidity with ±3% accuracy
  - Barometric pressure with ±1 hPa absolute accuracy
  - Temperature with ±1.0°C accuracy

Set-up





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Software and codes – Windows OS

- Arduino
  - https://www.arduino.cc/en/Main/Software
- Anaconda (python, pyserial, …)
  - https://www.anaconda.com/download/
  - pyserial installed with conda run
    - conda install -c anaconda pyserial
- User codes
  - Arduino sketch to read the sensors and to send the data to PC through Serial port (USB)
  - python code to get the data on the serial port and to write data file
  - Plot data with a python code using matplotlib

Timestamp

- Arduino does not have any DateTime functionality
  - Only time from board began running the current program
    - millis() function returns the number of milliseconds
      - This number will overflow (go back to zero), after approximately 50 days
    - micros() function returns the number of microseconds
      - This number will overflow (go back to zero), after approximately 70 minutes
- We use the PC timestamp when reading the data trough the serial port
  - We use the UTC time
  - A time difference between Arduino time with millis() and the PC time is also calculated

Plotting data (2018-10-19/2018-10-24)

- A python code is used to read the data from file and to plot them
- The data taken from Arduino set-up are compared with the ones taken from weather Oregon station
  - Data file C:\vws\data\dbase.csv
    - Data taken every 5 minutes
  - Note that time in dbase.csv is the local one
    - We convert it in UTC
- In the current Arduino set-up we have only the temperature sensors in the lab
  - The comparison with the weather station is only for the Indoor temperature data

