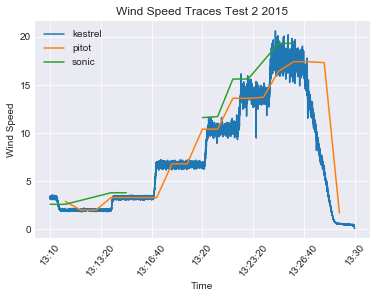
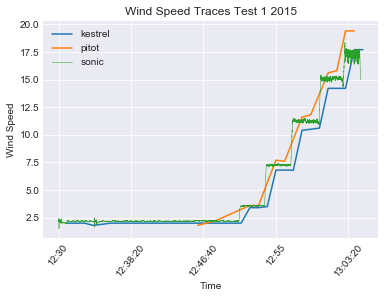
Pearl Ayem – 34404160

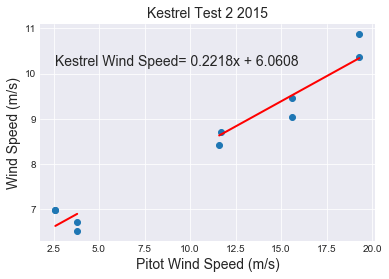
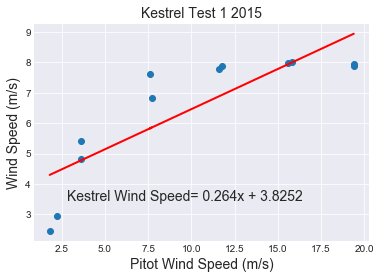
**ATSC 303 LAB 8 – ANEMOMETRY**

Part 1:

1. Wind traces for test 1 and 2 in 2015



1. Calibration with Pitot wind speed
   1. Kestrel:



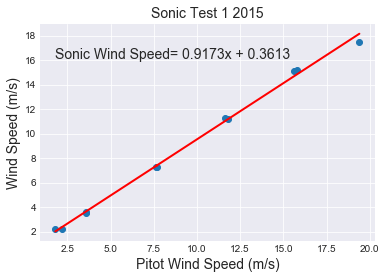
Transfer equation for test 1:

Calibration equation for test 1:

Transfer equation for test 2:

Calibration equation for test 2:

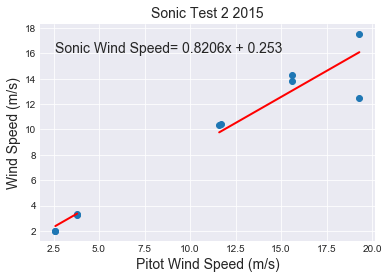
* 1. Sonic Test 1:



Transfer equation for test 1:

Calibration equation for test 1:

* 1. Sonic Test 2:



Transfer equation for test 2:

Calibration equation for test 2:

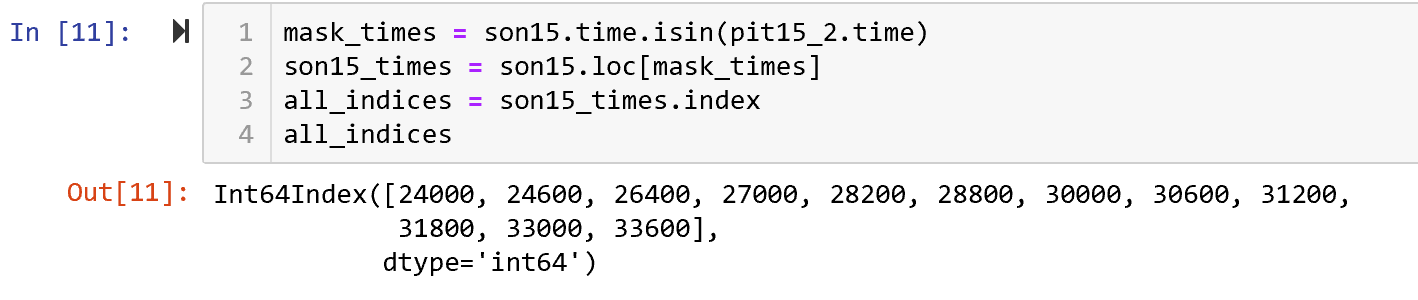
**Averaging all the data:** For each part (a,b, and c) the data was averaged in four steps.

(1) All instantaneous points with the same time as pitot data were selected.

(2) The indices of where these coinciding points occur in the Sonic and Kestrel datasets were stored.

(3) 10 points were picked before and after the indices found in (2)

(4) The 21 datapoints (for each index) were averaged into one datapoint for that time. This gave an average Sonic and Kestrel value of 21 datapoints around the timestamps of the Pitot dataset.