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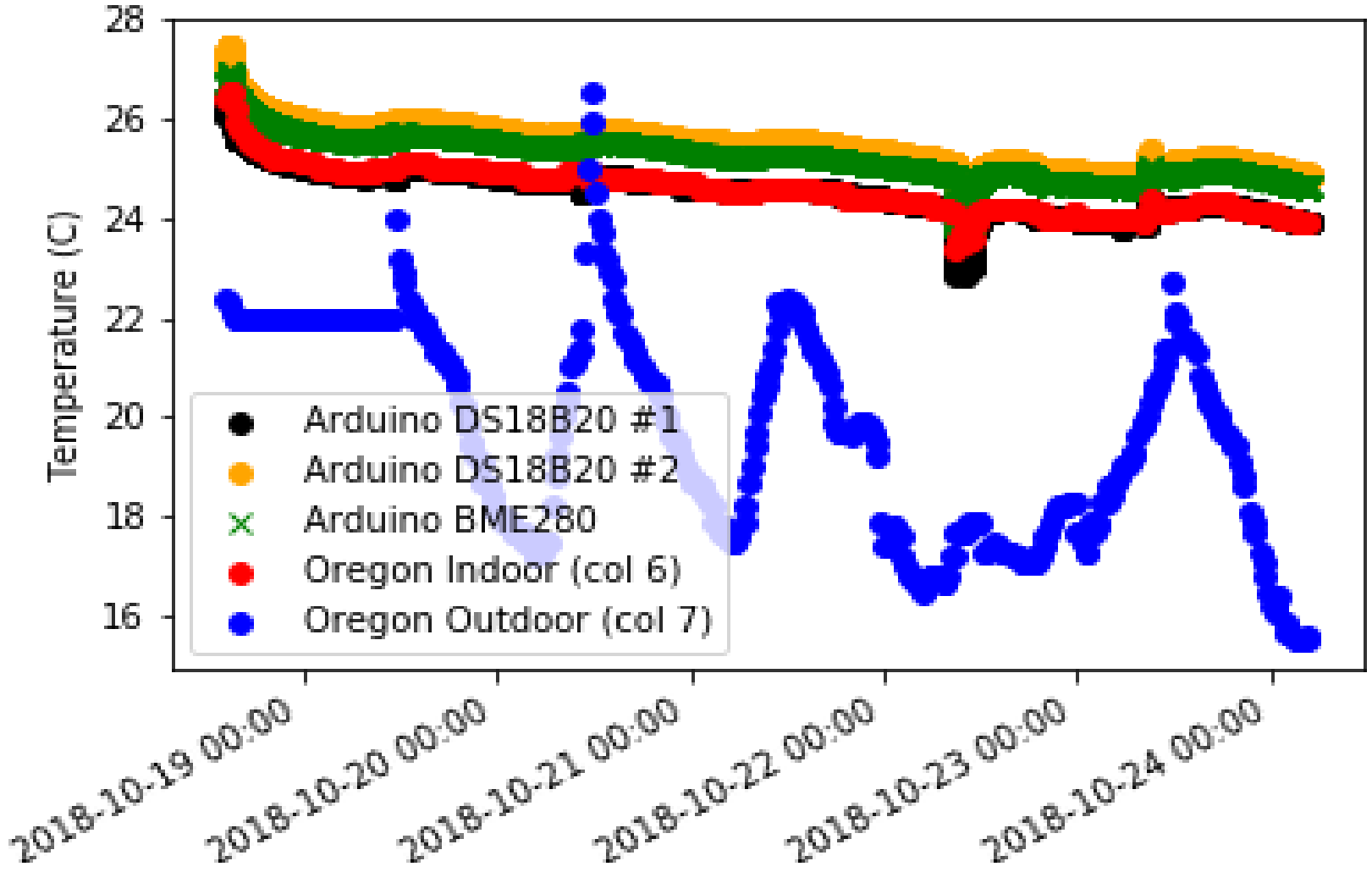
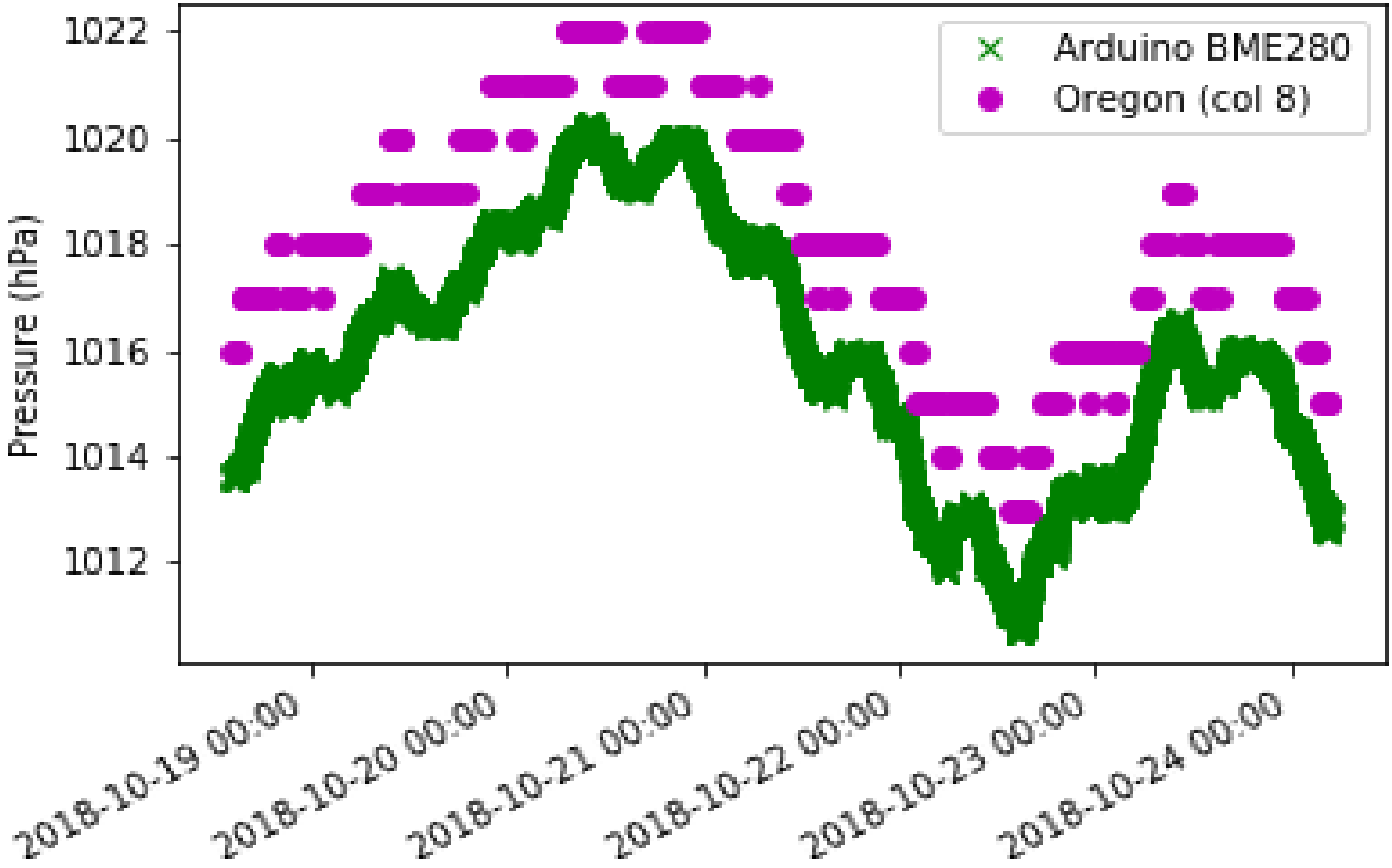
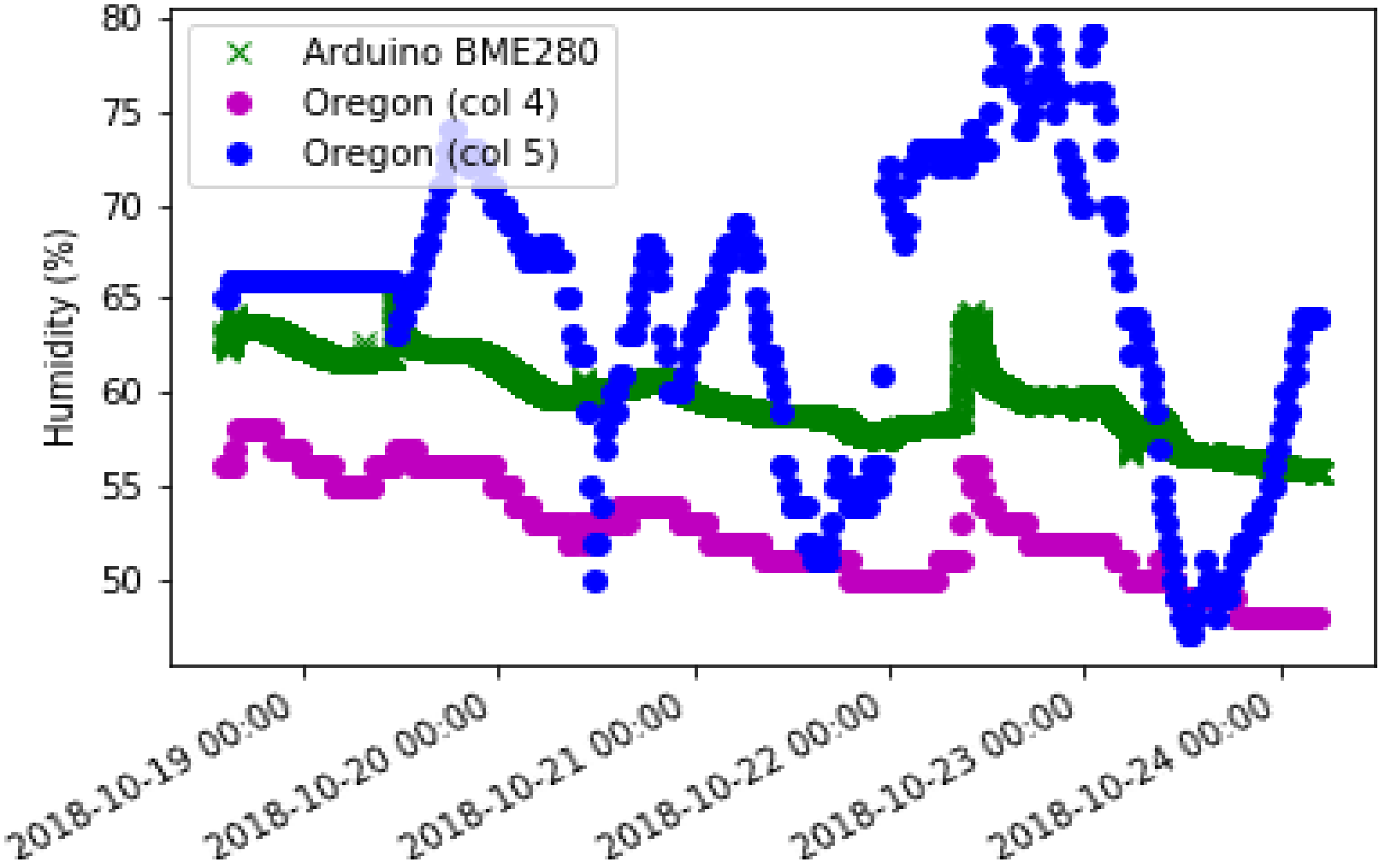
Temperature results



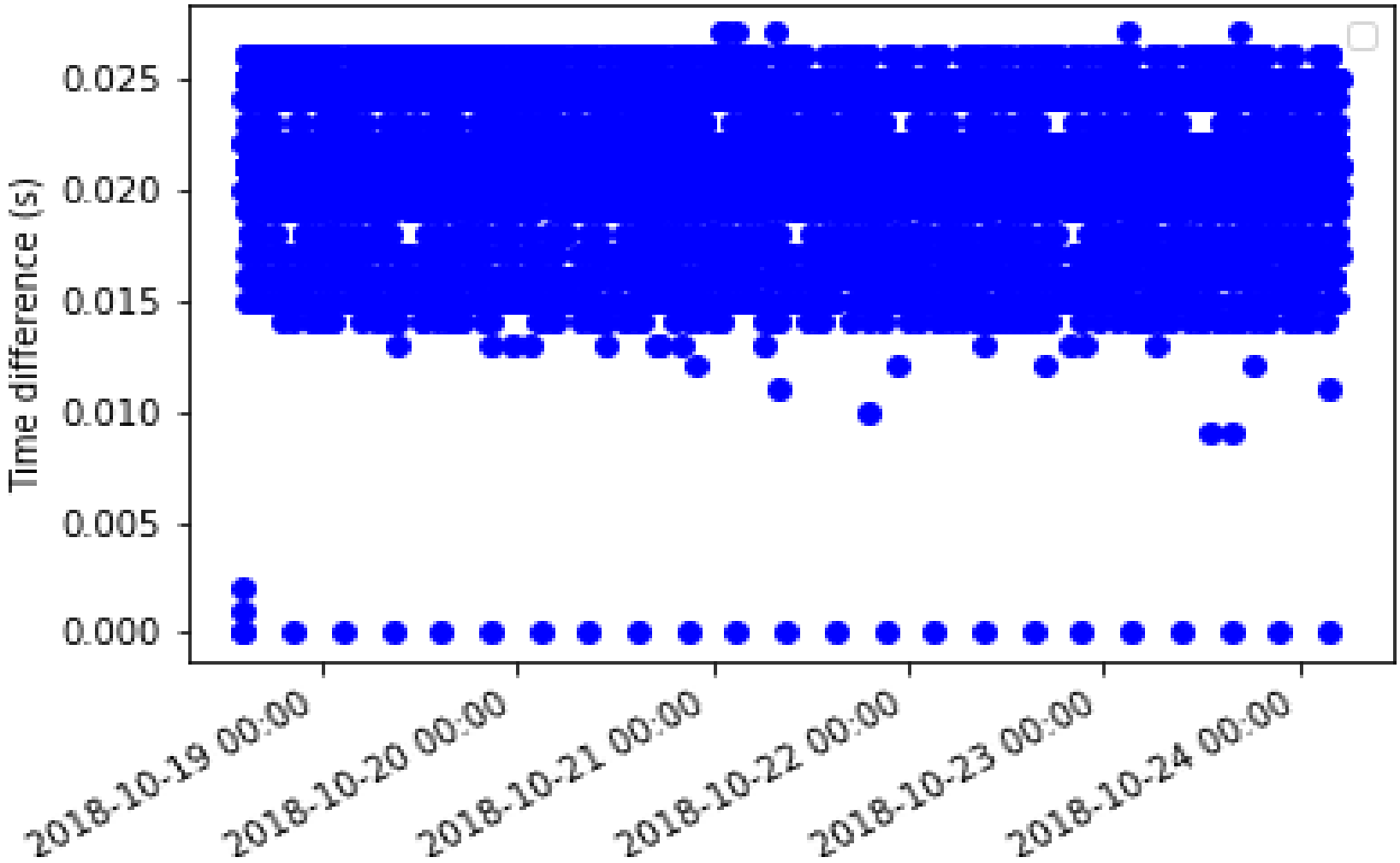
Pressure results



Humidity results



PC-Arduino Time step difference



Conclusions

- Arduino set-up to monitor temperature, pressure and humidity is running in BARI-01
  - The PC timestamp seems to be enough without requiring external hardware
  - On the other hands, a DS1307 Real Time Clock module can be added to the set-up to keep track of Arduino time
- An external temperature sensor will add soon taking care the maximum distance for the DS18B20 sensor
  - An 1Wire to I2C converter can be used
- Other info can be added
  - For example HV values

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