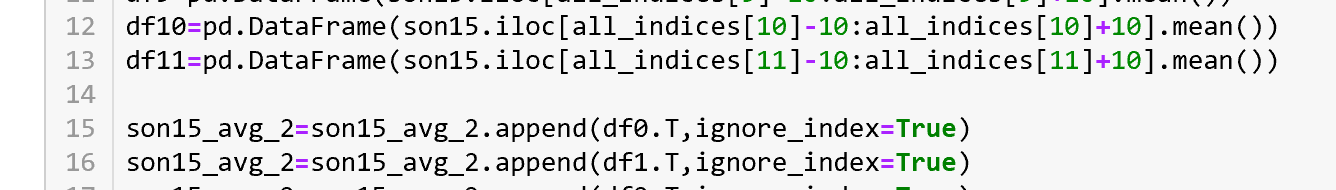


Sample code for steps (1) and (2) with the sonic data.

Line 1 🡪 mask\_times creates a Boolean mask for coinciding timestamps between the Pitot and Sonic data.

Line 2 🡪 Applies the mask to sonic data to filter only those rows with matching timestamps

Line 3 🡪 Finds the indies of the rows with the matching timestamps as they occur in the original dataset



Sample code for steps (3) and (4) with the sonic data (Test 2)

Lines 12 and 13 🡪 Select 10 rows before and after the index selected in (2). Find an average of the 21 rows and convert it into a row in a pandas dataframe.

Lines 15 and 16🡪 Append multiple such rows to a final dataframe that stores the averaged values at matching timestamps as the Pitot dataset.

1. Bias calculations



* 1. Kestrel Average Bias
     1. Test 1: 0.8931 ~0.89
     2. Test 2: 0.2597 ~0.26
  2. Sonic Average Bias Test 1

0.2298 ~ 0.23

* 1. Sonic Average Bias Test 2

0.90998 ~ 0.91

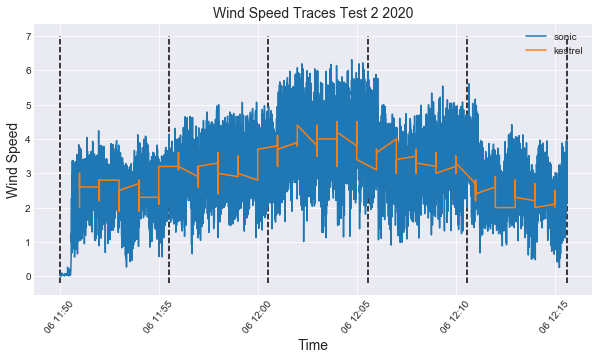
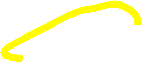
1. \_\_\_\_\_\_
2. \_\_\_\_\_\_
3. Considering an amplification factor of 5 on the barometer measurements, the following equation was used to calculate the windspeed:



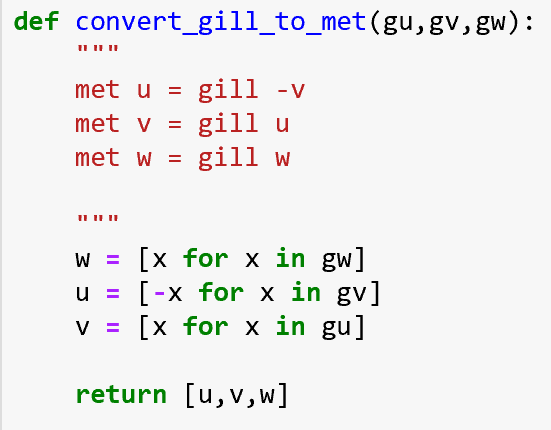
These results differ from those found in the spreadsheet because

Part 2:

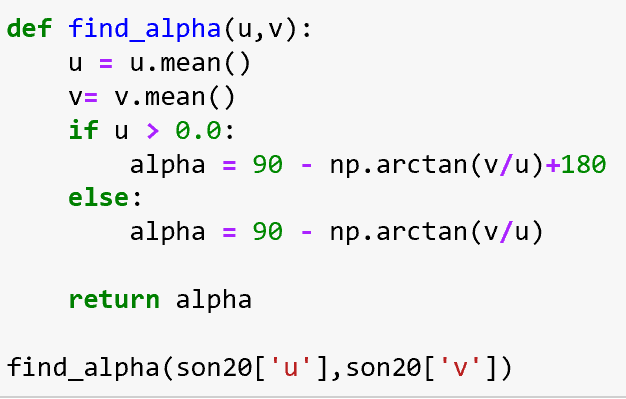
1. Wind Traces for Kestrel and Sonic (Only Test 2 plotted because Test 1 did not have good data)



1. The code used to convert Gill measurements to Meteorological ones is as follows:



The code used to calculate the wind direction is as follows:



The final wind direction using these was 89.80°

Further Questions: